3GPP TSG-RAN Working Group 1 TSGR1#4(99)368
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Agenda Item: 5.10

Source: Siemens AG

Title: Text proposal on modifications for S1.24

Document for: Decision

The following contains mainly editorial modification but also a few small text proposals in order to align S1.24 with other specification. Furthermore, implementation specific details have been deleted in order to produce more ‘spedification-like text.

Explanations for the modifications are given in each section.

6.3 Channel Allocation

It is proposed, to remove this chapter about DCA completely from S1.24, since the text was moved to R2.02 (Radio resource management)

6.4.3 Uplink Control

6.4.3.1 Common Physical Channel

< text taken from FDD S1.14>

The transmitter power of MS shall be calculated bythe following equation:

$$P_{PRACH} = L_{CCPCH} + I_{BTS} + \text{Constant value}$$

where, P_{PRACH} : transmitter power level in dBm,
L_{CCPCH}: measured path loss in dB(transmit power is broadcasted on BCH)
I_{BTS}: interference signal power level at BTS in dBm, which is broadcasted on BCH
Constant value: This value shall be set via Layer 3 message (operator matter).

~~Transmission power of CCPCH is transmitted using BCCH. Mobile station decides transmission power of RACH by open loop power control based on the information and the signal power level of the CCPCH.~~

6.4.3.2 Dedicated Physical Channel

<editorial streamlining>

The initial transmission power is decided in a similar manner as PRACH. After the synchronization between nodeB and UE is established, the UE transits into open-loop or closed-loop transmitter power control (TPC).

UL Open Loop Power Control:
The UE transmit power is set based on the measured path loss in the same way as for the PRACH.
~~The UE measures the received signal power of the CCPCH, which is sent with a reference power. After this, the transmitter power is decided in order to compensate the measured pathloss. This PC scheme provides very good compensation of fast fading, due to the short control cycle and the reciprocity of the TDD channel.~~

UL Closed Loop Power Control:
Closed-loop TPC is based on SIR, and the TPC processing procedures are the same as the FDD mode. During this power control process, the nodeB periodically makes a comparison between the received SIR measurement value and the target SIR value. When the measured value is higher than the target SIR value, TPC bit = „0“. When this is lower than the target SIR value, TPC bit = „1“. At the UE, soft decision on the TPC bits is performed, and when it is judged as „0“, the mobile transmit power shall be reduced by one power

control step, whereas if it is judged as „1“, the mobile transmit power shall be raised by one TPC step. A higher layer outer loop adjusts the target SIR. This scheme allowes quality based power control.

When the TPC bit cannot be received due to out-of-synchronisation, T_{MS} shall be kept at a constant value. When SIR measurement cannot be performed for being out-of-synchronisation, the TPC bit shall always be = „1“ during the period of being out-of-synchronisation.

6.4.4 Downlink Control

<editorial modification snd alignment with FDD>

6.4.4.1 Common Physical Channel

The Primary CCPCH transmit power can vary on a slow basis, i.e. the power is constant over many frames. The transmit power is determined by the network and signalled on the BCHCommon Physical Channels are not power controlled and can therefore be~~. The constant power is~~ used as a reference for measurements.

6.4.4.2 Dedicated Physical Channel

~~In principle, there is no restrictions on t~~The initial transmission power of the downlink Dedicated Physical Channel is set by the network. After the initial transmission, the nodeB transits into SIR-based closed-loop TPC as similar to the FDD mode.
The measurement of received SIR shall be carried out periodically at the UE. When the measured value is higher than the target SIR value, TPC bit = „0“. When this is lower than the target SIR value, TPC bit = „1“. At the BTS, soft decision on the TPC bits is performed, and when it is judged as „0“, the transmission power shall be reduced by one step, whereas if judged as „1“, the transmission power shall be raised by one step. When the TPC bit cannot be received due to out-of-synchronisation, the transmission power value shall be kept at a constant value. When SIR measurement cannot be performed due to out-of-synchronisation, the TPC bit shall always be = „1“ during the period of being out-of-synchronisation.
A higher layer outer loop adjusts the target SIR.

6.5 Timing Advance

< editorial streamlining + correction of misleading description>
The timing of transmissions from the UE is adjusted according to timing advance values received from the serving nodeB~~will be advanced with respect to the timing of signals received from the serving nodeB to compensate for round trip propagation delay~~. The initial value for timing advance ~~(TA)~~ will be determined in the serving nodeB by measurement of the timing of the PRACH~~a specific transmission from the UE [FFS]~~. The required timing advance will be represented as a [7] bit number~~, n~~ [(0-127)] being the multiple of [1.953 µs (= 8 chips)] which is nearest to the required timing advance. The maximum allowed value may be limited by the operator to a value lower than [127], if required or the function may be disabled. A UE cannot operate beyond the range set by the maximum value of the timing advance~~TA~~.
The serving nodeB will continuously measure the timing of a transmission from the UE and send~~signal~~ the necessary timing advance ~~(TA)~~ value~~.~~. On receipt of this~~e TA~~ value the UE will adjust the timing of its transmissions accordingly in steps of [± 8] chips~~.~~
~~As the UE moves within the cell, the serving nodeB will signal whether to advance, retard or maintain UE timing when the error in the timing of the signal received from the UE reaches a significant value. The UE shall respond by adjusting its timing advance by [±8] chips accordingly.~~
When TDD to TDD handover takes place the UE shall transmit in the new cell with timing advance TA adjusted by the relative timing difference Δt between the new and the old cell:

$$TA_{new} = TA_{old} + 2.\Delta t$$

~~shall measure the timing difference (Δ_{TA}) between the new and old cells, double it and add it to the current timing advance value TA_{old} to provide the new timing advance TA_{new}. to be used in the new cell The new value is adopted on completion of handover.~~

~~$TA_{new} = TA_{old} + 2.\Delta_{TA}$~~

6.6 Synchronisation and Cell Search Procedures

6.6.1 Cell Search

<editorial modification>

~~<Editors Note: It is approved according to TDoc TSGR1-(99)075 to have the following basic parameters:~~

- ~~Length 256 chips primary and secondary synchronisation sequences~~
- ~~SF of CCPCH <=16~~
- ~~Usage of t_{off} and t_{gap}~~
- ~~CCPCH pointing is for further study (cf. TDoc R1#2(99) 74)~~

~~>~~

During the initial cell search, the UE searches for a cell. It then determines the midamble, the downlink scrambling code and frame synchronisation of that cell. The initial cell search uses the Physical Synchronisation Channel (PSCH) described in S1.21. The generation of synchronisation codes is described in S1.23

This initial cell search is carried out in three steps:

Step 1: Slot synchronisation

During the first step of the initial cell search procedure the UE uses the primary synchronisation code c_p to acquire slot synchronisation to the strongest cell. Furthermore, frame synchronisation with the uncertainty of 1 out of 2 is obtained in this step. A single matched filter (or any similar device) is used for this purpose, that is matched to the primary synchronisation code ~~c_p~~ which is common to all cells. The procedure is according to the description for the FDD mode in S1.14.

Step 2: Frame synchronisation and code-group identification

The Step 2 is described for the case ~~Case 2) (cf. S1.21, chapter '7.4 The Physical Synchronisation Channel'),~~ where PSCH and CCPCH are in timeslot k and k+8 with k=0…7.

During the second step of the initial cell search procedure, the UE uses the sequence of Secondary Synchronisation Codes ~~$C_{S,i}$~~ to find frame synchronisation and identify one of 32 code groups. Each code group is linked to a specific t_{Offset}, thus to a specific frame timing, and is containing 4 specific scrambling codes. Each scrambling code is associated with a specific short and long basic midamble code.

The detection of secondary synchronisation sequence is done by correlating the received signal at the positions of the Secondary Synchronisation Code with all possible sequences of Secondary Synchronisation Codes, similar to FDD Mode. After four frames a sequence of eight codes is available providing all necessary information described above. Nevertheless, it should be noted that due to the special~~high~~ coding~~ gain~~ already three codes show the sequence unambiguously, i.e. a UE can determine the whole sequence when three codes have been received. ~~The Codes and sequences used for secondary SCH are depicted in table 9 of S1.23, chapter '7 Synchronisation Codes'.~~

Step 3: Scramblingcode identification

~~The Step 3 is described for Case 2) (cf. S1.21, chapter '7.4 The Physical Synchronisation Channel'), where PSCH and CCPCH are in Timeslot k and k+8 with k=0…~~

During the third and last step of the initial cell-search procedure, the UE determines the exact basic midamble code and the accompanying scrambling code used by the found cell. They are identified through correlation over the CCPCH with all four midambles of the code group identified in the second step . Thus the third step is a one out of four decision. ~~Cf. also table 9 in chapter '7.2 Code Allocation' of S1.23, where this step can be seen as deriving the CELL PARAMETER when already knowing the Code Group.~~

This step is taking into account that the CCPCH containing the BCH is transmitted using the first spreading code ($a_{Q=16}^{(h=1)}$ in figure 2 of S1.23 section '6.2 Spreading Codes') and using the first midamble $\mathbf{m}^{(1)}$ (derived from basic midamble code $\mathbf{m}_P$, cf. S1.21 section '7.2.3 Training sequences for spread bursts'). Thus CCPCH code and midamble can be immediately derived when knowing scrambling code and basic midamble code.

6.8 Idling Operation

It is proposed to remove this empty section at least for now, since its contents is or will be described in other specifications.

~~<Editors Note: A text exists in ARIB 3.3.6.3 which is removed now since not applicable. This should be taken into consideration when new text is to be produced.>~~

6.9 Handover

The proposal is to remove the whole section about Handover, since the contents was moved to other documents.

~~<Editors Note: A text exists in ARIB 3.3.6.6 which is removed now since not applicable. This should be taken into consideration when new text is to be produced. It should be also considered that TDD handover measurements are covered in S1.25. Slotted mode for inter-frequency handover is described in S1.22. According to TDoc TSGR1-#2(99)074 the following items have been identified:~~

- ~~Intra-frequency HHO: required~~
- ~~Intra-frequency SHO: FFS~~
- ~~Inter-frequency HHO: required~~

6.10 Discontinuous transmission (DTX) of Radio Frames

<modifications and editorial streamlining after discussion about DTX in adhoc 1 and the decision not to use DTX within a timeslot>

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.

<editor's note: It is for ffs, whether the midamble plus possibly TPC and TFCI bits will be continued to be transmitted in certain resource units. For instance transmission can be done acc. to a multiframe pattern. Additional signalling has to ensure, that the other side is informed about DTX.>

~~Two cases can occur. In the following, both are described for one single resource unit.~~

~~In the first case the data to be transmitted is not enough to fill one resource unit completely. In this case bit stuffing and/or rate matching is used in order to fill the resource unit completely.~~

~~*<editor's note: An alternative to this is to place the data to be transmitted directly before and after the midamble, where it is well protected. The transmit power will be switched off for the rest of the burst, where no data needs to be transmitted. Due to concerns about the switching of power within a burst this alternative is ffs>*~~

~~In the second case no data at all is to be transmitted in a certain resource unit. In this case the complete resource unit is discarded from transmission. Higher layer signalling has to ensure, that both sides are informed about this fact.~~

~~*<editor's note: It is for ffs, whether the midamble plus possibly TPC and TFCI bits will be continued to be transmitted in certain resource units. For instance transmission can be done acc. to a multiframe pattern.>*~~

~~DTX is done for each Coded Composite Transport Channel separately.~~

~~If multiple slots or codes are assigned to one Coded Composite Transport Channel, the two methods described before are combined, depending on if a TFCI is used or not.~~

~~In case of TFCI transmission, after multiplexing of all transport channels, bit stuffing and/or special rate matching is applied only to the last resource unit that contains data, but is only partially filled. This means that bit stuffing and/or special rate matching is not applied to each resource unit separately. I. e. bit stuffing and/or special rate matching is used in one resource unit per frame and Coded Composite Transport Channel, only.~~

~~In case of blind detection, bit stuffing and/or special rate matching is applied to each resource unit individually.~~