

Agenda Item: 5
Source: Siemens
Title: TPC command generation on downlink during RLS initialisation
Document for: Discussion and Decision

In TS 25.433 section 8.2.17.2 the following text, which describes what should be L1 functionality, appears:

"[FDD - The First RLS Indicator IE indicates if the concerning RL shall be considered part of the first RLS established towards this UE. If the First RLS indicator IE is set to "first RLS", the Node B shall use a TPC pattern of n* "01" + "1" in the DL of the concerning RL and all RLs which are part of the same RLS, until UL synchronisation is achieved on the Uu. The parameter n shall be set equal to the value received in the DL TPC pattern 01 count IE in the Cell Setup procedure. The TPC pattern shall continuously be repeated but shall be restarted at the beginning of every frame with CFNmod4=0. For all other RLs, the Node B shall use a TPC pattern of all "1"s in the DL until UL synchronisation is achieved on the Uu.]"

As this has been in a WG3 specification it is part of R99. Following an exchange of LS with WG3 (Tdoc 1336) WG1 may specify this behaviour in 25.214 and allow WG3 to reference the appropriate section.

A suitable CR is enclosed in this Tdoc below.

CHANGE REQUEST		Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.
25.214	CR	135r1
GSM (AA.BB) or 3G (AA.BBB) specification number ?		? CR number as allocated by MCC support team
For submission to: RAN#10 <small>list expected approval meeting # here ?</small>		Current Version: 3.4.0
	for approval <input checked="" type="checkbox"/> for information <input type="checkbox"/>	strategic <input type="checkbox"/> non-strategic <input type="checkbox"/> <small>(for SMG use only)</small>

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <http://ftp.3gpp.org/Information/CR-Formv2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: Siemens **Date:** 22 Nov 2000

Subject: TPC command generation on downlink during RLS initialisation

Work item:

Category:	F Correction <input checked="" type="checkbox"/> A Corresponds to a correction in an earlier release <input type="checkbox"/> B Addition of feature <input type="checkbox"/> C Functional modification of feature <input type="checkbox"/> D Editorial modification <input type="checkbox"/>	Release:	Phase 2 <input type="checkbox"/> Release 96 <input type="checkbox"/> Release 97 <input type="checkbox"/> Release 98 <input type="checkbox"/> Release 99 <input checked="" type="checkbox"/> Release 00 <input type="checkbox"/>
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(only one category shall be marked with an X)

Reason for change: The text in this CR is derived from 25.433 section 8.2.17.2 in which a pattern of TPC bits is sent on the DL for the benefit of UEs which may operate on the values during the time in which SIR estimates cannot be made of UL signals from that UE.

Clauses affected: 4.3.2.2 & 5.1.2.2.1.2 (added to document)

Other specs affected:	Other 3G core specifications <input type="checkbox"/> ? List of CRs: Other GSM core specifications <input type="checkbox"/> ? List of CRs: MS test specifications <input type="checkbox"/> ? List of CRs: BSS test specifications <input type="checkbox"/> ? List of CRs: O&M specifications <input type="checkbox"/> ? List of CRs:	
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Other comments:

<----- double-click here for help and instructions on how to create a CR.

4.3.2.2 No existing radio link

When one or several radio links are to be established and there is no existing radio link for the UE already, a dedicated physical channel is to be set up in uplink and at least one dedicated physical channel is to be set up in downlink. This corresponds to the case when a dedicated physical channel is initially set up on a frequency.

The radio link establishment is as follows:

- a) Node B considers the radio link sets which are to be set up to be in the initial state. UTRAN starts the transmission of downlink DPCCH/DPDCHs. Downlink TPC commands are generated as described in 5.1.2.2.1.2.
- b) The UE establishes downlink chip and frame synchronisation of DPCCH/DPDCHs, using the P-CCPCH timing and timing offset information notified from UTRAN. Frame synchronisation can be confirmed using the frame synchronisation word. Downlink synchronisation status is reported to higher layers every radio frame according to subclause 4.3.1.2.
- c) If no activation time for uplink DPCCH/DPDCH has been signalled to the UE, uplink DPCCH/DPDCH transmission is started when higher layers consider the downlink physical channel established. If an activation time has been given, uplink DPCCH/DPDCH transmission is started at the activation time or later, as soon as higher layers consider the downlink physical channel established. Physical channel establishment and activation time are defined in [5]. The total signalling response delay for the establishment of a new DPCH shall not exceed the requirements given in [8] sub-clause 7.3. If a power control preamble of non-zero length is used for initialisation of the DCH, uplink DPDCH transmission shall not start before the end of the power control preamble. The length of the power control preamble is N_{pcp} slots beginning at the start of uplink DPCCH transmission, where N_{pcp} is a higher layer parameter set by the network (see section 5.1.2.4). The starting time for transmission of DPDCHs shall also satisfy the constraints on adding transport channels to a CCTrCH, as defined in [2] sub-clause 4.2.14.
- d) UTRAN establishes uplink chip and frame synchronisation. Frame synchronisation can be confirmed using the frame synchronisation word. Radio link sets remain in the initial state until N_INSYNC_IND successive in-sync indications are received from layer 1, when Node B shall trigger the RL Restore procedure indicating which radio link set has obtained synchronisation. When RL Restore has been triggered the radio link set shall be considered to be in the in-sync state. The parameter value of N_INSYNC_IND is configurable, see [6]. The RL Restore procedure may be triggered several times, indicating when synchronisation is obtained for different radio link sets.

5.1.2.2 Ordinary transmit power control

5.1.2.2.1 General

The uplink inner-loop power control adjusts the UE transmit power in order to keep the received uplink signal-to-interference ratio (SIR) at a given SIR target, SIR_{target} .

The serving cells (cells in the active set) should estimate signal-to-interference ratio SIR_{est} of the received uplink DPCH. The serving cells should then generate TPC commands and transmit the commands once per slot according to the following rule: if $SIR_{est} > SIR_{target}$ then the TPC command to transmit is "0", while if $SIR_{est} < SIR_{target}$ then the TPC command to transmit is "1".

Upon reception of one or more TPC commands in a slot, the UE shall derive a single TPC command, TPC_{cmd} , for each slot, combining multiple TPC commands if more than one is received in a slot. Two algorithms shall be supported by the UE for deriving a TPC_{cmd} . Which of these two algorithms is used is determined by a UE-specific higher-layer parameter, "PowerControlAlgorithm", and is under the control of the UTRAN. If "PowerControlAlgorithm" indicates "algorithm1", then the layer 1 parameter PCA shall take the value 1 and if "PowerControlAlgorithm" indicates "algorithm2" then PCA shall take the value 2.

If PCA has the value 1, Algorithm 1, described in subclause 5.1.2.2.2, shall be used for processing TPC commands.

If PCA has the value 2, Algorithm 2, described in subclause 5.1.2.2.3, shall be used for processing TPC commands.

The step size $?_{TPC}$ is a layer 1 parameter which is derived from the UE-specific higher-layer parameter "TPC-StepSize" which is under the control of the UTRAN. If "TPC-StepSize" has the value "dB1", then the layer 1 parameter $?_{TPC}$ shall take the value 1 dB and if "TPC-StepSize" has the value "dB2", then $?_{TPC}$ shall take the value 2 dB.

After deriving of the combined TPC command TPC_{cmd} using one of the two supported algorithms, the UE shall adjust the transmit power of the uplink DPCH with a step of $?_{DPCCH}$ (in dB) which is given by:

$$?_{DPCCH} = ?_{TPC} ?_{TPC_{cmd}}$$

5.1.2.2.1.1 Out of synchronisation handling

The UE shall shut its transmitter off when the UE estimates the DPCH quality over the last 200 ms period to be worse than a threshold Q_{out} . This criterion is never fulfilled during the first 200 ms of the dedicated channel's existence. Q_{out} is defined implicitly by the relevant tests in [7].

The UE can turn its transmitter on when the UE estimates the DPCH quality over the last 200 ms period to be better than a threshold Q_{in} . This criterion is always fulfilled during the first 200 ms of the dedicated channel's existence. Q_{in} is defined implicitly by the relevant tests in [7]. When transmission is resumed, the power of the DPCH shall be the same as when the UE transmitter was shut off.

5.1.2.2.1.2 TPC command generation on downlink during RL initialisation

When commanded by higher layers the TPC commands sent on a downlink radio link from Node Bs that have not yet achieved uplink synchronisation shall follow a pattern as follows:

If higher layers indicate by "First RLS indicator" that the radio link is part of the first radio link set sent to the UE

- a value 'n' is obtained from the parameter "DL TPC pattern 01 count" passed by higher layers.

- the TPC pattern shall consist of n instances of "01" plus one instance of "1".

- the TPC pattern continuously repeat but shall be forcibly re-started at the beginning of each frame where $CFN \bmod 4 = 0$.

else

- The TPC pattern shall consist of all "1".

The TPC pattern shall terminate once uplink synchronisation is achieved.