3GPP TSG-R WG1 meeting #9 ***Document R1-99h83***

Dresden, Germany, 30th, November-3rd, December 1999

CHANGE REQUEST

25.214 **CR** **003 rev. 1** Current Version: 3.0.0

For submission to: TSG-R #6 for approval [X] strategic [ ]
for information [ ] non-strategic [ ]

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]

Source: Nokia **Date:** 28/10/99

Subject: Flexible timing of UTRAN response to uplink closed loop Tx diversity feedback commands (rev. 1)

Work item: TS 25.214

Category:

F	Correction	[ ]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[X]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: In closed loop Tx diversity UTRAN calculates new estimates of antenna weights based upon the feedback commands sent by UE. The new weights are applied in the beginning of the pilot field of the downlink DPCCH. Having received the feedback command through D-field of the uplink DPCCH the time left for processing the command at the UTRAN depends on used downlink physical channel structure, uplink DPCCH structure and propagation delay. As there is no definition of maximum cell size it is possible that the processing time at the UTRAN gets too short and the application of the new weights will take place one slot later. Thus, when the new weights are actually applied at UTRAN side depends on the cell radius. Yet, UE should know when UTRAN applies the weights in order to be able to do verification

Clauses affected: 8.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

8.1 Determination of feedback information

The UE uses the Common PIlot CHannel (CPICH) to separately estimate the channels seen from each antenna.

Once every slot, the UE computes the phase adjustment, f, and for mode 2 the amplitude adjustment that should be applied at the UTRAN access point to maximise the UE received power. In non-soft handover case, that can be accomplished by e.g. solving for weight vector, $\underline{w}$, that maximises

$$P=\underline{w}^H H^H H \underline{w} \quad (1)$$

where

$$H=[\underline{h}_1 \ \underline{h}_2 \ldots]$$

and where the column vectors $\underline{h}_i$ and h_2 represent the estimated channel impulse responses for the transmission antennas 1 and 2, of length equal to the length of the channel impulse response. The elements of w correspond to the phase and amplitude adjustments computed by the UE.

During soft handover or SSDT power control, the antenna weight vector, $\underline{w}$ can be, for example, determined so as to maximise the criteria function,

$$P=\underline{w}^H(H_1{}^H H_1 + H_2{}^H H_2 + \text{xxxx})\underline{w} \quad (2)$$

where H_i is an estimated channel impulse response for BS#i. In regular SHO, the set of BS#i corresponds to the active set. With SSDT, the set of BS#i corresponds to the primary base station(s).

The UE feeds back to the UTRAN access point the information on which phase/power settings to use. Feedback Signalling Message (FSM) bits are transmitted in the portion of FBI field of uplink DPCCH slot(s) assigned to FB Mode Transmit Diversity, the FBI D field (see 25.211). Each message is of length $N_W = N_{po}+N_{ph}$ bits and its format is shown in the Figure 1. The transmission order of bits is from MSB to LSB, i.e. MSB is transmitted first. FSM_{po} and FSM_{ph} subfields are used to transmit the power and phase settings, respectively.

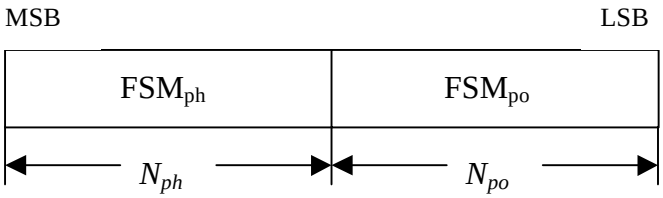

Figure 1 : Format of feedback signalling message. FSM_{po} transmits the power setting and FSM_{ph} the phase setting.

The adjustments are made by the UTRAN Access Point at the beginning of the downlink DPCCH pilot field. The downlink slot in which the adjustment is done is signaled to L1 of UE by higher layers. Two possibilities exist:

1. When feedback command is transmitted in uplink slot *i*, which is transmitted in ~~1024~~ a chip offset limited to 1024 ± 48 chips when compared to received downlink slot *j*, the adjustment is done at the beginning of the pilot field of the downlink slot (*j*+1) mod 15, or

2. When feedback command is transmitted in uplink slot *i*, which is transmitted in ~~1024~~ a chip offset limited to 1024 ± 48 chips when compared to received downlink slot *j*, the adjustment is done at the beginning of the pilot field of the downlink slot (*j*+2) mod 15.