3GPP TSG RAN WG1 ***TSGR1#16(00)1214***
Pusan, Korea, 10th – 13th October, 2000

Agenda item: **R99**

Source: **Panasonic, Philips**

Title: **Correction of uplink power control algorithm 2**

Document for: **Decision**

Introduction

Uplink power control algorithm 2 is specified in section 5.1.2.2.3 in TS 25.214. The period of the power control algorithm is different, depending on whether the UE is in soft handover or not. We think there remains an unclear point.

Discussion

In algorithm 2, the period is different between soft handover and not. It is 3 slots or 5 slots. It is not specified that every cell in the active set should be received, so some cells may be not be assigned RAKE fingers. So there may be a case that the active set is two and UE does not assign any fingers at all for one cell. If we apply a strict definition of soft handover, this case is not soft handover. So the current specification requires changing between a 3 slot or 5 slot period according to the finger assignment.

The finger assignment is very dependent on implementation. The 3 slot period and 5 slot period meet only coincide at slot number 0. So this requires that finger assignment should be done in slot number 0. We think this is against implementation freedom of finger assignment in the UE. So we propose that the UE should always use the 5-slot period, independently from the size of the active set.

Conclusion

We propose the following CR according to the above discussion that UE should always use the 5-slot period in power control Algorithm 2.

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e.g. for 3GPP use the format TP-99xxx
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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	134	Current Version:	3.4.0

GSM (AA.BB) or 3G (AA.BBB) specification number ? *? CR number as allocated by MCC support team*

For submission to:	RAN #10	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ?		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

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

Source: Panasonic, Philips **Date:** 2000-10-06

Subject: Correction of uplink power control algorithm 2

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Uplink power control algorithm 2 remains unclear in relation to thedefinition of soft handover. This CR tries to clarify this.

Clauses affected: 5.1.2.2.3

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:

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5.1.2.2.3 Algorithm 2 for processing TPC commands

NOTE: Algorithm 2 makes it possible to emulate smaller step sizes than the minimum power control step specified in subclause 5.1.2.2.1, or to turn off uplink power control by transmitting an alternating series of TPC commands.

5.1.2.2.3.1 Derivation of TPC_cmd when only one TPC command is received in each slot

When a UE is not in soft handover, only one TPC command will be received in each slot. In this case, the UE shall process received TPC commands on a 5-slot cycle, where the sets of 5 slots shall be aligned to the frame boundaries and there shall be no overlap between each set of 5 slots.

The value of TPC_cmd shall be derived as follows:

- For the first 4 slots of a set, TPC_cmd = 0.
- For the fifth slot of a set, the UE uses hard decisions on each of the 5 received TPC commands as follows:
  - If all 5 hard decisions within a set are 1 then TPC_cmd = 1 in the 5^{th} slot.
  - If all 5 hard decisions within a set are 0 then TPC_cmd = -1 in the 5^{th} slot.
  - Otherwise, TPC_cmd = 0 in the 5^{th} slot.

5.1.2.2.3.2 Combining of TPC commands from radio links of the same radio link set

When a UE is in soft handover, multiple TPC commands may be received in each slot from different cells in the active set. In some cases, the UE has the knowledge that some of the transmitted TPC commands in a slot are the same. This is the case when the radio links are in the same radio link set. For these cases, the TPC commands from radio links of the same radio link set shall be combined into one TPC command, to be processed and further combined with any other TPC commands as described in subclause 5.1.2.2.3.3.

5.1.2.2.3.3 Combining of TPC commands from radio links of different radio link sets

This subclause describes the general scheme for combination of the TPC commands from radio links of different radio link sets.

The UE shall make a hard decision on the value of each TPC_i, where i = 1, 2, …, N and N is the number of TPC commands from radio links of different radio link sets, that may be the result of a first phase of combination according to subclause 5.1.2.2.3.2.

The UE shall follow this procedure for 5~~3~~ consecutive slots, resulting in N hard decisions for each of the 5~~3~~ slots.

The sets of 5~~3~~ slots shall be aligned to the frame boundaries and there shall be no overlap between each set of 5~~3~~ slots.

The value of TPC_cmd is zero for the first 4~~2~~ slots. After 5~~3~~ slots have elapsed, the UE shall determine the value of TPC_cmd for the ~~third~~ fifth slot in the following way:

The UE first determines one temporary TPC command, TPC_temp_i, for each of the N sets of 5~~3~~ TPC commands as follows:

- If all 5~~3~~ hard decisions within a set are "1", $TPC\_temp_i = 1$.
- If all 5~~3~~ hard decisions within a set are "0", $TPC\_temp_i = -1$.
- Otherwise, $TPC\_temp_i = 0$.

Finally, the UE derives a combined TPC command for the ~~third~~ fifth slot, TPC_cmd, as a function ? of all the N temporary power control commands TPC_temp_i:

TPC_cmd(5~~3~~-slot) = ? (TPC_temp_1, TPC_temp_2, …, TPC_temp_N), where TPC_cmd(5~~3~~-slot) can take the values 1, 0 or –1, and ? is given by the following definition:

- TPC_cmd is set to 1 if $\frac{1}{N}\sum_{i=1}^{N} TPC\_temp_i > 0.5$.

- TPC_cmd is set to -1 if $\frac{1}{N}\sum_{i=1}^{N} TPC\_temp_i < -0.5$.

Otherwise, TPC_cmd is set to 0.