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Title: Power Control of TFCI field for DSCH in Soft Handover

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1. Introduction

DSCH is always associated with DCH, and it carries packet type data effectively. There are problems when DCH associated with DSCH is in soft handover region. One is the DSCH power control in soft handover region so that its improvement was discussed in [1][2]. Another problem is the power of control of TFCI bits for DSCH in soft handover. To improve the TFCI reliability, the power control of TFCI for DSCH in soft handover is considered in this proposal.

2. TFCI bits for DSCH in soft handover

When DSCH is transmitted in a specific Node B, TFCI may indicate the information of DSCH and DCH. If TFCI indicates UE to decode data on the DSCH, then TFCI bits for DSCH are transmitted either in logical split mode or in hard split mode. In hard split mode, TFCI is split into two fields for DCH and DSCH. It is the advantage of hard split that no signalling may be needed for the transmission of TFCI for DSCH(TFCI2) from other cell. And it is useful when Node Bs are even controlled by different RNC. When a new radio link is established, high layer decides transmission of TFCI2 on the new radio link. Since TFCI2 are not transmitted from every cell in the active set, the received power of TFCI1 and TFCI2 may be different. Thus, the power control of the DCH cannot guarantee the reliability of the TFCI2 even though it is essential to detect TFCI for the reliable detection of DSCH.

Two proposals of the power control of DSCH were discussed in [3]. One is fast inner loop power control with SSDT. The other is to generate TPC separately for DSCH, which is SIR based DSCH power control. Using similar approach, we can apply the power control of DSCH to TFCI field. Now we consider two methods to improve the reliability of TFCI2. The power of the TFCI in the cell, which is transmitting DSCH, should be controlled.

- ✍✍ To allocate higher power offset to TFCI field when the UE is in soft handover.
- ✍✍ To apply the power control for DSCH to TFCI field (To feedback separately).

The first approach requires small change of specification that the power offset for TFCI is determined by high layer signalling. It is general rule to adjust the power offset for TFCI under a situation. TFCI power offset is determined whether the cell transmitting DSCH is primary or non primary cell. It is also determined by the UE location (i.e. in soft handover region or in non-soft handover region).

- ✍✍ PO3
- ✍✍ *primary_TFCI_pow*
- ✍✍ *non-primary_TFCI_pow*

PO3 is power offset for TFCI. The *primary_TFCI_pow is* power offset when the cell is primary *and non-primary_TFCI_pow* represents power offset when the cell is non-primary. This approach is required of high layer signalling for the power offset of TFCI.

The second method is to generate feedback separately such as TPC for DSCH. In this approach, the power of TFCI can be controlled by TPC for DSCH.

We propose that the power control of DSCH can improve the reliability of TFCI. The adjustment of power offset can be reasonable method to reduce the change of the current specification.

3. Conclusion

In case of hard split mode, the received power of TFCI1 is not same to TFCI2. That is because TFCI2 from every cell is not transmitted when UE is in soft handover region. Hence the power control of DCH does not guarantee the reliability of the TFCI2. We propose that the power control for DSCH can be applied to TFCI, and it should be included in [3].

4. Reference

[1] TSG WG1#15 R1-00-1025, DSCH power control improvement in soft handover, Nokia.

[2] TSG WG1#15 R1-00-1119, Impoved PDSCH power control, Qualcomm.

[3] TSG WG1#16 R1-00-1307, TR 25.841.