
| | |
|---------------------|--|
| Agenda Item | : AH24 |
| Source | : Samsung Electronics Co., Ltd. |
| Title | : Power Control for Fast Cell Selection in HSDPA |
| Document for | : Discussion & Approval |

1. Introduction

Fast cell selection (FCS) has been proposed for HSDPA [1]. The paper discusses the impact of FCS on power control and presents possible power control strategies for the dedicated channels associated with HSDPA.

2. Discussion on Power Control for Fast Cell Selection

2.1 Uplink Power Control

If fast inter-Node B cell selection is to be supported, to ensure synchronisation of the scheduling and fast Hybrid ARQ states of the two cells, layer 1 signalling over-the-air seems to be the only viable candidate [2]. However, for FCS to select an arbitrary Node B in the active set, it is required that an arbitrary Node B in the active set can reliably detect this uplink layer 1 signalling. It was commented in [2] that this conflicts with normal uplink power control strategy that ensures that uplink transmission can be reliably detected by at least one Node B in the active set not by an arbitrary Node B in the active set. To support HSDPA, it is also required that UE can reliably transmit some data associated with HSDPA, such as uplink ACK/NACK related to fast HARQ and feedback information for MCS level selection, to the best cell. However, the normal uplink power control strategy also does not meet this requirement.

Note that at least best cell among the cells in active set should reliably detect the uplink transmission from UE, and that the uplink connection to current best cell as well as transmission of best cell indication and transmission-state information to new best cell should be maintained reliably during the period for change of best cell. Taking into account this, possible solutions can be as follows:

- Uplink power control is performed according to the power control request from the current best cell.
- When a new best cell is selected by UE, uplink transmit power may be increased if the current or new best cell requires to increase UE transmit power.

The solution can guarantee that uplink transmission from UE is detected reliably by the best cell when best cell is changed as well as during best cell remains not changed. However, it remains to study the impact on the overall system performance.

2.2 Downlink Power Control

In downlink, to facilitate scheduling and fast HARQ at Node B, the control information associated with HS-DSCH should be transmitted only from the best cell to UE. Thus, it is required that UE can reliably receive the control information carried on the dedicated channel associated with HS-DSCH, such as dedicated pointer channel (DPTRCH) [3], transmitted from the best cell. However, this requirement is not fulfilled by the normal downlink power control strategy that ensures that downlink transmission can be reliably received using radio link combination from all cells in active set not from the best cell. Furthermore, if new best cell is selected, it is also required that transmit power of the new best cell should be adjusted so that UE can detect the downlink transmission from the new best cell reliably. To meet these requirements, possible solutions can be as follows:

- Downlink power control is performed to compensate the downlink channel condition of the best cell
- When a new best cell is selected by UE, downlink transmit power may be increased if the downlink channel condition of any of the current and new best cell is not good.

The solution can guarantee that downlink transmission from the best cell is detected reliably by UE when best cell is changed as well as during best cell remains not changed. However, it remains to study the impact on the overall system performance.

3. Conclusion

In this paper, we discuss the impact of FCS on power control and propose possible power control strategies. The proposed power control strategies aim to guarantee that the uplink transmission from UE can be reliably detected by the best cell and that the downlink transmission from the best cell can be reliably detected by UE. It is proposed that the text proposal attached is included as the part of the RAN WG1 technical report TR25.848 "Physical Layer Aspects of UTRA High Speed Downlink Packet Access".

References

- [1] "Feasibility study of Advanced techniques for High Speed Downlink Packet Access", TSGR1#12(00)0556, Motorola.
- [2] "Physical layer aspects of Fast Cell Selection for HSDPA", TSGR1#17(00)1424, Ericsson.
- [3] "Control Channel Structure for High Speed DSCH (HS-DSCH)", TSGR1#16(00)1242, Motorola.

Contact Points



Contact_Points.doc
c

Text Proposal to TR 25.848

6.4.x Discussion on Power Control for Fast Cell Selection

Fast cell selection (FCS) has been proposed for HSDPA [1]. This section discusses the impact of FCS on power control and presents possible power control strategies for the dedicated channels associated with HSDPA.

6.4.x.1 Uplink Power Control

If fast inter-Node B cell selection is to be supported, to ensure synchronisation of the scheduling and fast Hybrid ARQ states of the two cells, layer 1 signalling over-the-air seems to be the only viable candidate [2]. However, for FCS to select an arbitrary Node B in the active set, it is required that an arbitrary Node B in the active set can reliably detect this uplink layer 1 signalling. It was commented in [2] that this conflicts with normal uplink power control strategy that ensures that uplink transmission can be reliably detected by at least one Node B in the active set not by an arbitrary Node B in the active set. To support HSDPA, it is also required that UE can reliably transmit some data associated with HSDPA, such as uplink ACK/NACK related to fast HARQ and feedback information for MCS level selection, to the best cell. However, the normal uplink power control strategy also does not meet this requirement.

Note that at least best cell among the cells in active set should reliably detect the uplink transmission from UE, and that the uplink connection to current best cell as well as transmission of best cell indication and transmission-state information to new best cell should be maintained reliably during the period for change of best cell. Taking into account this, possible solutions can be as follows:

- Uplink power control is performed according to the power control request from the current best cell.
- When a new best cell is selected by UE, uplink transmit power may be increased if the current or new best cell requires to increase UE transmit power.

The solution can guarantee that uplink transmission from UE is detected reliably by the best cell when best cell is changed as well as during best cell remains not changed. However, it remains to study the impact on the overall system performance.

6.4.x.2 Downlink Power Control

In downlink, to facilitate scheduling and fast HARQ at Node B, the control information associated with HS-DSCH should be transmitted only from the best cell to UE. Thus, it is required that UE can reliably receive the control information carried on the dedicated channel associated with HS-DSCH, such as dedicated pointer channel (DPTRCH) [3], transmitted from the best cell. However, this requirement is not fulfilled by the normal downlink power control strategy that ensures that downlink transmission can be reliably received using radio link combination from all cells in active set not from the best cell. Furthermore, if new best cell is selected, it is

also required that transmit power of the new best cell should be adjusted so that UE can detect the downlink transmission from the new best cell reliably. To meet these requirements, possible solutions can be as follows:

- Downlink power control is performed to compensate the downlink channel condition of the best cell
- When a new best cell is selected by UE, downlink transmit power may be increased if the downlink channel condition of any of the current and new best cell is not good.

The solution can guarantee that downlink transmission from the best cell is detected reliably by UE when best cell is changed as well as during best cell remains not changed. However, it remains to study the impact on the overall system performance.

References

- [1] “Feasibility study of Advanced techniques for High Speed Downlink Packet Access”, TSGR1#12(00)0556, Motorola.
- [2] “Physical layer aspects of Fast Cell Selection for HSDPA”, TSGR1#17(00)1424, Ericsson.
- [3] “Control Channel Structure for High Speed DSCH (HS-DSCH)”, TSGR1#16(00)1242, Motorola.