TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3) **_TSGR2#4(99)424_**
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Agenda Item: 7.2

Source: Telecom Modus

Title: Description and Application of SSDT

Document for: Decision

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1 Introduction

Site Selection Diversity Transmit Power Control (SSDT) is a form of power control for the downlink that can be applied while a UE is in soft handover (SHO). This document explains how SSDT works, and provides some examples when SSDT should be used. Simulations have been performed comparing SHO with SSDT to normal SHO.

2 Description of SSDT

In SHO, a UE has DL connections to more than one cell. Thus, one UE contributes to the DL interference in several cells. SSDT is a power control method that reduces the DL interference generated while the UE is in SHO. The principle of SSDT is that the best cell of the active set is dynamically chosen as the only transmitting site, and the other cells involved turn down off their DPDCHs. The DPCCH is transmitted as normally (Fig. 1).

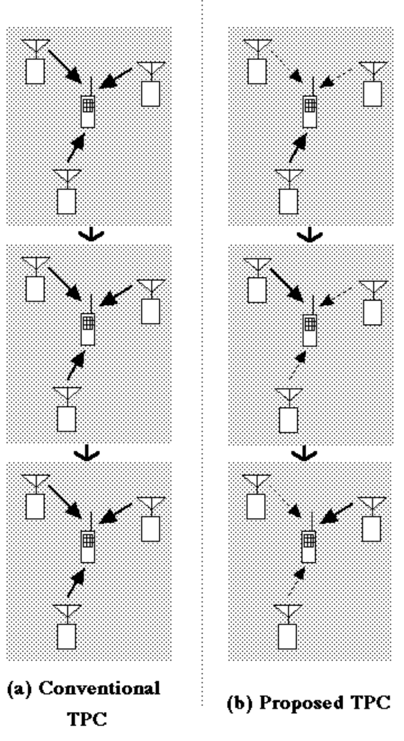

Figure 1: Principle of SSDT in compaison to conventional SHO

Each cell is given a temporary identification number. The UE measures the quality of the received signals, and chooses the best one as its 'primary' cell. The temporary id of this primary cell (the 'primary id') is transmitted on the UL DPCCH to all Node Bs of the active set. A cell that has been selected as primary station transmits its dedicated channels with the power necessary to reach the desired SIR target, whereas all other cells switch off their downlink DPDCH transmission. The 'primary id' is updated by the UE every frame, allowing to re-select the best cell every 10ms. In order for the UE to continue performing measurements and to maintain synchronization, the 'secondary' cells continue to transmit pilot information on the DPCCH.
The prerequisite for using SSDT during an RRC connection, or during a part of an RRC connection is that all Node B ivolved support SSDT. SSDT is switched on or off using L3 procedures. The control information itself (temporary id) terminates in the L1 of Node B and UE respectively.

3 Performance evaluation

Computer simulations were carried out to investigate the behaviour of

SSDT under ETSI&ITU-R guidelines for IMT-2000 RTT evaluation. The results are compared to a conventional power control method, where the transmit power of all BS involved is conrolled so that the correct target SIR value is reached.

Fig.2 shows capacity versus Doppler frequency for SSDT and conventional TPC (normal SHO). The simulations show that SSDT is superior to normal SHO at low speed, and that increases capacity by reducing overall interference. The capacity gains are approximately 40% without UE's diversity and 50% with UE's diversity at walking speed. At high mobile speed, the advantage of SSDT gradually diminishes. The performance degredation of SSDT at higher speed is caused by the limited update frequency of the primary cell id.

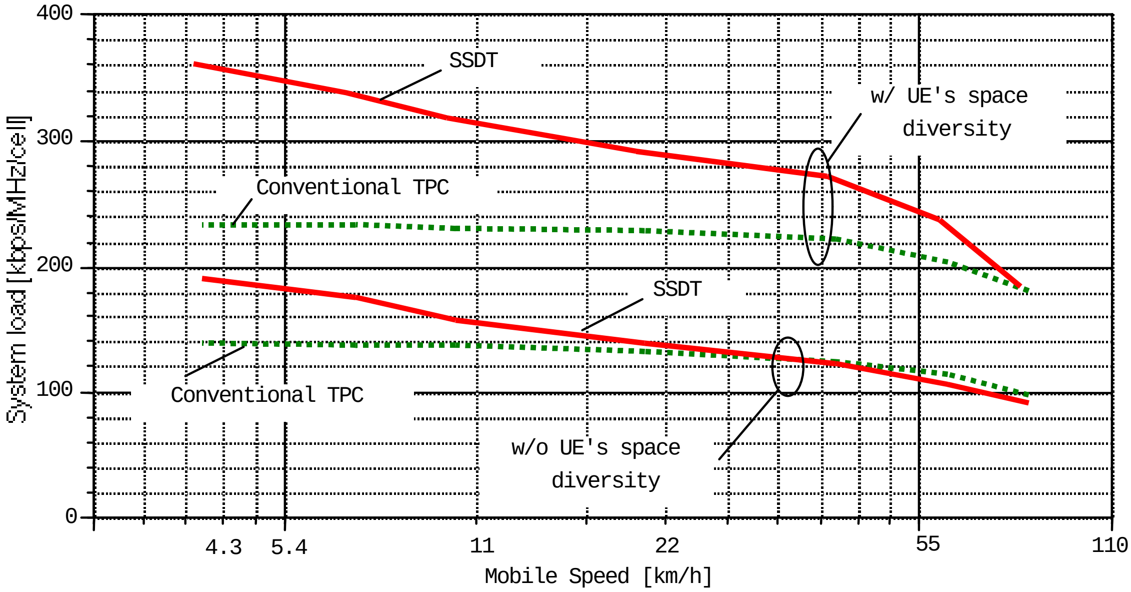

Figure 2: system load versus Doppler frequency. 6 independent path Rayleigh fading model with Vehicular-A profile. 6 finger RAKE reception. Every frame site seleciton (10ms).

4 Proposal

We propose to include the text and diagrams above in 25.922 (Radio Resource Management Strategies)