Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	Adaptive Power Control for Downlink
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Re:	Call for Contributions (80216m-08_024.pdf) on Project 802.16m System Description Document (SDD), Specific Topic: Power Control
Abstract	Adaptive power control for downlink on user level for interference mitigation.
Purpose	To be considered and discussed by TGm and adopted as text for the SDD.
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Adaptive Power Control for Downlink

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References

[1] 802.16m System Requirements Document IEEE 802.16m-08/002r4

Abbreviations

BS   base station
DL   downlink
MS   mobile station
UL   uplink

Introduction

According to [1] §6.4.2, interference mitigation schemes and flexible frequency re-use schemes shall be supported.

Here downlink power control is proposed to improve signal to interference distribution for systems operating in multi-cellular deployments with frequency reuse 1 or fractional frequency reuse (mixed reuse 1/reuse 3 operation).

Downlink Power Control

For interference minimization, it is proposed to reduce the transmit power level of individual downlink bursts in the frame. The power control is applied for both, data and pilot subcarriers to reduce the interference impact on pilots too.

Figure 1 shows the interference situation at MS_1. MS_1 receives data from BS_1 and receives interference from BS_2. The interference can be reduced if transmit power for MS_2, which is located near BS_2, can be reduced. This mechanism can be introduced in systems with beamforming and without beamforming.
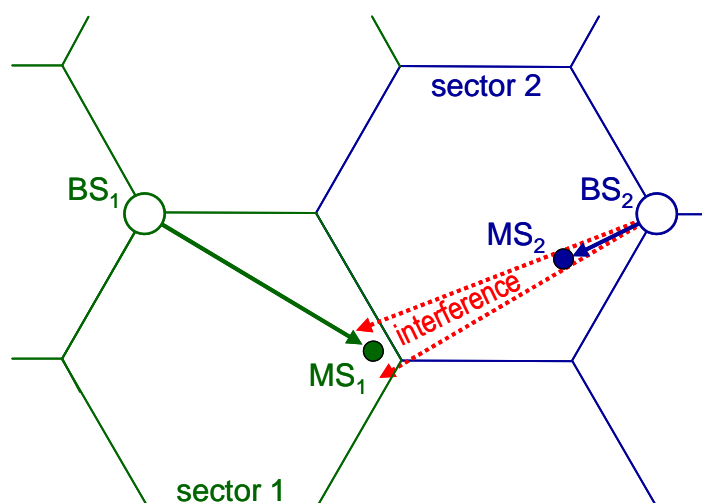

Figure 1: Down-link signal power

To allow for downlink power control, signaling has to be defined between BS and MS.

Signaling in DL:
- Signaling the user-individual power adjustments from the BS to the MS needs to be defined. The transmit power during one frame can be different for preamble, broadcast information and MS individual data bursts. Transmit power for MS individual data bursts can be signalled to the corresponding MS per DL burst or more efficiently only when the transmit power for MS individual data bursts needs to be adjusted.

Signaling in UL:
- Signaling about MS's receive power capabilities is required, e.g. power range the MS can handle during a frame in relation to the preamble power.

Proposed Text for SDD:

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10 Medium Access Control Sub-Layer

10.x Power Control

10.x.x DL Power Control

Provide a mechanism and control structures for adaptive downlink power control on a per user basis to improve interference distribution for systems operating in multi-cellular deployments.

11 Physical Layer

11.x Downlink Power Control

The per pilot tone power and the per data tone power can jointly be adjusted for adaptive downlink power control. In the case of dedicated pilots this is done on a per user basis and in the case of common pilots jointly for the users sharing the pilots.

11.6 DL Control Structure

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11.6.2.3.1.2 User-specific control information

User specific control information includes information on the attenuation of downlink data and pilot subcarriers on a per burst basis for adaptive downlink power control.

---End of the Text---