Project	**IEEE 802.16 Broadband Wireless Access Working Group**		
Title	**Downlink Power Control for WiMAX Femtocell in IEEE 802.16m**		
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Re:	TGm SDD: Femtocells; in response to the TGm Call for Contributions and Comments 802.16m-08/040 for Session 58		
Abstract	This contribution is a high level proposal for a power saving mode for femtocell BS		
Purpose	To discuss and adopt the proposed text in the next revision of the 802.16m SDD.		
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Downlink Power Control for WiMAX Femtocell in IEEE 802.16m

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NEC

1. Introduction

This contribution addresses the downlink power control for WiMAX Femtocell. Downlink power control for WiMAX Femtocell should be included to reduce the interference. In particular, we focus on a closed-loop approach, in which the Femtocell BS allocates transmission power according to CQI, QoS, interference limitation and loading of the network. We also describe the proposed closed-loop downlink strategy.

2. Discussion

WiMAX Femtocells is proposed to increase indoor coverage. A femtocell BS is a small base station which connects to service provider's network via broadband connections such as DSL. The major benefits of the femtocell concept are better indoor coverage and system throughput at significant reduction in costs. The femtocell concept can be implemented by any radio system in theory. However, WiMAX is very suitable for indoor environments since OFDMA effectively mitigates ISI caused by signal echoes typical for indoor environments.

One of the key problems of femtocell deployment is co-channel interference. The transmission power should be carefully selected to avoid interference with macro cells and neighbouring femtocells in hierarchical and dense deployment scenarios. That is why downlink closed-loop power control for femtocell is needed.

3. Downlink Closed-loop Power Control Strategy for WiMAX Femtocell

Downlink closed-loop power control shall be supported by femtocell BS in order to reduce interference to macro-cell or neighbouring femtocell. In the downlink close-loop power control scheme, MSs connected to Femtocell BS periodically measure and record metrics for interference and the received signal density from its anchored femtocell BS for each subcarrier or each subchannel when there is no downlink traffic intended for the MSs; When a downlink traffic channel is needed, the MS reports recorded metrics to the femtocell BS via the uplink control channel taking into consideration their historical values.

The BS allocates power according to QoS, loading, received metric's value, interference limitation, etc, to each user. To reduce the effect of co-channel interference, the Femtocell BS only allocates necessary resources on the downlink for every active user.

From the discussion above, downlink power control for femtocell BS shall be used to reduce the interference and a closed-loop downlink power control method for WiMAX femtocell is proposed. The proposed scheme includes benefits such as increasing the throughput and coverage for WiMAX femtocell, and reduction in interference to cellular system and other femtocell systems. It improves the power efficiency since only

necessary power is allocated to every user – Green Radio;

***Insert the following text into the "Support for Femtocell" clause** (IEEE 802.16m-08/003r5)*:

-- Proposed text --

17 Support for Femtocell

17.x Power control for Femtocell

17.x.1. Downlink power control

Downlink closed-loop power control shall be supported by femtocell BS in order to reduce interference to macro-cell or neighbouring femtocell.

In the downlink close-loop power control scheme, MSs connected with femtocell BS shall periodically measures and record metrics for interference and the received signal density from the anchored femtocell BS for each subcarrier or each subchannel when there is no downlink traffic; when a downlink traffic channel is needed, the MS reports the recorded metrics to the BS via the uplink control channel taking into consideration their historical values. The femtocell BS allocates power according to QoS, loading, received metric's value, interference limitation to each user. To reduce the effect of co-channel interference, the WiMAX Femtocell BS shall allocate only the necessary resources on the downlink for every active user.