Project	**IEEE 802.16 Broadband Wireless Access Working Group**
Title	**CR on SDD Chapter 15: Signalling Exchange between Femtocell and Macrocell BSs over-the-air in IEEE 802.16m**
Date Submitted	**2009-07-02**

Source(s)	Linghang Fan, Andreas Maeder, Nader Zein NEC	E-mail:	linghang.fan@eu.nec.com
	I-Kang Fu MediaTek		ik.fu@mediatek.com
	Fang-Ching (Frank) Ren, Rong-Terng Juang, Yung-Han Chen ITRI		frank_ren@itri.org.tw

Re:	Category: SDD comments / Area: Chapter 15 (Femtocell) "Comments on SDD 15 Femtocell"
Abstract	This contribution provides text addition to SDD to facilitate over-the-air signalling exchange between femtocell and macrocell BSs in IEEE 802.16m
Purpose	For discussion and approval by IEEE 802.16m TG
Notice	*This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups*. It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.
Patent Policy	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.

Signalling Exchange between Femtocell and Macrocell BSs over-the-air

Linghang Fan, Andreas Maeder, Nader Zein
NEC

I-Kang Fu
MediaTek

Fang-Ching (Frank) Ren, Rong-Terng Juang, Yung-Han Chen
ITRI

1. Introduction

This contribution addresses signalling exchange between WiMAX femtocell and macrocell BSs over-the-air, which leads to efficient resource management (eg. quick response to interference conditions, exchange of resource allocation parameters, etc.).

2. Discussion

Femtocell networks are a wireless technology concept that can improve indoor coverage and capacity, and a WiMAX femtocell BS needs to carefully balance its transmit power, which should be high enough to ensure good signal strengths for its subscribers, but not too high to avoid severe inference to other mobile station (MS)s, other femtocells and macrocell BS.

To address this problem, quick signaling exchange between femtocells and macrocell BSs is essential. In the current SDD, The femtocell BSs can support relay link transmission to establish air interface connection with overlapped macrocell BS to exchange control messages.

We think the over-the-air signaling exchange between the femtocells and macrocell BSs should not only be limited to the relay link, but also include other ways, such as direct link between femtocells and macrocell BSs.

3. Proposal

We propose to expand the over-the-air signaling exchange between WiMAX femtocell BSs and WiMAX macrocell BSs from relay link to other over-the-air methods to enable efficient resource management. Its main ideas are as follows:

- A WiMAX femtocell BS can communicate with one or more WiMAX macro-cell BSs over-the-air via different means, such as relay link and direct link.
- A WiMAX femtocell BS only uses control/signalling channels for exchanging information to/from the WiMAX macrocell BS.
- The WiMAX macrocell BS shall maintain the information related to each WiMAX femtocell within its coverage area which is updated periodically (preferably during off-peak hours).
- Signaling information from macrocell BS to femtocell BS can include interference measurement, resource allocation information, parameters for coordination, etc.
- An MS can scan the downlink channels. If it finds that the interference from a WiMAX femtocell BS is too high, it will report its measurement to the macrocell BS, and the latter will inform the femtocell BS to adjust its transmit power and/or spectrum allocation (e.g. use of subchannels) to reduce the co-channel interference. The macrocell BS may adjust its own subchannel assignment and/or transmit power.
- Signaling information from femtocell BS to macrocell BS can include some feedback report on aggregate traffic utility/load in its cell, etc.

Modify the following text into the "Support for Femtocell BS" clause (IEEE 802.16m-08/003r9a***):***

---------- Proposed text ----------

15 Support for Femtocell BS

15.2 Types of Base Stations

A Femtocell BS is a BS with low transmit power, typically installed by a subscriber in home or SOHO to provide the access to closed or open group of users as configured by the subscriber and/or the access provider. A Femtocell BS is connected to the service provider's network via broadband (such as DSL, or cable). ~~For the~~ The femtocell BSs ~~which can support Relay Link transmission, it~~ may communicate ~~establish the air interface connection~~ with the overlapped macrocell BS for exchanging control messages over the air-interface (e.g. via Relay Link).