Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Channel Estimation for Antenna Selection at Mobile Station**
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Source(s)	Zhifeng (Jeff) Tao, Andreas F. Molisch, Philip V. Orlik, Jinyun Zhang *Mitsubishi Electric Research Lab* Shigeru Uchida, Kentaro Sawa, Toshiyuki Kuze *Mitsubishi Electric Corp*	Voice: 617-621-{7557, 7558, 7570, 7595} Fax: 617-621-7550 {tao, molisch, porlik, jzhang}@merl.com Voice: +81-467-41-2885 Fax: +81-467-41-2486 Kuze.Toshiyuki@ah.MitsubishiElectric.co.jp
Re:	Response to the Call for Contributions IEEE 802.16m-08/016 ─ Uplink Pilot Structures
Abstract	This contribution proposes the channel estimation scheme for antenna selection at mobile station for 802.16m system description document (SDD).
Purpose	To adopt the channel estimation scheme for antenna selection at mobile station proposed herein into IEEE 802.16m system description document (SDD).
Notice	
Release	
Patent Policy	

Channel Estimation for Antenna Selection at Mobile Station

Zhifeng (Jeff) Tao, Andrea F. Molisch, Philip V. Orlik, Jinyun Zhang
Mitsubishi Electric Research Lab

Shigeru Uchida, Kentaro Sawa, Toshiyuki Kuze
**Mitsubishi Electric Corp**

1   Overview

Antenna selection is a technique in which only a subset of available antenna elements is used for the transmission/reception of data; the subset can change according to channel conditions and interference situation. It has been demonstrated in [1] and the references contained therein that antenna selection can effectively reduce hardware complexity/cost, while retaining most of the benefits of large antenna arrays (e.g., diversity).

To conduct antenna selection at mobile, the mobile station needs to estimate the channel for downlink and uplink, which is the main discussion subject of this contribution.

2   Channel Estimation Scheme

Figure 1 provides an illustration of channel estimation needed when mobile station performs antenna selection. For example, MS has one RF chain and 2 antennas. MS has to estimate the channel between both antenna and the BS, and then switches to (autonomously or under the instruction of BS) the antenna that provides the best channel with the BS.
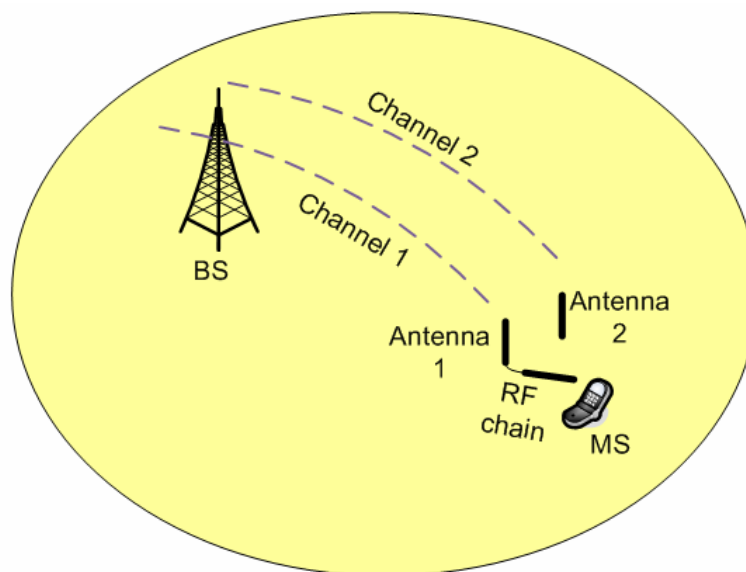
Figure 1: Channel estimation for antenna selection at mobile station.

As explained in [1], antenna selection in downlink can be performed autonomously by the mobile station in terms of channel estimation. Thus, it will work well with any downlink permutation/pilot scheme that has been defined in the current 802.16 standard and those that will be introduced in 802.16m.

For uplink, meanwhile, the mobile station needs to transmit using alternative antenna subset(s) momentarily so that the base station can estimate the channel state of the channel between the base station and the alternative antenna subset(s) at the mobile station. Akin to downlink, this will also work well with any uplink permutation/pilot scheme that has been defined in the current 802.16 standard and those that will be introduced in 802.16m. In order to avoid any explicit signaling, however, it is necessary to specify the default time dimension of the OFDMA resource unit at which the mobile station would switch to alternative antenna subset(s) in uplink transmission for channel estimation purpose. An example of uplink transmission using different antenna subset over different resource slot for channel estimation purpose is given in Figure 2 for UL PUSC permutation.
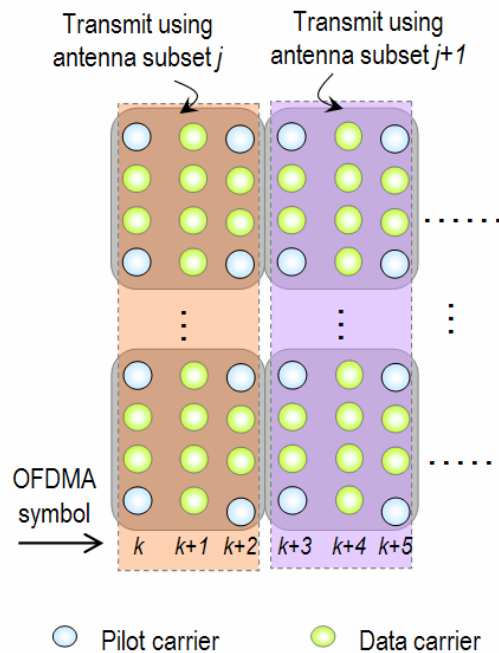
Figure 2: An example of uplink transmission using different antenna subset for channel estimation purpose (UL PUSC permutation)

3   Proposed Text Change

8.4 WirelessMAN-OFDMA PHY

[Insert subclause 8.4.8.7 as follows]

8.4.8.7 Antenna Selection at the MS

[Insert following statement at the end of subclause 8.4.8.7]

Upon the request of channel estimation for uplink antenna selection sent by the base station, mobile station shall transmit using the current antenna subset during the first slot time of the assigned resource. Then, it shall transmit using different alternative antenna subset during every following slot time of the assigned resource, until it finishes all the alternative antenna subset it previously negotiated with the base station or it reaches the last symbol of the assigned resource, whichever occurs first.

4 Reference

[1] Z. Tao, A. F. Molisch, P. V. Orlik, J. Zhang, C. Nie, T. Wang, T. Kuze, "Antenna Selection at the Mobile Station", IEEE C802.16m-08/170r1, Orlando, FL March 2008