Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Corrections to definitions of Downlink MIMO in OFDMA PHY**
Date Submitted	**2004-11-01**
Source(s)	Ran Yaniv, Tal Kaitz, Naftali Chayat, Vladimir Yanover ran.yaniv@alvarion.com **Alvarion Ltd.** tal.kaitz@alvarion.com

Re:	Call for comments, maintenance task group
Abstract	
Purpose	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) 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 and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures <http://ieee802.org/16/ipr/patents/policy.html>, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair <mailto:chair@wirelessman.org> as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site <http://ieee802.org/16/ipr/patents/notices>.

Corrections to definitions of Downlink MIMO in OFDMA PHY

Ran Yaniv, Tal Kaitz, Naftali Chayat, Vladimir Yanover
Alvarion Ltd.

1 Problem Statement

Several ambiguities exist in the definitions of downlink MIMO in 802.16REVd/D5, specifically:

1. MIMO_DL_Basic_IE() and MIMO_DL_Enhanced_IE() both describe DL allocations. This is similar in concept to the regular UL-MAP_IE. The first paragraph in the section is therefore not correct as it refers to a subsequent allocation and mentions ongoing relevance until the end of the frame.

2. The value of *'Matrix Indicator'* in MIMO_DL_Basic_IE() and MIMO_DL_Enhanced_IE() is not defined if transmit diversity mode is set to 'no diversity'. This configuration mode is a valid one since multiple MIMO transmission layers may be transmitted without STC encoding in each layer.

3. Definition of downlink MIMO capability negotiation is missing.

2 Detailed Text Changes

1. Section 8.4.5.3.8:

[Modify text from page 528 line 49 to page 529 line 3 as follows]

-------- BEGIN --------

In the DL-MAP, a MIMO-enabled BS may transmit DIUC=15 with the MIMO_DL_Basic_IE() to ~~indicate the MIMO configuration of the subsequent downlink allocation to a specific MIMO-enabled SS CID~~ describe downlink allocations assigned to MIMO-enabled SSs. The MIMO mode indicated in the MIMO_DL_Basic_IE() shall only apply to the ~~subsequent downlink~~ allocations described in the IE ~~until the end of frame~~.

-------- END --------

[Modify 'Matrix_indicator' entry in table 281 as follows]

-------- BEGIN --------

Matrix_indicator	2 bits	STC matrix (see 8.4.8.1.4.)
		Transmit_diversity = transmit diversity mode indicated in the latest TD_Zone_IE().
		if (Transmit_Diversity == 0b01)
		{
		00 = Matrix A
		01 = Matrix B
		10 – 11 = Reserved
		}
		elseif (Transmit_Diversity == 0b10)
		{
		00 = Matrix A
		01 = Matrix B
		10 = Matrix C
		11 = Reserved
		}
		else
		{
		00 – 11 = Reserved
		}

-------- END --------

2. Section 8.4.5.3.9:

[Modify text on page 530 lines 15-20 as follows]

-------- BEGIN --------

In the DL-MAP, a MIMO-enabled BS may transmit DIUC=15 with the MIMO_DL_Enhanced_IE() to ~~indicate the MIMO mode of the subsequent downlink allocation to a specific MIMO-enabled SS~~ describe downlink allocations assigned to MIMO-enabled SSs, each identified by the CQICH_ID previously assigned to it ~~the SS~~. The MIMO mode indicated in the MIMO_DL_Enhanced_IE() shall only apply to the ~~subsequent downlink~~ allocations described in the IE ~~until the end of frame~~.

-------- END --------

[Modify 'Matrix_indicator' entry in table 282]

-------- BEGIN --------

Matrix_indicator	2 bits	STC matrix (see 8.4.8.1.4.)
		Transmit_diversity = transmit diversity mode indicated in the latest TD_Zone_IE().
		if (Transmit_Diversity == 0b01)
		{
		00 = Matrix A
		01 = Matrix B
		10 – 11 = Reserved
		}
		elseif (Transmit_Diversity == 0b10)
		{
		00 = Matrix A
		01 = Matrix B
		10 = Matrix C
		11 = Reserved
		}
		else
		{
		00 – 11 = Reserved
		}

-------- END --------

3. Add section 11.8.3.7.6: define downlink MIMO capability negotiation.

[Add new section 11.8.3.7.6]

-------- BEGIN --------

11.8.3.7.6 OFDMA SS MIMO downlink support

This field indicates the different MIMO options supported by a WirelessMAN-OFDMA PHY SS in the downlink. This field is not used for other PHY specifications. A bit value of 0 indicates "not supported" while 1 indicates "supported."

Type	Length	Value	Scope
155	1	Bit #0: 2-antenna STC matrix A Bit #1: 2-antenna STC matrix B Bit #2: 4-antenna STC matrix A Bit #3: 4-antenna STC matrix B Bit #4: 4-antenna STC matrix C Bit #5: support multiple-layer DL-MAP IEs Bit #6-7: *reserved*	SBC-REQ (see 6.3.2.3.23) SBC-RSP (see 6.3.2.3.24)

-------- END --------