Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Interleaving for MIMO Transmission in IEEE 802.16e**
Date Submitted	**2004-11-4**
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Re:	IEEE 802.16e D5 Draft
Abstract	To facilitate interleaving across multiple spatial streams in MIMO transmission.
Purpose	To incorporate the changes here proposed into the 802.16e D4 Draft. ~~Crossed out indicates deleted text,~~ <u>underlined blue indicates new text change to the Standard,</u> and <u>underlined green indicates newly added text from the original contribution</u>
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Interleaving for MIMO Transmission in .16e

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1. Background

The interleaver parameters for MIMO transmission is not clearly defined in either [1] or [2]. We propose to fix this with the following text change.

2. Proposed Text Change

8.4.9.3.1. Interleaving for MIMO transmission

Let N_{cbps} be number of coded bits per the allocated subchannels per OFDM symbol per spatial stream. Let N_{cpc} be the number of coded bits per subcarrier, i.e. 2, 4 or 6 for QPSK, 16 QAM and 64 QAM, respectively. Let M_t be the number of spatial streams to jointly code across. Within a block of N_{cbps} bits at transmission, let k be the index of the coded bit before the first permutation, m_k be the index of that coded bit after the first and before the second permutation and j_k be the index after the second permutation, just prior to modulation mapping, and d be the modulo used for the permutation.

The first permutation is defined by the formula: $k = 0, 1, \ldots, N_{cbps} * M_t -1,\ d = 16,$

$$m_k = (N_{cbps} \cdot M_t / d) \cdot k_{\mathrm{mod}(d)} + floor(k / d) .$$

The second permutation is defined by the formula:

$$j_k = s \cdot floor(m_k / s) + (m_k + N_{cbps} \cdot M_t - floor(d \cdot m_k / N_{cbps} / M_t))_{\mathrm{mod}(s)} .$$

In the de-interleaver, the first permutation is defined by the formula: $j = 0, 1, \ldots, N_{cbps} * M_t -1,\ d = 16$

$$m_k = s \cdot floor(j / s) + (j + floor(d \cdot j / N_{cbps} / M_t))_{\mathrm{mod}(s)} .$$

The second permutation is defined by the formula:

$$k_j = d \cdot m_j - (N_{cbps} \cdot M_t - 1) \cdot floor(d \cdot m_j / N_{cbps} / M_t) .$$

References

[1]. IEEE P802.16-REVd/D5-2004 Draft IEEE Standards for local and metropolitan area networks part 16: Air interface for fixed

broadband wireless access systems

[2] IEEE P802.16e/D5, "Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems Amendment for Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands," September 2004