

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	<b>Modification of Open loop STC</b>	
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Re:		
Abstract	Modification of the open loop STC for 3, 4 Tx	
Purpose	Adoption of proposed changes into P802.16e	
	<del>Crossed-out indicates deleted text</del> , <u>underlined blue indicates new text change to the Standard</u>	
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## Modification of Open loop STC

### 1. Specific Text Changes

[Replace the section 8.4.8.3.5 as follows]

#### 8.4.8.3.5 Transmission schemes for 4-antenna BS

~~The proposed Space-Time-Frequency code (over two OFDMA symbols and two subcarriers) for 4Tx-Rate-1 configuration with diversity order 4 is given in three permuted versions:~~

~~$$A_1 = \begin{bmatrix} S_1 & -S_2^* & 0 & 0 \\ S_2 & S_1^* & 0 & 0 \\ 0 & 0 & S_3 & -S_4^* \\ 0 & 0 & S_4 & S_3^* \end{bmatrix}, A_2 = \begin{bmatrix} S_1 & -S_2^* & 0 & 0 \\ 0 & 0 & S_3 & -S_4^* \\ S_2 & S_1^* & 0 & 0 \\ 0 & 0 & S_4 & S_3^* \end{bmatrix}, A_3 = \begin{bmatrix} S_1 & -S_2^* & 0 & 0 \\ 0 & 0 & S_3 & -S_4^* \\ 0 & 0 & S_4 & S_3^* \\ S_2 & S_1^* & 0 & 0 \end{bmatrix}$$~~

~~The choice of subscript k to determine the matrix  $A_k$  is given by the following formula:~~

~~$k = \text{mod}(\text{floor}(\text{logical\_data\_sub\_carrier\_number\_for\_first\_tone\_of\_code}/2), 3) + 1$~~

~~where:~~

~~$\text{logical\_data\_sub\_carrier\_number\_for\_first\_tone\_of\_code} = 1, 2, 3, \dots, \text{Total \# of data sub-carriers}$~~

For all **optional** permutation zones using 4-antenna BS, one of the following three transmission matrices shall be used:

$$A = \begin{bmatrix} s_1 & -s_2^* & 0 & 0 \\ s_2 & s_1^* & 0 & 0 \\ 0 & 0 & s_3 & -s_4^* \\ 0 & 0 & s_4 & s_3^* \end{bmatrix}$$

$$B = \begin{bmatrix} s_1 & -s_2^* & s_5 & -s_7^* \\ s_2 & s_1^* & s_6 & -s_8^* \\ s_3 & -s_4^* & s_7 & s_5^* \\ s_4 & s_3^* & s_8 & s_6^* \end{bmatrix}$$

$$C = \begin{bmatrix} s_1 \\ s_2 \\ s_3 \\ s_4 \end{bmatrix}$$

Where,  $s_i$  may have different rates

The permuted matrix-A (over two OFDMA symbols and two subcarriers) for 4Tx-Rate 1 is given in three permuted matrices:

$$A_1 = \begin{bmatrix} S_1 & -S_2^* & 0 & 0 \\ S_2 & S_1^* & 0 & 0 \\ 0 & 0 & S_3 & -S_4^* \\ 0 & 0 & S_4 & S_3^* \end{bmatrix}, A_2 = \begin{bmatrix} S_1 & -S_2^* & 0 & 0 \\ 0 & 0 & S_3 & -S_4^* \\ S_2 & S_1^* & 0 & 0 \\ 0 & 0 & S_4 & S_3^* \end{bmatrix}, A_3 = \begin{bmatrix} S_1 & -S_2^* & 0 & 0 \\ 0 & 0 & S_3 & -S_4^* \\ 0 & 0 & S_4 & S_3^* \\ S_2 & S_1^* & 0 & 0 \end{bmatrix}.$$

The mapping of subscript k to determine the matrix  $A_k$  is given by the following formula:

$$k = \text{mod}(\text{floor}(\text{logical\_data\_sub\_carrier\_number\_for\_first\_tone\_of\_code}-1/2), 3) + 1.$$

where:

$$\text{logical\_data\_sub\_carrier\_number\_for\_first\_tone\_of\_code} = 1, 2, 3, \dots, \text{Total \# of data sub-carriers}$$

The permuted matrix-B (over two OFDMA symbols and two subcarriers) for 4Tx-Rate 2 is given in six permuted matrices:

$$B_1 = \begin{bmatrix} S_1 & -S_2^* & S_5 & -S_6^* \\ S_2 & S_1^* & S_6 & S_5^* \\ S_3 & -S_4^* & S_7 & -S_8^* \\ S_4 & S_3^* & S_8 & S_7^* \end{bmatrix}, B_2 = \begin{bmatrix} S_1 & -S_2^* & S_5 & -S_6^* \\ S_2 & S_1^* & S_6 & S_5^* \\ S_4 & S_3^* & S_8 & S_7^* \\ S_3 & -S_4^* & S_7 & -S_8^* \end{bmatrix}, B_3 = \begin{bmatrix} S_1 & -S_2^* & S_5 & -S_6^* \\ S_3 & -S_4^* & S_7 & -S_8^* \\ S_2 & S_1^* & S_6 & S_5^* \\ S_4 & S_3^* & S_8 & S_7^* \end{bmatrix},$$

$$B_4 = \begin{bmatrix} S_1 & -S_2^* & S_5 & -S_6^* \\ S_3 & -S_4^* & S_7 & -S_8^* \\ S_4 & S_3^* & S_8 & S_7^* \\ S_2 & S_1^* & S_6 & S_5^* \end{bmatrix}, B_5 = \begin{bmatrix} S_1 & -S_2^* & S_5 & -S_6^* \\ S_4 & S_3^* & S_8 & S_7^* \\ S_2 & S_1^* & S_6 & S_5^* \\ S_3 & -S_4^* & S_7 & -S_8^* \end{bmatrix}, B_6 = \begin{bmatrix} S_1 & -S_2^* & S_5 & -S_6^* \\ S_4 & S_3^* & S_8 & S_7^* \\ S_3 & -S_4^* & S_7 & -S_8^* \\ S_2 & S_1^* & S_6 & S_5^* \end{bmatrix}$$

The mapping of subscript k to determine the matrix  $A_k$  is given by the following formula:  $k$

$$= \text{mod}(\text{floor}(\text{logical\_data\_sub\_carrier\_number\_for\_first\_tone\_of\_code}-1/2), 6) + 1. \text{ where}$$

$$\text{logical\_data\_sub\_carrier\_number\_for\_first\_tone\_of\_code} = 1, 2, 3, \dots, \text{Total \# of data sub-carriers.}$$

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*End text proposal*

**References:**

- [1] IEEE P802.16-REVd/D6-2005 Draft IEEE Standards for local and metropolitan area networks part 16: Air interface for fixed broadband wireless access systems