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Re:	<i>This is a response to a Call for Comments IEEE802.16e-05/xx on IEEE P802.16e-D4</i>	
Abstract	<i>Transmission schemes for 2 or more antenna MSS in UL</i>	
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# Transmission schemes for 2 or more antenna MSS in UL

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## 1. Introduction

In OFDMA of the current 802.16 standard, transmission schemes for 2, 3 and 4-antenna BS in DL is supported. But spec is considered only 2-antenna MSS in UL. So we propose to support 2 or more (i.e., 2, 3 and 4) antenna MSS in UL.

## 2. Proposed text

*[Add new section 8.4.8.2.4 in 802.16e/D4]*

### 8.4.8.2.4 Uplink using STC

A user supporting transmission using STC configuration in the uplink, shall use a modified uplink tile, 4-transmit diversity data or 4-transmit spatial multiplexing data can be mapped onto each subcarrier. The mandatory tile shall be modified to accommodate those configurations. Figure xxx depicts the UL tile for STC transmission.

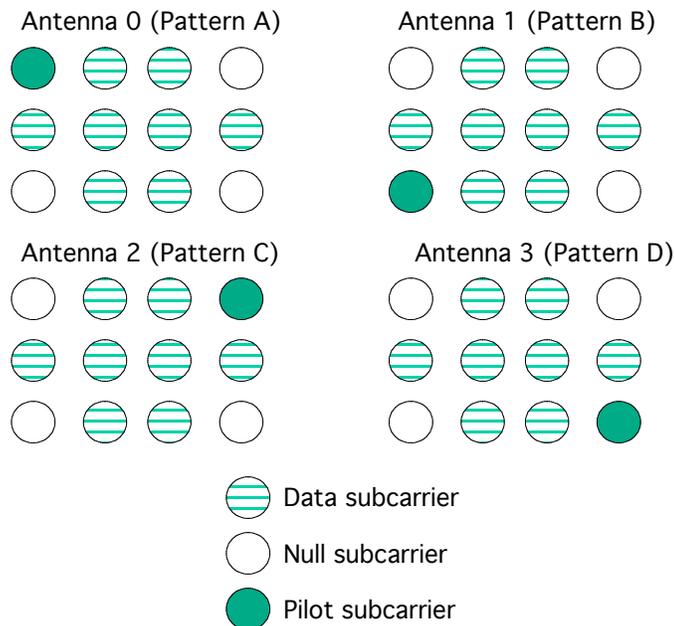


Figure xxx - Uplink pilot allocation for 4-antenna SS for the PUSC zones

Four single transmit antenna SS's or two double transmit antenna SS's can perform collaborative spatial multiplexing onto the same subcarrier. In this case, each SS should use the uplink tile with each pattern A, B, C, D.

[Add the following after section 8.4.8.4.1]

For 3-antenna SS and the optional PUSC, pilots for each antenna shall be allocated as shown in Figure aaa-1.

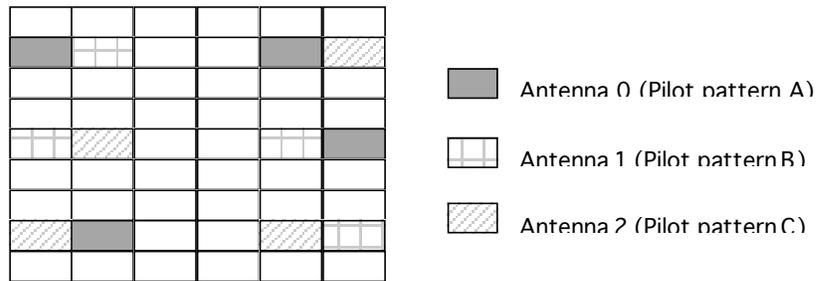


Figure aaa-1. Uplink pilot allocation for 3-antenna SS for the optional PUSC zones

For 4-antenna SS and the optional PUSC, pilots for each antenna shall be allocated as shown in Figure aaa-2.

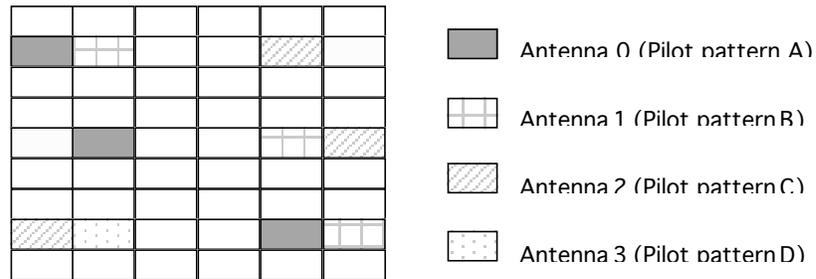


Figure aaa-2. Uplink pilot allocation for 4-antenna SS for the optional PUSC zones

For 3-antenna SS and the AMC, pilots for each antenna shall be allocated as shown in Figure aaa-3.

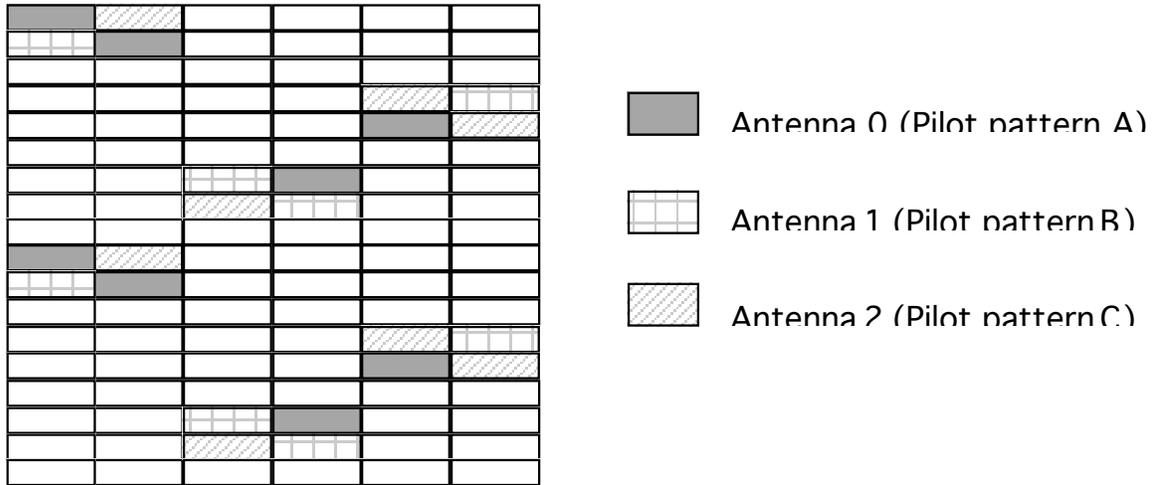


Figure aaa-3. Uplink pilot allocation for 4-antenna SS for AMC zones

For 4-antenna SS and the AMC, pilots for each antenna shall be allocated as shown in Figure aaa-4.

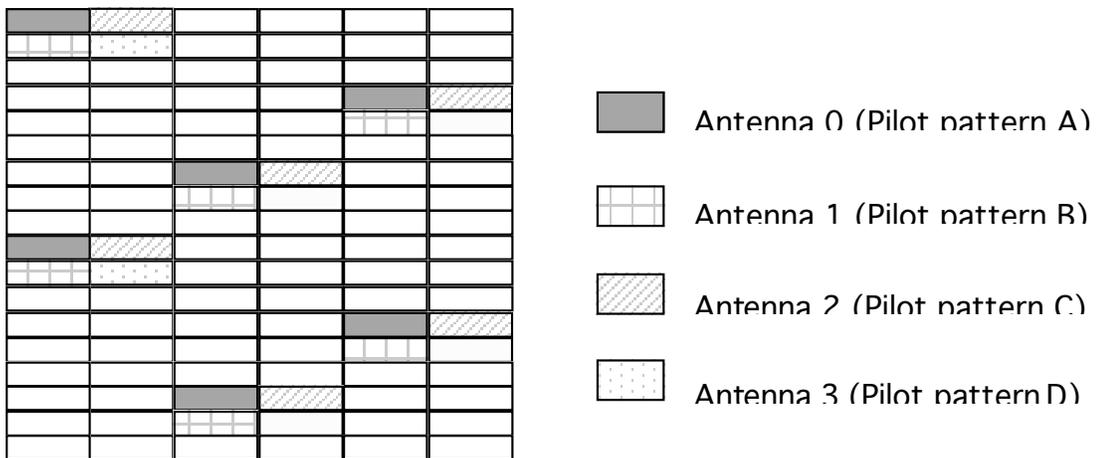


Figure aaa-4. Uplink pilot allocation for 4-antenna SS for AMC zones

[Insert the following after section 11.8.4.7.9]

11.8.4.7.9 Uplink control channel support

OFDMA MSS antenna for MIMO support

Type	Length	Value	Scope
xxx	1	Bit #0: 2 SS Tx	SBC-REQ (see 6.3.2.3.23)

	Bit #1: 3 SS Tx Bit #2: 4 SS Tx Bit #3: Collaborative SM Bit #5~7: reserved	SBC-RSP (see 6.3.2.3.24)
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[Add a new section 8.4.5.4.17]

8.4.5.4.17 MIMO UL Enhanced IE format

Table xxx – MIMO UL Enhanced IE format

Syntax	Size	Notes
MIMO_UL_Enhanced_IE () {		
Extended_UIUC	4 bits	Enhanced MIMO
Length	4 bits	Length of the message in bytes (variable)
Num_Assign	4 bits	Number of burst assignment
For (j=0; j< Num_assign; j++){		
CID	16 bits	SS basic CID
UIUC	4 bits	
STC	2 bits	0b00 = 2 antennas 0b01 = 3 antennas 0b10 = 4 antennas 0b11 = reserved
Matrix_indicator	2 bits	If (STC == 0b00) { 00 = Matrix A 01 = Matrix B 10-11 = Reserved } else if (STC == 0b01) { 00 = Matrix A 01 = Matrix B 10 = Matrix C 11 = Reserved } else if (STC == 0b10) { 00 = Matrix A 01 = Matrix B 10 = Matrix C 11 = Reserved } }

}		
Duration	10 bits	In OFDMA slots (see 8.4.3.1)
}		

**Num\_assign**

This field specifies the number of assignments in this IE.

**STC**

Indicates the STC mode that shall be used by the transmitter for allocations following this IE (see 8.4.8). All allocations without STC shall be transmitted only from one antenna (antenna 0). All allocations with STC the BS shall transmit from both its antennas.

**Matrix\_indicator**

The values of these two bits indicate the STC matrix (see 8.4.8.1.4).