Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Grouping of Space Time Coding Formats**
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Re:	Response to Recirculation Ballot #14c
Abstract	Grouping the STC formats to allow STC coding rate adjustment. The added text is highlighted in green; ~~the deleted text is stroked out.~~
Purpose	To incorporate the changes here proposed into the 802.16e D5 draft.
Notice	
Release	
Patent Policy and Procedures	

Grouping of Space Time Coding Formats

1 Introduction

The current IEEE802.16e-D4 specification, there are 2 STC formats for 2 antennas and 3 formats for 3 and 4 antennas. And the STC assignment is based on the sub-channel units. On the other hand, the FEC transmission format and coding modulation rate are defined for the non-MIMO transmission. However, due the design tradeoff, the MIMO scattered pilot allocation for 3 and 4 transmission requires the puncture operation, therefore, after the FCE coded data symbol is mapped onto the STC format, a factional of them are punctured by additional MIMO pilots insertion for 3 and 4 antenna transmit format. Such a puncture can cause the performance loss if the FEC coding rate is high. In this case, the scheduling of several higher coding rates, such as 2/3, 3/4, 5/6 ...etc, is limited. In order to maintain the backward compatibility, one the remedy is to introduce the coding redundancy in the space time coding as an additional degree of flexible, this can be done in a straightforward grouping of the exciting STC transmission matrices for multiple sub-channel allocation. The format grouping can reduce the overhead of the DL MAP IE overhead for the assigning the different STC formats.

2 Grouping of the STC formats

2.1 Example of the 2/3 antenna STC formats grouping

In Figure 1 ~~(a)~~ the possibilities of the STC matrix grouping for two transmission antenna is illustrated. Where the A2 is two transmit matrix-A and B2 is two transmit matrix-B, ~~Figure 1 (b) also illustrates the several possibilities for the 3 antenna grouping.~~A3 is 3-transmit matrix-A, B3 is 3-transmit matrix-B and C3 is 3-transmit matrix-C; A4 is 4-transmit matrix-A, B4 is 4-transmit matrix-B and C4 is 4-transmit matrix-C.

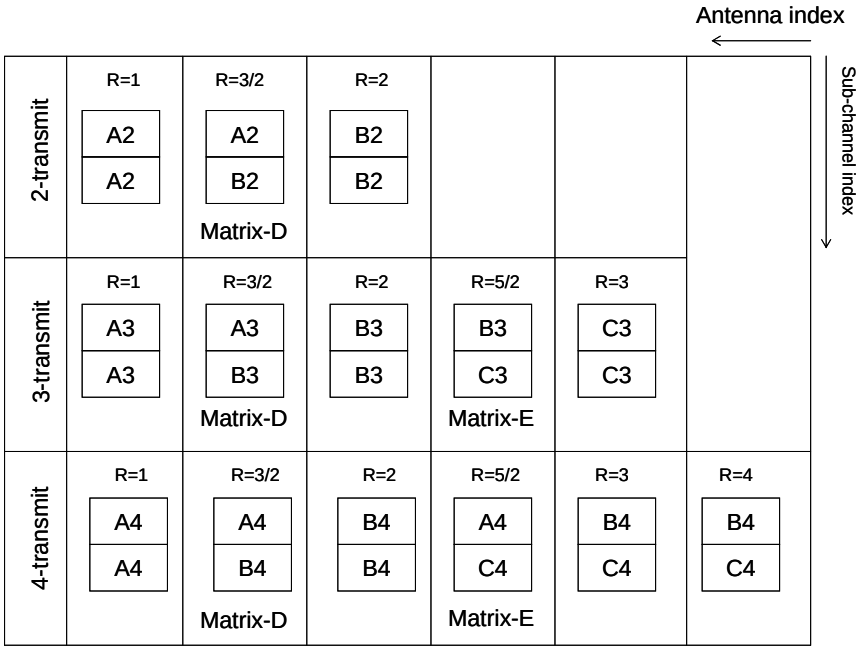

Figure 1 ~~Examples for the~~ STC format grouping with 2 sub-channels

3 Text Proposal

----------Start Text ----------

Table x - MIMO DL Basic IE

Syntax	Size	Notes
MIMO_DL_Basic_IE () {		
Extended DIUC	4 bits	0x05
Length	8 bits	Length in bytes
Num_Region	4 bits	
for (i = 0; i< Num_Region; i++) {		
OFDMA Symbol offset	10 bits	
Subchannel offset	5 bits	
Boosting	3 bits	
No. OFDMA Symbols	9 bits	
No. subchannels	5 bits	
Matrix_indicator	3 bits	STC matrix (see 8.4.8.4.) 000 = Matrix A 001 = Matrix B 010 = Matrix C 011 = Matrix D 100 = Matrix E ~~101 = Matrix F~~ ~~110 = Matrix G~~ ~~111= Matrix H~~
Num_layer	2 bits	
for (j = 0; j< Num_layer; j++) {		
if (INC_CID == 1) {		
CID	16 bits	
}		
Layer_index	2 bits	
DIUC	4 bits	0-11 burst profiles
}		
}		

Matrix D,E,~~F,G,H~~ is grouping matrix based on A.B.C.

----------End Text ----------