Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**2-antenna MIMO pilot allocation for PUSC/FUSC**
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Re:	Call for Reply Comments regarding the Maintenance Task Group Comment Report 80216maint-04_09.zip
Abstract	In this contribution, we propose to clarify the 2-antenna MIMO pilot allocation for PUSC/FUSC
Purpose	The contribution should be considered by Maintenance group within comment resolution Procedure. Corrections in Figure and typos in blue font.
Notice	
Release	
Patent Policy and Procedures	

2-antenna MIMO pilot allocation for PUSC/FUSC

1 Introduction

In 802.16REVd/D5 there is an inconsistence in the definition of the MIMO transmission between FUSC mode and PUSC mode. For FUSC MIMO case, data transmission is done over 2OFDM symbols while for PUSC MIMO case data transmission is done over 4 OFDM symbols. STTD mapping over 4 OFDM symbols makes the system more vulnerable to Doppler. This inconsistence will also cause another inconsistence between single antenna case and MIMO case in PUSC mode, since the data transmission is also performed over 2 OFDM symbols for non MIMO transmission. On the other hand, for single antenna case, the pilot density for PUSC is 4 subcarrier spacing. However, for MIMO case, it increases to 12 subcarrier spacing. This will cause the significant performance degradation for the fast frequency selective fading channel. In this contribution, we suggest to modify the definition of PUSC cluster for MIMO transmission and the pilot allocation within clusters, as well as to introduce the pilot shift scheme similar to that applied in FUSC mode. By this way we can keep the similar pilot density for both non-MIMO and MIMO cases and the same DL STTD transmission schemes for both PUSC mode and FUSC mode.

2 Proposed text change

Section 8.4.8.1.2.1.1 STC using 2 antennas in PUSC
Modify Figure 245 and 246

----------- *Start Text* ---------------------

The clusters composing the subchannels used by the STC mode shall be allocated and subcarriers numbered as defined in 8.4.6.2. The cluster structure of the subchannels allocated for STC is slightly modified to fit the STC requirements. The structure shall be modified as depicted in Figure 245 (switching 2 pilot carriers ~~the odd symbol~~ with 2 data carriers ~~from the even symbols~~ separately, switching of the data carriers and the pilots carriers shall be performed after constellation mapping, therefore maintaining all the encoding scheme and the subchannel allocation scheme). In this scheme, transmission on regular subchannels and STC subchannels is possible and is determined by the MAC layer (the allocation is performed by allocating major groups of subchannels for regular or STC transmission). The transmission of the data shall be performed in pairs of symbols as illustrated in Figure 246 ~~247~~.

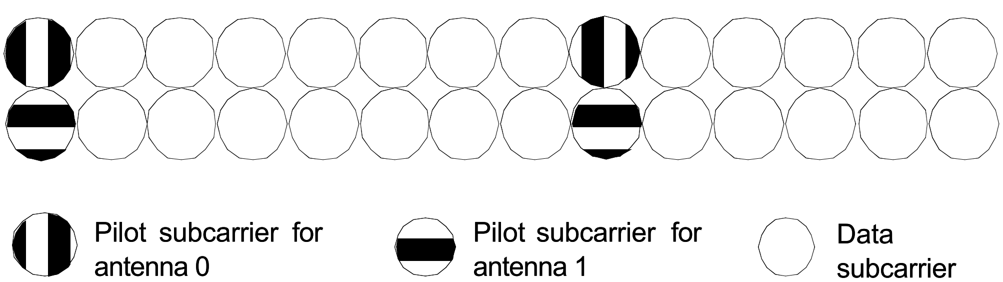

Figure 245 – Cluster structure

----------- *End Text* ---------------------

Insert the following section after Figure 245:

----------- *Start Text* ---------------------

The pilot locations in PUSC cluster shall obey the following rule:

PilotsLocation = (PUSC_PairNumber)mod(2)*4+PUSC_Pilot_Location
where PUSC_PairNumber is the OFDM symbol pair index in each PUSC allocation and counts from 0 to 1.
PUSC_Pilot_Location = 0, 8 is the frequency offset of the pilot carriers in each cluster.

----------- *End Text* ---------------------

Replace Figure 246(need modify)
----------- *Start Text* ---------------------

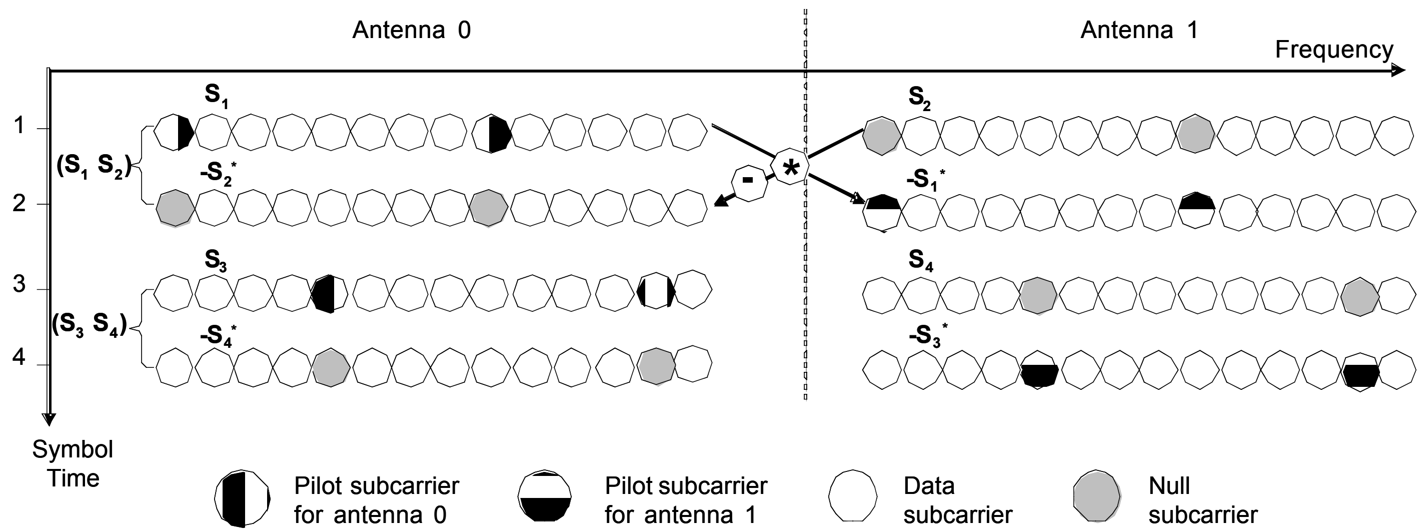

Figure 246—STC usage with PUSC

----------- *End Text* ---------------------

Section 8.4.8.1.2.1.2 STC using 2 antennas in FUSC

Insert the following section at line 11 on page 585.
----------- *Start Text* ---------------------

The Variable set of pilots embeded within the symbol of each segment shall obey the following rule:

PilotsLocation = VariableSet#x+6 . (floor(FUSC_SymbolNumber/2) mod 2)

where FUSC_SymbolNumber counts from 0 at the starting of the relevant STC zone. In the case where the PilotsLocation is collided with the constant pilot, the variable pilot location shall be shifted by 1.

----------- *End Text* ---------------------