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Abstract	Clarifies ambiguities in the data mapping for MIMO in PUSC for 2 TX antennas (matrix A,B)
Purpose	Adopt changes
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Clarifications for MIMO data mapping

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1. Motivation

The mapping of data to subcarriers in MIMO modes is not clear in the standard, especially for PUSC and FUSC. Two main things are not clear:

1. The meaning of the matrices (what s_0,s_1 appearing in the matrix format mean, or where in the encoded data stream they come from)
2. How data subcarriers are mapped to physical slots

We focus on the PUSC permutation, 2 transmit antennas and matrix A,B, and propose a solution based on the concepts of 802.16-2004.

2. Text changes

[Add a new subsection at the end of the section 8.4.8.1.2.1]

8.4.8.1.2.1.3 STC data mapping

In the STC zone, for spatial multiplexing, the mapping of modulated data after channel encoding to MIMO streams depends on the type of encoding (horizontal or vertical encoding).

For vertical encoding (num_layer=1), the number of data slots used by the FEC encoder equals R times the number of physical slots allocated in the map, where R is the space time coding rate and equals the number of streams in case of spatial multiplexing. Denote the number of allocated physical slots by D (duration). The D R data slots shall be encoded, including splitting the data into FEC blocks according to the concatenation rule, randomization, encoding, interleaving, and repetition, as specified in 8.4.9, and shall be mapped to QAM symbols. Then, the resulting QAM symbols shall be mapped in stream-first order into R streams as described in 8.4.8.

For example, if the rate is R=2, and no precoding is used, then the 48 QAM symbols of the first data slot are mapped to the first 24 subcarriers of the first physical slot (in antenna first order, so that the even QAM symbols are mapped to antenna 0 and the odd QAM symbols to antenna 1), the next 48 symbols are mapped to subcarriers 25..47 of the first physical slot. The mapping continues to the second physical slot, and so on.

For horizontal encoding with rate T, (num_layer=T), the number of data slots used by the FEC encoder equals the number of physical slots allocated in the map, and T different bursts are encoded. Each burst is allocated to a stream.

[Add the following text at the end of the section 8.4.4.2]

The number of symbols in an STC zone (not including the midamble) shall divide by the number of symbols in any MIMO matrix used in the zone. In addition, the STC zone shall include at least one full period of the pilot pattern defined for the relevant permutation and the number of antennas.

[Add the following text at the end of the section 8.4.8.1.2.1.1]

The following tables shows an STC data mapping example for the DL PUSC using vertical encoding as the result of mapping of QAM symbols (see 8.4.3.5) followed by MIMO encoding. Each row is subcarrier-in-subchannel, and each column is a symbol. $s_0..s_{47}$ denote first slot out of the FEC, $s_{48}..s_{95}$ denote second slot. The figure is in logical subcarriers (subcarrier in subchannel) over symbols (before DL PUSC permutation).

STTD (Matrix A), 2 antennas

	Antenna 0		Antenna 1	
	Even symbol	Odd symbol	Even symbol	Odd symbol
Sub carrier 0	s_0	$-s_{24}^*$	s_{24}	s_0^*
Sub carrier 1	s_1	$-s_{25}^*$	s_{25}	s_1^*
.	s_2	$-s_{26}^*$	s_{26}	s_2^*
.	s_3	$-s_{27}^*$	s_{27}	s_3^*
.	s_4	$-s_{28}^*$	s_{28}	s_4^*
.	s_5	$-s_{29}^*$	s_{29}	s_5^*
	s_6	$-s_{30}^*$	s_{30}	s_6^*
	s_7	$-s_{31}^*$	s_{31}	s_7^*
	s_8	$-s_{32}^*$	s_{32}	s_8^*
	s_9	$-s_{33}^*$	s_{33}	s_9^*
	s_{10}	$-s_{34}^*$	s_{34}	s_{10}^*
	s_{11}	$-s_{35}^*$	s_{35}	s_{11}^*
	s_{12}	$-s_{36}^*$	s_{36}	s_{12}^*
	s_{13}	$-s_{37}^*$	s_{37}	s_{13}^*
	s_{14}	$-s_{38}^*$	s_{38}	s_{14}^*
	s_{15}	$-s_{39}^*$	s_{39}	s_{15}^*
	s_{16}	$-s_{40}^*$	s_{40}	s_{16}^*
	s_{17}	$-s_{41}^*$	s_{41}	s_{17}^*
.	s_{18}	$-s_{42}^*$	s_{42}	s_{18}^*
.	s_{19}	$-s_{43}^*$	s_{43}	s_{19}^*
.	s_{20}	$-s_{44}^*$	s_{44}	s_{20}^*
.	s_{21}	$-s_{45}^*$	s_{45}	s_{21}^*
Subcarrier 22	s_{22}	$-s_{46}^*$	s_{46}	s_{22}^*
Subcarrier 23	s_{23}	$-s_{47}^*$	s_{47}	s_{23}^*

SM (Matrix B), 2 antennas

Antenna 0		Antenna 1	
Even symbol	Odd symbol	Even symbol	Odd symbol
s_0	s_{48}	s_1	s_{49}
s_2	s_{50}	s_3	s_{51}
s_4	s_{52}	s_5	s_{53}
s_6	s_{54}	s_7	s_{55}
s_8	s_{56}	s_9	s_{57}
s_{10}	s_{58}	s_{11}	s_{59}
s_{12}	s_{60}	s_{13}	s_{61}
s_{14}	s_{62}	s_{15}	s_{63}
s_{16}	s_{64}	s_{17}	s_{65}
s_{18}	s_{66}	s_{19}	s_{67}
s_{20}	s_{68}	s_{21}	s_{69}
s_{22}	s_{70}	s_{23}	s_{71}
s_{24}	s_{72}	s_{25}	s_{73}
s_{26}	s_{74}	s_{27}	s_{75}
s_{28}	s_{76}	s_{29}	s_{77}
s_{30}	s_{78}	s_{31}	s_{79}
s_{32}	s_{80}	s_{33}	s_{81}
s_{34}	s_{82}	s_{35}	s_{83}
s_{36}	s_{84}	s_{37}	s_{85}
s_{38}	s_{86}	s_{39}	s_{87}
s_{40}	s_{88}	s_{41}	s_{89}
s_{42}	s_{90}	s_{43}	s_{91}
s_{44}	s_{92}	s_{45}	s_{93}
s_{46}	s_{94}	s_{47}	s_{95}