Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	Sub-Channel Concatenation for CTC of SM with 2 and 4 Transmit Antennas
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Re:	IEEE 802.16-REVe/D5a, BRC recirc
Abstract	Clean up of the sub-channel concatenation for CTC in the MIMO mode, the update is in blue font
Purpose	To incorporate the changes here proposed into the 802.16e D5a draft.
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Sub-Channel Concatenation for CTC of SM with 2 and 4 Transmit Antennas

1 Introduction

In the 802.16e/D5a draft standard, Table 323 is designed to apply to single transmit antenna case. To support spatial multiplexing with 2 3, and 4 antennas, we need to modify the concatenation Table 323. We can also extend Table 324 to increase the maximal block size.

2 Text Proposal

[Extend and replace Table 324 with Table 324aa in section8.4.9.2.3]

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

Table 324 aa – CTC channel coding with additional OFDMA block size for single, 2 and 4 antennas with SM

Modulation	Data Block Size (bytes)	Encoded data block size (bytes)	Code rate	N	P0	P1	P2	P3
QPSK	144	288	1/2	576	31	42	232	18
QPSK	192	288	2/3	768	19	384	216	600
QPSK	216	288	3/4	864	19	2	16	6
16-QAM	144	288	1/2	576	31	42	232	18
16-QAM	192	288	2/3	768	19	384	216	600
16-QAM	216	288	3/4	864	19	2	16	6
64-QAM	144	288	1/2	576	31	42	232	18
64-QAM	192	288	2/3	768	19	384	216	600
64-QAM	216	288	3/4	864	19	2	16	6

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

[Modify Table 323 based on extended Table 324 aa with Table 323aa in section8.4.9.2.3]

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

Table 323 aa – Encoding subchannel concatenation for different rates in CTC

Modulation and rate	j_1 (for single antenna)	j_2 (for 2 antennas with SM)	j_4 (for 4 antennas with SM)
QPSK 1/2	24	12	6
QPSK 2/3	24	12	6
QPSK 3/4	24	12	6
16-QAM 1/2	12	6	3
16-QAM 2/3	12	6	3
16-QAM 3/4	12	6	3
64-QAM 1/2	8	4	2
64-QAM 2/3	8	4	2
64-QAM 3/4	8	4	2

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

[Insert Table 324 for three antennas in section8.4.9.2.3]

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

Table 324 bb – CTC channel coding for additional OFDMA block size for 3 antennas with SM

Modulation	Data Block Size (bytes)	Encoded data block size (bytes)	Code rate	N	P0	P1	P2	P3
QPSK	108	216	1/2	432	13	0	4	8
QPSK	144	216	2/3	576	31	88	156	52
QPSK	162	216	3/4	648	37	62	160	34
16-QAM	108	216	1/2	432	13	0	4	8
16-QAM	144	216	2/3	576	31	88	156	52
16-QAM	162	216	3/4	648	37	62	160	34
64-QAM	108	216	1/2	432	13	0	4	8
64-QAM	144	216	2/3	576	31	88	156	52
64-QAM	162	216	3/4	648	37	62	160	34

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

[Replace Table 323 based on extended Table 324 bb in section8.4.9.2.3]

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

Table 323 bb – Encoding subchannel concatenation for different rates in CTC

Modulation and rate	j_3 (for single antenna)
QPSK 1/2	6
QPSK 2/3	6
QPSK 3/4	6
16-QAM 1/2	3
16-QAM 2/3	3
16-QAM 3/4	3
64-QAM 1/2	2
64-QAM 2/3	2
64-QAM 3/4	2

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

[Replace Table 323 based on extended Table 322a in section8.4.9.2.3]

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

Table 323 bb – Subchannel concatenation rule for CTC

Number of Subchannels	Subchannels Concatenated
$n \le j$ AND $n \bmod 7 \neq 0$	1 block of n subchannels
$n \le j$ AND $n \bmod 7 = 0$	1 block of 4n/7 subchannels 1 block of 3n/7 subchannels
$n > j$	Same as Table 322

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