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Title	Correction for symbol structure for scalable FFT sizes
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Re:	IEEE P802.16e/D5-2004
Abstract	Proposes corrections for symbol structure definitions (permutations) in FFT sizes 1024, 512, 128
Purpose	Adopt changes.
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Correction for symbol structure for scalable FFT sizes

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1. Motivation

Correct errors in the symbol structure in 802.16e/D5.

2. Details

2.1. Left and right guard intervals

There is a mix-up between the left & right guard intervals in almost all the tables in the 802.16e/D5 draft. The DC sub-carrier is always defined in the beginning of the right side (carrier $N_{FFT}/2$), so in order to preserve symmetry the left side guard has to be always +1 bigger than the right side guard interval. This is the case in 16REVd (see tables of symbol structures of PUSC & FUSC in 16REVd/D5 – tables 308 and 309).

2.2. Range of permutation indices

Another problem is the indexes of the permutation for the big & small groups in PUSC (DL) for FFT 1024 (the indexes start from 1, and should have started from 0).
This contribution resolves this issue.

2.3. PUSC groups

There is a mistake in the group sizes in PUSC (DL) for FFT size 512.
The group sizes should be 3 (large group) and 2 (small group), instead there are group sizes 4 (big) and 4 (small), this issue is resolved in this contribution.

2.4. Constant pilots collide with variable pilots

Another issue is with the constant pilots location in FUSC (DL) for FFT sizes 1024 & 512.
Some constant pilots locations collide with the variable pilots location (in the +6 variable pilots offset case). This contribution also resolves this issue.

Note:
The same problem exists in 2K mode.
Our comment #XX for maintenance group proposes to remove the constant pilots altogether. If this comment is accepted for 802.16REVd, we recommend instead of correcting the constant pilot locations, to remove the constant pilots from the lists. The change must be synchronized with the change in 802.16REVd, since text relating to ConstantPilots is used in REVd.

2.5. Changes in rev1

- Permutation sequences changed.
- FFT-512 groups changed. For groups 3+2 the FCH (4 subchannels) cannot be applied. Groups of 4+1 is not a good solution because 1 subchannel group has low frequency diversity and doesn't supply granularity for suchannel migration between segments. So we propose to use 5+0 (large group = 5, no small group)

3. Changes summary

8.4.6.1.2.1 Symbol structure for PUSC

Change text in tables:

Table 308a—1024-FFT OFDMA downlink carrier allocations – PUSC

Number of Guard Subcarriers, Left	~~91~~92
Number of Guard Subcarriers, Right	~~92~~91

PermutationBase6 (for 6 subchannels)	~~3,2,6,4,5,1~~ 3,2,0,4,5,1
PermutationBase4 (for 4 subchannels)	~~3,4,2,1~~ 3,0,2,1

Table 308b—512-FFT OFDMA downlink carrier allocations - PUSC

Number of Guard Subcarriers, Left	~~45~~46
Number of Guard Subcarriers, Right	~~46~~45

PermutationBase~~4~~5 (for ~~4~~5 subchannels)	~~3,1,2,0~~ 4, 2, 3, 1, 0
~~PermutationBase4 (for 4 subchannels)~~	~~3,4,2,1~~

[Clarification note for the editor: second line is removed from the table]

Table 308c—128-FFT OFDMA downlink carrier allocations – PUSC

Number of Guard Subcarriers, Left	~~21~~22
Number of Guard Subcarriers, Right	~~22~~21

8.4.6.1.2.2 Symbol structure for FUSC

Change text in tables:

Table 309a—1024-FFT OFDMA downlink carrier allocations – FUSC

Number of Guard Subcarriers, Left	~~86~~87
Number of Guard Subcarriers, Right	~~87~~86

Constant set #0	~~39,330,351,645,726,850~~ 72*(2*n + k) + 9 when k=0 and n=0..5
Constant set #1	~~261,342,522,651,848~~ 72*(2*n + k) + 9 when k=1 and n=0..4

Table 309b—512-FFT OFDMA downlink carrier allocations - FUSC

Constant set #0	~~39, 330, 351~~ 72*(2*n + k) + 9 when k=0 and n=0..2
Constant set #1	~~261,342,420~~ 72*(2*n + k) + 9 when k=1 and n=0..2

8.4.6.2 Uplink

Table 311b—1024-FFT OFDMA uplink subcarrier allocations

Guard subcarriers (left,right)	~~91,92~~ 92,91

Table 311c—512-FFT OFDMA uplink subcarrier allocations

Guard subcarriers (left,right)	~~51,52~~ 52,51

Table 311d—128-FFT OFDMA uplink subcarrier allocations

Guard subcarriers (left,right)	~~15,16~~ 16,15

8.4.6.2.5 Additional optional Symbol Structure for PUSC

Table 313a—Optional 512-FFT OFDMA uplink subcarrier allocations

Number of Guard Subcarriers, Left	~~39~~40
Number of Guard Subcarriers, Right	~~40~~39

Table 313b—Optional 1024-FFT OFDMA uplink subcarrier allocations

Number of Guard Subcarriers, Left	~~79~~80
Number of Guard Subcarriers, Right	~~80~~79

Table 310d—Optional 128-FFT OFDMA FUSC downlink carrier allocations

Guard subcarriers (left,right)	~~9,10~~ 10,9

Table 313d—Optional-PUSC 128-FFT OFDMA PUSC uplink subcarrier allocations

Guard subcarriers (left,right)	~~9,10~~ 10,9

Table 314d—Optional 128-FFT OFDMA AMC carrier allocations

Guard subcarriers (left,right)	~~9,10~~ 10,9

Table 314a—Optional 2048-FFT OFDMA downlink carrier allocations

Number of Guard Subcarriers, Left	~~159~~160
Number of Guard Subcarriers, Right	~~160~~159

Table 310b—Optional 1024-FFT OFDMA downlink carrier allocations

Number of Guard Subcarriers, Left	~~79~~80
Number of Guard Subcarriers, Right	~~80~~79

Table 310c—Optional 512-FFT OFDMA downlink carrier allocations

Number of Guard Subcarriers, Left	~~39~~40
Number of Guard Subcarriers, Right	~~40~~39

8.4.4.3 DL Frame Prefix

[Change the following entries in table 266b p. 160 lines 30-40]

512	0	0-~~3~~4
	1	~~4 .~~*N/A*
	2	5-~~8~~9
	3	~~9~~N/A
	4	10-~~13~~14
	5	~~14~~N/A