

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >
Title	Clarification on Uplink PUSC Subcarrier Allocation for OFDMA
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Source(s)	Jungnam Yun, jnyun@posdata-usa.com POSDATA Co., Ltd.
Re:	IEEE P802.16e/D11.
Abstract	This presentation clarifies uplink PUSC subcarrier allocation for OFDMA.
Purpose	Review and adoption of the proposed text change into IEEE P802.16e/D12.
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1 Clarification of Uplink PUSC Subcarrier Allocation for OFDMA

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Jungnam Yun
POSDATA Co., Ltd.

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61. Problem Statements

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8Section 8.4.6.2.2 of IEEE 802.16e/D11 has been modified so that equations and descriptions can be applied to every
9FFT sizes. However, some common descriptions in section 8.4.6.2.2 of IEEE 802.16e/D11 are different from IEEE
10802.16-Cor1/D5.

11

122. Remedy

13[Change 8.4.6.2.2, page 436, line 21 as follows]

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168.4.6.2.2 Partitioning of subcarriers into subchannels in the uplink

17

18[Replace the contents of the section with the following text:]

19

20The usable subcarriers in the allocated frequency band shall be divided into N_{tiles} physical tiles as defined in Figure 236
21with parameters from Table 314. The allocation of physical tiles to logical tiles in subchannels is performed in the
22following manner:

23

241. Logical tiles are mapped to physical tiles in the FFT using Equation (113); for an example refer to 8.4.6.2.3.

25

$$26 \quad \text{Tiles}(s, n) = N_{\text{subchannels}} - n - (Pt[(s - n) \bmod N_{\text{subchannels}}] - UL_PermBase) \bmod N_{\text{subchannels}} \quad (113)$$

27

28where

29 $\text{Tiles}(s, n)$ is the physical tile index in the FFT with tiles being ordered consecutively from the most negative
30to the most positive used subcarrier (0 is the starting tile index)

31 n is the tile index 0...5

32 Pt is the tile permutation

33 s is the subchannel number in the range 0,..., $N_{\text{subchannels}}-1$

34 $UL_PermBase$ is an integer value in the range 0...69, which is assigned by a management entity

35 $N_{\text{subchannels}}$ is the number of subchannels for the FFT size given in Tables 314a/314b/314c

36

37After mapping the physical tiles in the FFT to logical tiles for each subchannel, the data subcarriers per slot are
38enumerated by the following process:

391. After allocating the pilot carriers within each tile, indexing of the data subcarriers within each slot is performed
40starting from the first symbol at the lowest indexed subcarrier of the lowest indexed tile and continuing in an ascending
41manner throughout the slot's subcarriers in the same symbol, then going to the next symbol at the lowest indexed data
42subcarrier, and so on. Data subcarriers shall be indexed from 0 to 47.

432. The mapping of data onto the subcarriers will follow Equation (114). This equation calculates the subcarrier index (as
44assigned in item 1) to which the data constellation point is to be mapped.

45

$$46 \quad \text{Subcarrier}(n, s) = (n - 13 - s) \bmod N_{\text{subcarriers}} \quad (114)$$

47where

48 $\text{Subcarrier}(n, s)$ is the permuted subcarrier index corresponding to data subcarrier n is subchannel s ,

49 n is a running index 0...47, indicating the data constellation point.

1 s is the subchannel number,
 2 $N_{subcarriers}$ is the number of subcarriers per slot.

3

4 For example, for subchannel 1 ($s = 1$), the first data constellation point ($n=0$) is mapped onto subcarrier $(0,1) = 13$,
 5 where 13 is the subcarrier with index 13 according to item 1 above. Considering the PUSC tile structure, it can be seen
 6 that this is the second indexed subcarrier on the second symbol within the slot. Similarly, for subchannel 3, the ninth
 7 data constellation point ($n = 8$) is mapped onto subcarrier $(8, 3) = 47$. According to item 1, this is the last indexed
 8 subcarrier of the third symbol within the slot.

9

10 Subcarrier enumeration shall not be applied to the slots in the UL-MAP indicated by either $UIUC = 0$ or $UIUC = 12$.

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12

13 3. References

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15 [1] IEEE Std 802.16-2004, "IEEE Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed
 16 Broadband Wireless Access Systems," Oct. 2004.

17 [2] IEEE P802.16-Cor1/D5, "Corrigendum to IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air
 18 Interface for Fixed Broadband Wireless Access Systems," Sep. 2005.

19 [3] IEEE P802.16e/D11, "Draft Amendment to IEEE Standard for Local and Metropolitan Area Networks Part 16: Air
 20 Interface for Fixed and Mobile Broadband Wireless Access Systems—Amendment for Physical and Medium
 21 Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands," Sep. 2005.

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