

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >
Title	<b>Flexible Frequency Reuse Operation</b>
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Abstract	Frequency reuse factor of 1 and non-one frequency reuse factor support at the same time
Purpose	Adoption of suggested changes into P802.16e/D2
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## Problem definition

In the current IEEE 802.16 REVd/D5, PUSC, FUSC, optional FUSC, and AMC permutation can be supported in a single frame by using Zone\_Switch\_IE(). All the permutation methods are supported in a full usage manner, but only PUSC permutation is supported

in a partial usage manner.

In this contribution, we propose two methods to support AMC permutation in a partial usage manner.

First method is to extend the meaning of “Used subchannel bitmap” field in downlink Frame Prefix format, and the second method is to add the bitmap field to DCD and UCD in the same way as the bitmap allocation for PUSC in the UCD.

## Suggested change to the standard

### 1. First Method :

Fix table 266 in page 503 of P802.16-REVd/D5 as shown below

**Table 244–OFDMA downlink Frame Prefix format**

Syntax	Size	Notes
DL_Frame_Prefix_Format() {		
Used subchannel bitmap	6 bits	xxxxx1: Subchannels 0-11 used xxxx1x: Subchannels 12-19 used xxx1xx: Subchannels 20-31 used xx1xxx: Subchannels 32-39 used x1xxxx: Subchannels 40-51 used 1xxxxx: Subchannels 52-59 used <a href="#">To use AMC in a partial usage manner, use the mapping in the table below.</a>
Ranging_Change_Indication	1 bit	
Repetition_Coding_Indication	2 bits	00 – No repetition coding on DL-MAP 01 – Repetition coding of 2 used on DL-MAP 10 – Repetition coding of 4 used on DL-MAP 11 – Repetition coding of 6 used on DL-MAP
Coding_Indication	3 bits	000 – CC encoding used on DL-MAP 001 – BTC encoding used on DL-MAP 010 – CTC encoding used on DL-MAP 011 to 111 – reserved
DL-MAP Length	8 bits	
Reserved	4 bits	Reserved; Shall be set to 0
}		

Further, change the explanation for “Used subchannel bitmap” as follows.

### **Used subchannel bitmap**

A bitmap indicating which groups of subchannel are used on the PUSC zone.

[To use AMC subchannel in a partial usage manner, use the mapping in the following table.](#)

<a href="#">bitmap</a>	<a href="#">On the AMC zone</a>
<a href="#">xxxxx1</a>	<a href="#">Bands 6k used, k=0,....,7</a>
<a href="#">xxxx1x</a>	<a href="#">Bands 6k+1 used, k=0,....,7</a>
<a href="#">xxx1xx</a>	<a href="#">Bands 6k+2 used, k=0,....,7</a>
<a href="#">xx1xxx</a>	<a href="#">Bands 6k+3 used, k=0,....,7</a>
<a href="#">x1xxxx</a>	<a href="#">Bands 6k+4 used, k=0,....,7</a>

<a href="#">1xxxxx</a>	<a href="#">Bands 6k+5 used, k=0.....7</a>
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2. Second Method :

Add the following row to table 351 in page 668 of P802.16-REVd/D5.

**Table 351—UCD PHY-specific channel encodings — WirelessMAN-OFDMA**

<a href="#">Name</a>	<a href="#">Type (1 byte)</a>	<a href="#">Length</a>	<a href="#">Value (variable length)</a>
<a href="#">UL allocated subchannel bitmap for optional AMC permutation</a>	<a href="#">173</a>	<a href="#">6</a>	<a href="#">This is a bitmap describing the bands allocated to the segment in the UL, when using the optional AMC permutation (see 8.4.6.3). The LSB of the first byte shall correspond to band 0. For any bit that is not set, the corresponding band shall not be used by the SS on that segment.</a>

Add the following row to table 356 in page 665 of P802.16-REVd/D5.

**Table 356—DCD channel encoding**

<a href="#">Name</a>	<a href="#">Type (1 byte)</a>	<a href="#">Length</a>	<a href="#">Value (variable length)</a>	<a href="#">PHY scope</a>
<a href="#">DL allocated subchannel bitmap for optional AMC permutation</a>	<a href="#">18</a>	<a href="#">6</a>	<a href="#">This is a bitmap describing the bands allocated to the segment in the DL, when using the optional AMC permutation (see 8.4.6.3). The LSB of the first byte shall correspond to band 0. For any bit that is not set, the corresponding band shall not be used by the SS on that segment.</a>	<a href="#">OFDMA</a>

## Proposed Solution

Adopt the second method because it is more flexible and can be applied to both uplink and downlink.