Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**FCH for 128 FFT mode**
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Re:	Supporting document for recirculation ballot #14b.
Abstract	In OFDMA mode, FCH message requires total of four subchannels per segment. In 128 FFT case, there are only total of three DL PUSC subchannels available for all three segments. The proposal is to use a modified compressed version of DLFP and allocate the two required subchannels per segment in time using two consecutive slots formed by four consecutive OFDM symbols.
Purpose	To adopt the enhancements to OFDMA PHY in P802.16e/D3 draft.
Notice	
Release	
Patent Policy and Procedures	

1 *Introduction*

In OFDMA mode, FCH message requires total of four subchannels per segment. In 128 FFT case, there are only total of three DL PUSC subchannels available for all three segments.

The proposal is to modify the OFDMA DLFP to a compressed version of half its original size (12 effective un-coded bits compared to its current 24 bits) satisfying the needs of 128 FFT case more efficiently and allocating the required two slots per segment in time formed by four consecutive OFDM symbols. The 12 bits are coded and repeated 2 times to create 48 bits, then modulated with repetition code X2.

In modifying the DLFP message the following considerations are used:

1. Because of the small number of subchannels remaining in 128 FFT case, there is no need to more than 2 bits for "Used subchannel bitmap".
2. Will not include four reserved bits.
3. Will allocate only 6 bits to "DL-Map_Length". This means that the max length is 64 slots out of the worst case (for 20 msec, 1.25 MHz BW) ~100 slots
4. Fix the "Repetition_Coding_Indication" to "No repetition coding on DL-MAP" and save the two bits.

2 Proposed Text Changes

Change 1: Change the Title of Table 266 to "**OFDMA downlink Frame Prefix format for all FFT sizes except 128**"

Change 2: Add the following text and table for DLFP format for 128 FFT to the end of Section 8.4.4.3:

For the case of 128 FFT, the following compressed format shall be used for DLFP.

Table xxx—OFDMA downlink Frame Prefix format for 128 FFT

Syntax	Size	Notes
DL_Frame_Prefix_Format() {		
Used subchannel bitmap	2 bits	**0b00: Subchannels 0 is used** **0b01: Subchannels 1 is used** **0b10: Subchannels 2 is used** **0b11: Reserved**
Ranging_Change_Indication	1 bit	
Coding_Indication	3 bits	**Refer to definition of Coding_Indication in Table 266.**
DL-Map_Length	6 bits	
}		

Change 3: Add the following text as the second paragraph of Section 8.4.4.4 at line 46:

In PUSC 128 FFT case, any segment used shall be allocated one subchannel. The first 2 slots in the downlink part of the segment contain the FCH as defined in 8.4.4.3. These slots contain 24 bits modulated by QPSK with coding rate 1/2 and repetition coding of 4. Equivalently, this means that the 12 bits are coded and repeated 2 times to create 48 bits, then the 6 bytes are modulated with repetition code of 2.

Change 4: Add the following text to the end of Section 8.4.5.3:

In the case of 128 FFT, Repetition Coding Indication bits are Reserved and are not used.

3 References

[1] IEEE P802.16-REVd/D5-2004 Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed Broadband Wireless Access Systems

[2] IEEE P802.16-REVe/D3-2004 Standard for Local and metropolitan area networks Part 16: Air Interface for Fixed Amendment for Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands