Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Multiple MAP Support**
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Re:	
Abstract	**Add MAP Format Indicator in the Frame Prefix of OFDMA PHY**
Purpose	Adoption of proposed changes into P802.16e /D4-2004
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1 Introduction

1.1 ~~Problem 1~~

~~Current OFDMA PHY specifies that either DL-MAP Message or Compressed MAP may appear at the head of the frame.~~

~~However, the MSS can detect the format of the MAP Message only after it decodes the first bytes of the MAP Message. This may slow down the decoding process of the MAP message.~~

1.2 Problem 2

H-ARQ enabled MSS should receive H-ARQ MAP Message. However, the MSS can receive the H-ARQ MAP Message only after receiving and decoding of the DL-MAP Message or Compressed MAP Message. In current spec. a MSS which uses H-ARQ must decode two bursts for MAP message, one for DL-MAP and the other for H-ARQ MAP.

This severally increases the MAP decoding overhead of the H-ARQ enabled terminals.

1.3 Problem 3

Current definition of H-ARQ does not include some fields required for system operation such as PHY synchronization fields and DCD count. And the definition allows that the H-ARQ MAP message can only located at the behind of the DL-MAP message.

Hence, we propose some text change.

1.4 Remedy

~~Put the MAP format indicator at the end of the Frame Prefix.~~
~~This approach does not make any backward compatibility problem because there are already reserved 4 bits at the end of the Frame Prefix and reduce the MAP message decoding overhead.~~
The propsed text enables that the H-ARQ MAP can appear directly after FCH hence reduce the MAP size and number of burst to decode for MAP. ~~Put the MAP format indicator at the end of the Frame Prefix.~~
~~This approach does not make any backward compatibility problem because there are already reserved 4 bits at the end of the Frame Prefix and reduce the MAP message decoding overhead.~~
Adopt text change.

1.5 Overhead Comparison of MAPs

1.5.1 Assumption

H-ARQ MAP
Number of MAP_IEs for data burst
DL-MAP & UL-MAP

1.5.2 Case 1: Using DL-MAP Message for H-ARQ MAP

DL-MAP Message
MAC header   48 bits
Type   8 bits
PHY sync.   32 bits
DCD count   8 bits

```
        BS ID                         48 bits
        H-ARQ MAP Pointer IEs         28 bits
UL-MAP Message
        MAC header                    48 bits
        Type                          8 bits
        Up ch. ID                     8 bits
        UCD count                     8 bits
        Alloc. Start T                32 bits
H-ARQ MAP
        Basic field                   20 bits
        =============================
                                      296 bits
```

1.5.3 Case 2: Using Compressed DL-MAP Message for H-ARQ MAP

```
Compressed DL-MAP Message (0 MAP-IE)
        Header                        16 bits
        PHY sync.                     32 bits
        DCD count                     8 bits
        BS ID                         48 bits
        H-ARQ MAP Pointer IEs         28 bits
Compressed UL-MAP Message
        UCD count                     8 bits
        Alloc. Start T                32 bits
H-ARQ MAP
        Basic field                   20 bits
        ===============================
                                      168 bits
```

1.5.4 Case 3: Using Proposed Scheme 1 for H-ARQ MAP

```
H-ARQ MAP
        Basic field                   20 bits
Frame Setup Compact DL-MAP IE format
        UL-MAP Type                   3 bits
        UL-MAP sub-type               5 bits
        Length                        4 bits
        PHY Sync Field                32 bits
        DCD Count                     8 bits
        Base Station ID               48 bits
        UCD Count                     8 bits
        Allocation Start Time         32 bits
        =========================
                                      160 bits
```

1.5.5 Case 4: Using Proposed Scheme 2 for H-ARQ MAP

H-ARQ MAP
    Basic field   20 bits
Reduced Frame Setup Compact DL-MAP IE format
        UL-MAP Type   3 bits
        UL-MAP sub-type   5 bits
        Length   4 bits
        Reduced Frame Number   8 bits
        Reduced DCD Count   4 bits
        Reduced Base Station ID   8 bits
        Reduced UCD Count   4 bits
        ========================
                                               56 bits

	Regular		Compressed	
Original	DL-MAP:	296 bits	Compressed:	168 bits
Proposed	Proposed 1:	160 bits	Proposed 2:	56 bits

2 Proposed Text

In page 111, Change the following section

8.4.4.3 DL Frame Prefix
[Apply the following changes to Tables 266 in section 8.4.4.3:]

Table 266a—DL Frame Prefix format

Syntax	Size	Notes
DL_Frame_Prefix_Format() {		
Used subchannel bitmap	6 bits	Bit #0: Subchannels 0-11 are used Subchannel group 0 Bit #1: Subchannels 12-19 are used Subchannel group 1 Bit #2: Subchannels 20-31 are used Subchannel group 2 Bit #3: Subchannels 32-39 are used Subchannel group 3 Bit #4: Subchannels 40-51 are used Subchannel group 4 Bit #5: Subchannels 52-59 are used Subchannel group 5
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	0b000 - CC encoding used on DL-MAP 0b001 - BTC encoding used on DL-MAP 0b010 - CTC encoding used on DL-MAP 0b011 - ZT CC used on DL-MAP 0b100 to 0b111 - Reserved
DL-Map_Length	8 bits	
MAP Type Change bit	1 bits	0: MAP Type is not changed

		1: MAP Type is changed
Reserved	4 bits 3 bits	
}		

MAP Message Format
This value indicates the change of the MAP Message type. The value of 0 indicates that the MAP type is same as previous frame. The value should be set to 0 if the FFT size is 2048.

In page 28, add the following section

6.3.2.3.43 H-ARQ MAP message

[Make the following changes to section 6.3.2.3.43:]

6.3.2.3.43 H-ARQ MAP message
This section describes the H-ARQ MAP message, which is designed for H-ARQ enabled SS. This IE shall only be used by a BS supporting H-ARQ, for SS supporting H-ARQ.   In the frame when a BS serve only the H-ARQ enabled MSS, the H-ARQ MAP may appear directly after Frame Prefix without DL-MAP to reduce overhead. However, the BS shall also support DL-MAP or Compressed MAP for ordinary MSS. Any MSS can detect MAP type by checking 3 MSB of first byte in the MAP burst.

In page 31, add the following section

6.3.2.3.43.6.7 Frame Setup Compact DL-MAP IE

[Add new section 6.3.2.3.43.6.7:]

6.3.2.3.43.6.7 Frame Setup Compact DL-MAP IE
A Compact MAP message that appears directly after FCH without DL-MAP should include the Frame Setup Compact DL-MAP IE at the front of the message.

Table ??— Frame Setup Compact DL-MAP IE format

Syntax	Size	Notes
Frame Setup Compact DL-MAP_IE () {		
UL-MAP Type =7	3 bits	Extension
UL-MAP sub-type	5 bits	= 0b00010
Length	4 bits	
PHY Synchronization Field	variable	
DCD Count	8 bits	
Base Station ID	48 bits	
UCD Count	8 bits	
Allocation Start Time	32 bits	
}		

6.3.2.3.43.6.8 Reduced Frame Setup Compact DL-MAP IE

[Add new section 6.3.2.3.43.6.8:]

6.3.2.3.43.6.8 Reduced Frame Setup Compact DL-MAP IE

A Compact MAP message that appears directly after FCH without DL-MAP may include the Reduced Frame Setup Compact DL-MAP IE instead of the Frame Setup Compact DL-MAP IE to reduce the size of the message. If no Frame Setup Compact DL-MAP IE exists in a frame all fields in the Frame Setup Compact DL-MAP_IE should be considered as same as previous frame. Only the frame number is increased by 1.

Table ??—Reduced Frame Setup Compact DL-MAP_IE format

Syntax	Size	Notes
Reduced Frame Setup Compact DL-MAP_IE () {		
UL-MAP Type =7	3 bits	Extension
UL-MAP sub-type	5 bits	= 0b00011
Length	4 bits	
Reduced Frame Number	8 bits	LSB 4 bits of Frame Number
Reduced DCD Count	4 bits	LSB 4 bits of DCD Count
Reduced Base Station ID	8 bits	LSB 4 bits of BS ID
Reduced UCD Count	4 bits	LSB 4 bits of UCD Count
}		