Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	**Compressed DL-MAP format for OFDMA PHY**
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Re:	It is a response to IEEE 802.16 Working Group Recirculation Ballot #11b Announcement (IEEE 802.16-03/38)
Abstract	The following proposal defines a method of reducing the DL-MAP overhead in the OFDMA PHY by using an **optional** compressed DL-MAP format, using only 7 bytes of header and saving 13 bytes per frame (104 data symbols in QPSK 1/2).
Purpose	Adopt to the OFDMA section
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Compressed DL-MAP format for OFDMA PHY

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1. General

The current definition of the DL_MAP message is extremely inefficient, as the current standard defines, in all the operational cases including TDD, FDD and H-FDD and all PHY modes, the DL_MAP is the first message transmitted at the beginning of each frame (after the DL_Frame_Prefix where appropriate). The current definition of the DL_MAP is a management message, including a standard MAC Header (6 Bytes), a type field (1 byte) a PHY Synchronization field (4 bytes), DCD count (1 byte), BS ID (6 bytes) and number of DL-MAP Elements (2 bytes). Adding all the fields beside the DL_MAP IEs sums to 20 bytes of headers.

In the OFDMA PHY layer, the additional overhead of 20 bytes, especially when not using all the sub-channels in a cell and when using short frames,

The following proposal defines a method of reducing the DL-MAP overhead in the OFDMA PHY by using an **optional** compressed DL-MAP format, using only 7 bytes of header and saving 13 bytes per frame (104 symbols in QPSK 1/2).

2. Proposed changes:

Change section 8.5.4.3

8.5.4.3 DL Frame Prefix

The DL_Frame_Prefix is a data structure transmitted at the beginning of each frame and contains information regarding the current frame. Table 214 defines the structure of DL_Frame_Prefix

Table 214—OFDMA DL Frame Prefix

Syntax	Size	Notes
DL_Frame_Prefix_Format() {		
Sub_Channels_Bitmap	32 bits	
Ranging_Change_Indication	1 bit	
Compressed_MAP_Used	1 bit	
DL_Map_Length	~~7~~6 bits	
Prefix_CS	8 bits	
}		

The fields in Table 214 are defined as:

Sub_Channel_Bitmap
A 32-bit field that defines a bitmap representing the sub-channels which are allocated to this sector. Each bit represent a sub-channel with same enumerated value, a value '1' means that the sub-channel represented by the bit is allocated to the sector.

Ranging_Change_Indication
A flag that indicates whether this frame contains a change of the allocation of Periodic Ranging/BW Request UL regions comparing to the previous frame. A value of '1' means that a change has occurred, and value of '0' means that the allocations of Periodic Ranging/BW Request regions in the current frame are the same as in the previous frame.

Compressed_MAP_Used
A flag that indicates whether regular or Compressed_DL-MAP message (see section 8.5.4.4) is used in this frame. A value of '1' means that Compressed_DL-MAP message is used and value of '0' means that regular DL-MAP messages is used.

DL_Map_Length
Defines the length in slots of the DL_Map message that follows immediately the DL_Frame_Prefix.

Prefix_CS
An 8-bit checksum for the DL-Frame prefix fields, with the generator polynomial:
$g(D) = D^8 + D^2 + D + 1$.

Push sections 8.5.4.4-8.5.4.6 down by one, and insert new section 8.5.4.4

8.5.4.4 Compressed DL-MAP message

In the OFDMA PHY a compressed DL-MAP message may be used instead of regular DL-MAP message. The format of the Compressed DL-MAP message is defined in Table 214a. When the

Compressed_DL-MAP message is used, it shall replace the regular DL-MAP message for any frame management purposes.

Table 214a—Compressed_DL-MAP message format

Syntax	Size	Notes
Compressed_DL-MAP_Message_Format() {		
PHY Synchronization Field	Variable	See section 8.5.5.1
CRC Indicator	1 bit	1 = CRC is appended to the Compressed_DL-MAP_Message 0 = No CRC is appended
DCD Count	7 bits	7 least segnificant bits of the DCD count field
Base Station ID	8 bits	8 least segnificant bits of the BS ID
Number of DL-MAP Elements *n*	8 bits	
for (*i* = 1; *i* <= *n*; *i*++) {		
DL_MAP_Information_Element()		For each DL-MAP element 1 to *n*.
}		
if !(byte boundary) {		
Padding Nibble	4 bits	Padding to reach byte boundary.
}		
if (CRC Indicator = 1) {		
CRC	32 bits	As defined in section 6.4.3.5
}		
}		

8.5.4.5 DL-MAP PHY Synchronization Field

Change in first paragraph:

The format of the PHY Synchronization Field of the DL-MAP message, as described in 6.4.2.3.2, or Compressed_DL-MAP, as defined in 8.5.4.4, is given in Table 216. The Frame Duration Codes are given in Table 215. The Frame number is incremented by 1 each frame and eventually wraps around to zero