Project	**IEEE 802.16 Broadband Wireless Access Working Group <http://ieee802.org/16>**
Title	An Efficient AMC Zone Configuration within H-ARQ for MIMO OFDMA
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Re:	
Abstract	An Efficient AMC Zone Configuration within H-ARQ for MIMO OFDMA
Purpose	Adoption of proposed changes into P802.16e ~~Crossed-out indicates deleted text,~~ underlined blue indicates new text change to the Standard
Notice	
Release	
Patent Policy and Procedures	

An Efficient AMC Zone Configuration within H-ARQ for MIMO OFDMA

1. Introduction

In section 6.3.2.3.43.6.7 of the draft standard [1], the configuration of MIMO zones within H-ARQ region is shown and the related extension MAP IEs for DL and UL are specified thereafter. According to the standard, MIMO and SISO regions for both diversity permutation zone and AMC permutation zone are shown to be separated in different symbols. While this causes little problem with the diversity permutation zone, it may increase overall overhead for the AMC permutation zone due to the unused resources at the symbol boundaries. This is especially true when the newly added chase combining regions for SISO and MIMO are also present within the same frame.
In this contribution, this issue is addressed and a dynamic switch between two methods of band AMC allocation is suggested.

2. Methods of AMC Zone Configuration within H-ARQ Region

Figure 23a and Figure 23b represent two methods of MIMO zone allocation within AMC band region, time zone allocation in Figure 23a and frequency band allocation in Figure 23b. Each scheme has its own pros and cons. The time zone allocation method has better channel estimation performance due to continuous pilot subcarriers along the entire frequency domain, improving decoder performance and frequency scanning for better choice of an AMC band. On the other hand, frequency band allocation method reduces overhead which otherwise is inevitable at symbol boundaries of different zones. Furthermore, in terms of granularity this method is better because a MIMO or SISO zone can be allocated to one or more bands of the total available bands (12 for the case of 1K FFT and 8 bins per band configuration), whereas 3 (for SISO) and 6 (for MIMO) symbols are the basic unit to be allocated within the available DL sub-frame (24 symbols for the case of 1K FFT with 2:1 DL:UL ratio).

The switch between these two methods in DL and UL is made by a new extension IE called AMC Zone Configuration IE and its format is also proposed. It serves as an indicator which instructs all SS on whether or not they can utilize all the pilot subcarriers along the entire bandwidth.

[Add a new section 6.3.2.3.43.6.9 as follows]

6.3.2.3.43.6.9 H-ARQ Compact DL-MAP IE format for AMC Zone Configuration

Due to the availability of multiple antennas and subpacket combining algorithm, there may be multiple zones in a single frame. When multiple zones exist within the band AMC region of a DL H-ARQ subframe, the adequate zone configuration shall be chosen by the BS and indicated through H-ARQ Compact DL-MAP IE for AMC Zone Configuration (Table 99c).

Table 99c—H-ARQ Compact DL-MAP IE format for AMC Zone Configuration

Syntax	Size (bits)	Notes
Compact_DL-MAP_IE() {		
DL-MAP Type=7	3	
DL-MAP sub-type	5	Extension sub type = 0x02
Length	4	Length of the IE in Bytes
AMC Zone Type	1	Indicates AMC zone type

		0 = Time domain zoning 1 = Frequency domain zoning
Pilot precoding	1	Indicates precoding on pilots within the burst 0 = No precoding on pilots 1 = precoding on pilots
Reserved	2	
}		

H-ARQ Compact DL-MAP IE for AMC Zone Configuration shall be used whenever there is a change in either AMC zone type or pilot precoding method in a DL or UL subframe.

As is suggested in Table 99c, there are two possible AMC zone types. In Figure 23a, the multiple zones are separated in time domain, whereas they are separated in frequency domain in Figure 23b. For the illustration purpose, 1K FFT size with 8 bins per band(12 AMC bands overall) and the 2x3 (2 bins by 3 symbols) basic AMC type are shown in both Figures.

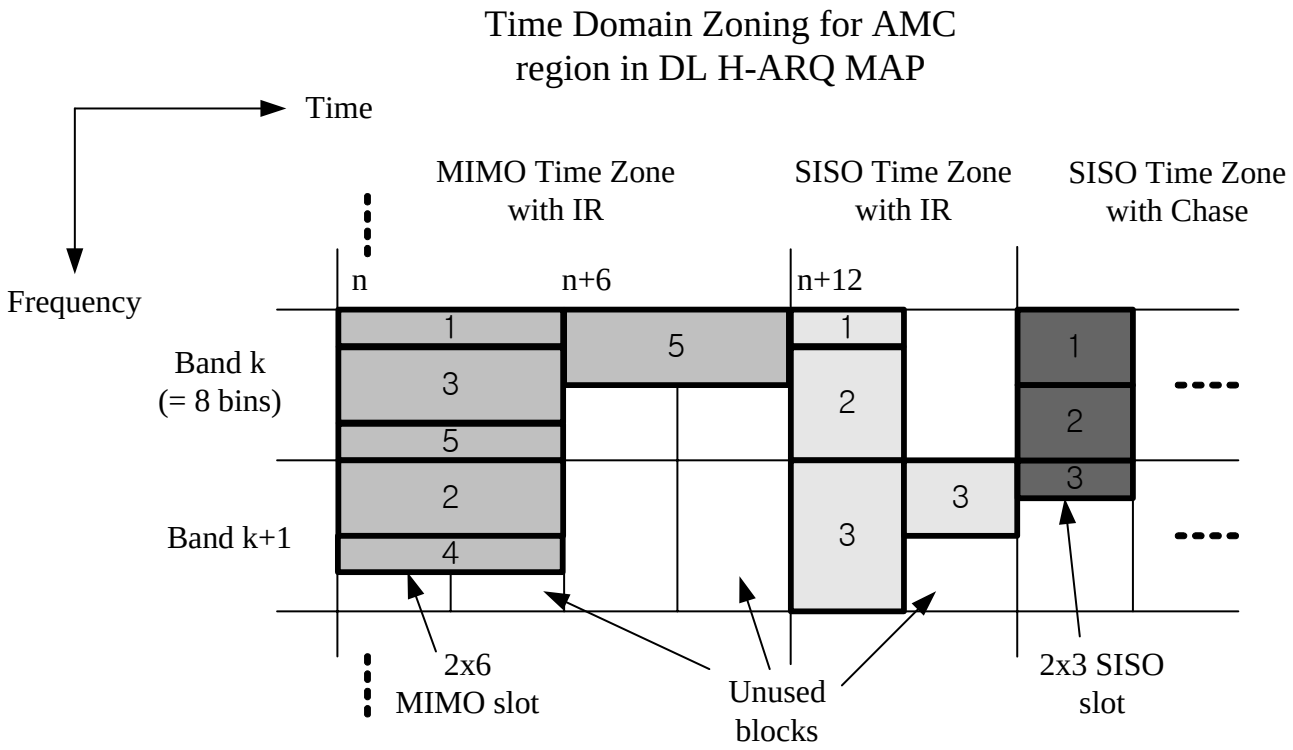

Figure 23a An Example of Time Domain Zoning for Multiple Zones in AMC Region of DL H-ARQ MAP (Method 1)

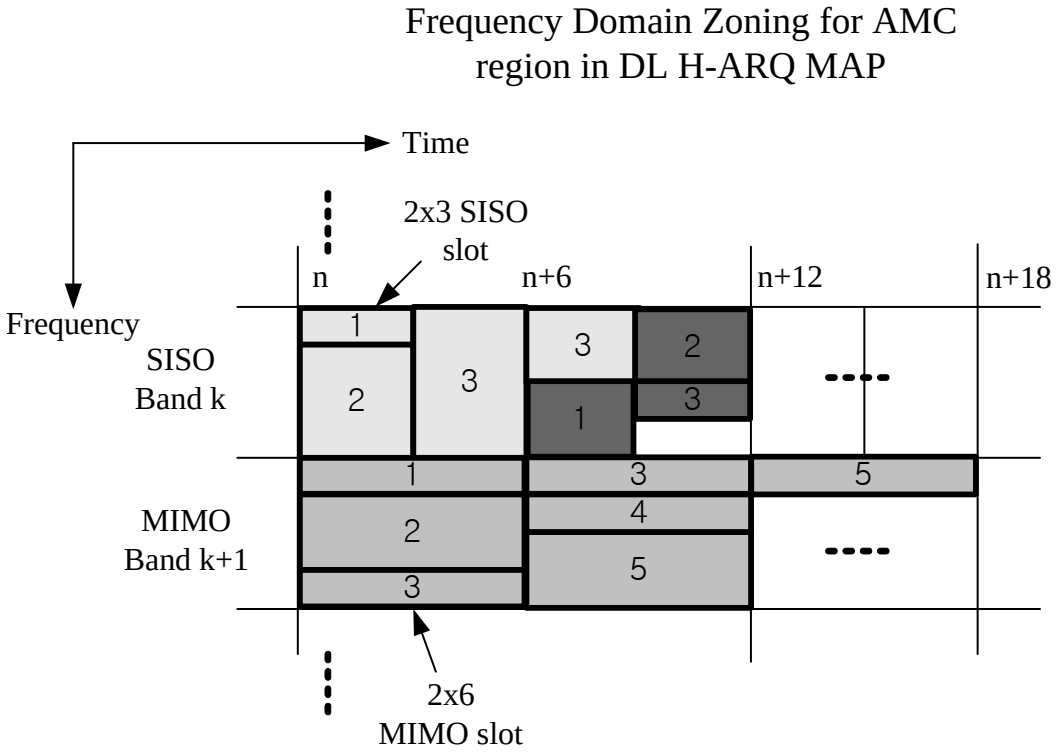

Figure 23b An Example of Frequency Domain Zoning for Multiple Zones in AMC Region of DL H-ARQ MAP (Method 2)

[Add a new section 6.3.2.3.43.7.9 as follows]

6.3.2.3.43.7.9 H-ARQ Compact UL-MAP IE format for AMC Zone Configuration

Due to the availability of multiple antennas and subpacket combining algorithm, there may be multiple zones in a single frame. When multiple zones exist within the band AMC region of a UL H-ARQ subframe, the adequate zone configuration shall be chosen by the BS and indicated through H-ARQ Compact UL-MAP IE for AMC Zone Configuration (Table 106b).

Table 106b—H-ARQ Compact UL-MAP IE format for AMC Zone Configuration

Syntax	Size (bits)	Notes
Compact_UL-MAP_IE() {		
UL-MAP Type=7	3	
UL-MAP sub-type	5	Extension sub type = 0x02
Length	4	Length of the IE in Bytes
AMC Zone Type	1	Indicates AMC zone type 0 = Time domain zoning 1 = Frequency domain zoning
Reserved	3	
}		

References:

[1] IEEE P802.16-REVd/D5-2004 Draft IEEE Standards for local and metropolitan area networks part 16: Air interface for fixed broadband wireless access systems

[2] IEEE P802.16e/D5 Air Interface for Fixed and Mobile Broadband Wireless Access Systems – Amendment for Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands

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