

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	<b>Proposed change on downlink control for multicast communication over IEEE 802.16.1a</b>	
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Re:	“IEEE 802.16-12-0142,” in response to Letter Ballot #38 on P802.16.1a/D1	
Abstract	Downlink control for multicast operation on GRIDMAN Draft Standard	
Purpose	To discuss and adopt the proposed text in the draft amendment document on GRIDMAN	
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# Proposed change on downlink control for multicast communication over IEEE 802.16.1a

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## 1. Introduction

This document provides a change on the downlink control for multicast communication to increase number of connections of multicast.

Figure 1 shows the number of connections for multicast communications using HR Multicast DL Assignment A-MAP IE. As shown the figure, number of connections using fragmented transmission is larger than that without fragmented transmission due to variable reason such as limit of resource in a subframe and level of MCS.

Thus, we propose a change on the downlink control for multicast communication (i.e., HR Multicast DL Assignment A-MAP IE).

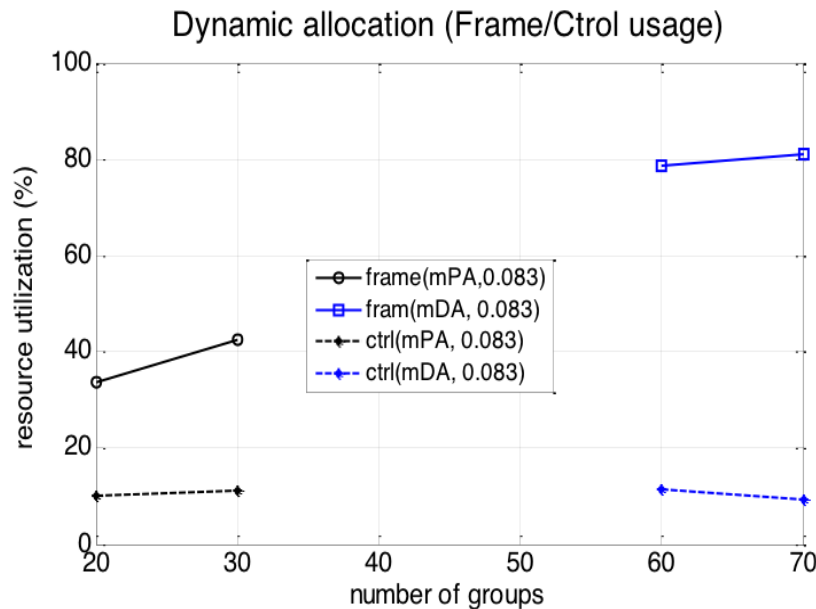
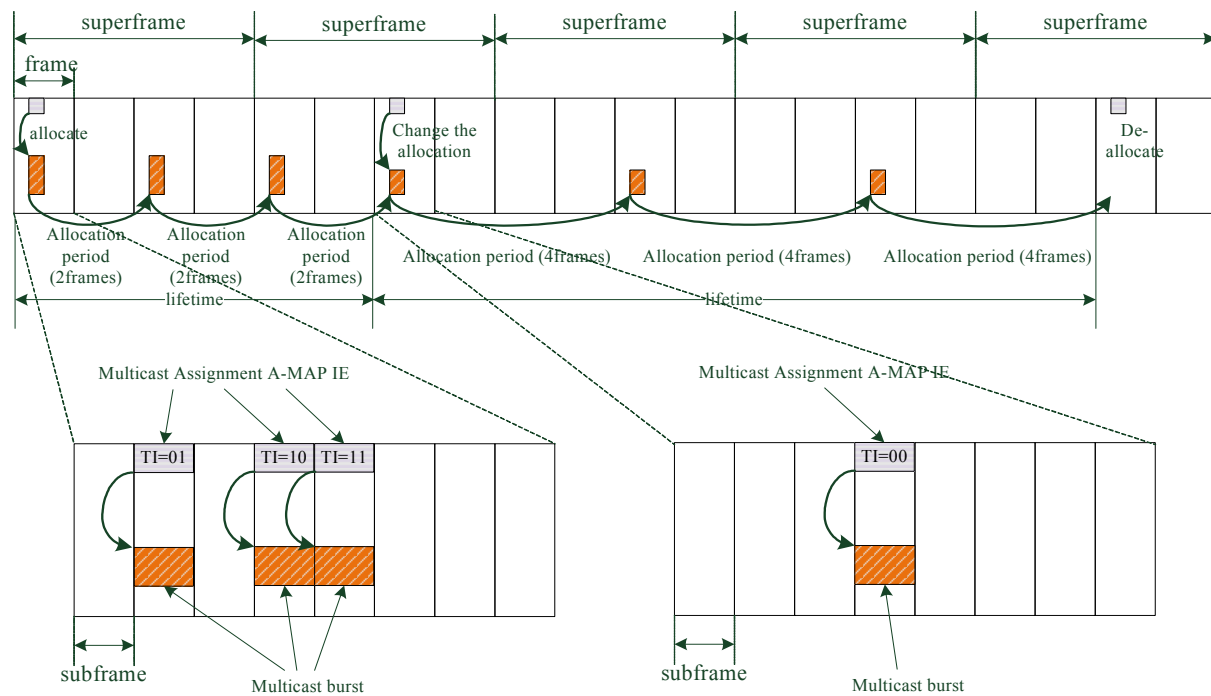


Figure 1—number of connections for multicast communication using HR Multicast DL Assignment A-MAP IE in 10MHz system bandwidth (mPA: no fragmentation, mDA: fragmentation)

## 2. HR Multicast DL Assignment A-MAP IE

Current HR Multicast DL Assignment A-MAP defined in P802.16.1a/D1 is transmitted persistently without fragmentation. To provide fragmented transmission of multicast traffic, the transmission indication is proposed and it indicates whether additional traffic is transmitted after transmission of multicast traffic in the time of allocation period. Transmission indication has 2bit information as follows:

- 0b00: no fragment
- 0b01: first fragment
- 0b10: continue
- 0b11: last fragment



**Figure 2—downlink control for multicast traffic with fragmentation**

## 3. References

- [1] IEEE 802.16-12-0132, GRIDMAN System Requirement Document including SARM annex, January 2012.
- [2] IEEE P802.16n<sup>TM</sup>/D1, Air Interface for Broadband Wireless Access Systems - Draft Amendment: Higher Reliability Networks, February 2012.
- [3] IEEE P802.16.1a<sup>TM</sup>/D1, WirelessMAN-Advanced Air Interface for Broadband Access Systems - Draft Amendment: Higher Reliability Networks, February 2012.
- [4] IEEE P802.16Rev3/D4, IEEE Draft Standard for Local and metropolitan area networks; Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems, February 2012.
- [5] IEEE P802.16.1<sup>TM</sup>/D4, IEEE Draft for WirelessMAN-Advanced Air Interface for Broadband Wireless Access Systems, February 2012.

#### 4. Proposed Text on the IEEE 802.16.1a Amendment Draft Standard

[-----Start of Text Proposal-----]

**[Remedy: Change 6.12.9.2.1 Downlink control channel for multicast communication in page 188 on P802.16.1a/D1 as follows:]**

##### 6.12.9.2.1 Downlink control channel for multicast communication

HR-multicast control channel (i.e., HR-Multicast DL Assignment A-MAP IE) carries configuration information (including allocation/change/release) for multicast communication for one multicast zone in an HR-BS. In HR-Multicast DL Assignment A-MAP, allocation period indicates a period of persistent allocation of multicast resource and Lifetime is a timer indicating the next instance of HR-Multicast DL-Assignment A-MAP IE. During the allocation period, transmission indication indicates whether multicast resource is fragmented. If the transmission indication(*TI*) is set to 00, it indicates no fragmented traffic is transmitted until the next allocation instance. If *TI* is set to 01, it indicates the first fragmented traffic and more fragmented traffic is expected to transmit until the *TI* is set to 11. More fragmented traffic is transmitted with the value of *TI* setting to 10 or 11. If *TI* is set to 10, it indicates more fragmented traffic is transmitting until it is set to 11. If *TI* is set to 11, no more fragmented traffic (i.e., last fragmented traffic) is transmitted. Unless the Lifetime expires, this HR-Multicast DL Assignment A-MAP excluding the value of *TI* does not change during the allocation duration. At the time the Lifetime expires, the HR-Multicast DL Assignment A-MAP shall change or release the allocation.

Table 208 - HR-Multicast DL Assignment A-MAP IE\*

Field	Size (bits)	Value/Description
HR-Multicast_DL_Assignment_A-MAP_IE() {		
A-MAP IE Type	4	HR-Multicast DL Assignment A-MAP IE
Allocation period	2	Period of persistent allocation of multicast resource. If (Allocation Period==0b00), it indicates the deallocation of persistent resource. 0b00: deallocation 0b01: 2 frames 0b10: 4 frames 0b11: 6 frames
If (Allocation Period == 0b00) {		

Table 208 - HR-Multicast DL Assignment A-MAP IE\*

Field	Size (bits)	Value/Description
Resource Index	11	5 MHz: 0 in first 2 MSB bits + 9 bits for resource index 10 MHz: 11 bits for resource index 20 MHz: 11 bits for resource index Resource index includes location and allocation size.
Long TTI Indicator	1	Indicates number for AAI subframes spanned by the allocated resource. 0b0: 1 AAI subframe (default TTI) 0b1: 4 DL AAI subframe for FDD or all DL AAI subframes for TDD (long TTI)
Reserved	22	
} else if(Allocation Period != 0b00) {		
Isizeoffset	5	Offset used to compute burst size index
MEF	2	MIMO encoder format  0b00: SFBC 0b01: Vertical encoding 0b10: Multi-layer encoding 0b11: CDR
If (MEF ==0b01) {		Parameter for vertical encoding
$M_t$	3	Number of streams in transmission $M_t \leq N_t$ $N_t$ : Number of transmit antennas at the HR-BS  0b000: 1 stream 0b001: 2streams 0b010: 3streams 0b011: 4streams 0b100: 5streams 0b101: 6streams 0b110: 7streams 0b111: 8streams
Reserved	1	
} else if (MEF == 0b10) {		Parameters for multi-layer encoding

Table 208 - HR-Multicast DL Assignment A-MAP IE\*

Field	Size (bits)	Value/Description
Si	4	<p>Index to identify the combination of the number of streams and the allocated pilot stream index in a transmission with MU-MIMO, and the modulation constellation of paired user in the case of 2 stream transmission</p> <p>0b0000: 2 streams with PSI=stream1 and other modulation = QPSK  0b0001: 2 streams with PSI=stream1 and other modulation = 16QAM  0b0010: 2 streams with PSI=stream1 and other modulation = 64QAM  0b0011: 2 streams with PSI=stream1 and other modulation information not available  0b0100: 2 streams with PSI=stream2 and other modulation =QPSK  0b0101: 2 streams with PSI=stream2 and other modulation =16QAM  0b0110: 2 streams with PSI=stream2 and other modulation =64QAM  0b0111: 2 streams with PSI=stream2 and other modulation information not available  0b1000: 3 streams with PSI=stream1  0b1001: 3 streams with PSI=stream2  0b1010: 3 streams with PSI=stream3  0b1011: 4 streams with PSI=stream1  0b1100: 4 streams with PSI=stream2  0b1101: 4 streams with PSI=stream3  0b1110: 4 streams with PSI=stream4  0b1111: n/a</p>
}		
Resource Index	11	<p>5 MHz: 0 in first 2 MSB bits + 9 bits for resource index  10 MHz: 11 bits for resource index  20 MHz: 11 bits for resource index  Resource index includes location and allocation size.</p>
Long TTI Indicator	1	<p>Indicates number for AAI subframes spanned by the allocated resource.  0b0: 1 AAI subframe (default TTI)  0b1: 4 DL AAI subframe for FDD or all DL AAI subframes for TDD (long TTI)</p>

Table 208 - HR-Multicast DL Assignment A-MAP IE\*

Field	Size (bits)	Value/Description
Lifetime(L)	4	Indicates the time to transmit next HR-Multicast DL Assignment A-MAP and the information <u>excluding Transmission Indication (TI)</u> of this HR-Multicast DL Assignment A-MAP does not change during the allocation duration. The next HR-Multicast DL Assignment A-MAP is at the superframe whose superframe number, Nsuperframe, satisfies the following condition.  Nsuperframe modulo L+1 = 0
<u>Transmission Indication (TI)</u>	<u>2</u>	<u>Indicates whether additional traffic is transmitting before allocation period</u> <u>0b00: no (no additional transmission)</u> <u>0b01: first (first transmission)</u> <u>0b10: continue (more transmission)</u> <u>0b11: last (no more transmission)</u>
Reserved	<del>7</del> <u>5</u>	
}		
}		

\*A 16bit CRC is generated based on the randomized contents of the HR-Multicast DL Assignment A-MAP IE. The CRC is masked by the 16-bit CRC mask (with masking prefix = 0b0 and message type indicator = 0b010) generated according to Table 192 as describe in 6.3.5.5.2.4.

[-----End of Text Proposal-----]