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Title	Improving HARQ Map Decoding Efficiency
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Re:	IEEE P802.16e/D9
Abstract	This contribution proposes a method for improving HARQ map decoding efficiency by inserting some fields in HARQ DL/UL MAP IE that enable omission of decoding some parts of the IE that belong to the HARQ modes the MS does not support.
Purpose	Review and Adopt the suggested changes into P802.16e/D9
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1 Introduction

This contribution proposes a method for improving HARQ map decoding efficiency by inserting some fields in HARQ DL/UL MAP IE that enable omission of decoding some parts of the IE that belong to the HARQ modes the MS does not support.

In P802.16e/D9 there are seven different HARQ modes, and an MS may support any subset of them. The capability of an MS on which HARQ modes are supported is negotiated through the SBC-REQ/RSP.

In general, multiple HARQ modes can exist in a HARQ DL MAP IE, and according to P802.16e/D9 an MS that supports a certain subset of HARQ modes has to decode all the fields of the IE that belong to the other HARQ modes that it does not support. This is because it does not know the length of the corresponding sub-burst IEs. As a result, the MS may experience unnecessary decoding delay and energy consumption.

Therefore, in this contribution we propose to insert the length field before the sub-burst_IE which indicates the size of the sub-burst IE in nibbles so that the MS can skip the fields while decoding the HARQ DL MAP IE.

In HARQ UL MAP IEs, a similar problem exists, so we propose to insert the length field in the HARQ UL MAP IE as well. In this case, however, if some of the sub-burst IEs are skipped then the MS is unable to learn the starting position of its own burst. Therefore, we propose to insert a field 'Duration' that indicates the sum of the duration in units of OFDMA slots (or Nsch) that belong to the HARQ region that corresponds to each HARQ mode.

The following section describes the proposed text changes in P802.16e/D9.

2 Proposed text changes

[Insert the following field in Table 286l as indicated below]

Table 286l—HARQ DL MAP IE format

Syntax	Size (bits)	Notes
Region_ID	8	Index to the DL region defined in DL region defini-tion TLV in DCD
}		
Mode	4	Indicates the mode of this ~~IE~~ HARQ region 0b0000 = Chase HARQ 0b0001 = Incremental redundancy HARQ for CTC 0b0010 = Incremental redundancy HARQ for Con-volutional Code 0b0011 = MIMO Chase H-ARQ 0b0100 = MIMO IR H-ARQ 0b0101 = MIMO IR H-ARQ for Convolutional Code 0b0110 = MIMO STC H-ARQ 0b0111-0b1111 *Reserved*
Boosting	3	000: normal (not boosted); 001: +6dB; 010: -6dB; 011: +9dB; 100: +3dB; 101: -3dB; 110: -9dB; 111: -12dB;
Length	8	Length in nibbles to indicate the size of the sub-burst IE in this HARQ mode

If (Mode == 0b0000) {	—	—
DL HARQ Chase sub-burst IE()	*variable*	—
} else if (Mode == 0b0001) {	—	—
DL HARQ IR CTC sub-burst IE()	*variable*	—
} else if (Mode == 0b0010) {	—	—
DL HARQ IR CC sub-burst IE() {	*variable*	—
} else if (Mode==0b0011) {		
MIMO DL Chase H-ARQ Sub-Burst IE ()	*variable*	
} else if (Mode==0b0100) {		
MIMO DL IR H-ARQ Sub-Burst IE ()	*variable*	
} else if (Mode==0b0101) {		
MIMO DL IR H-ARQ for CC Sub-Burst IE ()	*variable*	
} else if (Mode == 0b0110) {		
MIMO DL STC H-ARQ Sub-Burst IE ()	*variable*	
}	—	—
}	—	—
Padding	*variable*	Padding to byte; shall be set to 0
}	—	—

[Insert the following fields in Table 302i as indicated below]

Table 302i—HARQ UL MAP IE

Syntax	Size (bits)	Notes
Allocation Start Indication	1	0: No allocation start information 1: Allocation start information follows
If (Allocation Start Indication == 1) {	—	—
OFDMA Symbol offset	8	This value indicates start Symbol offset of subsequent sub-bursts in this HARQ UL MAP IE
Subchannel offset	7	This value indicates start Subchannel offset of subsequent sub-bursts in this HARQ UL MAP IE
Reserved	1	
}	—	—

Mode	3	Indicates the mode of this ~~IE~~ HARQ region 0b000 = Chase HARQ 0b001 = Incremental redundancy HARQ for CTC 0b010 = Incremental redundancy HARQ for convolutional code 0b011 = MIMO Chase H-ARQ 0b100 = MIMO IR H-ARQ 0b101 = MIMO IR H-ARQ for Convolutional Code 0b110 = MIMO STC H-ARQ 0b111 = *Reserved*
N sub Burst	4	Indicates the number of bursts in this UL MAP IE
Duration	12	Indicates the sum of the duration(or Nsch), in units of OFDMA slots, of sub-burst IEs in this HARQ region
Length	8	Length in nibbles to indicate the total size of all the sub-burst IEs in this HARQ mode
For (i =0 ;i < N Sub-burst; i++){	—	—
If (Mode == 000) {	—	—
UL HARQ Chase Sub-Burst IE ()	—	—
} else if (Mode== 001) {	—	—
UL HARQ IR CTC Sub-Burst IE ()	—	—
} else if (Mode== 010) {	—	—
UL HARQ IR CC Sub-Burst IE ()	—	—
} else if (Mode== 011) {		
MIMO UL Chase HARQ Sub-Burst IE ()		
} else if (Mode== 100) {		
MIMO UL IR H-ARQ Sub-Burst IE ()		
} else if (Mode== 101) {		
MIMO UL IR HARQ for CC Sub-Burst IE ()		
} else if (Mode == 110) {		
MIMO UL STC HARQ Sub-Burst IE ()		