

Project	<b>IEEE 802.16 Broadband Wireless Access Working Group</b> < <a href="http://ieee802.org/16">http://ieee802.org/16</a> >	
Title	Improving HARQ Map Decoding Efficiency	
Date Submitted	<b>2005-07-20</b>	
Source(s)	Jonghyun Won and Jaehwan Chang Samsung Electronics Co., Ltd.	<a href="mailto:j.h.won@samsung.com">j.h.won@samsung.com</a> <a href="mailto:jaehwan.chang@samsung.com">jaehwan.chang@samsung.com</a>
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	
Notice	This document has been prepared to assist IEEE 802.16. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.	
Release	The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by IEEE 802.16.	
Patent Policy and Procedures	The contributor is familiar with the IEEE 802.16 Patent Policy and Procedures < <a href="http://ieee802.org/16/ipr/patents/policy.html">http://ieee802.org/16/ipr/patents/policy.html</a> >, including the statement "IEEE standards may include the known use of patent(s), including patent applications, provided the IEEE receives assurance from the patent holder or applicant with respect to patents essential for compliance with both mandatory and optional portions of the standard." Early disclosure to the Working Group of patent information that might be relevant to the standard is essential to reduce the possibility for delays in the development process and increase the likelihood that the draft publication will be approved for publication. Please notify the Chair < <a href="mailto:chair@wirelessman.org">mailto:chair@wirelessman.org</a> > as early as possible, in written or electronic form, if patented technology (or technology under patent application) might be incorporated into a draft standard being developed within the IEEE 802.16 Working Group. The Chair will disclose this notification via the IEEE 802.16 web site < <a href="http://ieee802.org/16/ipr/patents/notices">http://ieee802.org/16/ipr/patents/notices</a> >.	

## 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 ~~change it to be mandatory to indicate the allocation offset~~ ~~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~~ ~~subsequent sub-bursts in the HARQ UL MAP IE.~~

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
<b>Region_ID</b>	8	Index to the DL region defined in DL region definition TLV in DCD
}		
<b>Mode</b>	4	Indicates the mode of this <del>IE</del> <a href="#">HARQ region</a> 0b0000 = Chase HARQ 0b0001 = Incremental redundancy HARQ for CTC 0b0010 = Incremental redundancy HARQ for Convolutional 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 <i>Reserved</i>
<b>Boosting</b>	3	000: normal (not boosted); 001: +6dB; 010: -6dB; 011: +9dB; 100: +3dB; 101: -3dB; 110: -9dB; 111: -12dB;
<a href="#">Length</a>	<a href="#">8</a>	<a href="#">Length in nibbles to indicate the size of the sub-burst IE in this HARQ mode</a>

If (Mode == 0b0000) {	—	—
<b>DL HARQ Chase sub-burst IE()</b>	<i>variable</i>	—
} else if (Mode == 0b0001) {	—	—
<b>DL HARQ IR CTC sub-burst IE()</b>	<i>variable</i>	—
} else if (Mode == 0b0010) {	—	—
<b>DL HARQ IR CC sub-burst IE() {</b>	<i>variable</i>	—
} else if (Mode==0b0011) {		
<b>MIMO DL Chase H-ARQ Sub-Burst IE ()</b>	<i>variable</i>	
} else if (Mode==0b0100) {		
<b>MIMO DL IR H-ARQ Sub-Burst IE ()</b>	<i>variable</i>	
} else if (Mode==0b0101) {		
<b>MIMO DL IR H-ARQ for CC Sub-Burst IE ()</b>	<i>variable</i>	
} else if (Mode == 0b0110) {		
<b>MIMO DL STC H-ARQ Sub-Burst IE ()</b>	<i>variable</i>	
}	—	—
}	—	—
<b>Padding</b>	<i>variable</i>	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
<del>Allocation Start Indication</del>	<del>1</del>	<del>0: No allocation start information 1: Allocation start information follows</del>
<del>If (Allocation Start Indication == 1) {</del>	<del>—</del>	<del>—</del>
<b>OFDMA Symbol offset</b>	8	This value indicates start Symbol offset of subsequent sub-bursts in this HARQ UL MAP IE
<b>Subchannel offset</b>	7	This value indicates start Subchannel offset of subsequent sub-bursts in this HARQ UL MAP IE
Reserved	<u>+2</u>	
<del>+</del>	<del>—</del>	<del>—</del>

<b>Mode</b>	3	Indicates the mode of <del>this IE</del> <a href="#">subsequent HARQ sub-bursts in this HARQ UL MAP IRegion</a> 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 = <i>Reserved</i>
<b>N sub Burst</b>	4	Indicates the number of bursts in this UL MAP IE
<b><u>Duration</u></b>	<u>12</u>	<a href="#">Indicates the sum of the duration(or Nsch), in units of OFDMA slots, of sub-burst IEs in this HARQ region</a>
<b><u>Length</u></b>	<u>8</u>	<a href="#">Length in nibbles to indicate the total size of all the sub-burst IEs in this HARQ mode</a>
For (i =0 ;i < N Sub-burst; i++){	—	—
If (Mode == 000) {	—	—
<b>UL HARQ Chase Sub-Burst IE ()</b>	—	—
} else if (Mode== 001) {	—	—
<b>UL HARQ IR CTC Sub-Burst IE ()</b>	—	—
} else if (Mode== 010) {	—	—
<b>UL HARQ IR CC Sub-Burst IE ()</b>	—	—
} else if (Mode== 011) {		
<b>MIMO UL Chase HARQ Sub-Burst IE ()</b>		
} else if (Mode== 100) {		
<b>MIMO UL IR H-ARQ Sub-Burst IE ()</b>		
} else if (Mode== 101) {		
<b>MIMO UL IR HARQ for CC Sub-Burst IE ()</b>		
} else if (Mode == 110) {		
<b>MIMO UL STC HARQ Sub-Burst IE ()</b>		