

Project	IEEE 802.16 Broadband Wireless Access Working Group < http://ieee802.org/16 >	
Title	Multiplexing extended header (MEH)	
Date Submitted	2009-08-27	
Source(s)	Scott Probasco Nokia	Voice: +1 469 939 9378 E-mail: [scott.probasco@nokia.com] *< http://standards.ieee.org/faqs/affiliationFAQ.html >
Re:	Letter Ballot #30, IEEE 802.16-09/0044	
Abstract	Proposed text for Multiplexing extended header (MEH)	
Purpose	Present text for review and acceptance in 16m task group.	
Notice	<i>This document does not represent the agreed views of the IEEE 802.16 Working Group or any of its subgroups.</i> It represents only the views of the participants listed in the "Source(s)" field above. It is offered as a basis for discussion. It is not binding on the contributor(s), who 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-SA Patent Policy and Procedures: < http://standards.ieee.org/guides/bylaws/sect6-7.html#6 > and < http://standards.ieee.org/guides/opman/sect6.html#6.3 >. Further information is located at < http://standards.ieee.org/board/pat/pat-material.html > and < http://standards.ieee.org/board/pat >.	

Fragmentation and packing extended header

Scott Probasco

Nokia (per <<http://standards.ieee.org/faqs/affiliationFAQ.html>>

1. Introduction

The current draft defines the “Multiplexing extended header” with four (4) separate definitions of the header blocks: first multiplexing header block, other multiplexing header block, first rearrangement multiplexing header block, and other rearrangement multiplexing header block. The syntax of the header blocks are basically the same, with minor changes, and can be re-written to utilize one single definition without changing the function as defined in D1.

2. Discussion

Since the four header blocks are basically the same, this proposal puts all Information Elements into one header and uses conditional statements to allow the header to be constructed identically as if defined by the four separate headers.

In order to keep the standard simple, to prevent future errors (which would occur if the text in the four separate header definitions are not kept syntactically the same), and to simply implementation, the four separate headers can be replaced with one single header. The specified function remains the same, even bit-exact.

3. Contribution Text

The text in this paragraph and immediately below, up to the text “Contribution text with edits follows this line“ can be ignored. It’s purpose is to set the proper numbering for subclauses, tables and figures. This is needed to make the proposed changes “cut and paste” friendly to the Editor.

15.2.2.2.3 Dummy Subclause

Table 664—Dummy Table

Figure 386—Dummy Figure

Dummy Equation (172)

[Contribution text with edits follows this line]

15.2.2.2.4 Multiplexing extended header (MEH)

The format of MEH is defined in Table 665. It is used when SDUs/SDUs fragments from different connections are included in the same MPDU. ~~Each MEH contains multiple Multiplexing Extended Header Blocks (MEHBs) or Rear-~~

~~re-arrangement Multiplexing Extended Header Blocks (RMEHBs). The SDUs or SDU fragments belonging to the same connection are packed together and with the information related to these SDUs or SDU fragments is included in one MEHB or RMEHB. The fields of MEH are defined in Table 666. The M bit in MEHB or RMEHB indicates if there is more MEHB or RMEHB followed.~~

Table 665—Multiplexing Extended Header Format

Syntax	Size (bit)	Notes
MEH () {		
LAST	1	0 = Another extended header follows MEH 1 = another extended header does not follow MEH
Type	TBD	MEH type
AFI	1	ARQ feedback IE indicator
Do {		
for (i = 1 ; M == 1 ; ++i)		
 MEHB (M)	1	Multiplexing extended header block
M	1	0 = Another SDU or SDU fragment follows this one 1 = This is the last SDU or SDU fragment in MEH
RI	1	Re-arrangement header indicator
If (i != 1) {		
FlowID	4	Flow Identifier
}		
FC	2	Fragmentation Control
SN	10	Payload sequence number
AFP	1	ARQ feedback poll indicator
if (RI == 1) {		
LSI	1	Last ARQ sub-block indicator
SSN	TBD	SUB-SN of the first ARQ sub-block
}		
if (i == 1) {		
Do {		
End	1	
If (End == 0) {		
Length	11	SDU or SDU fragment length
}		

Table 665—Multiplexing Extended Header Format

Syntax	Size (bit)	Notes
<u> </u> } while (! <u>End</u>)		
<u> </u> } else {		
<u> </u> Do {		
<u> </u> <u>Length</u>	<u>11</u>	<u>SDU or SDU fragment length</u>
<u> </u> <u>End</u>	<u>1</u>	
<u> </u> } while (! <u>End</u>)		
}		
} while (!M)		
Reserved	variable	
}		

Table 666—Multiplexing Extended Header Fields

Name	Length (bits)	Description
LAST	1	Last Extended Header Indicator (always set to 1)
Type	TBD	Extended Header Type
AFI	1	ARQ feedback IE indicator 0 = ARQ feedback IE is not present in the MAC PDU 1 = ARQ feedback IE follows after FPEH
MEHB	variable	Multiplexing extended header block (format shown in)
<u>M</u>	<u>1</u>	<u>Indication of more SDU or SDU fragment to send</u> <u>0 = no more SDU or SDU fragments follows the current data</u> <u>1 = one or more SDU or SDU fragment follows the current data</u>
<u>RI</u>	<u>1</u>	<u>Re-arrangement header indicator</u> <u>0 = no ARQ or rearrangement of blocks</u> <u>1 = ARQ, rearrangement of blocks is allowed</u>
<u>Flow ID</u>	<u>4</u>	<u>Flow ID of the SDU or SDU fragment identified. For the first SDU or SDU fragment, use the FlowID from the GMH.</u>
<u>FC</u>	<u>2</u>	<u>Fragmentation Control bits (see Table 661)</u>
<u>SN</u>	<u>10</u>	<u>Sequence number for the payload</u>

Table 666—Multiplexing Extended Header Fields

Name	Length (bits)	Description
<u>AFP</u>	<u>1</u>	<u>ARQ feedback poll indicator.</u> <u>0 = No ARQ feedback poll</u> <u>1 = ARQ feedback poll for the connection indicated in GMH</u>
<u>Length</u>	<u>11</u>	<u>This field indicates the length of SDU or SDU fragment.</u> <u>For 'N' SDU or SDU fragments in the PDU, N-1 Lengths are included, the Length field from the GMH is used to determine the missing Length.</u>
<u>End</u>	<u>1</u>	<u>Indication of more information</u> <u>0 = Indicating another "Length" and "End" fields are followed</u> <u>1 = Indicating no more "Length" and "End" fields are followed</u>

The format of MEHB is shown in Table 667, except the first MEHB. The format of the first MEHB is shown in Table 668. The first MEHB doesn't contain the Flow ID and the length for the first SDU/SDU fragment associated with the Flow ID. The Flow ID and the Length fields in the generic MAC header represent the flow ID and the length of the first SDU/SDU fragment associated with the first MEHB. The fields of MEHB are defined in Table 669.

Table 667—MEHB Format

Syntax	Size (bit)	Notes
MEHB() †		
M	†	0 = Another MEHB follows this MEHB 1 = This is the last MEHB in MEH
RI	†	Re-arrangement header indicator Always set to '0'
FlowID	4	Flow Identifier
FC	2	Fragmentation Control
SN	†0	
AFP	†	ARQ feedback poll indicator
Do †		
Length	†1	SDU or SDU fragment length
End	†	
† while (!End)		
†		

Table 668—First MEHB Format

Syntax	Size (bit)	Notes
First MEHB()		
M	1	0 = Another MEHB follows this MEHB 1 = This is the last MEHB in MEH
RI	1	Re-arrangement header indicator Always set to '0'
FC	2	Fragmentation Control
SN	10	
AFP	1	ARQ feedback poll indicator
Do		
End	1	
If (End == 0)		
Length	11	SDU or SDU fragment length
}		
} while (!End)		
}		

Table 669—MEHB Fields

Name	Length (bits)	Description
M	1	Indication of more MEHB —0 = no more MEHB follows the current MEHB —1 = one or more MEHB follows the current MEHB
RI	1	Re-arrangement header indicator 0 = FPEH format follows after RI bit 1 = RFPEH format follows after RI bit
Flow ID	4	Flow ID of the SDU/SDUs fragment identified in the MEHB
FC	2	Fragmentation Control bits (encoding shown in Table x.9)
SN	10	Sequence number for the payload identified in the MEHB

Table 669—MEHB Fields

Name	Length (bits)	Description
AFP	1	ARQ feedback poll indicator. 0 = No ARQ feedback poll 1 = ARQ feedback poll for the connection indicated in GMH
Length	11	This field indicates the length of SDU or SDU fragment. In case of First MEHB, if a payload consists of 'N' SDU/SDU fragments, N-1 'Length' fields are present. In case of MEHB, if a payload consists of 'N' SDU/SDU fragments, N 'Length' fields are present.
End	1	Indication of more information — 0 = Indicating another "Length" and "End" fields are followed — 1 = Indicating no more "Length" and "End" fields are followed

The format of RMEHB is shown in Table 670, except the first RMEHB. The format of the first RMEHB is shown in Table 671. In addition to the information in MEHB, the RMEHB contains additional information on ARQ retransmission. The fields of RMEHB are defined in Table 672.

Table 670—RMEHB Format

Syntax	Size (bit)	Notes
MEHB() {		
M	1	0 = Another RMEHB follows this RMEHB 1 = This is the last RMEHB in MEH
RI	1	Re-arrangement header indicator Always set to '0'
FlowID	4	Flow Identifier
FC	2	Fragmentation Control
SN	10	
AFP	1	ARQ feedback poll indicator
LSI	1	Last ARQ sub-block indicator
SSN	TBD	SUB-SN of the first ARQ sub-block
Do {		
Length	11	SDU or SDU fragment length
End	1	
} while (!End)		
}		

Table 671—First RMEHB Format

Syntax	Size (bit)	Notes
First MEHB() {		
M	1	0 = Another RMEHB follows this RMEHB 1 = This is the last RMEHB in MEH
RI	1	Re-arrangement header indicator Always set to '0'
FC	2	Fragmentation Control
SN	10	
AFR	1	ARQ feedback poll indicator
LSI	1	Last ARQ sub-block indicator
SSN	TBD	SUB-SN of the first ARQ sub-block
Do {		
End	1	
If (End == 0)		
Length	11	SDU or SDU fragment length
}		
} while (!End)		
}		

Table 672—RMEHB Fields

Name	Length (bits)	Description
M	1	Indication of more RMEHB —0 = no more RMEHB follows the current RMEHB —1 = one or more RMEHB follows the current RMEHB
RI	1	Re-arrangement header indicator 0 = FPEH format follows after RI bit 1 = RFPEH format follows after RI bit
Flow ID	4	Flow ID of the SDU/SDUs fragment identified in the RMEHB
FC	2	Fragmentation Control bits (encoding shown in Table 661)
SN	10	Sequence number for the payload identified in the MEHB

Table 672—RMEHB Fields

Name	Length (bits)	Description
AFR	1	ARQ feedback poll indicator. 0=No ARQ feedback poll 1=ARQ feedback poll for the connection indicated in GMH
LSI	1	Last ARQ sub-block indication 0=Indicating the last ARQ sub-block from the single ARQ block is not included in this MAC PDU 1=Indicating the last ARQ sub-block from the single ARQ block is included in this MAC PDU
SSN	1	SUB-SN of the first ARQ sub-block
Length	11	This field indicates the length of SDU or SDU fragment. In case of First RMEHB, if a payload consists of 'N' SDU/SDU fragments, N-1 'Length' fields are present. In case of RMEHB, if a payload consists of 'N' SDU/SDU fragments, N 'Length' fields are present.
End	1	Indication of more information —0=Indicating another "Length" and "End" fields are followed —1=Indicating no more "Length" and "End" fields are followed