Project	**IEEE 802.16 Broadband Wireless Access Working Group <**http://ieee802.org/16**>**
Title	**Clarifications about MAC Transmission and Delivery (16.2.4)**
Date Submitted	**2009-12-31**
Source(s)	Lei Wang InterDigital Communications, LLC Voice : +1 858 205-7286 E-mail: leiw@billeigean.com
Re:	IEEE 802.16 Working Group Letter Ballot #30b on P802.16m/D3
Abstract	The contribution proposes clarifications about MAC transmission and delivery (16.2.4).
Purpose	To be discussed and adopted by TGm for the 802.16m DRAFT amendment.
Notice	
Release	
Patent Policy	

Clarifications about MAC Transmission and Delivery (16.2.4)

Lei Wang
InterDigital Communications, LLC

1 Introduction

There are two issues with the 802.16m/D3 regarding the MAC transmission and delivery that need clarifications:

a) Due to the MAC encoding changes introduced in the 802.16m, it is necessary to check and reconfirm the MAC data transmission convention, i.e., transmission orders, specified by section 6.3.3.1 in 802.16-2009,

b) The MAC delivery issue also needs a clarification. This issue is not actually clearly addressed in the 802.16-2009. The 802.16m spec shall properly address this issue.

This contribution proposes clarifications regarding MAC transmission and delivery.

2 Discussions and Proposed Solutions

For the MAC transmission issue, we propose to start with the text in the 802.16-2009, i.e., copy the current 802.16-2009 MAC transmission convention text to the 802.16m draft, and make necessary modifications.

For the MAC delivery issue, the 802.16-2009 does not actually address it clearly. It only mentions the MAC delivery order issue in subsection 11.13.17.6 ARQ_DELIVERY_IN_ORDER_TLV for ARQ connection. This TLV used in DSx message. It indicates whether or not the order of delivery is preserved, i.e., whether data is to be delivered by the receiving MAC to its client application in the order in which the data was handed off to the originating MAC.

Considering today's all-IP network structure, for the network applications over IP that requires packet in-order delivery, there shall be above-IP mechanisms to ensure the in-order packet delivery to the applications. This makes MAC in-order delivery subject to further discussion and consideration. For sure, MAC in-order delivery will benefit some applications, but it may not needed for all network applications. Therefore, we propose MAC in-order-delivery is a service flow specific feature in 16m MAC, and it is signaled by a service flow parameter, called, MAC in-order-delivery, in the AAI_DSx messages.

3 Suggested changes in the 802.16m/D3

The following is the proposed change in the 802.16m/D3. Note that the new text is marked with blue and underline; the deleted text are marked with red and strikethrough.

Suggested change #1: page 121, line 1

Insert the following text in line 1 on page 121:

16.2.4.1 MAC Transmission and Delivery

As shown in Figure 387, at transmission side, the MAC PDU processing function blocks receive MAC SDUs from its upper layers, i.e., convergence sublayer in the data plane, or receive MAC control messages from MAC control modules in the control plane, construct the MAC PDUs, and transmit one or multiple concatenated MAC PDUs to the PHY layer. The MAC data shall be transmitted in accordance with the following rules:

a) Fields of MAC messages and TLV encodings are transmitted in the same order as they appear in the corresponding tables in this standard.

b) Fields of MAC messages and fields of TLV encodings, which are specified in this standard as binary numbers (including CRC and HCS), are transmitted as a sequence of their binary digits, starting from MSB. Bit masks (for example, in ARQ) are considered numerical fields. TLV encodings are transmitted in the order of Type, Length and Value. If the Value of a TLV or a field within the TLVs Value is explicitly specified as a numbered sequence of bits, then the order of transmission shall be

c) from highest sequence number to lowest sequence number. For signed numbers MSB is allocated for the sign. Length field in the "definite form" of ITU-T X.690 is also considered a numerical field.

d) Fields specified as SDUs or SDU fragments (for example, MAC PDU payloads) are transmitted in the same order of bytes as received from upper layers.

e) Fields specified as strings are transmitted in the order of symbols in the string.

In cases c) and d), bits within a byte are transmitted in the order "MSB first."

At the receiving side, the MAC PDU processing function blocks receive one or multiple concatenated MAC PDUs from the PHY layer, conduct the necessary processing, e.g., un-concatenation, decryption, unpacking, reassembly, etc., and then delivery the MAC SDUs to the convergence sublayer in the data plane or MAC control messages to the MAC control modules in the control plane. For a data transport connection, a service flow parameter, called MAC in-order delivery indicator, is used in AAI_DSx control messages to indicate whether or not data is to be delivered by the receiving MAC to its upper layer in the order in which the data was received by the originating MAC.

Suggested change #2: page 121, line 1

Change the subsection numbers of 16.2.4.x….. by increasing the 4th subsection number by 1, i.e., x+1.

Suggested change #3: page 216, line 29

Change the first sentence in the Description box of row "MAC in-order delivery indicator" as follows:

Indicate whether or not the order of delivery ~~in non-ARQ connection~~ is preserved by the MAC.

4 References

[1] IEEE Std 802.16-2009

[2] IEEE P802.16m/D3, “DRAFT Amendment to IEEE Standard for Local and metropolitan area networks”