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Title	Enhanced MSDU Packing Scheme	
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Re:	Re: MAC: Data Plane; in response to the TGm Call for Contributions and Comments 802.16m-08/033 for Session 57	
Abstract	This contribution proposes the text for packing scheme in 802.16m SDD	
Purpose	For discussion and approval by IEEE 802.16 TGm	
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Enhanced MSDU Packing Scheme

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Introduction

In the current 802.16e system, if the MAC service data unit (MSDU) packing scheme is enabled, the MS may pack multiple MSDUs of a same service flow into a single MAC PDU (MPDU). Using the packing scheme, the overhead caused by MPDU encapsulation is reduced. The encapsulation overhead decreases linearly as the number of packed MSDUs increases. In order to further reduce the transmission overhead, the MSDUs of different service flows should be packed into a MPDU. This contribution proposes an enhanced MSDU packing scheme for the 802.16m system.

Legacy MSDU Packing Scheme in 802.16e System

A typical IEEE 802.16e MPDU consists of a 6-byte generic MAC header, the payload, and an optional 4-byte CRC tailer. For an MS to individually encapsulate a number of N variable-length MSDUs of a same service flow, the total amount of overheads caused by encapsulation process is equal to $(6+4) \times N$ bytes. However, if these N variable-length MSDUs of the same service flow are packed into an MPDU, the total amount of incurred overhead becomes $6+4+2 \times N$ bytes, wherein a 2-byte packing subheader is attached to each packed MSDU. For example, when $N=4$, the overhead reduction could be up to $40-18=22$ bytes. Therefore, the packing scheme has been adopted by 802.16e system to use the airlink efficiently. However, because each MPDU is identified by the transport CID carried in the MAC header, an MPDU only comprises the MSDUs belonging to a same service flow. Therefore, if an MS desires to transmit four MSDUs ($N=4$), which are belonging to different service flows, the total amount of overheads caused by encapsulation process will be $(6+4) \times 4=40$ bytes, which is the same as the case without packing scheme. The deficiency in the 802.16e packing scheme is clear.

Enhanced MSDU Packing Scheme for 802.16m System

In the IEEE 802.16m system, the BS assigns a "Station Identifier" to the MS to uniquely identify the MS to the BS and the BS assigns a "Flow Identifier" to each MS connection in order to uniquely identify the connection within the MS. "Flow Identifiers" identify management connections and active transport Service Flows. Typically, the Flow Identifier is a short ID and it is used to replace the legacy 16-bit transport CID carried in MPDU. So, if a number of N MSDUs of different service flows are packed into a single MPDU, then the total amount of incurred overhead will be $P+Q+R \times N$ bytes, where P , Q and R are the sizes (in bytes) of 802.16m MAC header, tailer and packing subheader, respectively. For the sake of comparison, we simply consider the sizes of 802.16m MAC header and CRC tailer are the same as 16e system. If 1-byte Flow Identifier is carried in

the 802.16m packing subheader, then the total amount of overhead for transmitting four MSDUs of different service flows is equal to $6+4+3\times 4=22$ bytes. The overhead saved by proposed scheme is $40-22=18$ bytes. As a conclusion, in order to reduce the MPDU encapsulation overheads, MSDUs of different service flows may be packed into an MAC PDU, wherein the Flow Identifier of MSDU shall be included in the attached subheader.

Proposed Text Changes:

[Add the following section 10.x “MAC SDU Packing”]

10.x MAC SDU Packing

In order to reduce the MAC PDU encapsulation overheads, MAC SDUs of different service flows may be packed into an MAC PDU, wherein the Flow Identifier of MSDU shall be included in the attached subheader.