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Title	Consecutive Transmission of Bandwidth Request Indicators	
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Re:	SDD Session 56 Cleanup: BW request channel; in response to the IEEE 802.16m-08/033, Call for Contributions and Comments on Project 802.16m System Description Document (SDD)”	
Abstract	To propose relay frame structure to improve bandwidth usage efficiency.	
Purpose	To propose relay frame structures to be adopted to the 802.16m SDD	
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Consecutive Transmission of Bandwidth Request Indicators

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Introduction

In the last meeting, the optional quick access procedure for bandwidth request/grant has been adopted to the SDD. Using this procedure, an MS can get granted some amount of UL bandwidth without sending a BW-REQ message. If the granted UL bandwidth is not enough, the MS can use piggybacked bandwidth request.

In order to enable the BS to properly schedule UL bandwidth allocation in the optional quick access procedure, the bandwidth request indicator should contain MS/Flow ID (QoS) and bandwidth request size information.

(1) MS/Flow ID (QoS):

To indicate the proper MCS, BS needs to know who requests bandwidth.

To prioritize the received request, BS needs to know priority (QoS) of connection requesting bandwidth.

The flow ID can represent priority (QoS) of the connection, as well as other factors.

(2) Bandwidth Request Size

To minimize unused granted bandwidth or to shorten latency of SDU transmission, BS needs to know the requested bandwidth from the bandwidth request indicator.

The figure 1 shows an example of the 5-step regular procedure (left) and the optional quick access procedure (right). As shown in the figure, the optional quick access procedure may not shorten transmission latency from SDU (IP packet) transmission point of view. According to the SRD, data latency should be considered at the IP layer. So, the optional quick access procedure is not enough to meet the requirement.

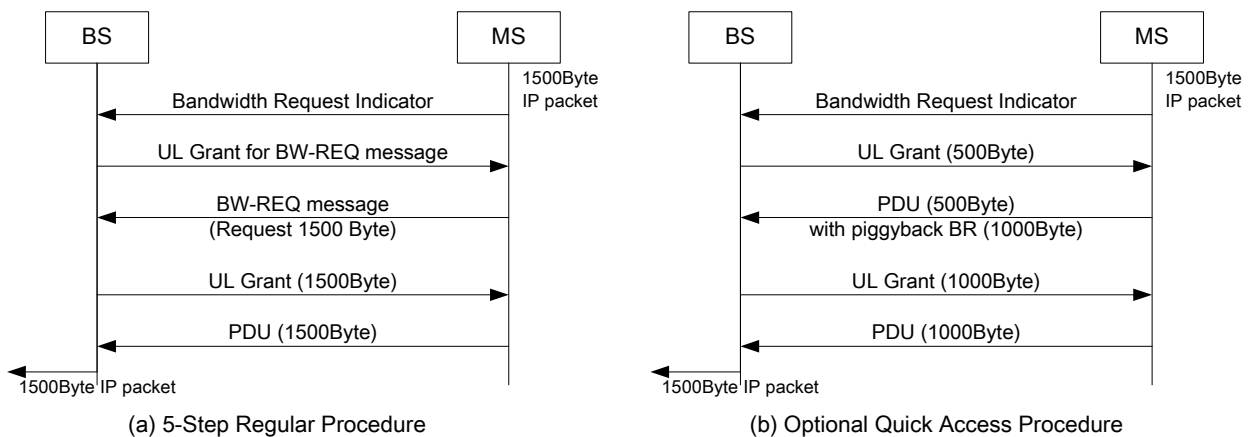


Figure 1: Example of Bandwidth Request/Grant procedures

As mentioned above, bandwidth request indicator needs to contain MS/Flow ID and bandwidth request size

information.

However, all necessary information may not be able to be associated with a bandwidth request indicator, because the number of indicators may be limited.

Proposed Bandwidth Request Method

In order to solve the above mentioned problem, we propose two consecutive bandwidth request indicator transmission.

The figure 2 shows the proposed bandwidth request/grant procedure.

MS sends two consecutive bandwidth request indicator to the BS, the first indicator represents MS/ Flow ID and the second one represents the bandwidth request size.

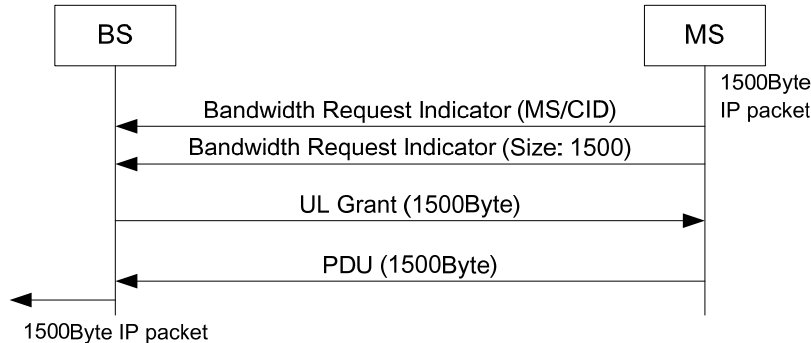


Figure 2: The proposed Bandwidth Request/Grant Procedure

Figure 3 illustrates the consecutive transmission of two bandwidth request indicators. After choosing two consecutive ranging opportunities, MS sends the bandwidth request indicator containing MS/Flow ID information on the first ranging opportunity and the one containing the bandwidth request size on the second ranging opportunity.

When BS detects the consecutive bandwidth request indicators, it shall treat them as one bandwidth request. MS shall not send a bandwidth request indicator containing the bandwidth request size information as a single bandwidth request indicator. The bandwidth request indicator containing the bandwidth request size shall always follow the one containing MS/Flow ID information.

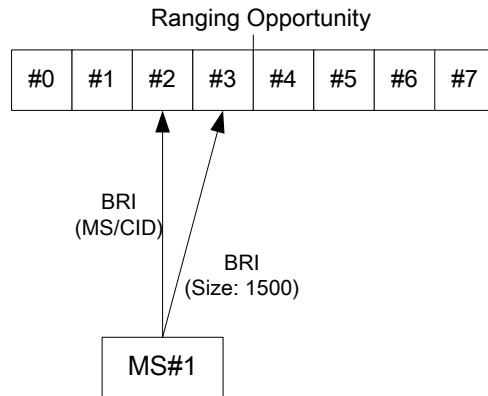


Figure 3: Two consecutive transmission

Proposed Text to the SDD

[Change the first paragraph of the 11.9.2.5 (Bandwidth Request Channel) as indicated]

Contention based or non-contention based random access is used to transmit a bandwidth request indicator on this control channel. To support different levels of QoS, the bandwidth request channel provides a mechanism for prioritized bandwidth requests. ~~Inclusion of addition information in a bandwidth request indicator such as bandwidth request size, MS-ID, flow identifier, uplink transmit power report and CINR report is FFS.~~
A bandwidth request indicator can include bandwidth request size, flow MS-ID, flow identifier, uplink transmit power report and CINR report (FFS).

[Change the second paragraph of the 11.9.2.5 (Bandwidth Request Channel) as indicated]

The random access bandwidth request procedure is described in Figure 35. A 5-step regular procedure (step 1 to 5) or an optional quick access procedure (step 1,4 and 5) may be supported concurrently. Step 2 and 3 are used only in 5-step regular procedure. In step 1, MS sends a one or two bandwidth request indicators that may indicate information such as MS addressing, flow identifier and/or request size ~~(FFS) and/or uplink transmit power report (FFS)~~, and the BS may allocate uplink grant based on certain policy. When the MS sends two bandwidth request indicators, the two bandwidth request indicators shall include different information and be transmitted on two consecutive bandwidth request channel resource blocks. The 5-step regular procedure is used independently or as fallback mode for quick access procedure. The MS may piggyback additional BW-REQ information along with user data during uplink transmission (step 5).