IEEE P802.11
Wireless LANs

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| Spec text unify queue size report |
| Date: 2017-05-07 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.2 with the following CIDs:

* 8426 8427 (2 CID)

Revisions:

* Rev 0: Initial version of the document.Option 1 of adding a new control ID for per AC based BSR A Control with per-TID based BSR A Control
* Rev 1: Revision of the document.Option 2 of replacing per AC based BSR A Control with per-TID based BSR A Control

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **clause** | **Comment** | **Proposed Change** | **Resolution** |
| 8426 | Robert Stacey | 25.34 | The two methods for reporting queue size (Queue Size field in QoS Data and BSR A-Control) are not compatible with each other. The Queue Size in QoS Data is reported per TID while Queue Size in BSR A-Control is reported per AC. An AP collecting Queue Size per TID would not know how to partition the BSR information (since it is the sum of the queue size for two TIDs). An AP that collects queue size per AC may make inaccurate allocations to STAs that do not support multi-TID aggregation or if the AP itself cannot receive multi-TID A-MPDUs. | Change the BSR so that it either reports queue size per TID or simplify it so that it just indicates which Acs have traffic. | Revised –Aggree in principle. Refer to IEEE 802.11-17/765r0 for discussionsTGax editor to make the changes shown in 11-17/0765r1  |
| 8427 | Robert Stacey | 25.34 | The BSR is poorly designed. Its only purpose is to report queue state for traffic not in the current aggregate (since queue size in QoS Control can do it for traffic in the aggregate). Even so, it is not strictly necessary since that status could be collected through multi-TID aggregation or through a separate access. It is not compatible with queue size reported in QoS Control since it reports per AC and has a queue size range that different from queue size in QoS Control. | Redesign BSR so that it reports queue size in a manner compatible with queue size in QoS Control. Say 3 fields of 8-bits representing the queue sizes of TIDs in each of the ACs not represeted by the TID of the QoS Data frame carrying the BSR. Queue size reported in a manner compatible with queue size in QoS Control (units of 256 octets). The TIDs reported in sets: say {1, 0, 4, 6} and {2, 3, 5, 7}, so that if the QoS Data frame is for a TID in set 1 the queue size for other TIDs are in set 1. | Revised –Aggree in principle. Refer to IEEE 802.11-17/765r0 for discussionsTGax editor to make the changes shown in 11-17/0765r1 |

## Discussion:

Refer to the discussion in doc IEEE 802.11-17/765r0. This contribution provides spec text for option 2 of replacing the per AC based queue size report with per TID based queue size report.

9.2.4.6.4.5 Buffer status report (BSR) Control

**TGax Editor: *replace the exiting text and tables in section of 9.2.4.6.4.5 with the text and tables as follows:***

The Control Information subfield, when the Control ID subfield is 3, contains buffer status information used for UL MU operation (see 27.5.2.5 (HE buffer status feedback operation for UL MU)). The format of the subfield is shown in Figure 9-15f (Control Information subfield format when Control ID subfield is 3).

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| --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 B11 | B12 B15 | B16 B23 | B24 B25 |
|  | First TID | Queue sizeof the first TID | Second TID | Queue sizeof the second TID | Scaling factor |
| Bits: | 4 | 8 | 4 | 8 | 2 |

**Figure 9-15f—Control Information subfield format when Control ID subfield is 3**

The First TID subfield indicates the TID for which the following Queue Size of the First TID subfield is present.

The Queue Size of the first TID subfield indicates the amount of buffered traffic in units of SF octets of the TID identified by the First TID subfield that is intended for the STA identified by the receive address of the frame containing the BSR Control field.

The Second TID subfield indicates the TID for which the following Queue Size of the Second TID subfield is present.

The Queue Size of the second TID subfield indicates the amount of buffered traffic in units of SF octets of the TID identified by the Second TID subfield that is intended for the STA identified by the receive address of the frame containing the BSR Control field.

The Scaling Factor subfield indicates the unit SF, in octets, of the Queue Size subfields. SF is equal to:

16 if the Scaling Factor subfield is 0

128 if the Scaling Factor subfield is 1

2 048 if the Scaling Factor subfield is 2

16 384if the Scaling Factor subfield is 3

The queue size values in the Queue Size of the first TID and Queue Size of the first TID subfields are the total sizes, rounded up to the nearest multiple of SF octets, of all MSDUs and A-MSDUs buffered at the STA (including the MSDUs or A-MSDUs contained in the (A-)MPDU containing the BSR in the delivery queues used for MSDUs and A-MSDUs belong to the specified TID. A queue size value of 254 is used for all sizes greater than 254 *SF* octets. A queue size value of 255 is used to indicate an unspecified or unknown size. If an MSDU or A-MSDU is fragmented and is not carried in an A-MPDU, the queue size value might remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted. If an MSDU or A-MSDU is fragmented and is carried in an A-MPDU, the queue size values are set according to the rules in 10.9 (HT operation).

27.5.2.5 HE buffer status feedback operation for UL MU

**TGax Editor: *modify section 27.5.2.5 as follows:***

A non-AP STA delivers buffer status reports (BSRs) to assist its AP in allocating UL MU resources in an efficient way. The non-AP STA can either implicitly deliver BSRs in the QoS Control field or BSR Control field of any frame transmitted to the AP (unsolicited BSR) or explicitly deliver BSRs in any frame sent to the AP in response to a BSRP variant Trigger frame (solicited BSR).

A non-AP STA reports its buffer status (unsolicited BSR) to the AP to which it is associated using either the QoS Control field or the BSR Control field(#4727) of frames it transmits as defined below:

* The HE STA shall report the buffer status for a given TID in the Queue Size subfield of the QoS Control field in QoS Data or QoS Null frames it transmits; except that the STA may set the Queue Size subfield to 255 to indicate an unknown/unspecified BSR for that TID. The HE STA may report the buffer status for a given TID in the Queue Size of the first TID or in the Queue Szie of the second TID subfield of the BSR Control field if the AP has indicated its support in the BSR Support subfield of its HE Capabilities element; otherwise the STA shall not report the buffer status in the BSR Control field.
	+ The HE STA may aggregate multiple QoS Data frames or QoS Null frames in an A-MPDU to report the buffer status for different TIDs. The HE STA shall follow the A-MPDU aggregation rules defined in 27.10.4 (A-MPDU with multiple TIDs) for aggregating QoS Data frames with multiple TIDs. The HE STA does not follow the rules defined in 27.10.4 (A-MPDU with multiple TIDs) for QoS Null frames whose Ack Policy subfield is No Ack.
* ~~The HE STA may report the buffer status in the BSR Control field(#4727) of frames it transmits if the AP has indicated its support in the BSR Support subfield(#4727) of its HE Capabilities element; otherwise the STA shall not report the buffer status in the BSR Control field(#4727).~~
	+ ~~The HE STA shall report the buffer status for its preferred AC, indicated by the ACI High subfield, in the Queue Size High subfield of the BSR Control field(#4727); except that the STA may set the Queue Size High subfield to 255 to indicate an unknown/unspecified BSR for that AC~~
	+ ~~The HE STA shall report the buffer status for all ACs, indicated by the ACI Bitmap subfield, in the Queue Size All subfield of the BSR Control field(#4727); except that the STA may set the Queue Size All subfield to 255 to indicate an unknown/unspecified BSR for those ACs~~
	+ ~~The HE STA shall set the Delta TID subfield according to Table 9-18c(#6695, #8705), and the Scaling Factor subfield as defined in 9.2.4.6.4.5 (Buffer status report (BSR) Control(#4727)).~~

NOTE 1—The STA can send an unsolicited BSR in response to Basic variant Trigger frames (with or without random RUs, as defined in 27.5.2.3 (STA behavior for UL MU operation(#8151)) and in 27.5.2.6 (UL OFDMA-based random access (UORA))) or it can send the unsolicited BSR after accessing the WM using EDCA.

NOTE 2—The STA can include both the QoS Control and the BSR Control field(#4727) in the same frame and it can set the Queue Size subfield of either of them to a value of 255.

An AP can also solicit one or more non-AP STAs for their BSR(s) by sending a BSRP variant Trigger frame (see 9.3.1.23 (Trigger frame format)). The non-AP STA responds (solicited BSR) as defined below:

* The STA that receives a BSRP Trigger frame(#Ed) shall follow the rules defined in 27.5.2.3 (STA behavior for UL MU operation(#8151)) to generate the HE TB PPDU(#6696) when the Trigger frame contains the 12 LSBs of the STA's AID(#7817) in any of the User Info fields; otherwise if the STA's buffers are not empty and the STA supports the UL OFDMA-based random access procedure, it may(#5365, #9916) follow the rules defined in 27.5.2.6 (UL OFDMA-based random access (UORA)) to gain access to a random RU and generate the HE TB PPDU(#6697) when the Trigger frame contains one or more random RU(s).
* The STA shall include in the HE TB PPDU one or more QoS Null frames containing one or more of the following:
	+ The QoS Control field(s) with Queue Size subfields for each of the TIDs for which the STA has

buffer status to report to the AP.

* + The BSR Control field(#4727) with the ~~Queue Size All subfield~~ Queue Size of the first TID or Queue Size of the second TID subfieleds indicating the queue size for ~~all the ACs~~the TIDs, indicated by the First TID and Second TID subfields, for which the STA has buffer status to report to the AP when the AP has indicated its support in the BSR Support subfield(#4727) of its HE Capabilities element. ~~The STA shall set Delta TID, SF, ACI High and Queue Size High subfields of the BSR Control field(#4727) as defined in 9.2.4.6.4.5 (Buffer status report (BSR) Control(# 4727))).~~
* The HE STA shall not solicit an immediate response for the frames carried in the HE TB PPDU(#6697) (e.g., by setting the Ack Policy subfield of the frame to Normal Ack or Implicit BAR).

NOTE—Similar to unsolicited BSR, the STA can set Queue Sizes in either QoS Control or BSR Control field(#4727) to 255 to indicate unknown/unspecified BSR for a TID, AC or all AC.

An AP may include a BSRP Trigger frame together with other control, data and management frames in one A-MPDU to a STA if the HE Capabilities element received from the STA has the BSRP A-MPDU Aggregation field equal to 1. If a STA receives a BSRP Trigger frame aggregated with control, data and management frames that solicits an acknowledgement, the response A-MPDU shall contain MPDUs in the order described in 9-425 (A-MPDU contents in the data enabled immediate response context)(#5998, #6701).