IEEE P802.11
Wireless LANs

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| HE Variant HT Control – Buffer Status Report |
| Date: 2016-07-06 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D0.1 with the following CIDs (24 **CIDs**):

* 824, 93, 1067, 2388 (4 CIDs)
* 45, 178, 254, 438, 680, 769, 770, 771, 817, 818, 1062, 1065, 1066, 1550, 2189, 2190, 2191, 2272, 2711, 147 (20 CIDs)

Revisions:

* Rev 0: Initial version of the document.

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.***

# PARS I (Buffer Status Report A-Control field)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 824 | Jinsoo Ahn | 13.63 | In order to request buffer status report by A-Control field in MU UL, at least trigger info and buffer status report request info need to be included in A-control field. However, using each A-control subfield is not feasible due to lack of A-control bits. | Add some control ID value for BSR and BSRR with/without trigger infoControl ID for BSRR with trigger infoControl ID for BSRR without trigger infoControl ID for Non-triggered BSR((TID, granularity, Queue size)Control ID for Triggered BSR (TID and granularity is not included)Based on buffer status report procedure, some options above could to be neglected | Revised –Agree in principle with the comment. The proposed resolution is to define a BSR A-Control field inline with the motioned concepts of 11/16/0628r1 (Buffer Status Report in HE Control field), and to define a BSRP variant Trigger frame to solicit BSRs. To keep the BSRP/BSR procedure simple and inline with concepts in the SFD no other options are considered.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 824. |
| 93 | Alfred Asterjadhi | 31.63 | This TBD needs to be removed from the Control ID values rows of the A-Control field. We do need a value for Buffer Status Report to support the normative behavior defined in 25.5.2.5 and maybe a value for CQI feedback. | Insert two rows, with Control ID value 3, and 4, one for Buffer Status Report, one for CQI Feedback Report, and replace remove TBD row. Replace 8 with 5 in the last row. For each of the new rows add the subfields length, add "See 9.2.4.6.4.4" in the last column of the row, and determine all missing fields that are necessary for each of the subfields and add their description) in new subclauses that follow 9.2.4.6.4.4. | Revised –Agree in principle with the comment. The proposed resolution is to define a BSR A-Control field inline with the motioned concepts of 11/16/0628r1 (Buffer Status Report in HE Control field), and to define a BSRP variant Trigger frame to solicit BSRs. For CQI feedback there is no proposed resolution as this concept needs more technical discussions. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 93. |
| 1067 | Kiseon Ryu | 15.26 | Control signaling of buffer status report for multiple TIDs/ACs should be defined to support the multi-TID A-MPDU. | Define the Control subfield for multiple TIDs/ACs buffer status report as an HE variant HT Control field. | Revised –Agree in principle with the comment. The proposed resolution is to define a BSR A-Control field inline with the motioned concepts of 11/16/0628r1 (Buffer Status Report in HE Control field).TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 1067. |
| 2388 | Yongho Kim | 13.63 | Since the request for buffer status from AP and buffer status report frame can be sent as in 25.5.2.5(HE buffer status feedback operation UL MU), request for buffer status and buffer status report(BSR) need to be included in Control Information | Insert Buffer Status Report trigger and Buffer Status Report(BSR) in Table 9-18a:Insert Buffer Status Report trigger with Control ID 3Insert Buffer Status Report with Control ID 4Insert the following 9.2.4.6.4.5 Buffer Status Report trigger after 9.2.4.6.4.4:"9.2.4.6.4.5 Buffer Status Report triggerThe Control Information subfield, when the Control ID subfield is 3, contains trigger information for buffer status report(see 25.5.2.5 (HE buffer status feedback operation for UL MU)).The format of the Control Information subfield consists of UL PPDU length subfield, RU allocation subfield, TID subfield, and Granualrity subfield.The UL PPDU Length subfield indicates the length of the HE trigger-based PPDU response and is set to a nonzero value that is TBD.The RU Allocation subfield indicates the resource unit (RU) assigned for transmitting the HE trigger-based PPDU response.The TID subfield indicates TID of TC or TS.The Granularity subfield indicates TBD granularity of the Queue Size for an HE STA to report."Insert the following 9.2.4.6.4.6 Buffer Status Report after 9.2.4.6.4.5:"9.2.4.6.4.6 Buffer Status ReportThe Control Information subfield, when the Control ID subfield is 4, contains buffer status report(see 25.5.2.5 (HE buffer status feedback operation for UL MU)).The format of the Control Information subfield consists of TID subfield, Granualrity subfield, and Queue Size subfieldThe TID subfield indicates TID of TC or TS.The Granularity subfield indicates TBD granularity of the Queue Size for an HE STA to report .The Queue Size subfield indicates the indicates the amount of buffered traffic for a given TC or TS at the HE STA sending this frame." | Revised –Agree in principle with the comment. The proposed resolution is to define a BSR A-Control field inline with the motioned concepts of 11/16/0628r1 (Buffer Status Report in HE Control field), and to define a BSRP variant Trigger frame to solicit BSRs. To keep the BSRP/BSR procedure simple and inline with concepts in the SFD no other options are considered.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 2388. |

**Discussion:** This document also includes motioned conceps passed during the IEEE F2F meeting in May: <https://mentor.ieee.org/802.11/dcn/16/11-16-0628-01-00ax-buffer-status-report-in-he-control-field.pptx>(also defined the TBDs).

**TGax Editor: *Insert a new row toTable 9-18a (Control ID subfield values (#CID 824, 93, 1067, 2388):***

**Table 9‑18a - Control ID subfield values**

|  |  |  |  |
| --- | --- | --- | --- |
| **Control ID value** | **Meaning** | **Length, in bits, of the****Control Information subfield** | **Contents of the****Control Information subfield** |
| … |  |  |  |
| 3 | Buffer Status Report (BSR) | 26 | See 9.2.4.6.4.5 (Buffer Status Report) |
| 4-15 | Reserved |  |  |

## 10.9 HT Control field operation

**TGax Editor: *Change the paragraph below as follows (#CID 824, 93, 1067, 2388):***

An HE variant HT Control field shall not be present in a frame addressed to a STA unless that STA declares support for +HTC-HE in the HE Capabilities Information field of its HE Capabilities element. The HE variant HT Control field carried in the frame may contain a Control subfield supported by the intended receiver that has:

* A value of 0 in the Control ID subfield when the transmitting STA expects an UL MU PPDU that carries an immediate acknowledgement, as described in 25.5.2 (UL MU operation).
* A value of 1 in the Control ID subfield when the transmitting STA changes the receive operation mode, as described in 25.8 (Operating mode indication).
* A value of 2 in the Control ID subfield when the transmitting STA follows the HE link adaptation procedure, as described in 10.31.4 (Link adaptation using the HE variant HT Control field).
* A value of 3 in the Control ID subfield when the transmitting STA follows the corresponding buffer status report procedure, as described in 25.5.2.5 (HE buffer status feeback operation for UL MU).

**TGax Editor: *Insert a new subclause (Buffer Status Report) below as follows (#CID 824, 93, 1067, 2388):***

**9.2.4.6.4.5 Buffer Status Report (BSR)**

The Control Information subfield, when the Control ID subfield is 3, contains buffer status information used for UL MU operation (see 25.5.2.5 (HE buffer status feedback operation for UL MU)).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 B5 | B6 B7 | B8 B9 | B10 B17 | B18 B25 |
|  | ACI Bitmap | Delta TID | ACI High | Scaling Factor  | Queue Size High | Queue Size All |
| Bits: | 4 | *2* | 2 | 2 | 8 | 8 |

**Figure 9‑14c--Control Information subfield format when Control ID subfield is 3**

The ACI Bitmap subfield indicates the access categories for which the buffer status is reported and its encoding is shown in Table 9-XX0 (ACI Bitmap to AC encoding). Each bit of the bitmap is set to 1 to indicate that the buffer status of the AC, which ACI is identified by the location of the bit in the ACI Bitmap, is reported; otherwise it is set to 0.

**Table 9‑XX – ACI Bitmap to AC encoding**

|  |  |  |  |
| --- | --- | --- | --- |
| **B0** | **B1** | **B2** | **B3** |
| AC\_BE | AC\_BK | AC\_VI | AC\_VO |

The Delta TID subfield, together with the values of the AC Bitmap subfield, indicate the number of TIDs for which the STA is reporting the buffer status. The encoding of the Delta TID subfield is shown in Table 9-XX (Delta TID subfield encoding).**Table 9‑XX – Delta TID subfield encoding**

|  |  |
| --- | --- |
| **Number of bits in the ACI Bitmap** **subfield that are set to 1** | **Mapping of Delta TID subfield value and number of TIDs, *NTID*** |
| 0 | Values 0 to 2 are not applicable;Value 3 indicates 8 TIDs (i.e., all ACs have traffic); |
| 1 | Value 0 indicates 1 TID; Value 1 indicates 2 TIDs;Values 2 to 3 are not applicable; |
| 2 | Value 0 indicates 2 TID; Value 1 indicates 3 TIDs;Value 2 indicates 4 TIDs; Value 3 is not applicable; |
| 3 | Value 0 indicates 3 TID; Value 1 indicates 4 TIDs;Value 2 indicates 5 TIDs; Value 3 indicates 6 TIDs; |
| 4 | Value 0 indicates 4 TID; Value 1 indicates 5 TIDs;Value 2 indicates 6 TIDs; Value 3 indicates 7 TIDs; |
| NOTE--The number of TIDs can be obtained as *NTID­* = *Nones* + *FVal*, where *Nones* is the number of bits set to one in the AC Bitmap subfield, and *Fval* is the value of the Delta TID subfield except when *Nones* is equal to 0 for which there is the *NTID* = 8 case. |

The ACI High subfield indicates the ACI of the AC for which the BSR is indicated in the Queue Size High subfield.

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
* 2048 if the Scaling Factor subfield is 2
* 16384 if the Scaling Factor subfield is 3

The Queue Size High subfield indicates the amount of buffered traffic, in units of *SF* octets, for the AC identified by the ACI High subfield.

The Queue Size All subfield indicates the amount of buffered traffic, in units of *SF* octets, for all the ACs identified by the ACI Bitmap subfield.

The queue size values in the Queue Size High and Queue Size All 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 present (A-)MPDU) in the delivery queues used for MSDUs and A-MSDUs with AC(s) that are specified in the ACI High and ACI Bitmap subfields, respectively. 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 a QoS Data frame is fragmented and is not carried in an A-MPDU, the queue size value can remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted. If a QoS Data frame is fragmented and is carried in an A-MPDU, the queue size values are set according to the rules in 10.9 (HT operation). *(#824, 93, 1067, 2388)*

***Author’s note:*** There is a difference w.r.t. baseline Queue Size: here the BSR is reported for all buffered traffic, accounting for the current transmission, while in the baseline Queue Size is reported for all buffered traffic, excluding the current transmission. See also at the end of the document.(#)

# PARS II (BSR operation)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 45 | Ahmadreza Hedayat | 59.47 | Regarding "In this case, an AP may indicate TBD granularity of the Queue Size for an HE STA to report (signaling method TBD). Upon reception of the frame including the TBD indication in the Trigger frame or in the HE A-Control field, the HE STA may respond with the frame including the Queue Size subfield in a QoS Control field or TBD HE A-Control field", the STA is in a better position to determine the granularity of the queue size it reports. So for the cases where the STA reports its queue size within the HE A-control (or HEC field) the STA shall report the granularity (hence the STA chooses the granularity too), unless the AP has specified the queue size granularity in its request. | Revise to: ""In this case, an AP may indicate TBD granularity of the Queue Size for an HE STA to report (signaling method TBD). Upon reception of the frame including the TBD indication in the Trigger frame or in the HE A-Control field, the HE STA may respond with the frame including the Queue Size subfield in a QoS Control field or TBD HE A-Control field and if the AP has not specified the granularity the STA shall indicate TBD granularity of the reported Queue Size"" | Revised –Agree in principle with the comment that the STA is in a better positon to determine the granularity of the queue size it reports. Proposed resolution clarifies this aspect by adding a scaling factor for the Queue Sizes that are signalled by the A-Control field and removing the cited sentence.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 45. |
| 178 | Alfred Asterjadhi | 77.39 | The normative description regarding the buffer status report poll and that of the buffer status report is incomplete, partly due to the existence of a few TBDs in this subclause and of fields that would be used for the solicitation and reporting of this buffer status. Provide clear indications how the AP triggers buffer status report polls (the obvious choice would be to define a BSRP variant of the Trigger frame), clear indications on how the reporting is performed by default using the QoS Control field in QoS Data frames (multiple of them will be possible in an A-MPDU), and optionally using the HE A-Control field, etc. | As in comment. | Revised –Agree in principle with the comment. Proposed resolution clarifies the normative behaviour as suggested by the comment and also accounting for the other suggestions of several other CIDs targeting the same subclause.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 178. |
| 254 | Anton Kiryanov | 59.44 | Broadcast Trigger frame, a unicast Trigger frame, a Trigger frame for random access are not defined | Remove the sentence or define frames if it is really necessary. E.g. a trigger frame that contains at least one RU allocated for random access is reffered to a Trigger frame for random access. | Revised –Agree in principle with the commenter. Propsoed resolution removes the sentence and adds clarifications on the rules by citing the respective subclauses where random RU access is defined and where scheduled RU access is defined.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 254. |
| 438 | Brian Hart | 59.50 | "HE STA may respond" | Clarify what the AP infers if the STA doesn't respond - e.g. the STA has nothing to send. Also, if the STA has nothing to send, should it respond? | Revised –Agree with the commenter that it is ambibuous. Proposed resolution is to clarify that the STA shall respond with BSR in those frames that carry the QoS Control field or the A-Control field. The STA that has nothing to send can set the Queue Size to 0 or can simply not report this state in the *unsolicited* BSR case. In the solicited BSR case, the AP that does receive only partial information may decide to poll the STA again, though this case need not be specified. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 438. |
| 680 | Huizhao Wang | 59.50 | Limit HE buffer status report within QoS Control field only, for maxim interoperability | Remove the places of using HE A-Control field for reporting Buffer Status in this paragraph | Rejected –Agree in principle with the comment that QoS Control field provides a basic BSR functionality that allows for maximum interoperability. However to enable additional flexibility (in terms of BSR for highest AC, all ACs or with different Scaling Factors) it is beneficital to enable an optional BSR functionality that uses the A-Control field for delivering BSR in a flexible and efficient way. Please refer to 11/16/0628r1 for more details. |
| 769 | Jarkko Kneckt | 59.44 | Trigger frame for random access is defined separately from individually addressed or group addressed Trigger frame. It is not clear what is this kind of trigger frame. The frame is not defined. | Define what is a trigger frame for random access. | Revised –Agree in principle with the comment. The description is misleading since the frame is the same (a Trigger frame) though it can contain one or more random RUs that can be accessed by STAs to transmit their BSRs. Proposed resolution clarifies this aspect. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 769. |
| 770 | Jarkko Kneckt | 59.47 | Why the AP can decide the granularity of the Queue Size report? AP may not have any understanding of the buffer size in the STA and the report may be non-sense. It would be less erroneous, if the STA can define the granularity of the Queue Status report. | Change the STA to define the granularity of the Queue Size Report. Do not allow the AP to define the granularity of the report. | Revised –Agree in principle with the comment. Proposed resolution is inline with the suggested change. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 770. |
| 771 | Jarkko Kneckt | 59.51 | Add possibility to provide Queue status to multiple TIDs with the same report. The STA should respond at least to requested TID, or the STA should be allowed to consider the most important traffic it has to send | Allow STA a possiblity to decide which TIDs it reports to the AP. | Revised –Agree in principle with the comment. Proposed resolution is inline with the suggested change. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 771. |
| 817 | Jinsoo Ahn | 59.54 | If buffer status report performed when AP trigger buffer status report, non-AP STAs may not need to feedback its granulaity and TID information because the informations are indicated by AP. However, if non-STAs want to report its buffer status without indication of AP, buffer status information shall include buffer size granulaity and TID information as well as buffer size. | Because AP 'may' indicate granularity,The following sentence need to be added at the first paragraph."Queue Size subfield shall include Queue length, Queue granularity, Queue TID fields." | Revised –Agree in principle with the comment. Proposed resolution is inline with the suggested change and that of CIDs 770 and 45, i.e., the STA decides the granularity rather than the AP. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 817. |
| 818 | Jinsoo Ahn | 59.55 | More data bit could be utilized by non-AP STA to indicate its presence of UL data. A non-AP STA shall set more data bit to 1 for all frames including control frame, e.g. ACK/BA, if the STA has UL data. | Insert the following"A Non-AP HE STA shall set more data bit to 1 for all MPDUs including control frame (e.g. BlockAck/ACK), if its queue size is bigger than 0." | Rejected –Signaling BSR with MD bit is inefficient because it does not provide to the AP information on the amount of data the STA has buffered. Both QoS Control and BSR A-Control reporting procedures defined enable the STA to provide sufficient information to the AP to efficiently allocate UL MU resoures.  |
| 1062 | Kiseon Ryu | 59.46 | Clarify TBD in the text "An AP may request an HE STA to send its buffer status information by TBD indication in the Trigger frame or in the HE A-Control field in a Data type of frame." | Replace "TBD indication" with "the Buffer Status Poll Indication" | Revised –Agree in principle with the comment that the TBD needs to be defined. The proposed resolution is to define a BRP variant Trigger frame that solicits BSR frames from the STAs inline with the suggestions of other CIDs. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 1062. |
| 1065 | Kiseon Ryu | 59.49 | Clarify TBD in the text "Upon reception of the frame including the TBD indication in the Trigger frame or in the HE A-Control field, the HE STA may respond with the frame including the Queue Size subfield in a QoS Control field or TBD HE A-Control field." | 1. Replace "TBD indication" with "the Buffer Status Poll Indication"2. Delete "TBD" from "TBD HE A-Control field" | Revised –Agree in principle with the comment that the TBDs needs to be defined. The proposed resolution is to define a BRP variant Trigger frame that solicits BSR frames from the STAs inline with the suggestions of other CIDs and define the BSR A-Control field. TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 1065. |
| 1066 | Kiseon Ryu | 59.54 | For the buffer status report for a given TID, QoS Control field is used. However, the spec has no text about the buffer status report for multiple TIDs/ACs, which needs to be described. | Add the text "To report the buffer status for multiple TIDs, an HE STA shall set one or more Queue Size subfield(s) in an HE A-Control field to the amount of queued traffic which needs to be reported." | Revised –Agree in principle with the commenter. Proposed resolution clarifies the setting of the Queue Sizes for both cases, in the QoS Control field, and in the BSR A-Contorl field.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 1066. |
| 1550 | Mark RISON | 59.41 | There are only two references to "buffer status report"s, both in the first two lines of this subclause | Define the concept more fully | Revised – Agree in principle with the comment. Proposed resolution defines the concept as suggested.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 1550. |
| 2189 | Tomoko Adachi | 59.42 | The buffer status report needs not to be limited when the AP requests. It can be an antonomous report. | Include a case that the non-AP STA can autonomously send a buffer status report. | Revised –Agree in principle with the commenter. Though not clear in the current description, the STA can alwyas report its BS without being polled. Proposed resolution clarifies this ambiguity.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 2189. |
| 2190 | Tomoko Adachi | 59.51 | As now an A-MPDU can mix different TIDs, it is not that meaningful that the AP specifies an TID for buffer status report. | Add a case when the AP doesn't specify a TID or allow a case specifying multiple TIDs. | Revised –Agree in principle with the commenter. Proposed resolution accounts for the suggested change, which as pointed out by the comment is already allowed, thought not explicitly indicated in this subclause.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 2190. |
| 2191 | Tomoko Adachi | 59.50 | The Queue Size subfield in a QoS Control field is associated with the TID of the data carried in the frame body field. This will lack flexibility. | Use HE control field instead of the Queue Size subfield and refer to the definition of AP PS buffer State subfield in the QoS Control field. Enable to express buffer status of multiple TIDs (or AC). | Revised –Agree in principle that adding an additional means of signalling BSR in the A-Control field adds to the flexibility. However, please note that delivery in the QoS Control field already has the necessary flexibility since the A-MPDU can carry multiple QoS Data, QoS Null frames with different TIDs (as such for all TIDs if needed). Proposed resolution is to add and clarify the normative behaviour related to the addition of the BSR A-Control field, and add any missing clarifications related to the delivery of multi-TID BSR with the QoS Control fields.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 2191. |
| 2272 | Woojin Ahn | 59.58 | before a UL STA assigned in secondary 40 transmits simultaneous CTS, it should perform CS on primary 80. If any 20 MHz channels neither the primary nor the allocated channel are busy, the UL STA shall not transmit CTS by the rule defined in 25.5.2.4. Howe | Insert the following at 25.5.2.6 line 63"Upon the acknowledgement of BSR of a specific TID, the STA shall stop the operation of EDCAF of the corresponding TID." | Rejected –The purpose of transmitting BSR to the AP is to aid the AP efficiently allocate UL resources to the STAs that report their BS. The proposed change would forbid these STAs to access the medium in SU mode impacting their performance if the AP does not allocate the UL MU resources in a timely manner. If SU is allowed the STA can always use EDCA to transmit frames if needed.  |
| 2711 | Yuichi Morioka | 59.43 | what is a broadcast Trigger frame? | Define broadcast Trigger frame. | Revised –Agree in principle with the comment. The sentence is superfluous in this paragraph since the corresponding normative behaviour related to the Trigger frame (RA setting etc) is already defined in the preceding subclauses of 25.5, and this subclause rather focuses on the buffer status reporting and polling procedures.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 2711. |
| 147 | Alfred Asterjadhi | 1337.65 | "When an A-MPDU contains multiple QoS Control fields, bits 4 and 8-15 of these QoS Control fields shall be identical." this would not be valid anymore (as 8-15 report the Buffer size per TID) when the A-MPDU contains MPDUs with different TIDs (as each MPDU reports its buffer status for its own TID which cannot be identical). | As in comment. | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested changes.TGax editor to make the changes shown in 11-16/0806r0 under all headings that include CID 147. |

**Discussion:** This document also includes motioned conceps passed during the IEEE F2F meeting in May: <https://mentor.ieee.org/802.11/dcn/16/11-16-0628-01-00ax-buffer-status-report-in-he-control-field.pptx> (also defined the TBDs).

**TGax Editor: *Change the subclause below as follows (#CID 824, 93, 1067, 2388, 178):***

**25.5.2.5 Buffer status feedback operation for UL MU**

*(#1550) (#254, 769, 2711)(#1062)(#45, 770)(#438, 1065)*

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 A-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).(*#178, 1065, 1550, 2189)*

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 A-Control field 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 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 25.10.3 (A-MPDU with multiple TIDs) for aggregating QoS Data frames with multiple TIDs. The HE STA does not follow the rules defined in 25.10.3(A-MPDU with multiple TIDs) for QoS Null frames whose Ack Policy subfield is No Ack.(*#771, 1066, 2190, 2191)*
* The HE STA may report the buffer status in the BSR A-Control subfield of frames it transmits if the AP has indicated its support in the A-BSR Support subfield of its HE Capabilities element; otherwise the STA shall not report the buffer status in the BSR A-Control subfield.
	+ 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 A-Control field; 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 A-Control field; except that the STA may set the Queue Size All subfield to 255 to indicate an *unknown/unspecified* BSR for those ACs*(#2190, 2191)*
	+ The HE STA shall set the Delta TID subfield according to Table 9-XX (Delta TID subfield encoding), and the Scaling Factor subfield as defined in 9.2.4.6.4.5 (Buffer Status Report (BSR))(*#45, 178, 770, 817. 1066)*

NOTE 1—The STA can send an *unsolicited* BSR in response to Basic variant Trigger frames (with or without random RUs, as defined in 25.5.2.3 (STA behaviour) and in 25.5.2.6 (UL OFDMA-based random access)) or it can send the *unsolicited* BSR after accessing the WM using EDCA.(*#254, 769, 2189)*

NOTE 2—The STA can include both the QoS Control and the BSR A-Control field 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)). (*#1062)* The non-AP STA responds (*solicited* BSR) as defined below:

* The STA that receives a BSRP variant Trigger frame shall follow the rules defined in 25.5.2.3 (STA behavior) to generate the trigger-based PPDU when the Trigger frame contains the STA’s AID in any of the Per User Info fields; otherwise the STA shall follow the rules defined in 25.5.2.6 (UL OFDMA based random access) to gain access to a random RU and generate the Trigger-based PPDU when the Trigger frame contains one or more random RU(s). (*#254, 769, 1065)*
* The STA shall include in the trigger-based PPDU one or more QoS Null or QoS Data frames containing:
	+ Either 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,(*#771, 1066, 2190, 2191)*
	+ Or the BSR A-Control field with the Queue Size All subfield indicating the queue size for all the ACs, indicated by the ACI Bitmap subfield, for which the STA has buffer status to report to the AP when the AP has indicated its support in the A-BSR Support subfield of its HE Capabilities element.
		- The STA shall set Delta TID, SF, ACI High and Queue Size High subfields of the BSR A-Control field as defined in 9.2.4.6.4.5 (Buffer Status Report (BSR))*(#45, 770, 817, 1066, 2190, 2191)*
* The HE STA shall not solicit an immediate response for the frames carried in the trigger-based PPDU (e.g., by setting the Ack Policy subfield of the frame to Normal Ack or Implicit BAR).*(#438)*

NOTE —Similar to *unsolicited* BSR, the STA can set Queue Sizes in either QoS Control or BSR A-Control field to 255 to indicate *unknown/unspecified* BSR for a TID, AC or all AC.**9.3.1.23 Trigger frame format**

**TGax Editor: *Change Table 9-ax2 as follows (#CID 824, 2388):***

Table 9‑ax2 - Trigger Type field encoding*(#824, 2388, 1062)*

|  |  |
| --- | --- |
| **Trigger Type value** | **Trigger Type description** |
| 0 | Basic Trigger |
| 1 | Beamforming Report Poll Trigger |
| 2 | MU-BAR |
| 3 | MU-RTS |
| 4 | Buffer Status Report Poll (BSRP) variant Trigger |
| 5-15 | Reserved |

**TGax Editor: *Insert a new subclaus at the end of this subclause as follows(#CID 824, 2388):***

9.3.1.23.3 BSRP variant

The BSRP variant Trigger frame format is as defined in Figure 9-51a (Trigger frame).

The Common Info field of the BSRP variant Trigger frame is as defined in Figure 9-51b (Common Info field) and the Trigger Dependent Common Info field is not present.

The Per User Info field of the BSRP variant Trigger frame is as defined in Figure 9-51c (Per User Info field) and the Trigger Dependent Per User Info field is not present.

**9.4.2.213 HE Capabilities element**

**TGax Editor: *Insert a “A-BSR Support” bit in Figure 9-554b (HE Capabilities element)(#CID 824, 93, 1067, 2388)***

**TGax Editor: *Insert a new paragraph at the end of this subclause as follows(#CID 824, 93, 1067, 2388):***

The A-BSR Support subfield indicates support by an AP for receiving an (A-) MPDU that contains BSR in the A-Control subfield and support by a non-AP STA for generating an (A-) MPDU that contains BSR in the A-Control subfield. The A-BSR Support subfield is set to 1 when the STA supports BSR A-Control field functionality; otherwise it is set to 0.(*#824, 93, 1067, 2388)*

**9.2.4.5.6 Queue Size subfield**

**TGax Editor: *Change the paragraphs below as follows(#CID 172):***

The Queue Size subfield is an 8-bit field that indicates the amount of buffered traffic for a given TC or TS at the STA sending this frame. The Queue Size subfield is present in QoS Data and QoS Null frames sent by non-AP STAs with bit 4 of the QoS Control field equal to 1. The AP can use information contained in the Queue Size subfield to determine the TXOP duration assigned to the STA or to determine the UL resources assigned to the HE STA (see 25.5.2 (UL MU operation)).

The queue size value is the total size, rounded up to the nearest multiple of 256 octets and expressed in units of 256 octets, of all MSDUs and A-MSDUs buffered at the STA (excluding the MSDU or A-MSDU of the present QoS Data frame sent by a non-HE STA and including the MSDUs or A-MSDUs contained in the present (A-) MPDU sent by an HE STA) in the delivery queue used for MSDUs and A-MSDUs with TID values equal to the value in the TID subfield of this QoS Control field. A queue size value of 0 is used solely to indicate the absence of any buffered traffic in the queue used for the specified TID. A queue size value of 254 is used for all sizes greater than 64 768 octets. A queue size value of 255 is used to indicate an unspecified or unknown size. If a QoS Data frame is fragmented and is not carried in an A-MPDU, the queue size value can remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted. If a QoS Data frame is fragmented and is carried in an A-MPDU, the queue size value is set as defined in 10.13.1 (A-MPDU contents).

**10.13 A-MPDU operation**

**10.13.1 A-MPDU contents**

According to its context (defined in Table 9-420 (A-MPDU Contexts)), an A-MPDU shall be constrained so that it contains only MPDUs as specified in the relevant table referenced from Table 9-420 (A-MPDU Contexts).

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 147):***

When an A-MPDU contains multiple QoS Control fields, bit 4 shall be identicall across all MPDUs that contain the QoS Control fields, and bits 8–15 of these QoS Control fields shall be identical across all MPDUs with equal value of the TID subfield.

A DMG STA that transmits an A-MPDU shall do so only in the Data Enabled Immediate Response context or the Control Response context, with contents as specified in Table 9-421 (A-MPDU contents in the data enabled immediate response context) and Table 9-424 (A-MPDU contents MPDUs in the control response context), respectively.