IEEE P802.11
Wireless LANs

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| Comment resolutions for QoS Control |
| Date: 2019-03-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D4.0 with the following CIDs (15 CIDs):

* 20459, 20460, 20461, 20462, 20463, 20572, 20672, 20717, 20734, 20907,
* 20908, 21123, 21452, 21465, 21453

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.***

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 20459 | Mark RISON | 71.62 | "The Queue Size subfield is an 8-bit field that indicates the amount of buffered traffic for a given TC or TS at the non-HE non-AP STA sending the frame that contains this subfield and the amount of buffered traffic at the non-AP STA for transmission to the HE AP identified by the receiver address of the frame that contains this subfield." is misleading. The Queue Size is always for a given TC or TS, not for all queues | Change the cited text at the referenced location to "The Queue Size subfield is an 8-bit field that indicates the amount of buffered traffic for a given TC or TS at the non-HE non-AP STA sending the frame that contains this subfield and the amount of buffered traffic for a given TC or TS at the HE non-AP STA for transmission to the HE AP identified by the receiver address of the frame that contains this subfield." | Revised –Agree with the comment. Proposed resolution accounts for the suggested change. TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20459. |
| 20460 | Mark RISON | 72.23 | The Queue Size, to be useful, needs to include traffic queued above the MAC SAP | At the end of the referenced paragraph add "The queue size may include MSDUs buffered above the MAC SAP." | Rejected –The comment fails to identify a technical issue. The queue size is an 8-bit long field that provides the amount of buffered traffic for a given TC or TS (the buffered traffic accounts for buffered MSDUs), not the MSDU themselves buffered above the MAC SAP. |
| 20461 | Mark RISON | 72.28 | The Queue Size subfield should not be specified three times. One for rx and one for tx is sufficient | Delete from "The Queue Size subfield contains:" to "A value of 255 to indicate a queue size that is unspecified or unknown" inclusive in the referenced subclause and replace with "The Queue Size subfield contains a UV subfield in the 6 LSBs and a SF subfield in the 2 MSBs." | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested change although we maintain the description related to the UV and SF subfields since their definitions are needed for the table. The Queue Size subfield encoding is now provided as a table that summarizes all the settings. TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20461. |
| 20462 | Mark RISON | 72.50 | Equation (9-0a) is not correct when the QS is >= 254 | Change the referenced line to "148 480 + 32 768 x UV, if the SF subfield is 3 and the UV subfield is < 62", append two lines "> 2 147 328 if the Queue Size subfield is 254" and "unspecified or unknown if the Queue Size subfield is 255" and delete the NOTE immediately following | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested changes. TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20462. |
| 20463 | Mark RISON | 72.56 | The encoding should be expressed as equations, not prose | At the referenced location change "The transmitter rounds the actual queue size using the following procedure:" to "An HE non-AP STA sets the Queue Size subfield or its UV and SF subfields as follows:". Change the first two bullets to "Else if QS <= 1008, UV = ceil( QS / 16 ) and SF = 0", the next two to "Else if QS <= 17 152, UV = ceil( (QS - 1024) / 256 and SF = 1", the next two to "Else if QS <= 146 432, UV = ceil ( (QS - 17 408) / 2048 ) and SF = 2", the next two to "Else if QS <= 2 147 328, UV = ceil( (QS - 148 480) / 32 768 ) and SF = 3" (where in all cases ceil( <x> ) is to be replaced by the ceiling symbols, - is to be replaced by the minus glyph and <= is to be replaced by the <= glyph), and append a new bullet "Else the Queue Size subfield is set to 254" and prepend at the start of the list a new bullet "If QS is unspecified or unknown, the Queue Size subfield is set to 255" | Revised –Agree in principle with the comment. Proposed resolution removes this paragraph and instead provides a table with the encoding of the Queue Size subfiedls depending on the QS at the STA, inline with the current encoding.TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20463. |
| 20572 | Mark RISON | 72.01 | "The Queue Size subfield is present in QoS Data frames and, for non-AP HE STAs, in QoS Nullframes sent by non-AP STAs with bit 4 of the QoS Control field equal to 1." -- this is duplication, and inaccurate duplication at that (see Table 9-10---QoS Control field) | Delete the cited text at the referenced location | Rejected –It is beneficial to have this explicitly stated in the Queue Size subfield since only HE STAs can use QoS Null frames to provide queue size in the QoS Control field, whole non-HE STAs cannot. Originally this sublause was mentioning only the QoS Data frames, which is not the only frame carrying the Queue Size as mentioned above. Also from a check of Table 9-10 the CRC could not identify the inaccuracy of the statements. Please identify the inaccuracy and submit a new comment or point the inaccuracy by some other means.  |
| 20672 | Mark RISON | 71.57 | "If sent by a non-HE STA or sent to a non-HE STA, the following apply: [...] If sent by a non-AP HE STA to an HE AP, the remainder of the subclause applies." -- this leaves undefined the cases of transmission to a peer HE TDLS STA or HE IBSS STA or HE mesh STA | As it says in the comment | Revised –Agree in principle with the comment. Proposed resolution clarifies that the Queue Size subfield is reserved if sent by a non-AP HE STA to another non-AP HE STA.TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20672. |
| 20717 | Mark RISON | 72.23 | Re CID 16001: the point is that there needs to be clarity as to what "buffered at the STA" means | At 72.27 add a "NOTE---Buffered MSDUs are those that have been received in an MA-UNITDATA.request but that have not been successfully transmitted." | Revised –Agree in principle with the comment although it should already be clear what buffered MSDUs mean at the MAC layer. But a note does not hurt. Proposed resolution accounts for the suggested change.TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20717. |
| 20734 | Mark RISON | 71.57 | Re CID 16078: the rejection is incorrect. The TID is passed as the Priority in the MA-UNITDATA.request | At the end of the referenced subclause add "NOTE---The Queue Size is based on data received by the STA at the MAC SAP (MA-UNITDATA.request). Any data in layers above the MAC is not taken into account." | Revised –Agree in principle with the comment although it should be already cleat that the queue size is based on data received by the STA at the MAC SAP. But again, a note does not hurt. Proposed resolution accounts for the suggested change.TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20734. |
| 20907 | Mark RISON | 72.24 | "including the MSDUs or A-MSDUs of the present MPDU or A-MPDU" makes no sense | Change to "including the MSDUs or A-MSDUs in the same PSDU as the MPDU containing the Queue Size subfield" | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested change.  TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 20907. |
| 20908 | Mark RISON | 72.24 | Re CID 16077: the proposed change was to exclude the current MSDU, to match the non-HE case | Change "including the MSDUs or A-MSDUs of the present MPDU or A-MPDU" at 72.24 to "excluding the MSDUs or A-MSDUs in the same PSDU as the MPDU containing the Queue Size subfield". Change "including the MSDUsor A-MSDUs in the same PSDU as the MPDU containing the BSR Control subfield" at 84.7 to "excluding the MSDUs or A-MSDUs in the same PSDU as the MPDU containing the BSR Control subfield" | Rejected –The comment fails to identify a technical issue. The legacy case was designed when MPDUs were not aggregated as such the rule was excluding the MSDUs or A-MSDUs. In 11ax the MPDUs are mainly aggregated as such the rule “including the MSDU or A-MSDU” is beneficial because the recipient of the QoS Control field can discount the MSDUs or A-MSDUs that are successfully received in the A-MPDU. With the earlier rule this would not be possible, and the recipient would not know of any of the lost frames in the received A-MPDU. |
| 21123 | Pascal VIGER | 71.62 | The section has been modified and misses one case for HE STA: "The Queue Size subfield...indicates.. the amount of buffered traffic at the non-AP STA for transmission to the HE AP identified by the receiver address of the frame that contains this subfield." The case of HE STA transmitting to HE STA (direct traffic or P2P) is now missing.For information, BSR already handles that :"Queue Size High subfield indicates the amount of buffered traffic...that is intended for the STA identified by the receive address of the framecontaining the BSR Control subfield".So destination of legacy 'Queue Size' format report has to be amended. | Modify the sentence by replacing to the "HE AP" by "to the HE STA" (in that case, both non-AP and AP cases are supported).Final sentence becomes: "...the amount of buffered traffic at the non-AP STA for transmission to the HE STA identified by the receiver address of the frame that contains this subfield." | Revised –Agree in principle with the comment. Proposed resolution clarifies that the Queue Size subfield is reserved if sent by a non-AP HE STA to another non-AP HE STA. this is because BSR is generated by a non-AP STA and intended to an AP. Also provided some more clarifications as to what STA sends these QoS Control fields by editorially reorganizing the sentence in question.TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 21123. |
| 21452 | Tomoko Adachi | 73.17 | Considering a case when some fragments are carried in A-MPDU 1 and others are carried in A-MPDU 2, can the queue size value of the MPDUs in A-MPDU 2 be the same with that of the MPDUs in A-MPDU 1 even if the amount of queued traffic changes as successive fragments are transmitted? | Clarify. | Rejected –The comment fails to identiy a technical issue and is asking a question. The queue size value of the MPDUs in the A-MPDU 2 will be greater than that of A-MPDU 1 if the queue size has increased at the time of transmitting the A-MPDU 2. This is because the STA is required to set the Queue Size to the current amount of the buffered BUs. |
| 21465 | Wookbong Lee | 72.31 | Would it be possible to show in a diagram the SF and UV in a table/diagram | As suggested in the comment | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested change. The Queue Size subfield encoding is now provided as a table that summarizes all the settings. TGax editor to make the changes shown in 11-19/0303r0 under all headings that include CID 21465. |
| 21453 | Tomoko Adachi | 84.15 | Considering a case when some fragments are carried in A-MPDU 1 and others are carried in A-MPDU 2, can the queue size value of the MPDUs in A-MPDU 2 be the same with that of the MPDUs in A-MPDU 1 even if the amount of queued traffic changes as successive fragments are transmitted? | Clarify. | Rejected –The comment fails to identiy a technical issue and is asking a question. The queue size value of the MPDUs in the A-MPDU 2 will be greater than that of A-MPDU 1 if the queue size has increased at the time of transmitting the A-MPDU 2. This is because the STA is required to set the Queue Size to the current amount of the buffered BUs. |

**Discussion: *None.***

* QoS Control field
* Queue Size subfield

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20459, 21123):***

The Queue Size subfield is an 8-bit field that indicates the amount of buffered traffic for a given TC or TS at the non-HE non-AP STA sending the frame that contains this subfield and the amount of buffered traffic for a given TC or TS at the HE non-AP STA for transmission to the HE AP identified by the receiver address of the frame that contains this subfield. The Queue Size subfield is present in QoS Data frames with bit 4 of the QoS Contorl field equal to 1 sent by non-AP STAs andin QoS Null frames with bit 4 of the QoS Control field equal to 1 sent by non-AP HE STAs. The AP might 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 non-AP HE STA (see 26.5.3 (UL MU operation)).*(#20459, 21123)* (#16232)

If sent by a non-HE STA or sent to a non-HE STA, the following apply:

* The queue size value is the approximate 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) 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.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20672, 21123):***

If sent by a non-AP HE STA to another non-AP HE STA, the Queue Size subfield is reserved.*(#20672, 21123)*

If sent by a non-AP HE STA to an HE AP, the remainder of the subclause applies.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20717, 20734, 20907):***

The queue size, *QS*, is the approximate total size in octets, of all MSDUs and A-MSDUs buffered at the STA (including the MSDUs or A-MSDUs in the same PSDU as the MPDU containing the Queue Size subfield(#16077)) 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.

NOTE 1—The queue size is based on data received by the STA at the MAC SAP (MA-UNITDATA.request). Any data in layers above the MAC is not taken into sccount.

NOTE 2—Buffered MSDUs are those that have been received in an MA-UNITDATA.request but that have not been successfully transmitted. *(#20717, 20734, 20907)* (#15963)

**TGax Editor: *Change the paragraph below and insert a new table as follows (#CID 20461, 20463, 21465):***

 The Queue Size subfield consists of a Scaling Factor subfield in the 2 MSBs (bits 14-15) of the QoS Control subfield and an unscaled value, *UV*, in the 6 LSBs (bits 8-13) of the QoS Control subfield. The Scaling Factor subfield provides the scaling factor, *SF*, with an encoding that is shown in Table 9-24e (Scaling Factor subfield encoding). A non-AP HE STA sets the Queue Size subfield in a QoS frame it transmits as shown in Table 9-X (Queue Size subfield encoding by a non-AP HE STA).

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| Table 9-X -- Queue Size subfield encoding by a non-AP HE STA |
| Queue Size, *QS* | Queue Size subfields | Description |
| Scaling Factor | UV |
| 0 | 0 | 0 | No buffered traffic in the queue used for the specified TID |
| 0 < *QS* ≤ 1 008 | 0 | Ceil (*QS*, 16) / 16 | The queue size is in units of 16 octets |
| 1 008 < *QS* ≤ 1 024 | 1 | 0 | The queue size is in units of 16 octets |
| 1 024 < *QS* ≤ 17 152 | 1 | Ceil (*QS* – 1 024, 256) / 256 | The queue size is in units of 256 octets |
| 17 152 < *QS* ≤ 17 408 | 2 | 0 | The queue size is in units of 256 octets |
| 17 408 < *QS* ≤ 146 432 | 2 | Ceil (*Q*S – 17 408, 2 048) / 2 048 | The queue size is in units of 2 048 octets |
| 146 432 < *QS* ≤ 148 480 | 3 | 0 | The queue size is in units of 2 048 octets |
| 148 480 < *QS* ≤ 2 147 328 | 3 | Ceil (*QS* – 148 480, 32 768) / 32 768 | The queue size is in units of 32 768 octets |
| *QS* > 2 147 328 | 3 | 62 | The queue size greater than 2 147 328 |
| Unspecified/Unknown | 3 | 63 | The queue size is unspecified or unknown |

*(#20461, 20463, 21465)*

**TGax Editor: *Change the paragraph below and insert a new table as follows (#CID 20462):***

An HE AP obtains the queue size, *QS*, from a received QoS Control field, which contains a scaling factor and an unscaled value, as follows:

*Q*

*S*

16

*U*

*V*



if the Scaling Factor subfield is 0



1024

256

*U*

*V*



+

if the Scaling Factor subfield is 1



17 408

2048

*U*

*V*



+

if the Scaling Factor subfield is 2



148 480

> 2 147 328 if the Scaling Factor subfield is 3 and UV subfield is 62

Unspecified or unknown if the Scaling Factor subfield is 3 and UV subfield is 63

32 768

*U*

*V*



+

if the Scaling Factor subfield is 3 and UV subfield is < 62

















=

*(#20462)* (#15963)

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20463):***

* (#15861, #15960, #15963)*(#20463)*

If the fragments are carried in non-A-MPDU or S-MPDU subframes, the queue size value of the MPDUs containing fragments might remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted. If the fragments are carried in an A-MPDU, the queue size values of the MPDU containing the fragments are set according to the rules in 10.13.1 (A-MPDU contents). (#16912, #16911)

* BSR Control

If the Control ID subfield in a Control subfield in an A-Control subfield is 3, the Control Information subfield of the Control subfield contains buffer status information used for UL MU operation (see 26.5.3.6 (HE buffer status feedback operation for UL MU)). The format of the subfield is shown in Figure 9-22e (Control Information subfield for BSR Control).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 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 |
| * Control Information subfield for BSR Control
 |

The ACI Bitmap subfield indicates the access categories for which the buffer status is reported and its encoding is shown in Table 9-24c (ACI Bitmap subfield encoding). Each bit of the ACI Bitmap subfield is set to 1 to indicate the buffer status of the corresponding AC, and set to 0 otherwise. If(#15202) the ACI Bitmap subfield is 0 and the Delta TID subfield is 3 it indicates that there is buffered traffic for all 8 TIDs (see Table 9-24d (Delta TID subfield encoding)).

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| --- |
| * ACI Bitmap subfield encoding
 |
| B0 | B1 | B2 | B3 |
| AC\_BE | AC\_BK | AC\_VI | AC\_VO |

The Delta TID subfield, together with the values of the ACI Bitmap subfield, indicate the number of TIDs for which the STA is reporting the buffer status. The encoding of the Delta TID subfield is defined in Table 9-24d (Delta TID subfield encoding).

|  |
| --- |
| * 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* + *DVal*, where *Nones* is the number of bits set to one in the AC Bitmap subfield, and *DVal* is the value of the Delta TID subfield except if(#15203) *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 ACI to AC mapping is shown in Table 9-24c (ACI Bitmap subfield encoding).

NOTE—It is up to the non-AP STA that reports the buffer status to determine which queue deserves higher priority with respect to the other queues. The determination might be based on the time the traffic has been outstanding, QoS delay requirements, amount of buffered traffic, etc., and is out of scope for this standard.

The Scaling Factor subfield indicates the unit *SF*, in octets, of the Queue Size High and Queue Size All subfields. The encoding of the Scaling Factor subfield is shown in Table 9-24e (Scaling Factor subfield encoding).

|  |
| --- |
| * Scaling Factor subfield encoding
 |
| Scaling Factor subfield | Scaling factor, *SF,* in octets |
| 0 | 16 |
| 1 | 256 |
| 2 | 2 048 |
| 3 | 32 768 |

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 that is intended for the STA identified by the receive address of the frame containing the BSR Control 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 that is intended for the STA identified by the receive address of the frame containing the BSR Control subfield.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20717, 20734, 20907):***

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 in the same PSDU as the MPDU containing the BSR Control subfield) 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.

NOTE 1—The queue size is based on data received by the STA at the MAC SAP (MA-UNITDATA.request). Any data in layers above the MAC is not taken into sccount.

NOTE 2—Buffered MSDUs are those that have been received in an MA-UNITDATA.request but that have not been successfully transmitted. *(#20717, 20734, 20907)*

A queue size value of 254 in the Queue Size High and Queue Size All subfields indicates that the amount of buffered traffic is greater than 254 ×*SF* octets.(#15866) A queue size value of 255 in the Queue Size High and Queue Size All subfields indicates that the amount of buffered traffic is an unspecified or unknown size.(#15866)

If the fragments are carried in non-A-MPDU frames or S-MPDUs, the queue size value of the MPDUs containing the fragments might remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted.(#16913) If the fragments are carried in the A-MPDU, the queue size values of the MPDUs containing the fragments are set according to the rules in 10.13.1 (A-MPDU contents).(#16914)