IEEE P802.11  
Wireless LANs

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| Comment resolutions for HT Control field (9.2.4.6.X and 10.1) – Block 2 | | | | |
| Date: 2017-02-24 | | | | |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (41 CIDs):

* 4732, 4733, 5052, 5053, 5124, 5125, 5440, 5851, 7249, 7379, 7716, 7717, 8178, 8248, 9495, 9803, 9804 (17 CIDs)
* 5335, 5441, 7888, (3 CIDs)
* 5054, 5055, 5056, 5126, 5442, 7302, 7303, 7305, 7719, 7865, 7867, 8133, 8179, 8180, 8181, 8249, 8426, 8427, 9620, 9621, 9806 (21 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 IV (9.2.4.6.4.3)

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| **CID** | **Commenter** | **P** | **L** | **Comment** | **Proposed Change** | **Resolution** |
| 4732 | Alfred Asterjadhi | 24 | 63 | Similar observation here. Saying UL MU is misleading. The operation refers to the generation of TB PPDUs. Maybe call the field "TB UL MU Disable"? | As in comment. | Rejected –  To keep consistency throughout the draft it is more appropriate to keep this existing terminology. |
| 4733 | Alfred Asterjadhi | 24 | 55 | N\_ss is called twice in the same subclause to identify tx and rx ss. To avoid confusion specify the variables as N\_rx, ss, and N\_tx, ss. | As in comment. | Revised –  Proposed resolution is inline with suggested change of CID 9804 that suggests to call the Tx NSS as Tx NSTS, resolving this ambiguity.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 4733. |
| 5052 | David Kloper | 24 | 54 | Is this limiting SS that can be allocated to a User, or aggregate number of SS in an MU-MIMO transmission? | Please add clarification. | Revised –  It is already clear from the existing text that the limiting SS is with respect to the STA, quoting “that the STA can receive” as such that can be allocated to the STA. however the proposed resolution suggested by CID 7716 may provide additional clarity that could satisfy the comment. As such the proposed resolution is inline with that of CID 7716, quoting “that the STA supports in reception”.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 5052. |
| 5053 | David Kloper | 24 | 62 | This should only limit UL MU for sending of buffered data, and not prohibit UL MU allocation for immediate Block Acknowledments. Otherwise it would prohibit DL MU. | Please add clarification. | Revised –  The UL MU Disable bit is used for coexistence purposes, and when to use it depend on the non-AP STAs decision. A note regarding this aspect was added to subclause 27.8.2 as part of the comment resolutions provided in 11-17-0115-08-00ax-comment-resolution-to-clause-27-8 for CID 5198.  Quoting the added note:  “NOTE—A device may have multiple radios that can result to difficult in-device coexistence challenges. The device might set UL MU Disable subfield to 1 if it has trouble responding to Trigger frames because the timing or high transmit power would cause interference with another radio in the device.”  Also please note that DL MU OFDMA is still possible, and the acknowledgment can be the SIFS-burst procedure defined in 11ac.  We additionally propose to clarify that this signaling is sent by the STA to the AP only after associaction (where coex becomes actually an issue).  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 5053. |
| 5124 | Dorothy Stanley | 24 | 59 | What does a station that supports 160 MHz but not 80+80 MHz set Channel Width to? Please clarify. | As in comment | Rejected –  A STA uses the HE Capabilities element to differentiate between the two supported modes (OMI simply indicates the operating channel width). Please refer to B1-B7 encoding of the HE PHY Capabilities Information field, quoting:  **“-**B2 indicates support for a 160 MHz channel width in the 5 GHz band.  -B3 indicates support for a 160/80+80 MHz channel width in the 5 GHz band.” |
| 5125 | Dorothy Stanley | 24 | 63 | UL MU is a critical feature in order to achieve the goal of high efficiency. Why are we allowing devices to disable UL MU operation? If this is for power save, then perhaps only allow devices to not support UL MU if their uplink duty cycle is very, very low. | As in comment | Revised –  The UL MU Disable bit is used for coexistence purposes, and when to use it depend on the non-AP STAs decision. A note regarding this aspect was added to subclause 27.8.2 as part of the comment resolutions provided in 11-17-0115-08-00ax-comment-resolution-to-clause-27-8 for CID 5198.  Quoting the added note:  “NOTE—A device may have multiple radios that can result to difficult in-device coexistence challenges. The device might set UL MU Disable subfield to 1 if it has trouble responding to Trigger frames because the timing or high transmit power would cause interference with another radio in the device.”  We additionally propose to clarify that this signaling is sent by the STA to the AP only after associaction (where coex becomes actually an issue).  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 5125. |
| 5440 | Graham Smith | 24 | 50 | Increase Reserved bit number to make length 30 bits | Figure 9-15d change Reserved bits from 3 to 21 | Rejected –  The comment fails to identify a technical issue. Increasing the number of reserved bits to 30 bits eliminates the possibility of aggregating more than one Control field and reduces the amount of useful information that can be carried by the HT Control field for different features, consequently reducing the flexibility and usefulness. It also causes to exceed the length of the HT Control field. |
| 5851 | Hyunhee Park | 24 | 44 | In the Control information subfield of OMI, Channel Width is not distingushed for Rx or Tx. The Control information subfield of OMI should be revised (for example, (1) adding Tx Channel Width or (2) adding Rx/Tx indication, deleting Tx NSS, etc.) | Add Tx Channel Width in Fugure 9-15d. | Revised—  Disagree with the comment and with the proposed changes. The RX and TX channel widths are the same. The proposed resolution is inline with that of multiple CIDs (e.g., 7249, 9803) in this topic that suggest to add a clarification that the Channel Width applies to both Rx and Tx.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 5851. |
| 7249 | Kiseon Ryu | 24 | 58 | Channel Width subfield in Operating Mode A-Control field indicates the channel width of the STA not only for ROM but also for TOM. | Modify the text as below:  The Channel Width subfield indicates the operating channel width supported by the STA in transmission and reception, and is set to 0 for 20 MHz, 1 for 40 MHz, 2 for 80 MHz, and 3 for 160 MHz and 80+80 MHz. | Revised—  Agree with comment. Proposed resolution is inline with the suggested change.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 7249. |
| 7379 | Laurent Cariou | 24 | 34 | This section includes Rx and Tx operating mode indications. The spec also defines management frames to signal operating mode changes (OMN frames). For consistency, the OMN frames should be modified to include the same indications as in the Operating mode subfield of the A-control. | Define a new IE for the Tx Operating mode parameters. This IE can be added to the existing VHT Operating Mode Notification frame. The new element would be understood by an HE AP (i.e., if the OMN capability is set and the AP is HE it understands the new element). | Rejected –  Comment fails to identify a technical issue. OMN frames are used by legacy STAs as well. Modifying them would make the procedure backward incompatible. In addition adding yet another mechanism that serves the same purpose as OMI Control field increases complexity and does not provide any gain (actually increases overhead as adding a MGMT frame is more redundant than adding an HT Control field). |
| 7716 | Mark Hamilton | 24 | 54 | Can refers to normative permission, not appropriate here | Change "can receive" to "is capable of receiving" | Revised –  Agree in principle (although REVmc consistently uses “can receive”. Proposed resolution is to specify that the STA supports in reception.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 7716. |
| 7717 | Mark Hamilton | 25 | 1 | Can refers to normative permission, not appropriate here | Change "can transmit to "is capable of transmitting | Revised –  Agree in principle (although REVmc consistently uses “can transmit”. Proposed resolution is to specify that the STA supports in transmission.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 7717. |
| 8178 | Osama Aboulmagd | 24 | 59 | does the channel width field in the Operating Mode indicates an operating channel at less or equal the indicated BW? E.g. when the Channel Width is set to 1, does it indicate less or equal 40 MHz | CLARIFY | Rejected –  The field indicates the operating channel width that is well defined in the standard (please refer to P17L6 of REVmc D8.0). Quoting:  “operating channel width: The channel width in which the station (STA) is currently able to receive.” |
| 8248 | Pascal VIGER | 24 | 62 | The UL MU Disable subfield indicates whether UL MU operation is suspended or resumed by the non-AP STA. There is no information indicating the reason of such a suspending, and no procedure to enter or exit this suspending phase. | A procedure shall be defined. Otherwise, STAs may decide by themselves the usage of not of UL MU scheme, which may downgrade the efficiency of UL MU mode. | Revised –  The UL MU Disable bit is used for coexistence purposes, and when to use it depend on the non-AP STAs decision. A note regarding this aspect was added to subclause 27.8.2 as part of the comment resolutions provided in 11-17-0115-08-00ax-comment-resolution-to-clause-27-8 for CID 5198.  Quoting the added note:  “NOTE—A device may have multiple radios that can result to difficult in-device coexistence challenges. The device might set UL MU Disable subfield to 1 if it has trouble responding to Trigger frames because the timing or high transmit power would cause interference with another radio in the device.”  Note to TGax editor: These changes are already incorporated in D1.1 as such no further changes are required.  TGax editor to make the changes shown in 11-17/0115r8 under all headings that include CID 5198. |
| 9495 | Yanchun Li | 24 | 58 | Current ROM shall be improved to settle the case with large number of STA in narrow band ROM mode. Current ROM requires all STAs to occupy primary 20MHz and causes low channel utility. Need to allocate some narrow band ROM STA to RU in non-primary portion. | The Channel Width field shall support indication of specific 20MHz channel which STA prefers in this ROM mode. | Rejected –  The Channel Width refers to the operating channel width of the STA, and as such it is not tied to the primary channel or non-primary channel concepts. |
| 9803 | Young Hoon Kwon | 24 | 58 | Operating channel width for transmission of Trigger based PPDU also needs to be indicated, and the Channel Width subfield can be used for this purpose too. | Modify the text to "The Channel Width subfield indicates the operating channel width supported by the STA in reception and transmission, and is ...". | Accepted |
| 9804 | Young Hoon Kwon | 25 | 1 | Main purpose of including Tx NSS in OMI is to use less number of Tx RF chains for power savings. However, different from Rx NSS, the number of Tx RF chains is more closely related with the number of space-time streams (N\_STS) compared to the number of spatial streams (N\_SS). For example, even in case a STA indicates Tx NSS to be 1, an serving AP can still allocate the STA single spatial stream with STBC, which requires at least two transmit RF chains to be turned on. Because this is still possible, even if a STA supporting STBC indicates Tx NSS = 1 to the serving AP, the STA shall have at least two Tx RF chains on, which defeats the original purpose of having Tx NSS subfield in OMI. For this issue, a simple remedy is to change Tx NSS subfield to indicate the maximum number of space-time streams (N\_STS) and modify the related operation accordingly. | As in the comment. | Revised –  Agree with the comment. Proposed resolution accounts for the suggested change.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 9804. |

## Discussion: *None.*

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 4740, 4733, 9804, 7716, 5052, 9803, 5851, 7717,):***

* Operating Mode

If the Control ID subfield is 1, the Control Information subfield contains information related to the operating mode change of the STA transmitting the frame containing this information (see 27.8 (Operating mode indication)). The format of the subfield is shown in Figure 9-15i (Control Information subfield format when the Control ID subfield is 1). *(#4740)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 B2 | B3 B4 | B5 | B6 B8 | B9 B11 |
|  | Rx NSS | Channel Width | UL MU Disable | Tx NSTS | Reserved |
| Bits: | 3 | 2 | 1 | 3 | 3 |
| * Control Information subfield format when Control ID subfield is 1*(#4733, 9804)* | | | | | |

The Rx NSS subfield indicates the maximum number of spatial streams, *NSS*, that the STA supports in reception*(#7716, 5052)* and is set to *NSS* – 1.

The Channel Width subfield indicates the operating channel width supported by the STA in reception and transmission*(#9803, 5851)*, and is set to 0 for 20 MHz, 1 for 40 MHz, 2 for 80 MHz, and 3 for 160 MHz and 80+80 MHz.

The UL MU Disable subfield indicates whether UL MU operation is suspended or resumed by the non-AP STA. The UL MU Disable subfield is set to 1 to indicate that UL MU operation is suspended; otherwise it is set to 0 to indicate that UL MU operation is resumed. An AP sets the UL MU Disable subfield to 0.

The Tx NSS subfield indicates the maximum number of spacel time streams, *NSTS*, that the STA supports in transmission*(#7717)* and is set to *NSTS* – 1.*(#4733, 9804)*

* Operating mode indication
* General

An HE STA can change its operating mode setting either using the procedure described in 11.42 (Notification of operating mode changes), or the procedure described in this subclause.

Operating mode indication (OMI) is a procedure used between an OMI initiator and an OMI responder. An HE STA that transmits a frame including an OMI Control subfield is defined as an OMI initiator. An HE STA that receives a frame including an OMI Control subfield(#7507) is defined as an OMI responder.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 5053, 5125):***

An HE STA may send to a STA that indicated value 1 in the OMI A-Control Support field in its HE Capabilities element an individually addressed(#7970) QoS Data, QoS Null, or Class 3 Management frame that contains the OM Control subfield(#7507), after association, to indicate a change in its receive and/or transmit operating parameters. If dot11OMIOptionImplemented is true, an HE STA implements the reception of an individually addressed QoS Data, QoS Null, or Class 3 Management frame that contains the OM Control subfield that indicates a change in receive and/or transmit operating parameters and the HE STA shall set the OMI A-Control Support subfield in the HE MAC Capabilities Information field to 1.*(#5053, 5125)*

An HE AP shall set dot11OMIOptionImplemented(#7890)(#4783) to true and the HE AP shall implement the reception of the OM Control subfield(#7507).

Operating Mode Indication and the Operation Mode Notification should not be transmitted in the same PPDU. When a STA transmits both Operating Mode Indication and Operating Mode Notification, the OMI responder shall use the channel width and the RX NSS of the latest received Operating Mode Indication or Operating Mode Notification from the OMI initiator.

The OMI initiator shall indicate a change in its receive operating mode by including the OM Control subfield(#7507) in a QoS Data, QoS Null, or Class 3 Management frame that solicits an immediate acknowledgement and is addressed to the OMI responder.*(#5053, 5125)*

NOTE—Frames that solicit an immediate acknowledgement are, for example, QoS Null frames and QoS Data frames with Normal Ack or Implicit BAR ack policy and Action frames.(#7024)(#7025)(#7026)(#7027)(#Ed)

The OMI initiator supports receiving PPDUs with a bandwidth up to the value indicated by the Channel Width subfield(#7198) and with a number of spatial streams up to the value indicated by the Rx NSS subfield of the OM Control subfield(#7617) as defined in 27.8.2 (Receive operating mode (ROM) indication).

The OMI initiator shall indicate a change in its transmit operating mode by including the OM Control subfield(#7507) in a QoS Data, QoS Null, or Class 3 Management frame that solicits an immediate(#7182) acknowledgement frame and is addressed to the OMI responder as defined in 27.8.3 (Rules for transmit operating mode (TOM) indication(#7115)).*(#5053, 5125)*

**27.8.3 Rules for transmit operating mode (TOM) indication**

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 9804):***

The TOM indication allows the OMI initiator to suspend responding to any variant of the Trigger frame or to adapt the maximum operating channel width and/or the maximum number of space time streams*(#9804)* it can transmit as a response to a Trigger frame from the OMI responder.

An OMI initiator that is a non-AP STA may indicate changes in its transmit parameters by sending a frame that contains the OM Control subfield to the OMI responder. The OMI initiator shall set:

* The UL MU Disable subfield to 1 to indicate suspension of the UL MU operation (see 27.5.2 (UL MU operation); otherwise it shall set the UL MU Disable subfield to 0 to indicate resumption or continuation of participation in UL MU operation.
* An AP that is an OMI initiator shall set the UL MU Disable subfield to 0.
* The Tx NSTS*(#9804)* subfield to the maximum number of Nsts*(#9804)* that the STA may use in response to Trigger frames.
* The Channel Width subfield indicates the maximum channel width that the STA will use in response to Trigger frames.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 9804):***

The OMI responder shall consider the OMI initiator as participating in UL MU operation for subsequent TXOPs when the UL MU Disable subfield is 0 in the received OM Control subfield with the following restrictions:

* The maximum number of space time*(#9804)* streams that the OMI initiator can transmit in response to Trigger frames is indicated in the Tx NSTS*(#9804)* subfield of the OM Control subfield
* The maximum channel width over which the OMI initiator can transmit in response to Trigger frames is indicated in the Channel Width subfield of the OM Control subfield

The OMI responder shall indicate a number of spatial streams in the Per User Info field of a Trigger frame, which contains the AID of the OMI initiator, that is less than or equal to the number of space time streams*(#9804)* that is calculated from the Tx NSTS*(#9804)* subfield of the OM Control subfield received from the OMI initiator.

# PARS V (9.2.4.6.4.4)

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P** | **L** | **Comment** | **Proposed Change** | **Resolution** |
| 5335 | EVGENY KHOROV | 25 | 5 | Clause 9.2.4.6.4.4 does not exist | It seems that the correct clause is 10.31.4 (Link adaptation using the HE variant HT Control field). It does not exist too but there are references to this clause in the text. | Revised –  Agree with comment. Proposed resolution fixes the reference, in this subclause and in 10.9 (HT Control operation), and in other places where the inconsistency occurs.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 5335. |
| 5441 | Graham Smith | 25 | 19 | Increase Reserved bit number to make length 30 bits | Figure 9-15e change Reserved bits from 9 to 23 | Rejected –  The comment fails to identify a technical issue. Increasing the number of reserved bits to 30 bits eliminates the possibility of aggregating more than one Control field and reduces the amount of useful information that can be carried by the HT Control field for different features, consequently reducing the flexibility and usefulness. It also causes to exceed the length of the HT Control field. |
| 7888 | Mark RISON | 25 | 5 | There is no behavioural MAC specification of HE link adaptation Control subfields | Change 27.13 to refer to the HE link adaptation Control subfield | Revised –  Agree with comment. Proposed resolution fixes the reference, in this subclause and in 10.9 (HT Control operation), and in other places where the inconsistency occurs.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 7888. |

**Discussion: *…***

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 5335, 4740, 7888):***

* HE link adaptation

If the Control ID subfield is 2, the Control Information subfield contains information related to the HE link adaptation procedure (see 27.13 (Link adaptation using the HE variant HT Control field))*(#5335, 7888)*. The format of the subfield is shown in Figure 9-15i (Control Information subfield format when the Control ID subfield is 2). *(#4740)*

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B2 | B3 B6 | B7 B15 |
|  | NSS | HE-MCS | Reserved |
| Bits: | 3 | 4 | 9 |
| * Control Information subfield format when Control ID subfield is 2 | | | |

The NSS subfield indicates the recommended number of spatial streams, *NSS*, and is set to *NSS* – 1.

The HE-MCS subfield indicates the recommended HE-MCS, and is set to the HE-MCS Index value (defined in 28.5 (Parameters for HE-MCSs)).

**10.9 HT Control field operation**

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 5335, 7888):***

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 vari-ant 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 HE trigger-based PPDU that carries an immediate acknowledgement, as described in 27.5.2 (UL MU operation).
* A value of 1 in the Control ID subfield when the transmitting STA changes the receive operating mode, as described in 27.8 (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 27.13 (Link adaptation using the HE variant HT Control field).*(#5335, 7888)*

…

**TGax Editor: *Replace 25.14 (Link adaptation using the HE variant HT Control field) with 25.17 (Link adaptation using the HE variant HT Control field) (#CID 5335, 7888).***

# PARS VI (9.2.4.6.4.5)

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P** | **L** | **Comment** | **Proposed Change** | **Resolution** |
| 5054 | David Kloper | 27 | 3 | This legacy definition does not have sufficient information to enable the correct UL MU allocation. The size should include MPDU headers, and AMPDU delimiters or it will often underestimate the allocation. | Please update definition to include all MAC layer overhead required to transfer the MSDU. | Rejected –  Adding the AMPDU delimiters, MPDU headers to the buffer stauts report adds significant complexity to the STA as it needs constant computation of all these quantities prior to reporting its BSR, while giving questionable benefit in terms of performance as the STA in any case needs to perform some form of padding of TB PDDUs due to its transmissions allocated with other devices, and due to other limitations at the AP side (minimum MPDU spacing, A-MPDU size, etc). |
| 5055 | David Kloper | 27 | 12 | Since this field is intended to allow UL MU allocation, it must only include MSDU that are available for sending in immediate response to a Trigger frame. Inclusion of buffered traffic that the MAC is not prepared to deliver would result in overallocation. | Please add clarification. | Rejected –  Providing BSR for only one interaction would require the AP to always poll the STA for reporting BSR for each interaction which can increase overhead. On the other side providing to the AP a buffer status report of all its queues is beneficial for the AP to determine what amount of resources, and frequency of triggers to be sent to a particular STA, based on the information provided in one interaction. |
| 5056 | David Kloper | 27 | 12 | Since we can now carry MMPDU and MPDU in the same AMPDU, should these sizes include MMPDU as well as MSDU? | Please add clarification. | Rejected --  MMPDUs are generally expected to be delivered using EDCA and to be sent rarely, and in those instances where they are going to be carried in the TB PPDU, their lengths are negligible (in the order of 40s of Bytes) to be accounted for in the resource allocation (considering additional padding required by the AP from the STAs to construct the TB PPDU and its contents). |
| 5126 | Dorothy Stanley | 25 | 32 | While queue size is definitely important to the AP in order to schedule UL MU, there are other metrics that are important as well. For example, knowing that the client is experiencing excessive jitter and latency on the uplink or has low battery life will be useful. | Modify BSR accordingly | Rejected –  Buffer status report is used to indicate to the AP the amount of data the sta has available in its queues for transmission. If the client is experiencing excessive jitter, latency, or other issues then the STA can transmit using EDCA, while also wait for being triggered. |
| 5442 | Graham Smith | 25 | 47 | Add Reserved bit number to make length 30 bits | Figure 9-15f add Reserved bits 4 | Rejected –  The comment fails to identify a technical issue. Increasing the number of reserved bits to 30 bits eliminates the possibility of aggregating more than one Control field and reduces the amount of useful information that can be carried by the HT Control field for different features, consequently reducing the flexibility and usefulness. It also causes to exceed the length of the HT Control field. |
| 7302 | Kwok Shum Au | 26 | 15 | There is no "AC Bitmap subfield". | In 26.15 and 26.41, replace "AC Bitmap subfield" with "ACI bitmap subfield". | Accepted |
| 7303 | Kwok Shum Au | 26 | 40 | The symbol F\_{Val} is defined as the value of the DL TX Power subfield in subclause 9.2.4.6.4.2. | Replace F\_{Val} with another symbol to avoid double definition. | Revised –  Agree in principle. Replace F\_{val} with D\_{val}, to recall Delta TID value.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 7303. |
| 7305 | Kwok Shum Au | 27 | 12 | The reference to subclause 10.9 is not appropriate. | Replace subclause 10.9 with subclause 10.13.1. | Rejected –  The reference is correct.  Subclause 10.13.1 contains a statement that applies to the QoS Control field:  “*When an A-MPDU contains multiple QoS Control fields, bits 4 shall be identical 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.”*  While subclause 10.9 contains a statement that applies to the HT Control field (where the BSR Control is carried):  *“The HT Control field of all MPDUs containing the HT*  *Control field aggregated in the same A-MPDU shall be set to the same value.”* |
| 7719 | Mark Hamilton | 27 | 9 | This is a normative permission. In clause 9, state it declaratively. | Change "can remain" to "optionally remains" | Revised –  In other comments targeting the “can” use in clause 9 the proposals were to use might. In order to keep consistency proposed resolution is to use “might”.  Same change is proposed for the same statement in the QoS COntorl field.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 7719. |
| 7865 | Mark RISON | 25 | 54 | "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 subfield, is reported and set to 0 otherwise." is not true. For example, 26.27 indicates that the status of 8 TIDs is being reported even if all bits in the bitmap are 0 | After "is reported" add "in the ACI Bitmap subfield" | Accepted |
| 7867 | Mark RISON | 27 | 3 | It is not clear what "the present (A-)MPDU" is | Change the cited text to "the (A-)MPDU containing the BSR" | Accepted |
| 8133 | Matthew Fischer | 26 | 15 | Wrong acronym - AC should be ACI | change AC Bitmap subfield to ACI Bitmap subfield | Accepted |
| 8179 | Osama Aboulmagd | 26 | 22 | BSR is really very confusing. The UP bits are mapped to AC. The same TID field is used to either indicate the UP or the TSID. I can understand the ACI Bitmap. Hoever the delta TID are very confusing. What function does this field provide? UP doesn't have TID associated with it. | clarify the use of TID | Rejected –  The function of the Delta TID field is provided in the paragraph that it is defined and in the Table 9-18c. “The Delta TID, together with the values of the ACI Bitmap field, indicates the number o TIDd for which the STA is reporting the buffer status”. This information is useful for the AP to be able to correctly set the TID Limit field in the Trigger frame that is sent to this STA for transmitting its Trigger-based PPDU contianing a multi-TID A-MPDU.  Please refer to <https://mentor.ieee.org/802.11/dcn/16/11-16-0628-01-00ax-buffer-status-report-in-he-control-field.pptx> for more information on this functionality. |
| 8180 | Osama Aboulmagd | 25 | 31 | BSR operation is redundant and is covered by biggybacking the buffer size using the Queue Size field of the QoS Control field | Given the efficiency of using piggybacing to communicate buffer status and the apparent complexity of the BSR operation as defined in this clause, the proposal is to delete this part. | Rejected –  The comment fails to identify a technical issue. The BSR Control field is an alternative way of delivering buffer status information to the AP, which in contrast to the delivery in the QoS Control field has a more flexible BSR range, thanks to the scaling factor, can deliver BSR for one AC and for all ACs in the same field, and also the number of TIDs for which there is buffered traffic. All of this without the need of additional access to the medium or multi-TID aggregation.  Please refer to <https://mentor.ieee.org/802.11/dcn/16/11-16-0628-01-00ax-buffer-status-report-in-he-control-field.pptx> for more information on this functionality. |
| 8181 | Osama Aboulmagd | 26 | 50 | SF needs to be included in the abbreviation clause, if it is not already there | as in comment | Revised—  Agree with comment. SF is not already there. Proposed resolution is to add it there.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 8181. |
| 8249 | Pascal VIGER | 25 |  | 9.2.4.6.4.5 Buffer Status Report (BSR) The report contains buffer status information used for UL MU operation. But the AP should only receive amount of data directed to it. | As already stated in 9.2.4.5 QoS Control Field for the legacy format of buffer status, add following sentence after 1st paragraph of 9.2.4.6.4.5 BSR: "For reporting its buffer status information, a non-AP HE STA considers the amount of buffered traffic intended for the HE AP." | Revised –  Agree in principle. Proposed resolution is to add the clarififcation in the queue size definitions.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 8249. |
| 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. | Rejected –  The BSR Control field is an alternative way of delivering buffer status information to the AP, which in contrast to the delivery in the QoS Control field has a more flexible BSR range, thanks to the scaling factor, can deliver BSR for one AC and for all ACs in the same field, and also the number of TIDs for which there is buffered traffic. All of this without the need of additional access to the medium or multi-TID aggregation. It is up to the STA to determine which method to use to deliver BSR. If the AP does not support multi-TID A-MPDU then it makes sense for the STA to use QoS Control BSR delivery (mandatory mode), if the AP supports multi-TID A-MPDU then it makes sense that the STA uses BSR Control, or QoS Control, or both to deliver BSR. From the AP’s perspective the resource allocation is going to be determined independently on which method the STA uses to deliver BSR, as long as the AP supports the BSR delivery method (referring to the BSR Control which is optional in RX).  Please refer to <https://mentor.ieee.org/802.11/dcn/16/11-16-0628-01-00ax-buffer-status-report-in-he-control-field.pptx> for more information on this functionality. |
| 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. | Rejected –  Similar comment to 8426.  The BSR Control field is an alternative way of delivering buffer status information to the AP, which in contrast to the delivery in the QoS Control field has a more flexible BSR range, thanks to the scaling factor, can deliver BSR for one AC and for all ACs in the same field, and also the number of TIDs for which there is buffered traffic. All of this without the need of additional access to the medium or multi-TID aggregation.  Please refer to <https://mentor.ieee.org/802.11/dcn/16/11-16-0628-01-00ax-buffer-status-report-in-he-control-field.pptx> for more information on this functionality. |
| 9620 | Yongho Seok | 26 | 47 | "The ACI High subfield indicates the ACI of the AC for which the BSR is indicated in the Queue Size High subfield." Current description of the ACI High subfield does not represent the AC having the highest amount of buffered traffic. Since current name of the subfield can miscommunicate, change the subfield name to "Reported ACI subfield". Otherwise justify the meaning of High in the subfield name. | change the subfield name from "ACI High subfield" to "Reported ACI subfield". | Revised –  Agree in principle with the comment. Proposed resolution adds a note clarifying that the determination that a queue has higher priority w.r.t. other queues depends on internal metrics at the STA and is out of the scope for the standard.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 9620. |
| 9621 | Yongho Seok | 26 | 60 | "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." Current description of the Queue Size High subfield does not represent the AC having the highest amount of buffered traffic. Since current name of the subfield can miscommunicate, change the subfield name to "Reported Queue Size subfield". Otherwise justify the meaning of High in the subfield name. | Change the subfield name from "Queue Size High subfield" to "Reported Queue Size subfield". | Revised –  Agree in principle with the comment. Proposed resolution adds a note clarifying that the determination that a queue has higher priority w.r.t. other queues depends on internal metrics at the STA and is out of the scope for the standard.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 9621. |
| 9806 | Young Hoon Kwon | 26 | 2 | In case all ACs have traffic, it is possible to set ACI bitmap is set to 0000 (when there are traffic for all 8 TIDs.). This needs to be described in this line, too. | Per comment | Revised –  Agree in principle. Added the exception and the reference to the table where this is defined.  TGax editor to make the changes shown in 11-17/0239r0 under all headings that include CID 9806. |

## Discussion: *None.*

* Buffer Status Report (BSR)

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 4740):***

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 9-15i (Control Information subfield format when the Control ID subfield is 3).*(#4740)*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 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 format when Control ID subfield is 3 | | | | | | |

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 9806, 7865):***

The ACI Bitmap subfield indicates the access categories for which the buffer status is reported and its encoding is shown in Table 9-18b (ACI Bitmap subfield 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 subfield, is reported in the ACI Bitmap subfield and set to 0 otherwise. *(#7865)* When 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 9-18c (Delta TID subfield encoding))*(#9806)*.

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

**TGax Editor: *Change the paragraph and table below of this subclause as follows (#CID 8133, 7302, 7303):***

The Delta TID subfield, together with the values of the ACI*(#8133, 7302)* 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 9-18c (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* *(#7303)*is the value of the Delta TID subfield except when *Nones* is equal to 0 for which there is the *NTID* = 8 case. | |

**TGax Editor: *Change the paragraph below, by adding a note, of this subclause as follows (#CID 9620, 9621):***

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

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.*(#9620, 9621)*

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
* 16 384 if the Scaling Factor subfield is 3

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 8249):***

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 field.*(#8249)*

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 field.*(#8249)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7867, 7719):***

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 (A-)MPDU containing the BSR)*(#7867)* 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 might*(#7719)* 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).

**9.2.4.5.6 Queue Size subfield**

**TGax Editor: *Change the sentence below of this subclause as follows (#CID 7719):***

If a QoS Data frame is fragmented and is not carried in an A-MPDU, the queue size value might*(#7719)* 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).

**3.4 Abbreviations and acronyms**

**TGax Editor: *Insert the following acronym (#CID 8181):***

SF Scaling factor*(#8181)*