IEEE P802.11
Wireless LANs

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| Comment resolutions for miscellaneous comments |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D5.0 with the following CIDs (12 CIDs):

* 22068, 22081, 22104, 22117, 22118, 22154, 22259, 22267, 22268, 22356,
* 22364, 22365

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** |
| 22068 | Li-Hsiang Sun | 360.14 | What does "either or both" refer to? there are 3 Queue Size fields in the sentence | change to "any of the three" | Revised –Agree in principle with the comment. Proposed resolution replaces “either or both” with “ any of the three” plus some minor editorial improvements. Same change is applied to a similar note found in the same subclause. TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22068. |
| 22081 | Liwen Chu | 77.42 | In TWT SP, after receiving the More Data field being equal to 1, the recipient in power save mode will go to doze sate. So Mode Data can't be set to 1 if the AP shedules the recipient in the following Trigger frames in TWT SP | Change Mode Data definition per the comment | Rejected –There are no technical issues with the current text. Please note that a recipient that is in power save mode cannot go to doze state if it receives a frame with MD field set to 1 as specified in this subclause. Hence the More Data field definition is inline with the current behavior defined for 11ax power save mechanisms.  |
| 22104 | Liwen Chu | 218.01 | There are several issues with TDLS TWT: 1), TDLS initiator asts as AP, most likely it should act as TWT responder, 2), assume a STA can be wither TWT requester or TWT responder, it is possible that TDLS Setup Response and TWT Confirm include requesting TWT and responding TWT respectively. | As in comment | Revised –Added the case of the TWT Responder Support field in the TDLS Setup Response.TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22104. |
| 22117 | Liwen Chu | 291.34 | Intra-BSS power save should be removed from the list since 1) the AP is not known about it, 2) if the PPDU is known or transmitted by the AP, the AP can't transmitted to the STA with intra-BSS power save anyway. | As in comment | Revised –Agree in principle with the comment. Proposed resolution removes the corresponding subclause reference.TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22117. |
| 22118 | Liwen Chu | 291.55 | Intra-BSS power save should be removed from the list since 1) the AP is not known about it, 2) if the PPDU is known or transmitted by the AP, the AP can't transmitted to the STA with intra-BSS power save anyway. | As in comment | Revised –Agree in principle with the comment. Proposed resolution removes the corresponding subclause reference.TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22118. |
| 22154 | Mark RISON | 186.10 | The Supported Channel Width Set field does not make sense. Any given STA (including any given AP) only operates in one band, so you either support the "in 2G4" features or the "in 5G/6G" features -- you can't have bits set in both | Change the middle cell of the Supported ChannelWidth Set row of Table 9-321b--Subfields of the HE PHY Capabilities Information field to "In the 2.4 GHz band:B0 indicates support for a 40 MHz channel widthB1-B3 are reserved.If a non-AP STA operates with a 20 MHz channelwidth and the 20 MHz In 40 MHz HE PPDU In 2.4GHz subfield is 1, then B4 indicates support of 242-tone RUs in a 40 MHz HE MU PPDU. Otherwise, B4 is reserved.B6 is reserved.In the 5 GHz and 6 GHz bands:B0 is reserved.B1 indicates support for a 40 MHz and 80 MHz channel width.B2 indicates support for a 160 MHz channel width.B3 indicates support for a 160/80+80 MHz channel width.B4 is reserved.If a non-AP STA operates with 20 MHz channel widthand the 20 MHz In 160/80+80 MHz HE PPDU sub-field is set to 0, then B5 indicates support of 242-toneRUs in a 40 MHz and 80 MHz HE MU PPDU. If a non-AP STA operateswith 20 MHz channel width and the 20 MHz In 160/80+80 MHz HE PPDU subfield is set to 1, then B5indicates support of 242-tone RUs in a 40 MHz, 80MHz, 160 MHz, and 80+80 MHz HE MU PPDU. Otherwise, B5 is reserved.B6 is reserved".In the rightmost cell delete "B6 is reserved." | Revised –Agree in principle with the comment. Proposed resolution proposes changes inline with the suggested changes, however minor editorial improvements are included as well to the proposed text.TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22154. |
| 22259 | Mark RISON |  | "MSDUs and A-MSDUs buffered at the STA" -- the STA does not buffer A-MSDUs, it buffers MSDUs (the things received at the MAC SAP) | In 9.2.4.5.6 change "all MSDUs and A-MSDUs buffered at the STA (excludingthe MSDU or A-MSDU of the present QoS Data frame) in the delivery queue used for MSDUs andA-MSDUs with TID values equal to the value in the TID subfield of this QoS Control field." to "all MSDUs buffered at the STA (excludingthe MSDU(s) in the present QoS Data frame) in the delivery queue used for MSDUs with TID values equal to the value in the TID subfield of this QoS Control field." and "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 frame containing the Queue Size subfield) inthe delivery queue used for MSDUs and A-MSDUs with TID values equal to the value in the TID subfieldof this QoS Control field." to "The queue size, QS, is the approximate total size in octets, of all MSDUs buffered at the STA(including the MSDUs in the same PSDU as the frame containing the Queue Size subfield) inthe delivery queue used for MSDUs with TID values equal to the value in the TID subfieldof this QoS Control field.". In 9.2.4.6a.4 change "all MSDUs and A-MSDUs buffered at the STA (including the MSDUsor A-MSDUs in the same PSDU as the frame containing the BSR Control subfield) in the delivery queuesused for MSDUs and A-MSDUs" to "all MSDUs buffered at the STA (including the MSDUsin the same PSDU as the frame containing the BSR Control subfield) in the delivery queuesused for MSDUs" | Rejected –The STA can buffer the MSDUs in the form of A-MSDUs as well. And since the BSR will be the amount of the payload then it is fine that it also accounts for the A-MSDU subframe headers when this set of MSDUs is stored in this format. In addition, please note that the same terminology is used in REVmd. Quoting from 9.2.4.5.6 of REVmd: “The Queue Size subfield is set to 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) 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.” |
| 22267 | Mark RISON | 90.54 | "Each bit of the ACI Bitmap subfield isset to 1 to indicate the buffer status of the corresponding AC" is confusing: it's actually that the buffer status for the AC is included in the (Queue Size All of the) BSR, not that each bit indicates the buffer status per se | Change the cited text to "Each bit of the ACI Bitmap subfield is set to 1 to indicate that the buffer status of the corresponding AC is included in the Queue Size All subfield" | Accepted |
| 22268 | Mark RISON | 90.54 | "Each bit of the ACI Bitmap subfield isset to 1 to indicate the buffer status of the corresponding AC, and set to 0 otherwise. If the ACI Bitmap subfield is 0 and the Delta TID subfield is 3 it indicates that there is buffered traffic for all 8 TIDs" -- second sentence contradicts first | Change the cited text to "[...] set to 0 otherwise, except that if the ACI Bitmap subfield is 0 and the Delta TID subfield is 3 the buffer status of all 8 TIDs is included" | Accepted |
| 22356 | Mark RISON |  | CID 20460. The Queue Size, to be useful, needs to include traffic queued above the MAC SAP. This was rejected on the basis that "The comment fails to identify a technical issue", which is spurious. If the traffic queued above the MAC SAP is not accounted for in the Queue Size, then the AP will receive misleading information as to the amount of data the STA has queued | In 9.2.4.5.6 Queue Size subfield, after NOTE 2, add "The queue size may additionally include the approximate total size in octets, of MSDUs buffered above the MAC SAP with priority values equal to the value in the TID subfieldof this QoS Control field." | Rejected –The comment fails to identify a technical issue. Please note that the MAC does not know what resides above the MAC SAP. It only knows what is provided to it via the MAC SAP.  |
| 22364 | Mark RISON |  | CID 20503. Actually, it's even more broken. The Supported Channel Width Set field is a 7-bit bitmap, not an enumeration allowing values 0-6 (even ignoring the fact that (b)6 is reserved), However, dot11HECurrentChannelWidthSet is not used anyway | It needs to be an unsigned integer in the range 0..63 (since b6 is reserved). It also needs to be referred to in Clause 26 too | Revised –Agree in principle that needs to be refered to a normative behavior related subclause, though not 26 since it is a PHY related. Proposed resolution is to add a normative sentence that ties this MIB variable to the respective field in the HE Capabities element. As for the encoding there is no need for it to be the same as that of the Channel Width Set field.TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22364. |
| 22365 | Mark RISON |  | CID 20503. Actually, it's even more broken. The Supported Channel Width Set field is a 7-bit bitmap, not an enumeration allowing values 0-6 (even ignoring the fact that (b)6 is reserved), However, dot11HECurrentChannelWidthSet is not used anyway | Delete dot11HECurrentChannelWidthSet from Table 27-54--HE PHY MIB attributes, Dot11PhyHEEntry, dot11PhyHEComplianceGroup and C.3 itself | Revised –Agree in principle that needs to be refered to a normative behavior related subclause, though not 26 since it is a PHY related. Proposed resolution is to add a normative sentence that ties this MIB variable to the respective field in the HE Capabities element. As for the encoding there is no need for it to be the same as that of the Channel Width Set field.TGax editor to make the changes shown in 11-19/1831r0 under all headings that include CID 22365. |

**Discussion: *None.***

* **Buffer status report operation(#20053)**

A non-AP STA delivers buffer status reports (BSRs) to assist its AP in allocating UL MU resources. The non-AP STA can either implicitly deliver BSRs in the QoS Control field or BSR Control subfield 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 Trigger frame (solicited BSR). The buffer status reported in the QoS Control field consists of a queue size value for a given TID (see 9.2.4.5.6 (Queue Size subfield)). The buffer status reported in the BSR Control field consists of an ACI bitmap, delta TID, a high priority AC, and two queue sizes (see 9.2.4.6a.4 (BSR Control)).(#21346)

An HE STA shall set the BSR Support subfield of the HE Capabilities element it transmits to 1 if dot11HEBSRControlImplemented is true; otherwise the HE STA shall set the BSR Support subfield to 0.

A non-AP STA reports its buffer status (unsolicited BSR) to the AP to which it is associated in the QoS Control field in QoS Null and QoS Data frames and in the BSR Control subfield (if present) in QoS Null, QoS Data and Management frames as defined below:(#21343)

* The HE STA shall report the queue size(#21346) for a given TID in the Queue Size subfield of the QoS Control field in QoS Data or QoS Null frames it transmits; the STA may set the Queue Size subfield to 255 to indicate an unknown/unspecified queue size(#21346) for that TID.
* The HE STA may aggregate multiple QoS Data frames or QoS Null frames in an A-MPDU to report the queue size(#21346) for different TIDs. The HE STA shall follow the A-MPDU aggregation rules defined in 26.6.3 (Multi-TID A-MPDU and ack-enabled single-TID A-MPDU) for aggregating QoS Data frames with multiple TIDs. The HE STA does not follow the rules defined in 26.6.3 (Multi-TID A-MPDU and ack-enabled single-TID A-MPDU) for QoS Null frames with No Ack ack policy(#20545).
* The HE STA may report the buffer status in the BSR Control subfield of frames it transmits if the AP has indicated its support in the BSR Support subfield of its HE Capabilities element; otherwise the STA shall not report the buffer status in the BSR Control subfield.
* The HE STA shall report the queue size(#21346) for its preferred AC, indicated by the ACI High subfield, in the Queue Size High subfield of the BSR Control subfield; the STA may set the Queue Size High subfield to 255 to indicate an unknown/unspecified queue size(#21346) for that AC.
* The HE STA shall report the queue size(#21346) for the(#20530) ACs, indicated by the ACI Bitmap subfield, in the Queue Size All subfield of the BSR Control subfield; the STA may set the Queue Size All subfield to 255 to indicate an unknown/unspecified BSR for those ACs.
* The HE STA shall set the Delta TID subfield according to Table 9-24d (Delta TID subfield encoding), and the Scaling Factor subfield as defined in 9.2.4.6a.4 (BSR Control).

NOTE 1—The STA can send an unsolicited BSR in response to certain Trigger frames except MU-RTS and BSRP (with or without RA-RUs, as defined in 26.5.2.3 (Non-AP STA behavior for UL MU operation) and in 26.5.4 (UL OFDMA-based random access (UORA))) or it can send the unsolicited BSR after accessing the WM using EDCA.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22068):***

NOTE 2—The STA might include a BSR Control subfield in a QoS Data or QoS Null frame. In this case the Queue Size subfield in the QoS Control field and the Queue Size High and Queue Size All subfields(#Ed) in the BSR Control subfield might differ, and any of the three subfields might be set to 255 to indicate unspecified or unknown queue size(#21346). The STA might include only the BSR Control subfield in a Management frame.*(#22068)* (#20495, #21345)

An AP can also solicit one or more associated non-AP STAs for their BSR(s) by sending a BSRP Trigger frame (see 9.3.1.22.6 (Buffer Status Report Poll (BSRP) variant)). The non-AP STA responds (solicited BSR) as defined below:

* The non-AP STA that receives a BSRP Trigger frame shall follow the rules defined in 26.5.2.3 (Non-AP STA behavior for UL MU operation) to generate the HE TB PPDU if the Trigger frame contains the 12 LSBs of the non-AP STA’s AID in any of the User Info fields; otherwise if the non-AP STA’s buffers are not empty and the non-AP STA supports the UL OFDMA-based random access procedure, it may follow the rules defined in 26.5.4 (UL OFDMA-based random access (UORA)) to gain access to an RA-RU and generate the HE TB PPDU when the Trigger frame contains one or more RA-RUs.
* The non-AP STA shall include in the HE TB PPDU one or more QoS Null frames containing one or more of the following:
* The QoS Control field(s) with Queue Size subfields for each of the TIDs for which the non-AP STA has queue size(#21346) to report to the AP.
* The BSR Control subfield with the Queue Size All subfield indicating the queue size for the(#20530) ACs, indicated by the ACI Bitmap subfield, for which the non-AP STA has queue size(#21346) to report to the AP if the AP has indicated its support in the BSR Support subfield of its HE Capabilities element. The non-AP STA shall set Delta TID, SF, ACI High and Queue Size High subfields of the BSR Control subfield as defined in 9.2.4.6a.4 (BSR Control).
* The non-AP STA shall not solicit an immediate response for the frames carried in the HE TB PPDU (e.g., the Ack Policy Indication subfield of a QoS Null frame(#21343) shall not be set to Normal Ack or Implicit BAR(#20545)).

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22068):***

NOTE 1—As with unsolicited BSR, the STA might include a BSR Control subfield in a QoS Null frame that is sent in response to the BSRP Trigger frame. In this case, the Queue Size subfield in the QoS Control field and the Queue Size High and Queue Size All subfields(#Ed) in the BSR Control subfield might differ, and any of the three subfields might be set to 255 to indicate an unspecified or unknown queue size(#21346).*(#22068)* (#21343, #21344)

(#20495)NOTE 2—An AP does not send a BSRP Trigger frame containing the 12 LSBs of the AID of the non-AP STA that sets the UL MU Disable field to 1.

An AP may include a BSRP Trigger frame together with other Control, Data and Management frames in one A-MPDU to a non-AP STA if the HE Capabilities element received from the non-AP STA has the BSRP BQRP A-MPDU Aggregation field equal to 1. A non-AP STA constructs the A-MPDU contained in the HE TB PPDU sent in response to a BSRP Trigger frame as described in 26.5.2.4 (A-MPDU contents in an HE TB PPDU).(#20816)

The NDP feedback report procedure described in 26.5.7 (NDP feedback report procedure) can be used for buffer status feedback operation. An AP that sent an NFRP Trigger frame to one or more non-AP STAs may send a BSRP Trigger frame to those non-AP STAs to get more precise buffer status information.

* More Data subfield

Change paragraphs 3-4 as follows:

An AP optionally sets the More Data subfield to 1 in Ack frames sent to a non-DMG ~~and~~ non-S1G non-HE STA and in Ack, BlockAck and Multi-STA BlockAck frames sent to an HE STA. An HE AP indicates that it supports setting the More Data subfield to 1 in these control response frames by setting the More Data Ack subfield to 1 in the QoS Info field of elements it includes in frames transmitted to the STA.(#20570)

***See the paragraph below of this subclause (#CID 22081):***

The AP can set the More Data subfield to 1 to indicate that it has a pending transmission for the STA if it ~~from which it~~ has received a frame that contains a ~~QoS Capability element~~QoS Info field(#20851) in which the More Data Ack subfield is equal to 1 from the STA and ~~that has one or more ACs that are delivery enabled and that is in PS mode to indicate that the AP has a pending transmission for the STA~~ one of the following conditions is true:

* The STA is in PS mode and has one or more ACs that are delivery enabled (see 11.2.2.6 (AP operation during the CP)).
* The STA is in PS mode and is a TWT requester or a TWT scheduled STA (see 26.8 (TWT operation))

A TDLS peer STA optionally sets the More Data subfield to 1 in Ack frames sent to a non-HE STA and in Ack, BlockAck, and Multi-STA BlockAck frames sent to an HE STA. An HE TDLS peer STA indicates that it supports setting the More Data subfield to 1 in these control response frames by setting the More Data Ack subfield to 1 in the QoS Info field of the QoS Capability element it includes in frames transmitted to the STA.

The TDLS peer STA can set the More Data subfield to 1 to indicate that it has pending transmission for the STA if it has received from the STA a TDLS Setup Request frame or TDLS Setup Response frame ~~that has TDLS peer PSM enabled and~~ that has the More Data Ack subfield equal to 1 in the QoS Info field of (#20851)the QoS Capability element ~~of its transmitted TDLS Setup Request frame or TDLS Setup Response frame to indicate that it has a pending transmission for the STA.~~ and one of the following conditions is true:

* The STA has TDLS peer PSM enabled (see 11.2.3.6 (AP operation))
* The STA is in PS mode and is a TWT requester or a TWT scheduled STA (see 26.8 (TWT operation)).

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22104):***

* **TDLS Action field formats**
* **TDLS Setup Request Action field format**

***Change Table 9-414 (Information for TDLS Setup Request Action field) as follows (maintaining numeric order):***

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| --- |
| * **Information for TDLS Setup Request Action field**
 |
| **Order** | **Information** | **Notes** |
| 19 | AID | The AID element containing the AID of the STA sending the frame is present if dot11VHTOptionImplemented, dot11HEOptionImplemented, or dot11S1GOptionImplemented is true.(#20748) |
| 23 | HE Capabilities | The HE Capabilities element is present if dot11HEOptionImplemented is true; otherwise it is not present. The HE Capabilities element is defined in 9.4.2.247 (HE Capabilities element) |
| 24 | TWT | The TWT element is optionally present if dot11TWTOptionActivated is true; otherwise not present. The Trigger subfield and the Negotiation Type subfield of the TWT element are set to 0. |

* **TDLS Setup Response Action field format**

***Change Table 9-415 (Information for TDLS Setup Response Action field) as follows (maintaining numeric order):***

|  |
| --- |
| * **Information for TDLS Setup Response Action field**
 |
| **Order** | **Information** | **Notes** |
| 20 | AID | The AID element containing the AID of the STA sending the frame is present if dot11VHTOptionImplemented, dot11HEOptionImplemented, or dot11S1GOptionImplemented is true.(#20748) |
| 25 | HE Capabilities | The HE Capabilities element is present if dot11HEOptionImplemented is true and the Status Code is SUCCESS; otherwise it is not present. The HE Capabilities element is defined in 9.4.2.247 (HE Capabilities element) |
| 26 | TWT | The TWT element is present if dot11TWTOptionActivated is true and the TWT element is present in the TDLS Setup Request frame that elicited this TDLS Setup Response frame. The TWT element is optionally present if dot11TWTOptionActivated is true and the TWT Requester Support field or the TWT Responder Support field is equal to 1 in the HE Capabilities in the TDLS Setup Request frame that elicited this TDLS Setup Response frame. Otherwise, the TWT element is not present. *(#22104)*The Trigger subfield and the Negotiation Type subfield of the TWT element are set to 0. |

* **TDLS Setup Confirm Action field format**

***Insert the following row in Table 9-416 (Information for TDLS Setup Confirm Action field):***

|  |
| --- |
| * **Information for TDLS Setup Confirm Action field**
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| **Order** | **Information** | **Notes** |
| 14 | HE Operation | The HE Operation element is present when dot11HEOptionImplemented is true, the TDLS Setup Response frame contained an HE Capabilities element and the Status Code is SUCCESS; otherwise it is not present. The HE Operation element is defined in 9.4.2.248 (HE Operation element). |

* **Power management**
* **Power management in a non-DMG infrastructure network**

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22117):***

A non-AP STA can be in one of two power management modes:

* Active mode: The STA receives and transmits frames at any time if the STA is in awake state. The non-HE STA remains in the awake state. The HE STA remains in the awake state unless the STA is unavailable. A STA that is unavailable is not capable of receiving PPDUs. A STA is permitted to be unavailable as described in 26.14.3 (Opportunistic power save), and 26.8.4.4 (TWT Information frame exchange for flexible wake time).*(#22117)*
* Power save (PS) mode: The STA enters the awake state to receive or transmit frames. The STA remains in the doze state otherwise.
* **AP operation**

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22118):***

An AP shall maintain for each currently associated STA a Power Management status that indicates in which power management mode the STA is currently operating. APs that implement and signal their support of APSD shall maintain for each currently associated STA an APSD and an access policy status that indicates whether the STA is presently using APSD and shall maintain the schedule (if any) for the STA. An AP shall, depending on the power management mode of the STA, temporarily buffer BUs destined to the STA. An AP implementing APSD shall, if a STA is using APSD and is in PS mode, temporarily buffer BUs destined to that STA. No BUs addressed directly to STAs operating in the active mode shall be buffered for power management reasons. An HE AP should not transmit to an HE STA if the STA might be unavailable, as defined in 26.8.4.4 (TWT Information frame exchange for flexible wake time), , and 26.14.3 (Opportunistic power save), unless the transmission is solicited by the STA.*(#22118)*

***Change items f) and g) in the 2nd paragraph as follows:***

The following rules describe the operation:

* When dot11FMSActivated is false, the AP shall transmit all buffered non-GCR-SP (11ak)non-SYNRA group addressed BUs immediately after every DTIM or during broadcast TWT SPs within that beacon interval as defined in 26.8.3.2 (Rules for TWT scheduling AP).(#20120)

When dot11FMSActivated is true and the AP has established an FMS delivery interval for a multicast stream, the AP shall transmit all non-GCR-SP (11ak)non-SYNRA group addressed BUs belonging to particular FMS stream immediately after the DTIM that has the Current Count field of the FMS Counter field(M101) set to 0 for that particular FMS stream or during broadcast TWT SPs within that beacon interval as defined in 26.8.3.2 (Rules for TWT scheduling AP).

The More Data subfield of each group addressed frame shall be set to indicate the presence of further buffered non-GCR-SP group addressed BUs that will be delivered using MPDUs with an RA other than a SYNRA. If the AP is unable, before the primary or secondary TBTT following the DTIM, to transmit all of the buffered non-GCR-SP group addressed BUs(11ak) that will be delivered using MPDUs with an RA other than a SYNRA, then the AP shall set the bit for AID 0 (zero) in the TIM element to 1 for a single BSSID or set the corresponding group address bit to 1 for multiple BSSIDs, as defined in 9.4.2.5 (TIM element), and when dot11FMSActivated is true, shall set the appropriate bits in the FMS Descriptor element as described in 9.4.2.74 (FMS Descriptor element) to indicate for which non-GCR-SP non-SYNRA group addresses there are still buffered BUs, until all buffered non-GCR-SP group addressed BUs that will be delivered using MPDUs with an RA other than a SYNRA have been transmitted.

When the AP transmits an STBC DTIM or TIM Beacon frame, the AP shall retransmit all non-GCR-SP group addressed BUs that will be delivered using MPDUs with an RA other than a SYNRA and that were transmitted following the non-STBC DTIM or TIM Beacon frame except that they are transmitted using the basic STBC MCS. It may be the case that a complete set of buffered non-GCR-SP non-SYNRA group addressed BUs is sent over a period of time during which non-STBC and STBC transmissions are interleaved, but the transition from non-STBC group addressed transmissions to STBC group addressed transmissions shall be preceded by the transmission of an STBC Beacon frame and the transition from STBC group addressed transmissions to non-STBC group addressed transmissions shall be preceded by the transmission of a non-STBC Beacon frame.

* When the AP receives a PS-Poll frame from a STA that is in PS mode, it shall forward to the STA a single buffered BU. The AP shall respond after a SIFS either with a Data or Management frame, or with an Ack frame; in which case the corresponding Data or Management frame is delayed. Until the transmission of this BU either has succeeded or is presumed failed (when maximum retries are exceeded), the AP shall acknowledge but ignore all PS-Poll frames from the same STA. This prevents a retried PS-Poll frame from being treated as a new request to deliver a buffered BU.

For a STA using U-APSD, the AP transmits one BU destined for the STA from any AC that is not delivery-enabled in response to PS-Poll frame from the STA. The AP should transmit the BU from the highest priority AC that is not delivery-enabled and that has a buffered BU. When all ACs associated with the STA are delivery-enabled, the AP transmits one BU from the highest priority AC that has a BU.

For a STA in PS mode and not using U-APSD, the AP shall set the More Data subfield of the response Data or Management frame to 1 to indicate the presence of further buffered BUs (not including the BU currently being transmitted) for the polling STA. For a STA using U-APSD, the AP shall set the More Data subfield to 1 to indicate the presence of further buffered BUs (not including the BU currently being transmitted) that do not use delivery-enabled ACs. When all ACs associated with the STA are delivery-enabled, the AP shall set the More Data subfield to 1 to indicate the presence of further buffered BUs (not including the BU currently being transmitted) using delivery-enabled ACs.

If there are buffered BUs to transmit to the STA, the AP may set the More Data bit in a QoS +CFAck frame to 1 in response to a QoS Data frame to indicate that it has one or more pending BUs buffered for the PS STA identified by the RA in the QoS +CF-Ack frame. An AP may also set the More Data bit in an Ack frame to 1 in response to a QoS Data frame to indicate that it has one or more pending BUs buffered for the PS STA identified by the RA in the Ack frame, if that PS STA has set the More Data Ack subfield in the QoS Info field ~~QoS Capability element~~ (#20851)to 1. An HE AP may also set the More Data bit in a BlockAck or Multi-STA BlockAck frame to 1 to indicate that it has one or more pending BUs buffered for the HE PS STA identified by the RA in the BlockAck or Multi-STA Blockack frame, if that HE PS STA has set the More Data Ack subfield in the QoS Info field(#20851) to 1. An HE AP indicates support of sending Ack, BlockAck, or Multi-STA BlockAck frames with a nonzero More Data subfield by setting the More Data Ack subfield to 1 in the QoS Info field of frames it transmits.

Unless indicated above, the AP shall set the More Data bit to 0.
* HE PHY Capabilities Information field

The subfields of the HE PHY Capabilities Information field are defined in Table 9-321b (Subfields of the HE PHY Capabilities Information field).

**TGax Editor: *Change the row below of this table as follows (#CID 22154):***

|  |
| --- |
| * Subfields of the HE PHY Capabilities Information field
 |
| Subfield | Definition | Encoding |
| Supported Channel Width Set | In the 2.4 GHz band:* B0 indicates support for a 40 MHz channel width
* B1, B2, and B3 are reserved
* B4 indicates support of 242-tone RUs in a 40 MHz HE MU PPDU if a non-AP STA operates with a 20 MHz channel width and the 20 MHz In 40 MHz HE PPDU In 2.4 GHz subfield is 1; otherwise B4 is reserved
* B5 and B6 are reserved

In the 5 GHz and 6 GHz bands:* B0 is reserved
* B1 indicates support for a 40 MHz and 80 MHz channel width
* B2 indicates support for a 160 MHz channel width
* B3 indicates support for a 160/80+80 MHz channel width
* B4 is reserved.
* B5 indicates support of 242-tone RUs in a
	+ 40 MHz and 80 MHz HE MU PPDU if a non-AP STA operates with 20 MHz channel width and the 20 MHz In 160/80+80 Mhz HE PPDU subfield is set to 0, or
	+ 40 MHz, 80 MHz, 160 MHz, 80+80 MHz HE MU PPDU if a non-AP STA operates with 20 MHz channel width and the 20 MHz In 160/80+80 Mhz HE PPDU subfield is set to 1, or
	+ Is reserved otherwise
* B6 is reserved

*(#22154)* | B0 is set to 0 if not supported. B0 set to 1 if supported.B1 is set to 0 if not supported, i.e., it indicates a 20 MHz-only non-AP HE STA in the 5 GHz band or 6 GHz band. B1 set to 1 if supported. (#20239)B2 is set to 0 if not supported. B2 set to 1 if supported. If B2 is 1, then B1 is set to 1.(#mdr)B3 is set to 0 if not supported. B3 is set to 1 if supported. If B3 is 1, then B2 is set to 1.(#mdr)B4 is set to 0 if not supported. B4 set to 1 if supported.B5 set to 0 if not supported. B5 set to 1 if supported.NOTE 1—If a non-AP STA operates with 20 MHz channel width and the 20 MHz In 40 MHz HE PPDU In 2.4 GHz subfield is 0, then B4 is set to 0.(#Ed)*(#22154)*NOTE 2—If a non-AP STA operates with 20 MHz channel width and the 20 MHz In 160/80+80 MHz HE PPDU subfield is 0(#mdr), then the 242-tone RU in a 160 MHz and 80+80 MHz HE MU PPDU in the 5 GHz band or 6 GHz band is not supported. |
| … | (#21367) |  |

**TGax Editor: *See the subclause below (#CID 22259):***

* Queue Size subfield

Replace 9.2.4.5.6 with the following:

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-AP non-HE STA sending the frame that contains this subfield and the amount of buffered traffic for a given TC or TS at the non-AP HE STA for transmission to the HE STA 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 Control field set to 1 sent by a non-AP STA and in QoS Null frames with bit 4 of the QoS Control field set to 1 sent by a non-AP HE STA. 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 26.5.2 (UL MU operation)).(#20459, #20572, #21123)

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-MSDU
* s 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 sent by a non-AP HE STA to an HE STA, the remainder of the subclause applies.(#20672, #21123)

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 frame(#mdr) containing the Queue Size subfield) 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).

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

The Queue Size subfield consists of a Scaling Factor subfield in B14–B15 of the QoS Control subfield and an unscaled value, *UV*, in B8–B13 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 9-13a (Queue Size subfield encoding by a non-AP HE STA).

|  |
| --- |
| * Queue Size subfield encoding by a non-AP HE STA
 |
| Queue Size subfields | Queue Size, QS | Description |
| Scaling Factor | UV |
| 0 | 0 | 0 | No buffered traffic in the queue used for the specified TID |
| 0 | Ceil (*QS*, 16) / 16 | 0 < *QS* ≤ 1008 | The queue size is in units of 16 octets |
| 1 | 0 | 1008 < *QS* ≤ 1024 | The queue size is rounded up to 1024 octets |
| 1 | Ceil (*QS* – 1024, 256) / 256 | 1024 < QS ≤ 17 152 | The queue size is in units of 256 octets |
| 2 | 0 | 17 152 < QS ≤ 17 408 | The queue size is rounded up to 17 408 octets |
| 2 | Ceil (*QS* – 17 408, 2048) / 2048 | 17 408 < QS ≤ 146 432 | The queue size is in units of 2048 octets |
| 3 | 0 | 146 432 < QS ≤ 148 480 | The queue size is rounded up to 148 480 octets |
| 3 | Ceil (*QS* – 148 480, 32 768) / 32 768 | 148 480 < QS ≤ 2 147 328 | The queue size is in units of 32 768 octets |
| 3 | 62 | QS > 2 147 328 | The queue size greater than 2 147 328 |
| 3 | 63 | Unspecified or unknown | The queue size is unspecified or unknown |

An HE STA(#20672, #21123) obtains the queue size, *QS*, from a received QoS Control field, which contains a scaling factor and an unscaled value, as follows:

*



(#20462, #20463)The queue size value of QoS Data frames containing fragments might remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted (see 10.23.3.5.1 (General)). If the QoS Data frames containing fragments are carried in an A-MPDU, the queue size values of the MPDU containing the fragments are set according to the rules in 10.12.1 (A-MPDU contents).(#21452)

* BSR Control

The Control Information subfield in a BSR Control subfield(#20485) contains buffer status information used for UL MU operation (see 26.5.3 (MU cascading sequence)). The format of the subfield is shown in Figure 9-22e (Control Information subfield format in a BSR Control subfield).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 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 in a BSR Control subfield(#mdr)
 |

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22267, 22268):***

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 that the buffer status of the corresponding AC is included in the Queue Size All subfield, and set to 0 otherwise, except thatif the ACI Bitmap subfield is 0 and the Delta TID subfield is 3 is the buffer status of all 8 TIDs is included (see Table 9-24d (Delta TID subfield encoding)). *(#22267, 22268)*

|  |
| --- |
| * 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 1—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 *Nones* is equal to 0 for which there is the *NTID* = 8 case.NOTE 2—The Delta TID might be used by an AP to determine the setting of the TID Aggregation Limit field in the User Info field addressed to the STA in a subsequent Basic Trigger frame.(#20532) |

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 9-154 (ACI Bitmap subfield encoding)(#21461).

NOTE—It is up to the non-AP STA that reports the buffer status to determine the queue that(#mdr) 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.

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 frame(#mdr) 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 account.

NOTE 2—Buffered MSDUs are those that have been received in an MA-UNITDATA.request but that have not been successfully transmitted and have not been discarded.(#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. 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.

The queue size value of the QoS Data frames containing the fragments might remain constant in all fragments even if the amount of queued traffic changes as successive fragments are transmitted (see 10.23.3.5.1 (General)). If the QoS Data frames containing fragments are carried in the A-MPDU, the queue size values of the MPDUs containing the fragments are set according to the rules in 10.18 (HT Control field operation).(#21453)

ASN.1 encoding of the MAC and PHY MIB

* MIB Detail

**TGax Editor: *See the paragraph below of this subclause (#CID 22364, 22265):***

dot11HECurrentChannelWidthSet OBJECT-TYPE

 SYNTAX Unsigned32 (0..6)

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a status variable.

 This attribute specifies the channel width set, equal to 0 for a 40 MHz channel width in the 2.4 GHz band, equal to 1 for a 40 MHz and 80 MHz channel width in the 5 GHz or 6 GHz band, equal to 2 for a 160 MHz channel width in the 5 GHz or 6 GHz band, equal to 3 for a 160/80+80 MHz channel width in the 5 GHz or 6 GHz band, equal to 4 for 242-tone RUs in a 40 MHz HE MU PPDU in the 2.4 GHz band, equal to 5 for 242-tone RUs in a 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz HE MU PPDU in the 5 GHz or 6 GHz band, and the value 6 is reserved."

::= { dot11PhyHEEntry 2 }

**27.2.4 PHYCONFIG\_VECTOR parameters**

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 22364, 22265):***

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an HE PHY contains an OPERATING\_CHANNEL parameter, which identifies the operating or primary channel. The PHY shall set dot11CurrentPrimaryChannel to the value of this parameter. The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an HE PHY contains a CHANNEL\_WIDTH parameter, which identifies the operating channel width and takes one of the values 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 80+80 MHz. The PHY shall set dot11CurrentChannelWidth to the value of this parameter. The PHY shall set dot11HECurrentChannelWidthSet to a value that is obtained from the Supported Channel Width Set subfield of a transmitted HE Capabilities element.*(#22364, 22365)*