IEEE P802.11
Wireless LANs

|  |
| --- |
| CR for MU EDCA parameters |
| Date: 2017-11-28 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Laurent Cariou |  |  |  | laurent.cariou@intel.com |

Abstract

This document provides CR for CIDs related to MU EDCA parameters:

11153, 11798, 12041, 12085, 12089, 12428, 12462, 13037, 13075, 13090, 13887

Revision 1:

* Change CR for CID 12428 to Rejected.

Revision 2:

* Editorial changes during discussion.
* Revised resolution for CID13887 and CID13075.
* CID12303 is highlighted in red as this requires more discussion.

Revision 3:

* Add a note for CID12041 to explain the reasons for the normative behaviour with QoS capability element in beacon. Modify beacon frame format related to MU EDCA Parameter Set and QoS capability elements.
* Delete 12303 from the document
1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number(C)** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 11153 | Adrian Stephens | 10.22.2.2 | 194.56 | "its local MIB variables related to CWminand CWmax" -- lazy specification | Cite the specific variables or delete the note. |  Revised – agree with the comment. Delete the note and apply the changes as proposed in doc 1828r4. |
| 11798 | Graham Smith | 27.2.6 | 228.40 | "A STA that has not received an MU EDCA Parameter Set element from the AP to which it is associated does not follow the procedure described in this subclause." Why not make this positive rather than negative. Much better | Replace cited text with "A STA that has received an MU EDCA Parameter Set element from the AP to which it is associated follows the procedure described in this subclause." |  Revised – agree with the commenter. Apply the changes as proposed in doc 1828r4. |
| 12041 | Jarkko Kneckt | 9.4.2.240 | 152.11 | The MU QoS Info field contains EDCA Parameter Update Count field that is also present in the QoS Info field of the EDCA parameter set element. The QoS Info field in the EDCA Parameter Set element calculates only EDCA parameter changes, ax has not rewritten the field to calculate MU EDCA parameters as well. It is unclear whether EDCA Parameter Update Count in MU QoS Info is increased by one when either EDCA or MU EDCA parameter set changes or is the value increased by one when a value in MU EDCA Parameter Set changes? | Please clarify whether EDCA Parameter set update count keeps a record for both the EDCA and MU EDCA, or are EDCA and MU EDCA having separate update counters. If separate counters are used, please rename the MU EDCA parameters to use MU EDCA Parameter Set Update Counter. |  Revised– agree with the commenter. It is likely that changes of EDCA parameters and MU EDCA parameters will be provided at the same time. The resolution proposes to use only a single update count and to make sure EDCA parameters are always sent together with MU EDCA parameters (when present). Make the changes as proposed in doc 1828r4. |
| 12085 | Jinsoo Ahn | 9.4.2.240 | 152.33 | AIFSN is a value of number of slots and MU EDCA Timer field is a value of number of 8TUs. "a value 0 of the AIFSN fieldindicates that the AIFSN is equal to the value of the MU EDCA Timer" is not correct although there are example text. | In "a value 0 of the AIFSN fieldindicates that the AIFSN is equal to the value of the MU EDCA Timer, i.e., EDCA is disabled for the duration specified by the MUEDCATimer for the corresponding AC.",remove "the AIFSN is equal to the value of the MU EDCA Timer, i.e.," |  Revised – agree that it is incorrect. Agree also that there is an issue if the MU EDCA Timer is set to 0 and this value should be reserved. Apply the changes as proposed in doc 1828r4. |
| 12089 | Jinsoo Ahn | 27.2.6 | 228.58 | For special use of 11ax(For wireless devices controlled cetrally with real time traffic), make an option for UL MUEDCA only channel access | If the value of MU EDCA timer is 255, STA shall not decrease MU EDCA timer value. If MU EDCA timer is 255 and AIFSN is set to identical value, it means there are no EDCA. |  Rejected – the protocol has been defined to always provide a fall back to SU EDCA parameters. See16/998r3 and 1368r2 for background on the proposed solution. |
|  |  |  |  |  |  |  |
| 12428 | Liwen Chu | 9.4.2.240 | 151.50 | It is better to allow an AP announce the new TXOP limit for MU EDCA since the AP may decrease the TXOP limit to give AP more chance for MU transmission. | As in comment | Rejected – current assumption is that MU EDCA parameters are used to lower probability to access the medium but once the medium is acquired, the TxOP duration is kept the same.  |
| 12462 | Liwen Chu | 27.2.6 | 229.13 | It seems the sentence can be removed. | Remove it. |  Rejected – this is a recommendation to raise awareness of the issue for P2P traffic. |
| 13037 | Matthew Fischer | 10.2.4.2 | 178.26 | Add MU EDCA Parameter set element to some other management frame to allow these values to be dynamically modified during an association and to allow the AP to provided different values of these parameters to different non AP STAs by including a MGMT frame that can carry the element that allows an individual RA | Add MU EDCA Parameter set element to some management frame that allows an individual RA |  Rejected – similarly to EDCA parameters, it is simpler to have MU EDCA parameters that are the same for all STAs in the BSS. |
| 13075 | Pascal VIGER | 27.2.6 | 228.44 | MU EDCA is applied for QoS Data frames were transmitted successfully in the HE TB PPDU. Does this also concern when QoS Null frames are transitted due to no data queued for the required AC ? Please clarify. | as per comment |  Revised – Agree that the current text is unclear. Make the changes as defined in doc 1828r4. |
| 13090 | Patrice Nezou | 27.2.6 | 229.14 | "A non-AP HE STA should only send QoS Data frames in an HE TB PPDU with ACs for which the STA'sbuffer queues contain frames that are only addressed to its associated AP."It is not a sufiicient condition when using TDLS transmission. When a TDLS stream is established, we must check that the corresponding AC used by the TDLS transmission must not be in MU EDCA mode. | When a TDLS stream is established, we must check that the corresponding AC used by the TDLS transmission must not be in MU EDCA mode. |  Rejected – there are no needs for any normative text when establishing the TDLS transmission. The STA should be aware of the risks of low probability of access it the AC used for TDLS traffic is also used for UL traffic to the AP and was moved to MU EDCA parameters. But there is no need for a rule that prevents establishing TDLS using an AC using MU EDCA parameters.  |
| 13887 | Yongho Seok | 27.2.6 | 229.14 | "A non-AP HE STA should only send QoS Data frames in an HE TB PPDU with ACs for which the STA's buffer queues contain frames that are only addressed to its associated AP."Why should a non-AP HE STA send only QoS Data frames in an HE TB PPDU? Why not a QoS Null, BAR or other frames?I checked this changes (CID 8297) from 11-17/204r5.Comment was "Disable MU transmission mode when direct link transmissions are initiated by sending a frame containing an OMI A-Control field, and reset EDCA parameters."It seems that the comment was an implemenation issue. I don't understand how the cited sentence is related with the DLS. | Remove the cited sentence. |  Revised – The referenced spec text is wrongly interpreted by the commenter. It simply raises awareness that an AC used both for UL traffic to the AP and TDLS traffic to other STAs can be moved to MU EDCA parameters, which can lower TDLS access probability. Agree that the current text is unclear. Make the changes as defined in doc 1828r4. |

1. **Proposed changes**

***11ax Editor: Text highlighted in red is not part of the resolution***

***11ax Editor: Modify 9.4.2.240 MU EDCA parameter set element as follows:***

* MU EDCA Parameter Set element

(#8262)The format of the MU EDCA Parameter Set element is defined in Figure 9-589cu (MU EDCA Parameter Set element).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
|  | Element ID | Length | Element ID Extension | QoS Info | MU AC\_BE Parameter Record | MU AC\_BK Parameter Record | MU AC\_VI Parameter Record | MU AC\_VO Parameter Record |
| Octets: | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 |
| * MU EDCA Parameter Set element
 |

The Element ID, Length, and Element ID Extension fields are defined in 9.4.2.1 (General).

For an infrastructure BSS, the MU EDCA Parameter Set element is used by an AP to control the EDCA from HE non-AP STAs as defined in 27.2.6 (Obtaining an EDCA TXOP for HE non-AP STAs using MU EDCA parameters)(#8201). The most recent MU EDCA Parameter Set element received by a non-AP HE STA(#4742) is used to update the appropriate MIB values.

The format of the QoS Info field is defined in 9.4.1.17 (QoS Info field) when sent by the AP(#5912). The QoS Info field contains the EDCA Parameter Set Update Count subfield, which is initially set to 0 and is incremented each time any of the MU AC parameters changes in the MU EDCA Parameter Set element. This subfield is used by a non-AP HE STA(#6460) to determine whether the MU EDCA Parameter Set has changed and requires updating the appropriate MIB attributes. (#12041)

The format of the(#6461) MU AC\_BE, MU AC\_BK, MU AC\_VI, and MU AC\_VO Parameter Record(#5897) fields are identical and defined(#6462) in Figure 9-589cv (MU AC Parameter Record field format).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | ACI/AIFSN | ECWmin/ECWmax | MU EDCA Timer |
| Octets: | 1 | 1 | 1 |
| * MU AC Parameter Record field format
 |

The format of the ACI/AIFSN field is defined(#6463) in Figure 9-262 (ACI/AIFSN field) and the encoding of its subfields is (#6318)defined in 9.4.2.29 (EDCA Parameter Set element), except that a value 0 of the AIFSN field indicates that EDCA is disabled for the duration specified by the MUEDCATimer for the corresponding AC. (#12085)

The format of the ECWmin/ECWmax field is defined(#6464) in Figure 9-263 (ECWmin and ECWmax fields) and the encoding of its subfields is (#6319)defined in 9.4.2.29 (EDCA Parameter Set element).

The MU EDCA Timer field indicates the duration of time, in units of 8 TUs, during which the HE STA uses the MU EDCA parameters for the corresponding AC, as defined in 27.2.6 (Obtaining an EDCA TXOP for HE non-AP STAs using MU EDCA parameters), except that the value 0 is reserved(#5843, #8290, #4744) (#5843, #8290, #4744). (#12085)

***11ax Editor: Modify 27.2.6 Obtaining an EDCA TXOP for HE non-AP STAs unsing MU EDCA parameters as follows:***

* EDCA operation using MU EDCA parameters (#10327)

An HE AP may announce MU EDCA parameters for non-AP HE STAs(#6256), by including the MU EDCA Parameter Set element in selected Beacon frame, and in all Probe Response and (Re)Association(#7931) Response frames it transmits. If an HE AP announces both EDCA parameters and MU EDCA Parameters, the MU EDCA Parameter Set element shall be included in all Beacon frames that contain an EDCA Parameter Set element. An HE AP shall set the QoS Info field of an MU EDCA Parameter Set element (if present) to the same value as the QoS Info field of an EDCA Parameter Set element (if present). An HE AP may change the MU EDCA parameters by including the MU EDCA Parameter Set element with updated MU EDCA parameters in the Beacon frames and Probe Response frames it transmits. The EDCA Parameter Set Update Count subfield is incremented every time any of the AC parameters or the MU AC parameters change.

An HE STA shall update its MIB attributes that correspond to fields in an MU EDCA Parameter Set element,(#5411) within an interval of time equal to one beacon interval after receiving an updated EDCA parameter set. HE STAs update the MIB attributes and store the EDCA Parameter Set update count value of the received QoS Info field.

An HE STA shall use the EDCA Parameter Set Update Count Value subfield in the QoS Capability element of all Beacon frames to determine whether the STA is using both the current EDCA Parameter Values and the current MU EDCA Parameter Values. If the EDCA Parameter Set update count value in the QoS Capability element is different from the value that has been stored, the HE STA shall send a Probe Request frame to the AP to query for any update. (#12041)

NOTE – The QoS capability element is present in beacons only if the EDCA Parameter Set element and the MU EDCA Parameter Set element is not present. In such case, the only way for an HE STA to query the updated parameters is to send a Probe Request frame to the AP. (#12041)

(#8214)A STA that has received an MU EDCA Parameter Set element from the AP to which it is associated follows the procedure described in this subclause. (#11798) (#4745, #3193)

A (#10327)non-AP HE STA that receives a Basic Trigger frame that contains a User Info field(#7178) addressed to the STA(#7795), and that receives an immediate response from the AP for the transmitted HE TB PPDU, shall update its CWmin[AC], CWmax[AC], AIFSN[AC] and HEMUEDCATimer[AC] state variables to the values contained in the most recently received MU EDCA Parameter Set element sent by the AP to which the STA is associated, for all the ACs from which QoS Data frames were transmitted successfully(#7660) in the HE TB PPDU. The HEMUEDCATimer[AC] state variable is updated with the value contained in the MU EDCA Timer subfield of the MU EDCA Parameter Set element. The backoff counter maintenance corresponding to the updated state variables shall follow the rules in 10.22.2.2 (EDCA backoff procedure), and the updated HEMUEDCATimer[AC] shall start at the end of the immediate response.(#8213, #9521, #4747)

In a non-AP HE STA,(#3194) each HEMUEDCATimer[AC] shall uniformly count down without suspension(#8264) to 0 when its value is nonzero.

NOTE 1—A non-AP STA that sends a frame to the AP with an OM Control field(#4727) containing a value of 1 in the UL MU Disable field does not participate in UL MU operation. As such it is exempt from updating its EDCA access parameters to the values contained in the MU EDCA Parameter Set element as defined in this subclause.(#5684)

NOTE 2—A non-AP STA that sends a QoS Data frame(#6596) with Ack policy set to No Ack updates its state variables to the values contained in the MU EDCA Parameter Set element irrespective of receiving immediate response from the AP. The updated HEMUEDCATimer starts at the end of the HE TB PPDU.(#8213)

NOTE 3—A non-AP STA is not required to update its state variables to the values contained in the MU EDCA Parameter Set element when:

* The Trigger frame addressed to the STA is not a Basic Trigger frame
* The STA does not include QoS Data frames in the HE TB PPDU response sent in response to the Basic Trigger frame(#4748)
* The STA transmits the HE TB PPDU in response to a Basic Trigger frame following the rules defined in 27.5.5 (UL OFDMA-based random access (UORA)).(#5032)

NOTE 4—The TxOPLimit[AC] state variables are not updated by the procedure defined in this subclause, but in 10.22.2.8 TxOP limit.(#7138)

A non-AP HE STA that transmits QoS Data frames in an HE TB PPDU should only send QoS Data frames from ACs for which the STA's buffer queues contain frames that are only addressed to its associated AP. (#13075, #13887)(#8297)

When the HEMUEDCATimer[AC] of a non-AP HE STA(#7186) reaches zero, then the STA may update the CWmin[AC], CWmax[AC] and AIFSN[AC] either to the values that are contained in the most recently received EDCA Parameter Set element sent by the AP to which the STA is associated, or to the values contained in the default dot11EDCATable if an EDCA Parameter Set element has not been received. An non-AP HE STA that sends a frame with OM Control field(#4727) with the UL MU Disable subfield set to 1 as defined in 27.8.3 (Rules for transmit operating mode (TOM) indication) may set the HEMUEDCATimer[AC] for all its ACs to 0 on receiving an immediate acknowledegment from the OMI responder.(#)

***11ax Editor: Modify 10.2.4.2 HCF contention based channel access (EDCA) as follows:***

* HCF contention based channel access (EDCA)

An HE AP can additionally provide MU EDCA parameters for non-AP HE STAs(#6256), as defined in 27.2.6 (EDCA operation using MU EDCA parameters). (#12041)

***11ax Editor: Modify 10.22.2.2 EDCA backoff procedure as follows:***

* EDCA backoff procedure

(#9857)Change the last paragraph as follows:

If the backoff procedure is invoked for reason c), d), e) or f) above, or the transmission failure of a non-initial frame by the TXOP holder, the value of CW[AC] shall be updated as follows before invoking the backoff procedure:

* If the QSRC[AC] or the QLRC[AC] has reached dot11ShortRetryLimit or dot11LongRetryLimit respectively, CW[AC] shall be reset to CWmin[AC].
* If dot11RobustAVStreamingImplemented is true and either the QSDRC[AC] or the QLDRC[AC] has reached dot11ShortDEIRetryLimit or dot11LongDEIRetryLimit, respectively, CW[AC] shall be reset to CWmin[AC].
* Otherwise,
* If CW[AC] is less than CWmax[AC], CW[AC] shall be set to the value (CW[AC] + 1) × 2 – 1.
* If CW[AC] is equal to CWmax[AC], CW[AC] shall be left unchanged.

NOTE—An HE STA updates its local MIB variables related to CWmin and CWmax as defined in 27.2.6 (EDCA operation using MU EDCA parameters).(#9612)

***11ax Editor: Modify 9.3.3.3 Beacon frame format as follows:***

* Beacon frame format

Insert the following new rows into Table 9-27 (Beacon frame body):

|  |
| --- |
| * Beacon frame body
 |
| **Order** | **Information** | **Notes** |
| 74 | HE Capabilities | The HE Capabilities element is present when dot11HEOptionImplemented is true; otherwise it is not present. |
| 75 | HE Operation | The HE Operation element is present when dot11HEOptionImplemented is true; otherwise it is not present. |
| 76 | TWT | The TWT element is optionally present when dot11TWTOptionActivated is true; otherwise it is not present. |
| 77 | UORA Parameter Set | The UORA Parameter Set element is optionally present when dot11OFDMARandomAccessOptionImplemented(#11985) is true; otherwise it is not present. |
| 78 | BSS Color Change Announcement | The BSS Color Change Announcement element is optionally present when dot11HEOptionImplemented is true; otherwise it is not present. |
| 79 | Spatial Reuse Parameter Set | The Spatial Reuse Parameter Set element is optionally present if dot11HighEfficiencyOptionImplemented is true; otherwise it is not present. |
| 80 | MU EDCA Parameter Set | The MU EDCA Parameter element is optionally present if dot11HighEfficiencyOptionImplemented is true; otherwise it is not present. The MU EDCA Parameter element is not present if the QoS Capability element is present. |
| 81 | ESS Report | The ESS Report element is optionally present when dot11HEOptionImplemented is true; otherwise it is not present. |

Modify the following rows into Table 9-27 (Beacon frame body):

|  |
| --- |
| * Beacon frame body
 |
| **Order** | **Information** | **Notes** |
| 21 | QoS Capability | The QoS Capability element is present if dot11QosOptionImplemented and dot11MeshActivated is false, and EDCA Parameter Set element and MU EDCA Parameter Set element is not present. |