IEEE P802.11
Wireless LANs

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| CR for MU EDCA |
| Date: 2019-11-11 |
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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 o***

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| **CID** | **Commenter** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 24334 | RISON, Mark | 323.40 | 26.2.7 | "A non-AP STA that receives an MU EDCA Parameter Set element from the AP with which it is associatedfollows the procedure defined in this subclause." -- well, obviously. We don't need to say this(and don't say it anywhere else). "follows the procedure defined in" is only useful as a cross-reference. | Delete the cited text | Accept |
| 24335 | RISON, Mark | 132.45 | 9.3.3.2 | It is not clear how the EDCA parameter set update count workswhen the EDCA parameters and MU EDCA parameters are not both sent.E.g. get a beacon with a changed update count in an EDCA Parameter Set element,but no MU EDCA Parameter Set element.The EDCA parameters have changed. Have the MU EDCA parameters changed?Can't tell, so need to send a probe request anyway, possibly unnecessarily.Actually, 26.2.7 explicitly states that you have to send MU with non-MU,if you use MU at all: "An HE AP that has dot11MUEDCAParametersActivated equal to true includes the MU EDCA ParameterSet element in the Management frames it transmits that include the EDCA Parameter Set element."But this should be in the format tables. | In Table 9-34--Beacon frame body change"The MU EDCA Parameter Set element is optionally present ifdot11HEOptionImplemented is true and dot11MUEDCAParameters-Activated is true; otherwise, it is not present."to"The MU EDCA Parameter Set element is present ifdot11HEOptionImplemented is true, dot11MUEDCAParameters-Activated is true and the EDCA Parameter Set element is present;otherwise it is optionally present ifdot11HEOptionImplemented is true and dot11MUEDCAParameters-Activated is true; otherwise, it is not present."In 26.2.7 delete "An HE AP that has dot11MUEDCAParametersActivated equal to true includes the MU EDCA ParameterSet element in the Management frames it transmits that include the EDCA Parameter Set element." | Revised – agree with the commenter. Modify table 9-34 Beacon frame body to clarify that the MU EDCA parameters are sent in beacons if the QoS capability element is not present if MUEDCAParametersActivated is true. Apply the changes marked as #24335 in this document. |
| 24336 | RISON, Mark | 208.29 | 9.4.2.250 | "The QoS Infofield contains the EDCA Parameter Set Update Count subfield, which is initially set to 0 and is incrementedeach time any of the MU EDCA parameters in the MU EDCA Parameter Set element changes. This subfieldis used by a non-AP HE STA to determine whether the MU EDCA Parameter Set has changed and requiresupdating the appropriate MIB attributes." -- as 26.2.7 EDCA operation using MU EDCA parametersindicates, the update count is shared between EDCA and MU EDCA so changeswhenever either changes. | In the baseline 9.4.1.17 QoS Info fieldchange "The EDCA Parameter Set Update Count subfield is described in 10.2.3.2 (HCF contention based channelaccess (EDCA))."to "The EDCA Parameter Set Update Count subfield indicates when the EDCA parameters (and/or for an HE BSS, the MU EDCA parameters)have changed (see 10.2.3.2 (HCF contention based channel access (EDCA))."In the baseline 9.4.2.28 EDCA Parameter Set elementchange "The format of the QoS Info field is defined in 9.4.1.17 (QoS Info field). The QoS Info field contains theEDCA Parameter Set Update Count subfield, which is initially set to 0 and is incremented each time any ofthe AC parameters changes. This subfield is used by non-AP STAs to determine whether the EDCAparameter set has changed and requires updating the appropriate MIB attributes. "to "The format of the QoS Info field is defined in 9.4.1.17 (QoS Info field) when sent by the AP.NOTE---The QoS Info field contains theEDCA Parameter Set Update Count subfield, which indicates when the EDCA parameters (and/or for an HE BSS, the MU EDCA parameters)have changed (see 10.2.3.2 (HCF contention based channel access (EDCA))."and change " EDCA parameter set element" to " EDCA Parameter Set element"In the baseline 9.4.2.34 QoS Capability elementchange "The QoS Info field is 1 octet in length and is defined in 9.4.1.17 (QoS Info field)."to "The format of the QoS Info field is defined in 9.4.1.17 (QoS Info field) when sent by the AP.NOTE---The QoS Info field contains theEDCA Parameter Set Update Count subfield, which indicates when the EDCA parameters (and/or for an HE BSS, the MU EDCA parameters)have changed (see 10.2.3.2 (HCF contention based channel access (EDCA))."In 9.4.2.250 MU EDCA Parameter Set elementchange "The format of the QoS Info field is defined in 9.4.1.17 (QoS Info field) when sent by the AP. The QoS Infofield contains the EDCA Parameter Set Update Count subfield, which is initially set to 0 and is incrementedeach time any of the MU EDCA parameters in the MU EDCA Parameter Set element changes. This subfieldis used by a non-AP HE STA to determine whether the MU EDCA Parameter Set has changed and requiresupdating the appropriate MIB attributes."to "The format of the QoS Info field is defined in 9.4.1.17 (QoS Info field) when sent by the AP.NOTE---The QoS Info field contains theEDCA Parameter Set Update Count subfield, which indicates when the EDCA parameters (and/or for an HE BSS, the MU EDCA parameters)have changed (see 10.2.3.2 (HCF contention based channel access (EDCA))."and change "For an infrastructure BSS, the MU EDCA Parameter Set element is used by an AP to control the EDCAfrom non-AP HE STAs as defined in 26.2.7 (EDCA operation using MU EDCA parameters). The mostrecent MU EDCA Parameter Set element received by a non-AP HE STA is used to update the appropriateMIB values."to "For an infrastructure BSS, the MU EDCA Parameter Set element is used by the AP to control the useof EDCA by non-AP HE STAs following a UL MU transmission, as defined in 26.2.7 (EDCA operation using MU EDCA parameters). The mostrecent MU EDCA Parameter Set element received by a non-AP HE STA is used to update the appropriateMIB values."At 1719.4 and 1719.12 change "Parameter Set update count value" to "parameter set update count value"At 1719.10 change "EDCA Parameter Set Update Count Value subfield" to "EDCA Parameter Set Update Count subfield" | Accept |
| 24337 | RISON, Mark | 276.63 | 10.23.2.9 | "The TXOP limits are advertised by the AP in the EDCA Parameter Set element in Beacon and Probe Responseframes transmitted by the AP." -- also in the MU EDCA Parameter Set element, optionally | Change to:"The TXOP limits are advertised by the AP in the EDCA Parameter Set element (and optionally, for an HE AP,the MU EDCA Parameter Set element) in Beacon and Probe Responseframes transmitted by the AP." | Reject –TxOP limits are not defined in the MU EDCA parameters and are the same as those specified in EDCA parameter set element. |
| 24338 | RISON, Mark | 323.62 | 26.2.7 | "An HE STA shall check the EDCA Parameter Set Update Count subfield value in the QoS Info field of theQoS Capability element in the most recently received Beacon frame against the stored value to determine ifthe HE STA is using the current EDCA and MU EDCA parameters. If the EDCA Parameter Set UpdateCount subfield value is different from the stored value, then the HE STA shall send a Probe Request frameto the AP to solicit an update."-- this does not match the baseline equivalent, which is:"A QoS STA shall use theEDCA Parameter Set Update Count Value subfield in the QoS Capability element of all Beacon frames todetermine whether the STA is using the current EDCA Parameter Values. If the EDCA Parameter Set updatecount value in the QoS Capability element is different from the value that has been stored, the QoS STA shallquery the updated EDCA parameter values by sending a Probe Request frame to the AP."Also, there might not be a QoS Capability element in the most recently received beacon (it might justcontain an EDCA Parameter Set element instead). | Change the cited 26.2.7 text to:"An HE STA shall use theEDCA Parameter Set Update Count Value subfield in the QoS Capability element of Beacon frames, where present, todetermine whether the STA is using the current EDCA (and optionally MU EDCA) parameter values. If the EDCA Parameter Set UpdateCount value is different from the value that has been stored, the QoS STA shallquery the updated EDCA (and any MU EDCA) parameter values by sending a Probe Request frame to the AP." | Revised - Change the cited 26.2.7 text to:"An HE non-AP STA shall use theEDCA Parameter Set Update Count subfield in the QoS Capability element of Beacon frames, where present, todetermine whether the STA is using the current EDCA (and optionally MU EDCA) parameter values. If the EDCA Parameter Set Update Count subfield value is different from the value that has been stored, the STA shallquery the updated EDCA (and any MU EDCA) parameter values by sending a Probe Request frame to the AP." |
| 24339 | RISON, Mark | 324.04 | 26.2.7 | "NOTE--If the QoS Capability element is present in a Beacon frame, the EDCA Parameter Set element and the MUEDCA Parameter Set element are not present. In this case, the only way for an HE STA to obtain the updated parametersis to send a Probe Request frame to the AP." -- the current rules do not forbid an MU EDCA Parameter Setelement when the QoS Capability element is present, only the EDCA Parameter Set element.Also, there are other ways, in principle, which are to wait until a beacon with the EDCA Parameter Set element,or to reassociate to the same AP. | In Table 9-34--Beacon frame body change"The MU EDCA Parameter Set element is optionally present ifdot11HEOptionImplemented is true and dot11MUEDCAParameters-Activated is true; otherwise, it is not present."to"The MU EDCA Parameter Set element is present ifdot11HEOptionImplemented is true, dot11MUEDCAParameters-Activated is true and the EDCA Parameter Set element is present;otherwise, it is not present." | Revised – agree in principle with the commenter. Apply the changes marked as #24339 in this document. |
| 24340 | RISON, Mark | 324.04 | 26.2.7 | "NOTE--If the QoS Capability element is present in a Beacon frame, the EDCA Parameter Set element and the MUEDCA Parameter Set element are not present. In this case, the only way for an HE STA to obtain the updated parametersis to send a Probe Request frame to the AP." -- the current rules do not forbid an MU EDCA Parameter Setelement when the QoS Capability element is present, only the EDCA Parameter Set element.Also, there are other ways, in principle, which are to wait until a beacon with the EDCA Parameter Set element,or to reassociate to the same AP. | Delete the cited text | Revise – change beacon frame to make sure that if the MU EDCA parameter is included in beacon, the EDCA parameter is also present. Keep the NOTE without changes. Apply the changes as marked as #24340 in this document. |
| 24393 | RISON, Mark |  |  | [Resubmission of comment withdrawn on D5.0] Is MU EDCA used pre-assoc for UORA? That is, if a STA transmits pre-association under UORA, and the transmission is acked, it is required to honour MU EDCA information from the AP? | Clarify | Reject – responding to a trigger frame for UORA is not a condition for changing to MU EDCA parameters. The condition for changing is, in part, as follows: A non-AP HE STA that receives a Basic Trigger frame that contains a User Info field addressed to the STA, and that the STA has to successfully transmit QoS data frame and unassociated STAs cannot transmit QoS data frame.In case of UORA, the Basic Trigger frame is not addressed to the STA, so the condition is not met. |
| 24394 | RISON, Mark | 324.38 | 26.2.7 | [Resubmission of comment withdrawn on D5.0] Is MU EDCA used pre-assoc for UORA? That is, if a STA transmits pre-association under UORA, and the transmission is acked, it is required to honour MU EDCA information from the AP? | At the end of the list in the referenced NOTE add a bullet "- The STA is not associated to the AP that sent the Trigger frame" | Reject – responding to a trigger frame for UORA is not a condition for changing to MU EDCA parameters. The condition for changing is, in part, as follows: A non-AP HE STA that receives a Basic Trigger frame that contains a User Info field addressed to the STA and that the STA has to successfully transmit QoS data frame and unassociated STAs cannot transmit QoS data frame.In case of UORA, the Basic Trigger frame is not addressed to the STA, so the condition is not met. |
| 24472 | RISON, Mark |  |  | It isn't possible to have different params for TDLS compared with MU EDCA, because the reference model for EDCA only allows one set of EDCA params per AC. Need to have wording about temporarily changing EDCA params when MPDU for TDLS peer hits front of EDCAF queue, and then restoring afterwards. The approach suggested in the resolution of CID 22285 is not adequate, because it prevents simultaneous use of TDLS and MU EDCA | As it says in the comment | Reject – we have this situation in baseline today as well. A STA associated to an AP1 uses EDCA parameters advertised by AP1. If the associated STA transmits a probe request to an AP2, it will use the default EDCA parameters. The issue highlighted is not an issue if we consider that the EDCA reference model applies only for a link between one STA and one AP. |
| 24537 | Hamilton, Mark | 248.09 | 10.2.3.2 | dot11MUEDCATable is not used in body text. | Insert text in 10.2.3.2 that describes the context for use of this alternate set of EDCA parameters. | Revised. it is used in 26.2.7. We can make better use of this by referring to it more in this section, to improve the understanding. Apply the changes marked as #24537 in this document |

1. **Proposed changes**
* EDCA operation using MU EDCA parameters

**TGax editor: modify the following paragraphs as follows (#24335)**

 (#22497) 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 in the QoS Info field of the EDCA Parameter Set element and MU EDCA Parameter Set element is incremented every time any of the EDCA parameters or the MU EDCA parameters change.

**TGax editor: end of changes (#24335)**

**TGax editor: modify the following paragraphs as follows (#24537)**

A non-AP HE STA shall update the dot11EDCATable and dot11MUEDCATable that correspond to fields in an EDCA Parameter Set element or an MU EDCA Parameter Set element within an interval of time equal to one beacon interval after receiving an updated EDCA or MU EDCA parameter set from its associated AP (#24537). When updating its MIB attributes, an HE STA stores the value of the EDCA Parameter Set Update Count subfield in the QoS Info field of the received EDCA Parameter Set element or MU EDCA Parameter Set element.

A non-AP HE STA shall check the EDCA Parameter Set Update Count subfield value in the QoS Info field of the QoS Capability element in the most recently received Beacon frame against the stored value to determine if the HE STA is using the current EDCA and MU EDCA parameters. If the EDCA Parameter Set Update Count subfield value is different from the stored value, then the HE STA shall send a Probe Request frame to the AP to solicit an update.

NOTE—If the QoS Capability element is present in a Beacon frame, the EDCA Parameter Set element and the MU EDCA Parameter Set element are not present. In this case, the only way for an HE STA to obtain the updated parameters is to send a Probe Request frame to the AP.

A non-AP HE STA that receives a Basic Trigger frame that contains a User Info field addressed to the STA shall update its CWmin[AC], CWmax[AC], AIFSN[AC] and MUEDCATimer[AC] state variables to the values contained in the dot11MUEDCATable (#24537), for all the ACs from which at least one QoS Data frame was transmitted successfully in an HE TB PPDU in response to the Trigger frame. A QoS Data frame is transmitted successfully by the STA in an HE TB PPDU for an AC if it requires immediate acknowledgment and the STA receives an immediate acknowledgment for that frame, or if the QoS Data frame does not require immediate acknowledgment.

**TGax editor: end of changes (#24537)**

The MUEDCATimer[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 10.23.2.2 (EDCA backoff procedure) except that if AIFSN[AC] is 0 then the EDCAF corresponding to that AC shall be suspended until the MUEDCATimer[AC] reaches 0 or is reset to 0(#22186). The updated MUEDCATimer[AC] shall start at the end of the immediate response if the transmitted HE TB PPDU contains at least one QoS Data frame for that AC that requires immediate acknowledgment, and shall start at the end of the HE TB PPDU if the transmitted HE TB PPDU does not contain any QoS Data frames for that AC that require immediate acknowledgment.

In a non-AP HE STA, each MUEDCATimer[AC] shall uniformly count down without suspension to 0 when its value is nonzero.

NOTE 1—A non-AP STA that sends a frame to the AP with an OM Control subfield containing a value of 1 in the UL MU Disable subfield or a value of 0 in the UL MU Disable subfield and a value of 1 in the UL MU Data Disable subfield 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.

NOTE 2—A non-AP STA does not update its state variables to the values contained in the MU EDCA Parameter Set element if any of the following apply:(#22218, #Ed)

* 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
* The STA transmits the HE TB PPDU in response to a Basic Trigger frame following the rules defined in 26.5.4 (UL OFDMA-based random access (UORA))

NOTE 3—The TXOP limits are not updated by the procedure defined in this subclause, but by that in 10.23.2.9 (TXOP limits).

A non-AP STA that sends frames that are not addressed to its associated AP may use the EDCA parameters values that are contained in the most recently received EDCA Parameter Set element sent by the AP with which the STA is associated, or to the default EDCA parameter values (see Table 9-137 (Default EDCA Parameter Set element parameter values if dot11OCBActivated is false)), following the rules in 10.2.3.2 (HCF contention based channel access (EDCA)).

If the MUEDCATimer[AC] of a non-AP HE STA reaches 0, either by counting down or due to a reset following the reception of an MU EDCA Control frame, the STA shall update CWmin[AC], CWmax[AC] and AIFSN[AC] to the values that are contained in the most recently received EDCA Parameter Set element sent by the AP with which the STA is associated.(#22325)

A non-AP HE STA that sends a frame with an OM Control subfield with the UL MU Disable subfield set to 1 or with the UL MU Disable subfield set to 0 and the UL MU Data Disable subfield set to 1 as defined in 26.9.3 (Transmit operating mode (TOM) indication) may set the MUEDCATimer[AC] for all ACs to 0 on receiving an immediate acknowledgment from the OMI responder. The STA continues the current EDCA backoff procedure without modifying the QSRC[AC], QLRC[AC] or the backoff counter for the associated EDCAF, regardless of whether the MUEDCATimer[AC] has reached zero, until the STA invokes a new EDCA backoff procedure. The STA follows the rules defined in 10.23.2.2 (EDCA backoff procedure) for updating CWmin, CWmax and AIFSN for that AC(#22433).

A non-AP HE STA that receives an individually addressed MU EDCA Control frame from its associated AP may reset the MUEDCATimer[AC] to 0 for an AC if the bit corresponding to that AC in the Affected ACs subfield is equal to 1 when the MUEDCATimer[AC] of the STA is not equal to 0(#22545). The STA may invoke a new EDCA backoff procedure after the MUEDCATimer[AC] is reset for that AC and after CWmin[AC], CWmax[AC] and AIFSN[AC] are updated for that AC, as per this subclause, in response to the MUEDCATimer[AC] reset.

**TGax editor: modify Table 9-34 Beacon frame body as follows (#24335, #24339, #24340) – changes in green**

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| * Beacon frame body
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| **Order** | Information | Notes |
| 19 | EDCA Parameter Set | The EDCA Parameter Set element is present if dot11QosOptionImplemented is true, ~~and~~ dot11MeshActivated is false, and the QoS Capability element is not present; otherwise it is not present. |
| 20 | QoS Capability | The QoS Capability element is present if dot11QosOptionImplemented is true, ~~and~~ dot11MeshActivated is false, and neither the EDCA Parameter Set element nor the MU EDCA Parameter Set element are ~~is not~~ present; otherwise it is not present. |
| 83 | MU EDCA Parameter Set | The MU EDCA Parameter Set element is present if dot11HEOptionImplemented is true, dot11MeshActivated is false, dot11MUEDCAParametersActivated is true, and the QoS Capability element is not present; otherwise, it is not present. |