IEEE P802.11
Wireless LANs

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| LB275 CR for SCS TCLAS Enhancements  |
| Date: September 8, 2023 |
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 Abstract

This submission proposes resolutions for following CIDs received for TGbe LB275:

19356, 19357, 20060, 20061

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: Changes based on offline feedback. Added AP recommendation for TCLAS (and other parameters) in the unsolicited SCS Response for an SCS stream termination.
* Rev 2: Changes based on offline feedback. Changed the capability field name to “SCS UL TCLAS With Recommendation Support”. Added should requirement to include TCLAS for uplink. Using CID 20061 to propose minimal text changes to enable AP to suggest a different TID/UP in the SCS response.
* Rev 3: Simplified the proposal based on offline feedback - removed TCLAS recommendation in SCS Response, and only keeping the UL TCLAS in the SCS Request and UP/TID recommendation in the QoS Characteristics in the SCS Response.
* Rev 4: Updates to move the new UL TCLAS capability bit to EHT Capabilities element. Added text to clarify not sending UL TCLAS to APs which don’t have the new capability set to 1.

***TGbe editor: The baseline for this document is 11be D4.1.***

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 TGbe Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e., they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Clause | Page | Comment | Proposed Change | Resolution |
| 19356 | Brian Hart | 35.17 | 648.35 | APs deal with a complicated set of flows starting and stopping at different times with different priority (at client and AP) due to different policy (at AP and client). APs need to be able to reject or counter an overbroad or overnarrow service request in order to better support other higher priority flows. However, the language at P648L35 and P648L56 prevents uplink TCLAS elements and any TCLAS-based counter-proposal. | Allow both the client's request and any AP counter to include TCLAS element(s) and (if needed) a TCLAS Processing element. If required, further add a capability bit to indicate support for this new mode of operation. | RevisedAgree with the commenter. Revised text to support inclusion of UL TCLAS by the non-AP MLD in SCS request and support UP/TID recommendation by the AP MLD in SCS Response.TGbe editor, please make the changes tagged by CID #19356 in 11-23/1540r4 |
| 19357 | Brian Hart | 35.17 | 648.35 | APs deal with a complicated set of flows starting and stopping at different times with different priority aAt client and AP) due to different policy (at AP and client). APs need to be able to reject or counter an overbroad or overnarrow service request in order to better support other higher priority flows. However, the language at PP648L56 prevents downlink TCLAS elements and any TCLAS-based counter-proposal. | Allow any AP counter to a DL request to include TCLAS element(s) and (if needed) a TCLAS Processing element. If required, further add a capability bit to indicate support for this new mode of operation. | RevisedAgree with the commenter. Revised text to support inclusion of UL TCLAS by the non-AP MLD in SCS request and support UP/TID recommendation by the AP MLD in SCS Response.TGbe editor, please make the changes tagged by CID #19356 in 11-23/1540r4 |
| 20060 | Binita Gupta | 35.17 | 648.35 | AP manages varied set of policy for UL and DL flows to provide QoS differentiation. An AP should have the visibility of UL traffic flows and be able to send a counter proposal for an overbroad or overnarrow traffic flows to prioritize flows in UL. However, this text prevents sending a TCLAS for UL. Also text at P648L56 prevents suggesting TCLAS counter proposal in an SCS response from the AP. | Allow TCLAS to be included for UL flows in SCS request from the client and allow AP to send a counter proposal for UL TCLAS if desired to meet its policy. If required add a capability bit to indicate support for such operation. Commenter will bring a contribution. | RevisedAgree with the commenter. Revised text to support inclusion of UL TCLAS by the non-AP MLD in SCS request and support UP/TID recommendation by the AP MLD in SCS Response.TGbe editor, please make the changes tagged by CID #19356 in 11-23/1540r4 |

Discussion:

Current 11be spec draft does not allow TCLAS element to be included for uplink in an SCS Request when a QoS Characteristics element is provided for uplink in the request. This limits the visibility of UL flow(s) (for which the non-AP MLD is making SCS request with QoS Characteristics element) at the AP MLD. It is important for AP MLD to know the UL TCLAS information for flows corresponding to SCS request with QoS Characteristics, so that it can identify/classify these flows in UL and correlate with the UL QoS Characteristics requested for policy verification and QoS prioritization of these flows in the network.

Note that the TCLAS information is always provided for the downlink SCS request. We believe there is no technical reason to limit providing TCLAS only for the DL and not provide it for the UL, since UL TCLAS information is also important for AP to know, and it is needed for the AP MLD to be able to correlate UL SCS QoS Characteristics with specific IP flows.

The resolutions proposed here defines following:

* **Support for UL TCLAS in SCS Request:** AP policy settings might require verification for flow classification for UL before accepting resources requested in the SCS Request. If policy setting can’t be verified, AP may end up rejecting the SCS request per its policy. UL TCLAS is also needed by the AP to be able to correlate relevant IP flows with the SCS QoS Characteristics element provided for UL for E2E QoS prioritization for these UL flows in the network. This CR doc proposes to enable sending TCLAS for UL in the SCS Request and enable a way to indicate to the STAs that UL TCLAS is required per policy.

Note that the proposal here of adding UL TCLAS to the SCS request does not impact baseline UL triggering mechanism defined based on prefererd\_AC. The AP considers UL TCLAS information provided in the SCS request in its policy verification and QoS prioritization for UL IP flows.

Additionally, AP network policy setting may require it to suggest a different UP/TID for a QoS Characteristics requested in an SCS request. Hence an AP should be able to suggest a different UP/TID field in the QoS Characteristics element included in the SCS Response frame (along with other parameters for which a different value can be suggested as per current 11be spec draft).

﻿**9.4.1.9 Status Code field**

***TGbe editor: Please add new status codes in the Table as shown below (#19356).***

**Table 9-78—Status codes**

|  |  |  |
| --- | --- | --- |
| **Status code** | **Name** | **Meaning** |
| … | … | … |
| <ANA> | DENIED\_UL\_TCLAS\_REQUIRED  | The SCS request is denied because TCLAS is required for the UL SCS stream per policy and is not provided in the request. |

**﻿9.4.2.313.2 EHT MAC Capabilities Information field**

***TGbe editor: Please modify the Figure and the Table as shown below (#19356).***

The format of the EHT MAC Capabilities Information field is defined in [Figure 9-1001ah (EHT MAC](#_bookmark233) [Capabilities Information field format)](#_bookmark233).

B0 B1 B2 B3 B4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EPCS Priority Access Support | EHT OM Control Support | Triggered TXOP Sharing Mode 1 Support | Triggered TXOP Sharing Mode 2 Support | Restricted TWT Support |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Bits: | 1 |  | 1 |  | 1 | 1 | 1 |
|  | B5 | B6 |  | B7 | B8 | B9 | B10 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCS Traffic Description Support | Maximum MPDU Length | MaximumA-MPDU Length Exponent Extension | EHT TRS Support | TXOP Return Support In Triggered TXOP Sharing Mode 2 |

Bits: 1 2 1 1 1

B11 B12 B13 B14 B15

Bits: 1 2 1. 1

|  |  |  |  |
| --- | --- | --- | --- |
| Two BQRs Support | EHT Link Adaptation Support | SCS UL TCLAS Support | Reserved |

**Figure 9-1001ah—EHT MAC Capabilities Information field format**

The subfields of the EHT MAC Capabilities Information field are defined in [Table 9-404m (Subfields of the](#_bookmark234) [EHT MAC Capabilities Information field)](#_bookmark234).

**Table 9-404m—Subfields of the EHT MAC Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| … | … | … |
| SCS UL TCLAS Support  | Indicates support for UL TCLAS in the SCS request. | Set to 1 if the dot11SCSULTCLASImplemented is true (see 35.17 (EHT SCS procedure)).Set to 0 otherwise. |

﻿**35.17 EHT SCS procedure**

***TGbe editor: Please add following two paragraphs after the 3rd paragraph in this subclause (#19356).***

An EHT AP that supports receiving TCLAS for UL in an SCS Request as described in this subclause, shall set dot11SCSULTCLASImplemented to true and shall set the SCS UL TCLAS Support subfield to 1 in the EHT MAC Capabilities Information field of the EHT Capabilities element that the AP transmits. A non-AP EHT STA that supports sending TCLAS for UL in an SCS Request as described in this subclause, shall set dot11SCSULTCLASImplemented to true and shall set the SCS UL TCLAS Support subfield to 1 in the EHT MAC Capabilities Information field of the EHT Capabilities element that the non-AP STA transmits. ﻿All STAs affiliated with an MLD shall set the SCS UL TCLAS Support subfield in the EHT MAC Capabilities Information field of the EHT Capabilities element that they transmit to the same value.

***TGbe editor: Please modify paragraphs and add new paragraphs in this subclause as shown below (#19356).***

An SCS Descriptor element, contained in an SCS Request frame in which the QoS Characteristics element is present and the Direction subfield in the QoS Characteristics element is equal to direct link, shall not contain the Intra-Access Category Priority Element, TCLAS Element, and TCLAS Processing Element fields.

An SCS Descriptor element, contained in an SCS Request frame transmitted by a non-AP EHT STA, in which the QoS Characteristics element is present and the Direction subfield in the QoS Characteristics element is equal to uplink, shall not contain the Intra-Access Category Priority Element, TCLAS Element, or TCLAS Processing Element fields, if the SCS UL TCLAS Support subfield is set to 0 in the EHT Capabilities element transmitted by the non-AP EHT STA.

A non-AP EHT STA should include TCLAS Element(s) and optionally a TCLAS Processing Element in an SCS Descriptor element, contained in an SCS Request frame with Request Type equal to “Add” or “Change”, in which the QoS Characteristics element is present and has Direction subfield equal to uplink, if the non-AP EHT STA has the SCS UL TCLAS Support subfield set to 1 in the EHT Capabilities element that it transmits and the SCS Request is sent to an EHT AP which has the SCS UL TCLAS Support subfield to 1 in the EHT Capabilities element that the AP transmits. If the uplink QoS Characteristics element included in the SCS Request frame indicates QoS characteristics for multiple UL IP flows, then the non-AP EHT STA should include one TCLAS element for each of those UL IP flows in the SCS Request frame and should include a TCLAS Processing element with the Processing field value set to 1.

A non-AP EHT STA shall not transmit an SCS Request frame with SCS Descriptor element(s) containing TCLAS Element(s) or TCLAS Processing Element, in which a QoS Characteristics element is present and has Direction subfield equal to uplink, to an EHT AP from which it has not received an EHT Capabilities element with the SCS UL TCLAS Support subfield equal to 1.

A value of REQUEST\_DECLINED, REQUESTED\_TCLAS\_NOT\_SUPPORTED\_BY\_AP, REJECTED\_WITH\_SUGGESTED\_CHANGES or INSUFFICIENT\_TCLAS\_PROCESSING\_RESOURCES shall be set in the corresponding SCS Status field of the SCS status duple in the SCS Response frame when an EHT AP denies the SCS request for the requested SCSID.

If the SCS Request frame with an SCS Description element containing a QoS Characteristics element is rejected by an EHT AP by setting the Status field value to REJECTED\_WITH\_SUGGESTED\_CHANGES, the AP shall include an SCS Descriptor element containing a QoS Characteristics element in the SCS Response frame signaling the suggested QoS characteristics parameters for this SCS stream. An AP shall include an SCS Descriptor element containing a QoS Characteristics element in an SCS Response frame with the Status field value set to REJECTED\_WITH\_SUGGESTED\_CHANGES only if the SCS Descriptor element in the corresponding SCS Request frame contained a QoS Characteristics element.

When an EHT AP that has the dot11SCSULTCLASImplemented set to true denies an SCS request received from a non-AP EHT STA that has set the SCS UL TCLAS Support subfield to 1 in the EHT Capabilities element that the non-AP STA transmits, the AP may set the corresponding SCS Status field of the SCS status duple in the SCS Response frame to DENIED\_UL\_TCLAS\_REQUIRED, otherwise this status code shall not be used in the SCS Response frame by the EHT AP.

NOTE - If an SCS request is rejected by an EHT AP by setting the Status field value to DENIED\_UL\_TCLAS\_REQUIRED, the non-AP EHT STA can send the SCS request again to the EHT AP with TCLAS information included for the UL flow(s).

NOTE - An EHT AP considers UL TCLAS information provided in the SCS request in its QoS prioritization and policy verification for UL flows. How the AP uses the UL TCLAS information is beyond the scope of this standard.

The SCS Descriptor element that is included in an SCS Response frame shall not contain any Intra-Access Category Priority element, TCLAS Elements field or TCLAS Processing Element field. The Request Type field value in the corresponding SCS Descriptor element is reserved. The following fields in the QoS Characteristics element included in the corresponding SCS Descriptor element in the SCS Response frame may differ from the corresponding values in the requested SCS stream: Minimum Service Interval, Maximum Service Interval, Service Start Time, Medium Time, User Priority and TID.

﻿**Annex C**

**﻿C.3 MIB Detail**

***TGbe editor: Please add new MIB variable in this subclause as shown below (#19356).***

Dot11EHTStationConfigEntry ::= SEQUENCE {

dot11EHTPPEThresholdsRequired TruthValue,

dot11TIDtoLinkMappingActivated TruthValue,

dot11EHTEPCSPriorityAccessActivated TruthValue,

dot11MSDTimerDuration Unsigned32,

dot11MSDTXOPMax Unsigned32,

dot11MultiLinkActivated TruthValue,

dot11MLDAssociationSAQueryMaximumTimeout Unsigned32,

dot11EHTMCSFeedbackOptionImplemented INTEGER,

dot11EHTEMLSROptionImplemented TruthValue,

dot11EHTEMLSROptionActivated TruthValue,

dot11EHTEMLMROptionImplemented TruthValue,

dot11EHTEMLMROptionActivated TruthValue,

dot11OperationParameterUpdateImplemented TruthValue,

dot11EHTLinkReconfigurationOperationActivated TruthValue,

dot11MultiLinkTrafficIndicationActivated, TruthValue

dot11SCSULTCLASImplemented TruthValue

}

dot11SCSULTCLASImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true indicates that the station implementation is capable of supporting UL TCLAS in the SCS request.”

DEFVAL { false }

::= { dot11EHTStationConfigEntry <Last\_assigned+1>}

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Clause | Page | Comment | Proposed Change | Resolution |
| 20061 | Binita Gupta | 35.17 | 648.56 | AP manages varied set of policy for UL and DL flows to provide QoS differentiation. For DL flows, an AP should have a way to counter propose/suggest a different DL TCLAS and/or UP/TID to better prioritize DL flows, e.g. if the TCLAS received from the STA is too broad or too narrow and/or UP/TID requested does not align with AP policy. | Allow an AP to counter propose/suggest a DL TCLAS element and/or UP/TID in Intra-Access Category Priority element in an SCS Response for DL flows. If required add a capability bit to indicate support for such operation. Commenter will bring a contribution. | RevisedAgree with the commenter. Revised text to enable an AP to suggest a different UP/TID in the QoS Characteristics element in the SCS Response. TGbe editor, please make the changes tagged by CID #20061 in 11-23/1540r4 |

Discussion:

AP can have network policy setting which require it to suggest a different UP/TID for a QoS Characteristics requested in an SCS request. Hence an AP should be able to suggest a different UP/TID field in the QoS Characteristics element included in the SCS Response frame (along with other parameters for which a different value can be suggested as per current 11be spec draft).

**35.17 EHT SCS procedure**

***TGbe editor: Please modify following paragraph in this subclause***

﻿The SCS Descriptor element that is included in an SCS Response frame shall not contain any Intra-Access

Category Priority element, TCLAS Elements field or TCLAS Processing Element field. The Request Type

field value in the corresponding SCS Descriptor element is reserved. The following fields in the QoS

Characteristics element included in the corresponding SCS Descriptor element in the SCS Response frame

may differ from the corresponding values in the requested SCS stream: Minimum Service Interval,

Maximum Service Interval, Service Start Time, (#20061)Medium Time, User Priority and TID.