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.

***TGbe editor: The baseline for this document is 11be D4.0.***

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 TCLAS recommendation by the AP MLD in SCS Response.TGbe editor, please make the changes tagged by CID #19356 in 11-23/1540r2 |
| 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 TCLAS recommendation by the AP MLD in SCS Response.TGbe editor, please make the changes tagged by CID #19356 in 11-23/1540r2 |
| 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 TCLAS recommendation by the AP MLD in SCS Response.TGbe editor, please make the changes tagged by CID #19356 in 11-23/1540r2 |

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.

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 required for the AP MLD to be able to correlate UL SCS request with QoS Characteristics with specific IP flows.

The resolutions proposed here define following two aspects:

1. **Support 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. Hence, proposing to support sending TCLAS for UL in the SCS Request and enable a way to indicate to the STAs that UL TCLAS is required for policy verification. 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.
2. **Support TCLAS recommendation in SCS Response**: APs deal with a complicated set of flows starting and stopping at different times with different priority and may have different policy settings for flows. Based on its policy settings, an AP should be able to counter-propose/recommend a modified TCLAS (and other parameters) for an SCS request. It is better for the AP to provide suggested parameters in the SCS Response to provide further information to the non-AP MLD for making a follow-up SCS request with revised set of parameters, instead of just failing the SCS request in case of a policy mismatch. An AP may also recommend TCLAS (and other parameters) in the unsolicited SCS Response for an SCS stream termination it sends to a STA, to indicate TCLAS and other parameters which would be acceptable to the AP in a follow-up SCS request.

﻿**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 setting and is not provided in the request. |
| <ANA> | REJECTED\_WITH\_SUGGESTED\_TCLAS\_CHANGES\_POLICY\_CONFLICT | The SCS request is rejected because of a QoS policy conflict at the AP. Suggested TCLAS and other parameters are provided so that the non-AP STA can attempt to send another SCS request with the suggested changes. |
| <ANA> | TCLAS\_PROCESSING\_TERMINATED\_POLICY\_CONFLICT\_SUGGESTED\_TCLAS\_CHANGES | The SCS stream is terminated due to policy conflict for the TCLAS specified. Suggested TCLAS and other parameters are provided so that the non-AP STA can attempt to send another SCS request with the suggested changes. |

﻿**9.4.2.312.2.3 Common Info field of the Basic Multi-Link element**

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

The format of the Extended MLD Capabilities And Operations subfield is defined in [Figure 9-1001l](#bookmark200) [(Extended MLD Capabilities And Operations subfield format)](#bookmark200).

B0 B1 B4 B5 B6 B15

Bits: 1 4 1 10

|  |  |  |  |
| --- | --- | --- | --- |
| Operation Parameter Update Support | Recommended Max Simultaneous Links | SCS UL TCLAS With Recommendation Support | Reserved |

**Figure 9-1001l—Extended MLD Capabilities And Operations subfield format**

The subfields of the Extended MLD Capabilities And Operations subfield are defined in [Table 9-404k (Sub-](#bookmark201) [fields of the Extended MLD Capabilities And Operations subfield)](#bookmark201).

**Table 9-404k—Subfields of the Extended MLD Capabilities And Operations subfield**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| SCS UL TCLAS With Recommendation Support  | Indicates support for UL TCLAS and AP recommendation of TCLAS and other parameters for DL and UL, during the SCS procedure. | Set to 1 if the dot11SCSULTCLASWithRecommendationImplemented is true. Set to 0 otherwise.See 35.17 (EHT SCS procedure) |

**9.6.18.3 SCS Response frame format**

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

The SCS Descriptor List field is optionally present when the SCS Response frame is sent from a STA affiliated with an MLD to a STA affiliated with another MLD. If present, the SCS Descriptor List field contains zero or more SCS Descriptor elements, as defined in [9.4.2.120 (SCS Descriptor element)](#bookmark150). If the Status subfield is set to REJECTED\_WITH\_SUGGESTED\_CHANGES for an SCSID in the SCS Status List field, the SCS Descriptor element included for that SCSID contains a QoS Characteristics element to describe the suggested traffic characteristics and QoS expectations of traffic flows that belong to this SCS stream identified by the SCSID field value in the same SCS Descriptor element.

If the Status subfield is set to REJECTED\_WITH\_SUGGESTED\_TCLAS\_CHANGES\_POLICY\_CONFLICT or TCLAS\_PROCESSING\_TERMINATED\_POLICY\_CONFLICT\_SUGGESTED\_TCLAS\_CHANGES for an SCSID in the SCS Status List field, the SCS Descriptor element included for that SCSID contains TCLAS element(s) and an optional TCLAS Processing element to signal suggested traffic classifier parameters allowed per policy and may optionally include an Intra-Access Category Priority element and/or a QoS Characteristics element in the same SCS Descriptor element to signal suggested User Priority and/or QoS characteristics parameters allowed per policy for the traffic classifier parameters indicated by TCLAS element(s) and any TCLAS Processing element.

For each SCS Status duple in the SCS Status List field with Status subfield indicating REJECTED\_WITH\_SUGGESTED\_CHANGES or REJECTED\_WITH\_SUGGESTED\_TCLAS\_CHANGES\_POLICY\_CONFLICT, an SCS Descriptor element is present whose SCSID field matches the SCSID subfield in the SCS Status duple; no SCS Descriptor element is present otherwise.

﻿**35.17 EHT SCS procedure**

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

Each EHT AP affiliated with an AP MLD, that supports receiving TCLAS for UL in an SCS Request and supports sending a recommendation for TCLAS and other parameters in an SCS Response for both UL and DL as described in this subclause, shall set dot11SCSULTCLASWithRecommendationImplemented to true and shall set the SCS UL TCLAS With Recommendation Support subfield to 1 in the Extended MLD Capabilities And Operations subfield ﻿of the Basic Multi-Link element that the AP transmits.

Each EHT STA affiliated with a non-AP MLD, that supports sending TCLAS for UL in an SCS Request and supports receiving a recommendation for TCLAS and other parameters in an SCS Response for both DL and UL as described in this subclause, shall set dot11SCSULTCLASWithRecommendationImplemented to true and shall set the SCS UL TCLAS With Recommendation Support subfield to 1 in the Extended MLD Capabilities And Operations subfield ﻿of the Basic Multi-Link element that the STA transmits.

***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 subelement 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 in which the QoS Characteristics subelement 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 With Recommendation Support subfield is set to 0 in the Extended MLD Capabilities And Operations subfield ﻿of the Basic Multi-Link element transmitted by the non-AP MLD.

A non-AP MLD 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 subelement is present and the Direction subfield in the QoS Characteristics element is equal to uplink, if the non-AP MLD has the SCS UL TCLAS With Recommendation Support subfield is set to 1 in the Extended MLD Capabilities And Operations subfield ﻿of the Basic Multi-Link element that it transmits.

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 dot11SCSULTCLASWithRecommendationImplemented set to true denies an SCS request received from an EHT non-AP STA that has set the SCS UL TCLAS With Recommendation Support subfield to 1 in the Extended MLD Capabilities And Operations subfield ﻿of the Basic Multi-Link element that it 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 or REJECTED\_WITH\_SUGGESTED\_TCLAS\_CHANGES\_POLICY\_CONFLICT, otherwise these status codes shall not be used in the SCS Response frame.

If an 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\_TCLAS\_CHANGES\_POLICY\_CONFLICT, the AP shall include an SCS Descriptor element in the SCS Response frame containing TCLAS element(s) and optionally a TCLAS Processing element to signal suggested traffic classifier parameters allowed per policy and may optionally include an Intra-Access Category Priority element and/or a QoS Characteristics element in the same SCS Descriptor element to signal suggested User Priority and/or QoS characteristics parameters allowed per policy for the traffic classifier parameters indicated by TCLAS element(s) and any TCLAS Processing element.

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 MLD can send the SCS request again to the AP with TCLAS information included for the UL flow.

The Request Type field value in the SCS Descriptor element contained in an SCS Response frame 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.

An EHT AP that has dot11SCSULTCLASWithRecommendationImplemented set to true may use the MLME-SCS-TERM.request primitive to send an unsolicited SCS Response frame with Status field set to TCLAS\_PROCESSING\_TERMINATED\_POLICY\_CONFLICT\_SUGGESTED\_TCLAS\_CHANGES, to terminate an SCS stream of an EHT non-AP STA that has set the SCS UL TCLAS With Recommendation Support subfield to 1 in the Extended MLD Capabilities And Operations subfield ﻿of the Basic Multi-Link element that it transmits, otherwise this status code shall not be used in an unsolicited SCS Response. In the unsolicited SCS Response frame the AP:

* shall set the Dialog Token field to 0, and
* shall set the SCSID field to identify the SCS stream being terminated, and
* shall include an SCS Descriptor element containing TCLAS element(s) and optionally a TCLAS Processing element to signal recommended traffic classifier parameters allowed per policy and may optionally include an Intra-Access Category Priority element and/or a QoS Characteristics element in the same SCS Descriptor element to signal recommended User Priority and/or QoS characteristics parameters allowed per policy for the traffic classifier parameters indicated by TCLAS element(s) and any TCLAS Processing element.

﻿**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

dot11SCSULTCLASWithRecommendationImplemented TruthValue

}

dot11SCSULTCLASWithRecommendationImplemented 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 and AP provided recommendation for TCLAS and other parameters during the SCS procedure.”

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 11-23/1540r2 |

**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 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.