IEEE P802.11
Wireless LANs

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| 802.11Issues related to SCS Response Frame and procedure(relative to IEEE-802.11-2020) |
| Date: 2021-05-12 |
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**Abstract**

This submission identifies issues related to the definition of the Stream Classification Service (SCS) Response frame and SCS Procedure; and proposes corresponding resolutions.

History:

R6: Added Mark Rison as a co-author

R5: Further clean up of the proposed resolution to CID #583

R4: more refinement to the proposed resolution to CID #583

R3: Additional updates based on discussions in the April 26th, teleconference; offline reviews

R2: Incorporated feedback from the April 19, 2021 teleconference

R1: fixed a typo

R0: Initial Version

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| 49 | Ganesh Venkatesan | 9.6.18.2 | 1565 |  | All 802.11 management frames are extensible by adding vendor-specific elements.The SCS Response frame as described in IEEE802.11-2020 becomes unparsable if vendor-specific element(s) are added to it. | Add a count field to indicate the number of duples in the Status List field | Revise. TGme editor to incorporate the editor instructions in submission 11-21/0688 corresponding to CID #49 |

**Discussion**

1. All 802.11 action frames are extensible by the addition of vendor-specific element(s), see subclause 9.3.3.13 (Action frame format)
2. The Stream Classification Service Response action frame (described in 9.6.18.3) contains a SCS Status list of variable length, with one or more Status duple(s) of 3-octet length each. When the frame is extended by adding one or more vendor-specific elements, the frame become unparsable, since it is hard to determine the end of the SCS Status List field and the start of the the vendor-specific element(s).
3. If a Count field is added after the Dialog Token field to indicate the number of SCS Status duples in the SCS Status List field, the SCS Response frame with vendor-specific element(s) becomes parsable.
4. The authors of this contribution are not aware of any existing implementations of SCS in the field, however they do anticipate deployments in the near future. Therefore, there is a short-term opportunity to fix this issue without creating back-compatibility issues.
5. The authors of this contribution also note that the Stream Classification Service Request frame is not affected by this issue. Although the Request contains a SCS Descriptor List field of variable length, each SCS Descriptor in the list starts with an Element ID and a Length value, that makes parsing possible irrespective of the number of descriptors in the list.

**Resolution: Accept**

***Editor: Change Cl. 9.6.18.3 as follows:***

**9.6.18.3 SCS Response frame format**The SCS Response frame is sent in response to an SCS Request frame using the procedures defined in 11.25.2. The Action field of an SCS Response frame contains the information shown in Figure 9-955.

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|  | Category | Robust Action | Dialog Token | Count | SCS Status List |
| Octets | 1 | 1 | 1 | 1 | Variable |

**Figure 9-955—SCS Response frame Action field format**

The Category field is defined in 9.4.1.11.

The Robust Action field is defined in 9.6.18.1.

The Dialog Token field is set to the nonzero value of the corresponding SCS Request frame. If the SCS Report frame is being transmitted for a reason other than in response to an SCS Request frame, then the Dialog Token field is set to 0.

The Count field is set to the value of the number of SCS Status duples in the SCS Status List field.

The SCS Status List field contains one or more SCS Status duples. The format of the SCS Status duple is defined in Figure 9-956.

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| 585 | Thomas Derham | 9.4.1.9 | 876-877 |  | Status Code names are supposed to be unique, since they are used to reference specific status code values in normative text. However the name REQUESTED\_TCLAS\_NOT\_SUPPORTED is given to both Status Code 56 and 80 | Disambiguate status codes 56 and 80 | Revise. TGme editor to incorporate the editor instructions in submission 11-21/0688 corresponding to CID #585 |

***Discussion:***

Both status codes were added in 11v with descriptions (56) “Requested TCLAS processing is not supported by the AP” and (80) “Requested TCLAS not supported”.

In 802.11-2012, (56) did not have a name but (80) had name REQUESTED\_TCLAS\_NOT\_SUPPORTED.

11aa added the name for (56) REQUESTED\_TCLAS\_NOT\_SUPPORTED\_BY\_AP, but somehow the name in 802.11-2016 is REQUESTED\_TCLAS\_NOT\_SUPPORTED (which is duplicate of that of 80).

Therefore, the proposed change is to actually implement the intention of 11aa. Note that this change would also align with, and fix an issue with, the current SCS text, which currently references a status code by the name REQUESTED\_TCLAS\_NOT\_SUPPORTED\_BY\_AP name which is not currently defined. The proposed change also updates the MSCS text to align status code names used in both cases.

***Editor: Change Cl. 9.4.1.49 as follows:***

**9.4.1.9 Status Code field**

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| 56 | REQUESTED\_TCLAS\_NOT\_ SUPPORTED\_BY\_AP | Requested TCLAS processing is not supported by the AP. |
| 57 | INSUFFICIENT\_TCLAS\_ PROCESSING\_RESOURCES | The AP or PCP has insufficient TCLAS processing resources to satisfy the request. |

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| 80 | REQUESTED\_TCLAS\_NOT\_SUPPORTED | Requested TCLAS not supported. |
| 81 | TCLAS\_RESOURCES\_EXHAUSTED | TCLAS resources exhausted. |

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| 97 | TCLAS\_PROCESSING\_ TERMINATED | Requested TCLAS processing has been terminated by the AP. |

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| 128 | TCLAS\_PROCESSING\_TERMINATED\_INSUFFICIENT\_QOS | Requested TCLAS processing has been terminated by the AP due to insufficient QoS capacity. |
| 129 | TCLAS\_PROCESSING\_TERMINATED\_POLICY\_CONFLICT | Requested TCLAS processing has been terminated by the AP due to conflict with higher layer QoS policies. |

***Editor: Change Cl. 11.25.3 as follows:***

* MSCS procedures

<snip>

A value of REQUEST\_DECLINED, REQUESTED\_TCLAS\_NOT\_SUPPORTED\_BY\_AP, or INSUFFICIENT\_TCLAS\_PROCESSING\_RESOURCES shall be set in the Status field in the MSCS Response frame or in the MSCS Status subelement of the MSCS Descriptor element of the (Re)Association Response frame, when the AP declines the MSCS request; an MSCS Descriptor element is optionally present in the MSCS Response frame for this case. If an MSCS Descriptor element is present in an MSCS Response frame that does not indicate a status of “SUCCESS”, the Request Type field is set to “Change” and the element indicates a suggested set of parameters that could be accepted by the AP in response to a subsequent request by the non-AP STA. In the MSCS Descriptor element of a (Re)Association Response frame with a value in the Status field other than “SUCCESS” the Request Type field is set to “Add” if no suggested set of parameters is indicated, or set to “Change” if the element indicates a suggested set of parameters that could be accepted by the AP in response to a subsequent request by the non-AP.

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| 583 | Thomas Derham | 11.25.2 | 2342 |  | UP assignment based on SCS classifier match is not defined in the event that an MSDU matches multiple SCS descriptors | Add clarification with a precedence rule for the case where an MSDU matches more than one SCS Descriptor | Revise. TGme editor to incorporate the editor instructions in submission 11-21/0688 corresponding to CID #583 |

***Editor: Change Cl. 11.25.2 and 11.25.3 as follows:***

**11.25.2 SCS procedures**

The stream classification service (SCS) is a service that may be provided by an AP to its associated STAs that support SCS. In SCS, the AP classifies incoming individually addressed MSDUs based upon parameters provided by the non-AP STA.

The classification allows the UP, drop eligibility, and EDCA transmit queue to be selected for all MSDUs matching the classification.

Implementation of SCS is optional for a STA. A STA that implements SCS shall set its dot11SCSImplemented to true. A STA with dot11SCSActivated equal to true shall support stream classification and shall set to 1 the SCS field of the Extended Capabilities elements that it transmits. If dot11SCSActivated is true, dot11SCSImplemented shall be true.

A non-AP STA that supports SCS may request use of SCS by sending an SCS Request frame that includes an SCS Descriptor element with the Request Type field set to “Add” or “Change.” The SCS Descriptor List field in the SCS Descriptor element identifies how MSDUs are classified and the priority to assign to MSDUs that match this classification.

Each SCS stream is identified by an SCSID. This SCSID is used by a non-AP STA to request creation, modification, or deletion of an SCS stream. The SCSID is used by an AP to identify an SCS stream in SCS responses.

Upon receipt of an SCS Request frame from an associated non-AP STA, the AP shall respond with a corresponding SCS Response frame. A value of SUCCESS shall be set in the corresponding Status field of the SCS Status duple in the SCS Response frame when the AP accepts the SCS request for the requested SCSID. A value of REQUEST\_DECLINED, REQUESTED\_TCLAS\_NOT\_SUPPORTED\_BY\_AP, 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 the AP denies the SCS request for the requested SCSID.

If the AP declines a request to change a previously accepted SCSID, the previously accepted classification for this SCSID continues to operate.

If the requested SCS is accepted by the AP, the AP shall process subsequent incoming individually addressed MSDUs from the DS or WM that match the TCLAS elements and optional TCLAS Processing element classifier specified in the SCS Descriptor element.

If an MSDU matches the classifier specified in the SCS Descriptor elements of multiple SCS streams, the SCS Descriptor element that specifies the greatest number of classifier parameters required for a match (i.e. the most granular classifier) is used. If an MSDU matches the classifier specified in SCS Descriptor elements that specify the same number of classifier parameters, which classifier is used is implementation dependent.

The number of classifier parameters required for a match in a given TCLAS element is 1 when the Classifier Type is 2, 3 or 10, and is 3 when the Classifier Type is 5. For other classifier types, the Classifier Mask field indicates which classifier parameters are required for a match. For Classifier Types 1 and 4, the (IP) Version classifier parameter is not counted when determining the number of classifier parameters required for a match.  Reserved fields are not classifier parameters.

If multiple TCLAS elements are included in an SCS Descriptor element, the number of classifier parameters required for a match is the sum of the number of classifier parameters required for a match for each TCLAS element if the Processing field in the TCLAS Processing element is 0, or is the minimum of the number of classifier parameters required for a match for each TCLAS element if the Processing field is 1. If a TCLAS Processing element is included where the Processing field is 2, the number of classifier parameters required for a match is 0.

A STA should not request creation of multiple SCS streams that might match the same MSDU and specify the same number of classifier parameters.

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| 584 | Thomas Derham | 11.25.2 | 2343 |  | It is stated that the length field of the SCS Descriptor element is set to 0 when the non-AP STA sends a SCS Request frame to remove an existing SCSID setup with the corresponding AP. However, this is incorrect - the length field should be 2 since both SCSID and Request Type fields are present. | Correct the length value to 2 (from the current incorrect value of 0) | Revise. TGme editor to incorporate the editor instructions in submission 11-21/0688 corresponding to CID #584 |

***Editor: Change Cl. 11.25.2 as follows:***

**11.25.2 SCS procedures**

A non-AP STA may request the termination of an accepted SCS stream by sending an SCS Request frame with the Request Type field set to “Remove” and the requested SCSID in the SCS Descriptor element. No Intra-Access Priority, TCLAS, or TCLAS Processing elements shall be included in the SCS Descriptor element.

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| 586 | Thomas Derham | 11.25.2 | 2343 |  | The status code “Terminate” specified to be used by AP when it responds to a request to remove an SCS stream, or sends an unsolicited frame to cancel an SCS stream, is not defined in Status Codes table. Specific status code values are defined for corresponding procedures in MSCS.The commenter propose that SCS Status aligns with MSCS Status for Terminate.  | Replace “Terminate” with TCLAS\_PROCESSING\_TERMINATED when responding to a remove request from STA. Replace “Terminate” with the following defined status codes when AP sends unsolicited cancelation to provide the reason when available: TCLAS\_PROCESSING\_TERMINATED, TCLAS\_PROCESSING\_TERMINATED\_INSUFFICIENT\_QOS, TCLAS\_PROCESSING\_TERMINATED\_POLICY\_CONFLICT, or TCLAS \_RESOURCES\_EXHAUSTED | Revise. TGme editor to incorporate the editor instructions in submission 11-21/0688 corresponding to CID #586 |

Discussion: Some additional editorial cleanup included in the resolution proposed below corresponding to the comment.

***Editor: Delete ‘granted’ in Figure 6-27- Example SCS setup and termination protocol exchange.***

***Editor: Change Cl. 9.6.18.3 SCS Response frame format as follows:***

The SCSID field identifies an SCS stream.
The Status field indicates the status of the SCS stream, as indicated in Table 9-50 (Status Codes).

***Editor: Change Cl. 11.25.2 as follows:***

**11.25.2 SCS procedures**

Upon reception of an SCS Request frame that requests termination of an SCS stream, the AP shall send an SCS Response frame with the Dialog Token and SCSID fields set to the corresponding fields in the SCS Request frame and the Status field set to TCLAS\_PROCESSING\_TERMINATED.

The AP may send an unsolicited SCS Response frame at any time to terminate an SCS stream. The AP shall set the Dialog Token field to 0, the SCSID field to identify the SCS stream being terminated, and the Status field to TCLAS\_PROCESSING\_TERMINATED, TCLAS\_PROCESSING\_TERMINATED\_INSUFFICIENT\_QOS, TCLAS\_PROCESSING\_TERMINATED\_POLICY\_CONFLICT, or TCLAS \_RESOURCES\_EXHAUSTED.

When an SCS stream is terminated, the AP shall cease to apply the classifier*(s)* related to it.