IEEE P802.11
Wireless LANs

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| Proposed resolution for lb193mc CID 78, 309, and 310  |
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Abstract

This submission contains a proposal to enable frame classification based on the MAC header content, which is a proposed resolution for CID-78, 309 and 310 from LB193mc.

**Introduction**

This submission contains a proposal to enable frame classification based on the MAC header content, which is a proposed resolution for CID-78, 309 and 310 from LB193mc.

***The proposed modifications are in reference to the text*** ***in IEEE P802.11REVmc/D1.5 [1] and are indicated by the change marks as follows:***

**3.1 Definitions**

**traffic classification (TCLAS):** The specification of certain parameter values to identify the medium access control (MAC) protocol data units (MPDUs). The classification process, performed at a quality-of-service (QoS) access point (AP), uses the parameter values to examine each MPDU and determine whether the MPDU matches a classification specification. TCLAS might also occur at non-access-point (non-AP) QoS station (STA).

NOTE—However, the procedure for classification at a non-AP STA is beyond the scope of this standard.

**traffic filter:** A set of traffic specifications defined by the use of traffic classification (TCLAS) elements that are utilized by the traffic filtering service (TFS) to identify specific allowed frames.

8.4.2.33 TCLAS element

The TCLAS element specifies an element that contains a set of parameters necessary to identify MPDUs. It can be used to identify incoming MSDUs (from a higher layer in all STAs or from the DS in an AP) that belong to a particular TS. The TCLAS element is also used when the traffic does not belong to a TS, for example, by the FMS, DMS, and TFS services. If required, the TCLAS element is provided in ADDTS Request and ADDTS Response frames only for the downlink or bidirectional links. TCLAS element needs not be provided for the uplink or direct- link transmissions. The structure of this element is shown in Figure 8-199.

The Element ID and Length fields are defined in 8.4.2.1.

When the UP field contains a value that is less than or equal to 7 and greater than or equal to 0, the value specifies the UP of the associated MSDUs. When the UP field contains a value that is greater than or equal to 8 and less than or equal to 11, the value specifies the access category of the associated MPDUs. The UP field value of 255 is reserved and indicates that the UP of the MSDU and the access category of the MPDU are not compared as part of the Traffic Filter. The encoding of the contents of the User Priority field of an TCLAS element is specified in Table 8-xx0.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Element ID | Length (L+1) | User Priority | Frame Classifier |
| Octest: 1 | 1 | 1 | Variable |

**Figure 8-199—TCLAS element format**

**Table 8-xx0—User Priority field of TCLAS element**

|  |  |
| --- | --- |
| User Priority | Meaning |
| 0-- 7 | The User Priority value of an MSDU  |
| 8 | The AC value of an MPDU is AC-VO |
| 9 | The AC value of an MPDU is AC-VI |
| 10 | The AC value of an MPDU is AC-BE |
| 11 | The AC value of an MPDU is AC-BK |
| 12 - 254 | Reserved |
| 255 | The User Priority field is not used for comparison.  |

The Frame Classifier field is 3–255 octets in length and is defined in Figure 8-200.

|  |  |  |
| --- | --- | --- |
| Classifier Type | Classifier Mask | Classifier Parameters |
| Octest: 1 | 1 or 3 | -Variable |

**Figure 8-200—Frame Classifier field**

The Frame Classifier field comprises the following subfields: Classifier Type, Classifier Mask, and

Classifier Parameters. The Classifier Type subfield is 1 octet in length and specifies the type of classifier

parameters in this TCLAS as defined in Table 8-111.

**Table 8-111—Frame classifier type**

|  |  |
| --- | --- |
| Classifier type | Classifier parameters |
| 0 | Ethernet parameters |
| 1 | TCP/UDP IP parameters |
| 2 | IEEE 802.1Q parameters |
| 3 | Filter Offset parameters |
| 4 | IP and higher layer parameters |
| 5 | IEEE 802.1D/Q parameters |
| 6 | IEEE 802.11 MAC header parameters |
| 7-255 | Reserved |

When the Classifier type is a value less than or equal to 5, the Classifier Mask subfield specifies a bitmap in which bits that have the value 1 identify a subset of the classifier parameters whose values need to match those of the corresponding parameters in a given MSDU for that MSDU to be classified to the TS of the affiliated TSPEC. The bitmap is ordered from the LSB to the MSB, with each bit pointing to one of the classifier parameters of the same relative position as shown in this subclause based on classifier type. An incoming MSDU that failed to be classified to a particular TS may be classified to another active TS based on the frame classifier for that TS. If, however, all the frame classifiers for the active TS have been exhausted, the MSDU does not belong to any active TS and is classified to be a best-effort MSDU. In cases where there are more bits in the bitmap than classifier parameters that follow, the MSBs that do not point to any classifier parameters are reserved.

When the Classifier Type is equal to 6, the Classifier Mask subfield specifies a bitmap in which every two bits correspond to one field of the MAC header, as specified in Figure 8-xx1. Setting the LSB of the 2 bits to 1 indicates the use of the corresponding MAC Header field for comparison, and setting the LSB of the two bits to 0 indicates the corresponding MAC header field is not used for comparison, and the corresponding Match Specification is not included in the Classifier. The setting of the MSB of the two bit to 1 indicates the inclusion of the corresponding MAC Header Filter (a bit mask) in the corresponding Match Specification; the setting of the MSB of the two bits to 0 indicates the MAC Header Filter is not included in the corresponding Match Specification and every bit of the Match Specification, if included in the Classifier Parameter, needs to be compared. If an optional MAC Header field needs to be compared, the LSB of the two bits in the Classifier Mask corresponding to the optional MAC header field shall be set to 1, and an MPDU that does not include the optional field is not a matching MPDU.

**Table 8-xx1—Classifier Mask for Classifier Type (6)**

|  |  |  |
| --- | --- | --- |
| Octet index | Bits index | Classifier parameters |
| 0 | B0B1 | Frame Control  |
| B2B3 | Duration/ID  |
| B4B5 | Address 1 |
| B6B7 | Address 2 |
| 1 | B0B1 | Address 3 |
| B2B3 | Sequence Control  |
| B4B5 | Address 4 |
| B6B7 | QoS Control |
| 2 | B0B1 | HT Control |
| B2B3 | Reserved |
| B4B5 | Reserved |
| B6B7 | Reserved |

For Classifier Type 0, the classifier parameters are the following parameters contained in an Ethernet packet header: Source Address, Destination Address, and Type (“Ethernet” [B12]). The endianness of the Type field is as defined in Ethernet [B12]. The Frame Classifier field for Classifier Type 0 is defined in Figure 8-201. It has a length of 16 octets.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Classifier Type (0) | Classifier Mask | Source Address | Destination Address | Type |
| Octest: 1 | 1 | 6 | 6 | 2 |

**Figure 8-201—Frame Classifier field of Classifier Type 0**

**……**

The Frame Classifier field for Classifier Type 5 is defined in Figure 8-208.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Classifier Type (5) | Classifier Mask | 802.1QPCP | 802.1Q CFI | 802.1Q VID |
| Octest: 1 | 1 | 1 | 1 | 2 |

**Figure 8-208—Frame Classifier field of Classifier Type 5**

The subfields in the classifier parameters are represented and transmitted in big-endian format.

The PCP subfield contains the value in the 4 LSBs; the 4 MSBs are reserved.

The CFI subfield contains the value in the LSB; the 7 MSBs are reserved.

The VID subfield contains the value in the 12 LSBs; the 4 MSBs are reserved.

For Classifier Type 6, the format of the Frame Classifier field of an TCLAS element is illustrated in Figure 8-xx2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Classifier Type (6) | Classifier Mask | Frame Control Match Specification | Duration Match Specificaiton | Address 1 Match Specification | Adress 2 Match Sepcification |
| Octest: 1 | 3 | 0 or 2 or 4 | 0 or 2 or 4 | 0 or 6 or 12 | 0 or 6 or 12 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Adress 3 Match Specification | Sequence Contril Specification  | Address 4 Specification | QoS Control Specification | HT Control Specificaiton |
|  0 or 6 or 12 | 0 or 2 or 4 | 0 or 6 or 12 | 0 or 2 or 4 | 0 or 4 or 8 |

**Figure 8-xx2—Frame Classifier field of Classifier Type 6**

For Classifier Type 6, the formats of the Frame Control Match Specification subfield, Duration/ID subfield, Address 1 subfield, Address 2 subfield, Address 3 subfield, Sequence Control subfield, Address 4 subfield, QoS Control subfield and HT Control subfield of the Frame Classifier field of a TCLAS element are illustrated in Figure8-xx3, Figure 8-xx4, Figure 8-xx5, Figure 8-xx6, Figure 8-xx7, Figure 8-xx8, Figure 8-xxx9, Figure 8-xx10, and Figure 8-xx11, respectively. The Match Specification subfield contains the match specification (i.e., the parameters) of the corresponding MAC header field with which an MPDU needs to be compared. When the corresponding Filter Mask is not present, every bit in a Match Specification needs to be compared; otherwise, only the bits with the same bit positions as the bits that are set to 1 in the corresponding Filter Mask subfield are compared.

|  |  |
| --- | --- |
| Frame Control Match Specification | Frame Control Filter Mask |
| Octets 2 |  0 or 2 |

**Figure 8-xx3—Frame Control Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| Duration/ID Match Specification | Duration/ID Filter Mask |
| Octets 2 | 0 or 2 |

**Figure 8-xx4—Duration/ID Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| Address 1 Match Specification | Address 1 Filter Mask |
| Octets 6 | 0 or 6 |

**Figure 8-xx5—Address1 Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| Address 2 Match Specification | Address 2 Filter Mask |
| Octets 6 | 0 or 6 |

**Figure 8-xx6—Address2 Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| Address 3 Match Specification | Address 3 Filter Mask |
| Octets 6 | 0 or 6 |

**Figure 8-xx7—Address3 Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| Sequence Control Match Specification | Sequence Control Filter Mask |
| Octets 2 | 0 or 2 |

**Figure 8-xx8—Sequence Control Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| Address 4 Match Specification | Address 4 Filter Mask |
| Octets 6 | 0 or 6 |

**Figure 8-xx9—Address4 Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| QoS Control Match Specification | QoS Control Filter Mask |
| Octets 2 | 0 or 2 |

**Figure 8-xx10—QoS Control Match Specification Subfield of Classifier Type 6**

|  |  |
| --- | --- |
| HT Control Match Specification | HT Control Filter Mask |
| Octets 4 | 0 or 4 |

**Figure 8-xx11—HT Control Match Specification Subfield of Classifier Type 6**

**8.4.2.35 TCLAS Processing element**

The TCLAS Processing element is present in the ADDTS Request, ADDTS Response, FMS Request, DMS Request, and TFS Request frames if there are multiple TCLASs associated with the request. It indicates how an MPDU should be processed by the classifier. The TCLAS Processing element is defined in Figure 8-210 (TCLAS Processing element).

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Element ID | Length (1) | Processing |
| Octest: 1 | 1 | 1 |

**Figure 8-210—TCLAS Processing element**

The Element ID and Length fields are defined in 8.4.2.1 (General).

The Processing subfield is 1 octet long. The encoding of the Processing subfield is shown in Table 8-113 (Encoding of Processing subfield).

**Table 8-113—Encoding of Processing subfield**

|  |  |
| --- | --- |
| Processing subfield value | Meaning |
| 0 | Incoming MSDU’s higher layer parameters have to match to the parameters in all the associated TCLAS elements. |
| 1 | Incoming MSDU’s higher layer parameters have to match to at least one of the associated TCLAS elements. |
| 2 | Incoming MSDUs that do not belong to any other TS are classified to the TS for which this TCLAS Processing element is used. In this case, there are not any associated TCLAS elements. |
| 3 | Parameters of frames being processed by the classification function have to match to the parameters in all the associated TCLAS elements.  |
| 4 | Parameters of frames being processed by the classification function have to match to at least one of the associated TCLAS elements.  |
| 5 | Parameters of frames being processed by the classification function do not belong to any categorization by the associated TCLAS elements.  |
| 6-255 | Reserved |

REFERENCE:

[1] IEEE P802.11REVmc\_D1.5, Draft IEEE Standard for Information Technology – Telecommunications and information exchange between systems, local and metropolitan area networks – Specific requirements, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications