IEEE P802.11
Wireless LANs

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| Resolution for LB266 CIDs related to 9.4.2.316 QoS Characteristics element Part 1 (General and Editorial) |
| Date: September, 2022 |
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 Abstract

This submission proposes a resolution for the following 33 CIDs for TGbe (LB266).

10070, , 10424, 10425, 10703, 10704, , 11523, 11524, 11525, 11699, 11954, (presented and SP’ed on 9/14)

12321, 12468, 12719, 12831, 12833, 12971, 12972, 13109, 13110, 13218, 13219, , 13246, 13247, 13485, 13486, 13488, 14071

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: removed CID 12973
* Rev 2: corrected some resolution incorrectly labelled as Rejected (should be Revised)
* Rev 3: deferred CIDs 10071, 13245, 11243, 12174, 12291, 12292

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 TGaxbe 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** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 10070 | Thomas Derham | 252.59 | The TID and User Priority subfields always contain the same value, therefore are mutually redundant. | Remove one of them (unless there is a plan for the definition of one of the fields to be extended in the future so they are not mutually redundant, in which case add a note or similar to clarify) | **Revised**This field can be extended in the future to contain a value that is not the same as the User Priority e.g., in the future, the TID value could be just a number that is not tied to the User Priority value, which can be set separately. Added a note to clarify it.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 10070** |
|  |  |  |  |  |  |
| 10424 | yan li | 252.42 | Table 9-401p shows Direction subfield is allocated in Bit 5 and Bit 6,while the location for Direction subfield is B0 to B1 in the Figure 9-1002at--Control Info field format;I am confused about it | please keep the location for Direction subfield consistent | **Revised**Agreed and resolved the same as CID 11523.**TGbe editor, please make changes as shown in 11-22/1436r3 for CID 11523** |
| 10425 | yan li | 252.59 | Since TID subfield is set to the same value as User Priority subfield,why do we need these two similar subfield.It is redundant | as the comment | **Rejected**This field can be extended in the future to contain a value that is not the same as the User Priority e.g., in the future, the TID value could be just a number that is not tied to the User Priority value, which can be set separately. Added a note to clarify it. |
| 10703 | Liangxiao Xin | 254.15 | No peak data rate is defined in the element. The mean data rate, the peak data rate, and the burst size are the parameters of the token bucket model, which provides standard terminology for describing the behavior of a traffic source. | Please add the definition of peak data rate and add the peak data rate field in the element | **Revised**Agreed in principle and resolved the same as CID 13245.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 13245** |
| 10704 | Liangxiao Xin | 254.59 | It is not clear how to use the MSDU Count Exponent field to compute the MSDU delivery ratio. | need an algorithm of calculating the MSDU delivery ratio | **Rejected**The MSDU delivery ratio is just a simple ratio between the number of MSDUs delivered within the delay bound for every 10MSDU Count Exponent MSDUs arrived in the MAC SAP. |
|  |  |  |  |  |  |
| 11523 | Xiaofei Wang | 252.45 | The direction subfield should be B0 and B1, not Bit 5 and Bit 6 as in table 9-401p. | as in comment | **Accepted** |
| 11524 | Xiaofei Wang | 252.62 | If TID and UP subfields are set to the same value, maybe just one is needed. | delete one of TID and UP | **Revised**Please see the explanation in resolution of CID 10070.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 10070** |
| 11525 | Xiaofei Wang | 253.05 | Link ID field has been defined a number of times in the spec; better to consolidate and refer to the previous definitions | as in comment | **Revised**Agreed. Used the same style as the LinkID description in section 12.7.2**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 11525** |
| 11699 | Abdel Karim Ajami | 254.12 | The current Medium Time field size is one octet and allows to signal a maximum of 65 msec every 1 sec which may not satisfy the QoS requirements of the direct link | Extend the Medium Time field to allow a STA to request larger medium time for the direct link | **Revised**Agreed in principle. Changed the Medium Time from 1 octet to 2 octets to indicate 0s to 0.99968s (i.e., with the values 0 - 3,905 in units of 256 us). Values 3,906 to 65,535 are reserved.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 11699** |
| 11954 | Jarkko Kneckt | 252.60 | The Control Info field of the QoS Characteristics element a TID and UP fields. D2.0 sets both values to the same value. Is there any need to have the both values? | Please clarify why both TID and UP fields are needed in the Control Info field of the QoS Characteristics element. If there is no need for both fields, then delete the TID field. | **Revised**Please see the explanation in resolution of CID 10070.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 10070** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 12321 | Guogang Huang | 252.60 | Considering TID 0-7 and TID 8-15 have completely different usage, i.e. the TID within (0-7) can be shared by one or more traffic flows, but the TID within (8-15) is assigned to one traffic flow at most, the current SCS mechnism cannot prioritize a particular traffic stream. From this point, we should allow the traffic stream to map to a TID within 8-15. | As in comment | **Rejected**This proposed resolution was discussed in TGbe before and consensus was not reached. |
| 12468 | Yusuke Asai | 251.45 | The term of "QoS traffic transfer" appears only once in the D2.0. | Add the definition of the term or replace it with an alternative. | **Rejected**Here the term “transfer” is used as simple English meaning “moving from one place to another”. The term “transfer” is also used in the baseline in many places the same way.  |
| 12719 | Pascal VIGER | 251.42 | As QoS Characteristics element contains a set of parameters that define the characteristics and QoS expectations of a traffic flow that could be conveyed over several links in between MLDs, it is useful to have an overall specification (as currently) but also several expectations per each link (this makes STA specify how transport is performed, if needed) | Allow a list of QoS Characteristics element, each having a distinct Link ID. | **Rejected**Currently, the QoS characteristics element describes the flow at the MLD-level so any link(s) barring restrictions from TID-to-link mapping. Therefore, the QoS characteristic element should not be per a specific link/LinkID. |
| 12831 | Laurent Cariou | 254.64 | The range of Medium Time field in QoS Characteristics element does not cover entire range of typical values. | Change the length of this field to 2 octets similar to the field in TSPEC of same name. | **Accepted** |
| 12833 | Laurent Cariou | 252.53 | The description in the paranthesis is bit restrctive relative to definition of the peer-to-peer link in REVme. | Replace "(MSDUs or A-MSDUs are sent from the non-AP STA to another non-AP STA)." with "(MSDUs or A-MSDUs are sent over a peer-to-peer link). | **Accepted** |
| 12971 | Chunyu Hu | 253.59 | Improve wording: "the relevant acknowledgement". Change "relevant" in "the relevant acknowledgement" to either "associated" or "corresponding". | As in comment | **Revised**Agreed and replaced the word with “corresponding”.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 12971** |
| 12972 | Chunyu Hu | 254.15 | Is the Burst Size meant to count the number of (maximum) bursts, or number of bytes in the burst of traffic? I think it's the latter. In either case, needs clarification. | As in comment | **Revised**Clarified that the burst is measure “within the Delay Bound” as in the proposed resolution of CID 13245.“The Burst Size field is 4 octets long and contains an unsigned integer that specifies the **maximum burst, in octets, of the MSDUs or A-MSDUs** belonging to the traffic flow that arrive at the MAC SAP **within a time duration specified in the Delay Bound field”****TGbe editor, please make changes as shown in 11-22/1436r3 tagged 13245** |
| 13109 | Chittabrata Ghosh | 254.28 | Need to clarify what is the expectation for the MSDU Delivery ratio, when the Delay Bound parameter is not specified. | As in comment | **Revised**Agreed. Same resolution as CID 13246.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 13246** |
| 13110 | Chittabrata Ghosh | 254.64 | The Medium Time field should be applicable only for the direct/p2p link, since the requirement for UL and DL are specified by the min/max service intervals and service start time. Text needs to clarify this. | As in comment | **Revised**Agreed. Same resolution as CID 13247.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 13247** |
| 13218 | Evgeny Khorov | 12.53 | The practical need in the Minimum Service Interval field is not clear. | Remove this field | **Rejected**The value in this field indicates the STA does not want to be served by the AP more frequent than once every Minimum Service Interval. |
| 13219 | Evgeny Khorov | 40.54 | What is the difference between MSDU Delivery Ratio = 0 and not present | Make 0 reserved | **Accepted** |
|  |  |  |  |  |  |
| 13246 | Binita Gupta | 254.28 | Need to clarify what is the expectation for the MSDU Delivery ratio, when the Delay Bound parameter is not specified. | As in comment | **Revised**Agreed in principle and added text to reflect the same. Also added “The 4 MSBs of the MSDU Delivery Ratio field are reserved.”. Also added text to specify that the MSDU Delivery ratio field and the MSDU Count Exponent field are either both present or both absent.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 13246** |
| 13247 | Binita Gupta | 254.64 | The Medium Time field should be applicable only for the direct/p2p link, since the requirement for UL and DL are specified by the min/max service intervals and service start time. Text needs to clarify this. | As in comment | **Revised**Agreed in principle and added text to reflect the same.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 13247** |
| 13485 | Liwen Chu | 251.44 | QoS Characteristics will be applied to MLD level | update the text per the comment | **Rejected**Agreed with the comment but In 35.3.22 Multi-link SCS procedure, there’s already a sentence essentially describing the same: “An SCS Request frame sent by a non-AP STA affiliated with a non-AP MLD to the AP of an AP MLD that contains a QoS Characteristics element in which the Direction subfield is set to uplink or downlink or one that does not contain a QoS Characteristics element is interpreted as a request for creation of an SCS stream that applies at the MLD level.” |
| 13486 | Liwen Chu | 252.59 | since the TID subfield is set to the same value as the User Priority field, one of them canbe removed. | update the text per the comment | **Revised**Please see the explanation in resolution of CID 10070.**TGbe editor, please make changes as shown in 11-22/1436r3 tagged 10070** |
| 13488 | Liwen Chu | 254.05 | The Service Start Time is MLD level information. The value of the field shouldn't be changed when the frame that carris it is retransmitted in different link (the time should not be the value in TSF time of the transmitting link). | update the text per the comment | **Revised**Since there is no concept of an MLD-level TSF, the Service Start Time field has to refer to a TSF of a link.Enabled the existing LinkID field to indicate the link for which the TSF is used for the Service Start Time so that even when the frame that contains the QoS characteristics element is retransmitted on another link, the LinkID and Service Start Time values will remain the same. |
| 14071 | Liuming Lu | 251.41 | Currently 802.11be has not defined enough parameters of QoS Characteristics element for the latency sensitive traffic. And the potential support for the future TSN applications needs to be considered for the specification of the extended parameters of QoS Characteristics element. | Suggest to specify the extended parameters of QoS Characteristics element for the latency sensitive traffic. TSN paramerters can be used as a reference to specify the extended parameters of QoS Characteristics element. | **Rejected**TGbe has not discussed anything TSN specific that is related to the context of the QoS characteristics element. The proposed resolution lacks a specific proposal. Please provide a more detailed proposal. |

Proposed Text Change

***TGbe editor: modify subclause 9.4.2.316 as follows:***

9.4.2.316 QoS Characteristics element

The QoS Characteristics element contains a set of parameters that define the characteristics and QoS expectations of a traffic flow, in the context of a particular non-AP EHT STA, for use by the EHT AP and the non-AP EHT STA in support of QoS traffic transfer using the procedures defined in 11.25.2 (SCS procedures) and 35.9 (Restricted TWT (r-TWT)).

The element information format comprises the items as defined in this subclause, and the structure is defined in Figure 9-1002as (QoS Characteristics element format).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|    | Element ID | Length | Element ID extension | Control Info | Minimum Service Interval | Maximum Service Interval | Minimum Data Rate | Delay Bound |
| Octets: | 1 | 1 | 1 | 4 | 4 | 4 | 3 | 3 |
|  | Maximum MSDU Size | Service Start Time | Service Start Time LinkID | Mean Data Rate | Burst Size | MSDU Lifetime | MSDU Delivery Ratio | MSDU Count Exponent | Medium Time |
| Octets: | 0 or 2 | 0 or 4 | 0 or 1 | 0 or 3 | 0 or 4 | 0 or 2 | 0 or 1 | 0 or 1 | 0 or 2(#11699) |
|  | Figure 9-1002as – QoS Characteristics element format |

The structure of the Control Info field is defined in Figure 9-1002at (Control Info field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 B1 | B2 B5 | B6 B8 | B9 B24 | B25 B28 | B29 B31 |
|  | Direction  | TID | User-Priority | Presence Bitmap of Additional Parameters | LinkID | Reserved |
| Bits: | 2 | 4 | 3 | 16 | 4 | 3 |
|  | Figure 9-1002at – Control Info field format |

The Element ID, Length, and Extended Element ID fields are defined in 9.4.2.1 (General).

The subfields of the Control Info field are defined as follows:

* The Direction subfield specifies the direction of data described by this element as defined in Table 9-401p (Direction subfield encoding).

|  |
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| Table 9-401p - Direction subfield encoding  |
| Bit 0(#10424) | Bit 1(#10424) | Usage |
| 0 | 0 | Uplink, defined as follows: * MSDUs or A‑MSDUs are sent from the non-AP STA to the AP.
 |
| 1 | 0 | Downlink, defined as follows: * MSDUs or A‑MSDUs are sent from the AP to the non-AP STA.
 |
| 0 | 1 | Direct link (MSDUs or A‑MSDUs are sent from the non-AP STA to another non-AP STA). |
| 1 | 1 | Reserved. |

* The TID subfield contains the TID value of the data frames that are described by this element. The TID subfield is set to the same value as the User Priority field. The values 8~15 are reserved.
* The User Priority subfield contains the user priority value (0~7) of the data frames that are described by this element. When the TCLAS element is present in the SCS Request frame containing this element, and the User Priority subfield in the TCLAS element has a value of 0 to 7(#10071), the User Priority subfield is set to the User Priority value specified in the TCLAS element. When an Intra-Access Category Priority element is present in the SCS Request frame containing this element, the User Priority subfield is set to the same value(#10071).
* The Presence Bitmap of Additional Parameters subfield contains a bitmap where the ith entry of the bitmap is set to 1 if the ith field starting from the Maximum MSDU Size field is present in this element. For each field starting from the Maximum MSDU Size field, the value 0 is reserved.
* The LinkID subfield contains the link identifier that corresponds to (#11525)the link for which the direct link transmissions are going to occur. This field is reserved if the Direction subfield is equal to any value but 2 (Direct link).
* Note: the presence of the TID subfield is for any future expansion to enable carrying a TID value that is independent of the User Priority(#10070).

The Minimum Service Interval field contains the following:

* If the Direction subfield is set to 0 (Uplink), the Minimum Service Interval field contains an unsigned integer that specifies the minimum interval, in microseconds, between the start of two consecutive service periods that are allocated to the STA for UL frame exchanges and the value 0 is reserved.
* If the Direction subfield is set to 1 (Downlink), the Minimum Service Interval field contains an unsigned integer that specifies the minimum interval, in microseconds, between the start of two consecutive service periods that are allocated for DL frame exchange sequences and the value 0 indicates that this parameter is unspecified.
* If the Direction subfield is set to 2 (Direct link) the Minimum Service Interval field contains an unsigned integer that specifies the minimum interval, in microseconds, between the start of two consecutive service periods that are allocated to the STA for direct link frame exchanges and the value 0 is reserved.

The Maximum Service Interval field contains the following:

* If the Direction subfield is set to 0 (Uplink), the Maximum Service Interval field contains an unsigned integer that specifies the maximum interval, in microseconds, between the start of two consecutive service periods that are allocated to the STA for UL frame exchanges and the value 0 is reserved.
* If the Direction subfield is set to 1 (Downlink), the Maximum Service Interval field contains an unsigned integer that specifies the maximum interval, in microseconds, between the start of two consecutive service periods that are allocated for DL frame exchange sequences and the value 0 indicates that this parameter is unspecified.
* If the Direction subfield is set to 2 (Direct link) the Maximum Service Interval field contains an unsigned integer that specifies the maximum interval, in microseconds, between the start of two consecutive service periods that are allocated to the STA for direct link frame exchanges and the value 0 is reserved.
* The value of this field is greater than or equal to the value of the Minimum Service Interval field.

The Minimum Data Rate field contains an unsigned integer that specifies the lowest data rate specified at the MAC SAP, in kbps, for transport of MSDUs or A-MSDUs belonging to the traffic flow described by this element.

* If the Direction subfield is set to 0 (Uplink) or 1 (Downlink), the value 0 is reserved.
* If the Direction subfield is set to 2 (Direct link), the value 0 indicates that this parameter is unspecified.

The Delay Bound field contains an unsigned integer that specifies the maximum amount of time, in microseconds, allowed to transport an MSDU or A-MSDU belonging to the traffic flow described by this element, measured between the time marking the arrival of the MSDU, or the first MSDU of the MSDUs constituting an A-MSDU, at the local MAC sublayer from the local MAC SAP and the time of completion of the successful transmission or retransmission of the MSDU or A-MSDU to the destination. The completion time of the MSDU or A-MSDU transmission includes the corresponding(#12971) acknowledgment frame transmission time, if present.

* If the Direction subfield is set to 0 (Uplink) or 2 (Direct link), the value 0 indicates that this parameter is unspecified.
* If the Direction subfield is set to 1 (Downlink), the value 0 is reserved.
* This field is nonzero if the Burst Size field is present(#13245).

The Maximum MSDU Size field contains an unsigned integer that specifies the maximum size, in octets, of MSDUs or A‑MSDUs belonging to the traffic flow described by this element.

The Service Start Time field contains an unsigned integer that specifies the anticipated time, in micro-seconds, when the traffic starts for the associated TID. The Service Start Time indicates to the AP the time when the STA expects to exchange frames corresponding to the TID specified in this element. The field represents the four lower order octets of the TSF timer associated to the link specified in the LinkID field at the start of the anticipated service period.(#13488)

The 4 LSBs of the Service Start Time LinkID field indicates the link identifier that corresponds to the link for which the TSF timer is used to indicate the Service Start Time (#13488). The 4 MSB are reserved. This field is present only if the Service Start Time field is present.

The Mean Data Rate field indicates the average data rate specified at the MAC SAP, in kbps, for transport of MSDUs or A-MSDUs belonging to the traffic flow within the bounds of this element.

The Burst Size field is 4 octets long and contains an unsigned integer that specifies the maximum burst, in octets, of the MSDUs or A-MSDUs belonging to the traffic flow that arrive at the MAC SAP within a time duration specified in the Delay Bound field(#13245).

The MSDU Lifetime field contains an unsigned integer that specifies the maximum amount of time, in units of milliseconds, since the arrival of the MSDU at the MAC data service interface beyond which the MSDU is not useful and may be discarded at the MSDU transmitter. The amount of time specified in this field is larger than or equal to the amount of time specified in the Delay Bound field, if present.

The MSDU Delivery Ratio field specifies the MSDU loss requirement and is encoded as follows:

* The 4 LSBs of the MSDU Delivery Ratio field indicate the percentage of MSDUs or A-MSDUs that are expected to be delivered within the delay bound specified in the Delay Bound field and its encoding is defined in Table 9-401q (MSDU Delivery Ratio field values). The 4 MSBs of the MSDU Delivery Ratio field are reserved. If the delay bound is not specified, then the MSDU Delivery Ratio indicates the percentage of MSDUs or A-MSDUs that are expected to be delivered successfully to the receiver (#13246).

|  |
| --- |
| Table 9-401q MSDU Delivery Ratio field values |
| Value | MSDU delivery ratio |
| 0 | Reserved(#13219) |
| 1 | 95% |
| 2 | 96% |
| 3 | 97% |
| 4 | 98% |
| 5 | 99% |
| 6 | 99.9% |
| 7 | 99.99% |
| 8 | 99.999% |
| 9 | 99.9999% |
| 10 – 15 | Reserved |

The MSDU Count Exponent field contains an unsigned integer that specifies the exponent from which the number of incoming MSDUs used for computing the MSDU delivery ratio is obtained. The number of incoming MSDUs is equal to 10MSDU Count Exponent. This field is present only if the MSDU Delivery Ratio field is present (#13246).

The Medium Time field contains an unsigned integer that specifies the medium time, in units of 256 microseconds per second, requested by the STA as the average medium time needed in each second. The 4 MSB of the Medium Time field are reserved. The values from 3,906 to 4,095 are reserved(#11699). This field is present only if the Direction subfield is set to 2 (Direct link)(#13247).

Do you agree to the resolution provided in doc 11-22/1436r3 for the following CIDs?

10070, 10424, 10425, 10703, 10704, 11523, 11524, 11525, 11699, 11954,

 12321, 12468, 12719, 12831, 12833, 12971, 12972, 13109, 13110, 13218, 13219, 13246, 13247, 13485, 13486, 13488, 14071