IEEE P802.11
Wireless LANs

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| LB266 CR for CIDs 10710, 12711 |
| Date: July 24, 2022 |
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 Abstract

This submission proposes resolutions for following 3 CIDs received for TGbe LB266:

10710, 12711, 12768

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: add one related CID 12768

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.***

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 10710 | Liangxiao Xin | 9.2.4.6.4 | Letancy sensitive traffic requires to be transmitted before it is expired. However,there is no legancy information in BSR for the latency sensitive traffic. AP may schedule trigger-based transmission wihtout considering the legacy requirement. AP may schedule the trigger transmission after the latency sensitive traffic expires. | add expiration time in BSR for latency sensitive traffic | **Revised**Agree with the commenter. Add QSR control subfield variant of an A-control subfield.**TGbe editor, please incorporate changes as shown in 11-22/1278r1 tagged 10710 and 12711** |
| 12711 | Pascal VIGER | 9.2.4.6.4 | QoS Characteristics element provides parameters that describe traffic characteristics (within the SCS procedure), especially the low latency (LL) parameters, so that AP shall be able to create an optimal schedule .Unfortunatly, it is well known that such traffic is never well specified and does not inform the real amount of LL at a given time inside buffer's STA.An updated BSR shall be provided for Latency Sensitive data | An updated BSR Control shall inform the AP scheduler of an amount of data with regards to a timing indication, which provides the expected date for delivery (e.g. UL trigger). This greatly helps the AP scheduling UL RUs accordingly (date and size). | **Revised**Agree with the commenter. Add QSR control subfield variant of an A-control subfield.**TGbe editor, please incorporate changes as shown in 11-22/1278r1 tagged 10710 and 12711** |
| 12768 | Romain GUIGNARD | 4.5.6.3 | The support for predictable latency is based on statistical approach (QoS characteristics) which is well adapted for periodic traffic. The standard should also consider the aperiodic low latency traffic (control command, almost expired time-to-live packets for high reliability traffic). | Please consider signalling such as BSR to inform AP about instantaneous low latency needs. | **Revised**Agree with the commenter. Add QSR control subfield variant of an A-control subfield.**TGbe editor, please incorporate changes as shown in 11-22/1278r1 tagged 10710 and 12711** |

**Discussion**

**The QSR lets non-AP STA provide delay bound information of a certain amount of its buffered SCS traffic to the AP. Then, AP can use the delay bound information to schedule trigger based transmission to satisfy latency requirement of the buffered SCS traffic.**

**Below is an example. STA1 has x+y bytes buffered traffic of TID 6. STA2 has z bytes buffered traffic of TID5. STA1 sends two QSR control subfields to report x bytes buffered traffic with expiration time 1 and expiration time 2, respectively. Then, the AP should finish the transmission of x bytes buffered traffic of STA1 before expiration time 1 and finish the transmission of another y bytes buffered traffic of STA1 before expiration time 2.**

**STA3 uses QSR and BSR together. BSR of AC3 includes the buffer of TID 5 included in the QSR.**

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***TGbe editor: The baseline for this document is 11be D2.0***

**9.2.4.6.4 HE variant** **(#10710, #12711)**

***TGbe editor: Change Table 9-25 (Control ID subfield values) as follows***

**Table 9-25—Control ID subfield values**

|  |  |  |  |
| --- | --- | --- | --- |
| **Control ID value** | **Meaning** | **Length of the Control Information subfield (bits)** | **Content of the Control Information subfield** |
| 0 | Triggered response scheduling (TRS) | 26 | See 9.2.4.6a.1 (TRS Control) |
| 1 | Operating mode (OM) | 12 | See 9.2.4.6a.2 (OM Control) |
| 2 | HE link adaptation (HLA) | 26 | See 9.2.4.6a.3 (HLA Control) |
| 3 | Buffer status report (BSR) | 26 | See 9.2.4.6a.4 (BSR Control) |
| 4 | UL power headroom (UPH) | 8 | See 9.2.4.6a.5 (UPH Control) |
| 5 | Bandwidth query report (BQR) | 10 | See 9.2.4.6a.6 (BQR Control) |
| 6 | Command and status (CAS) | 8 | See 9.2.4.6a.7 (CAS Control) |
| 7 | EHT operating mode (EHT OM) | 6 | See [9.2.4.7.8 (EHT OM Control)](#bookmark7) |
| 8 | Single response scheduling (SRS) | 10 | See [9.2.4.7.9 (SRS Control)](#bookmark12) |
| 9 | AP assistance request (AAR) | 20 | See [9.2.4.7.10 (AAR Control)](#bookmark14) |
| 10 | QoS status report (QSR) | 26 | See 9.2.4.7.11 (QSR Control) |
| 11–14~~7–14~~ | Reserved |  |  |
| 15 | Ones need expansion surely (ONES) | 26 | Set to all 1s |

***TGbe editor: Add subclause 9.2.4.7.x QSR Control as follow***

**9.2.4.7.xx QSR Control (#10710, #12711)**

The Control Information subfield in a QSR Control subfield contains QoS status information used for UL

MU operation (see 26.5.2 (UL MU operation)). The format of the subfield is shown in Figure 9-xxxx (Control

Information subfield format in a QSR Control subfield).

 B0 B1 B3 B4 B5 B6 B11 B12 B25

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| First TID QSR | TID | Scaling Factor | Queue Size | Earliest MSDU Expiration Time |

Bits: 1 3 2 6 14

**Figure 9-xxxx—Control Information subfield format in a QSR Control subfield**

The First TID QSR subfield indicates that the QSR Control subfield is a QSR Control subfield of the TID identified by the TID subfield with the smallest value of the Earliest MSDU Expiration Time among all QSR Control subfields of the same TID transmitted in the same PSDU if the First TID QSR subfield is set to 1; otherwise, it is set to 0.

The TID subfield indicates the TID for which the QoS status is reported.

The Scaling Factor subfield indicates the unit SF, in octets, of the Queue Size subfields. The encoding of the Scaling Factor subfield is shown in Table 9-24f (Scaling Factor subfield encoding).

The Queue Size subfield indicates the amount of buffered traffic, in units of SF octets, for the TID identified by the TID subfield that is intended for the STA identified by the receiver address of the frame containing the QSR Control subfield to be delivered before the earliest MSDU expiration time except those amounts of buffered traffic that are reported in the other QSR Control subfield(s) with earlier expiration time(s) in the same PSDU.

The queue size value in the Queue Size subfield shall is set to be less or equal to the total size, rounded up to the nearest multiple of SF octets, of all MSDUs and A-MSDUs buffered at the MLD (including the MSDUs or A-MSDUs of the SCS traffic streams in the same PSDU as the frame containing the QSR Control subfield) in the delivery queues used for MSDUs and A-MSDUs with TID that are specified in the TID subfield.

NOTE 1—The total size is based on data received by the STA at the MAC SAP (MA-UNITDATA.request). Any data in layers above the MAC is not taken into account.

NOTE 2—Buffered MSDUs are those that have been received in an MA-UNITDATA.request but that have not been

successfully transmitted and have not been discarded.

NOTE 3—The queue size includes the sizes of the MSDUs and A-MSDUs in the same PSDU with the same TID and the same earliest expiration time as the value of Earliest MSDU Expiration Time indicated in this QSR Control subfield.

A queue size value of 62 in the Queue Size subfields indicates that the amount of buffered traffic is greater than 62 × SF octets. A queue size value of 63 in the Queue Size subfields indicates that the amount of buffered traffic is an unspecified or unknown size.

The queue size value of the QoS Data frames containing the fragments might remain constant in all fragments

even if the amount of queued traffic changes as successive fragments are transmitted (see 10.23.3.5.1 (General)). If the QoS Data frames containing fragments are carried in the A-MPDU, the queue size values of the MPDUs containing the fragments are set according to the rules in 10.18 (HT Control field operation).

The Earliest MSDU Expiration Time subfield contains an unsigned integer that specifies the time, in microseconds, when at first MSDU or A-MSDU indicated in the Queue Size subfield reaches its delay bound as indicated in the corresponding QoS characteristics element. The field represents the 14 lower order bits of the TSF timer at the time when the first MSDU or A-MSDU indicated in the Queue Size subfield reaches its delay bound. The field shall be set to a value which represents the TSF timer of the link where the QSR control subfield is transmitted after the end time of the PPDU containing the QSR Control subfield

**9.4.2.313.2 EHT MAC Capabilities Information field**

***TGbe editor: update the below figure***

 B0 B1 B2 B3 B4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EPCS Priority Access Supported | EHT OM Control Support | Triggered TXOP Sharing Mode 1 Support | Triggered TXOP Sharing Mode2 Support | Restricted TWT Support |

 Bits: 1 1 1 1 1

 B5 B6 B7 B8 B9 B10

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCS Traffic Description Supported | Maximum MPDU Length | Maximum A-MPDU Length Exponent | EHT TRS Support | TXOP Return Support In TXOP Sharing Mode 2 |

 Bits: 1 2 1 1 1

 B11 B12 B15

|  |  |
| --- | --- |
| QSR Supported | Reserved |

 Bits: 1 4

**Figure 9-1002af—** **EHT MAC Capabilities Information field format**

***TGbe editor: add the new row below to the table***

**Table 9-401j—Subfields of the EHT MAC Capabilities Information field (continued)**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| QSR Supported | For an AP, indicates support for receiving a frame with a QSR Control subfield. For a non-AP STA, indicates support for generating a frame with a QSR Control subfield. | If the +HTC-HE Support subfield is 1:Set to 1 if the STA supports the QSR Control subfield functionality.Set to 0 otherwise.Reserved if the +HTC-HE Support subfield is 0. |

**35.5 MU operation**

**35.5.2 EHT UL MU operation**

***TGbe editor: Add subclause 35.5.2.x QoS status report operation as follow***

**35.5.2.x QoS status report operation (#10710, #12711)**

A non-AP STA delivers QoS status reports (QSRs) to assist its AP in allocating UL MU resources to satisfy the QoS requirement of the traffic delivery of the non-AP STA. The non-AP STA can implicitly deliver QSRs in the QSR Control subfield of any frame transmitted to the AP (unsolicited QSR) or explicitly deliver QSRs in the QSR Control subfield of any frame sent to the AP in response to a BSRP Trigger frame (solicited QSR). The QoS status reported in the QSR Control field consists of one TID, one queue size and one earliest MSDU expiration time (see 9.2.4.7.xx (QSR Control)).

An EHT STA shall set the QSR Support subfield in the EHT Capabilities element it transmits to 1 if dot11EHTQSRControlImplemented is true; otherwise, the EHT STA shall set the QSR Support subfield to 0.

An EHT STA with the QSR Support subfield set to 1 shall follow the rules as defined in 26.5.5 (Buffer status report operation) to report its buffer status to the AP and the additional rules as defined below to report QoS status to the AP.

A non-AP STA reports its QoS status (unsolicited QSR) to the AP with which it is associated in the QSR Control subfield (if present) in QoS Null, QoS Data and Management frames as defined below:

* The EHT STA may report the QoS status in the QSR Control subfield of frames it transmits if the AP has indicated its support in the QSR Support subfield of its EHT Capabilities element; otherwise the STA shall not report the QoS status in the QSR Control subfield.
	+ The EHT STA shall report the TID, the queue size and the earliest MSDU expiration time of the buffered traffic in the TID subfield, the Queue Size subfield and the earliest MSDU Expiration Time subfield of the QSR Control subfield. The EHT STA may set the queue size to be less or equal to the total size of all the MSDUs and A-MSDUs buffered in the TID.
	+ The non-AP STA may include in one PPDU more than one QoS Null, QoS Data and Management frames containing more than one QSR Control subfields with same TID subfield. The non-AP STA shall not count the same amount of the queue size in multiple QSR Control subfields in the same PPDU. The QSR Control subfield with earlier time of the earliest MSDU expiration time shall be transmitted earlier in the PPDU.

An AP can also solicit one or more associated non-AP STAs for their QSR(s) by sending a BSRP Trigger frame (see 9.3.1.22.6 (BSRP Trigger frame format)). The non-AP STA responds (solicited QSR) as defined

below:

* The non-AP STA that receives a BSRP Trigger frame shall follow the rules defined in 26.5.2.3 (Non-AP STA behaviour for UL MU operation) to generate the TB PPDU if the Trigger frame contains the 12 LSBs of the non-AP STA’s AID in any of the User Info fields; otherwise if the non-AP STA’s buffers are not empty and the non-AP STA supports the UORA procedure, it may follow the rules defined in 26.5.4 (UL OFDMA-based random access (UORA)) to gain access to an RA-RU and generate the TB PPDU when the Trigger frame contains one or more RA-RUs.
* The non-AP STA shall include in the TB PPDU one or more QoS Null frames containing one or more QSR Control subfield with the TID subfield, the Queue Size subfield and the Earliest MSDU Expiration Time subfield indicating that the non-AP STA has the queue size of the specified TID to be delivered to the AP before the earliest MSDU expiration time if the non-AP STA has buffered SCS traffic with delay bound requirement and the AP has indicated its support in the QSR Support subfield of its EHT Capabilities element.
* The non-AP STA may include in the TB PPDU more than one QoS Null frames containing more than one QSR Control subfields with same TID subfield. The non-AP STA shall not count the same amount of the queue size in multiple QSR Control subfields with different values in the Earliest MSDU Expiration Time subfields in the same TB PPDU. The QSR Control subfield with earlier time of the earliest MSDU expiration time shall be transmitted earlier in the PPDU.
* The non-AP STA shall not solicit an immediate response for the frames carried in the TB PPDU (e.g., the Ack Policy Indicator subfield of a QoS Null frame shall not be set to Normal Ack or Implicit BAR).