IEEE P802.11
Wireless LANs

|  |
| --- |
| PDT MAC and CC50 CR of BSR Enhancement  |
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|  |  |  |  |  |

Abstract

This submission proposes to amend draft text of BSR enhancement in 11bn D0.1 and to resolve CC50’s 27 comments as below.

175, 195, 1537, 1538, 1684,

1685, 2080, 2111, 2581, 2582,

2583, 2584, 2585, 2635, 2636,

2637, 2638, 2827, 2975, 2976

2977, 3165, 3279, 3437, 3577

3648, 3870.

The baseline is 11bn D0.1

Revision History:

* Rev 0: Initial version of the document.
* Rev 1: Update based on comments received in the 11bn reflector.
* Rev 2: Update based on comments during the presentation in the 11bn conf. call. Change is highlighted in cyan.

**Discucssion**

None.

**Motions in 11bn**

Motion 13

* TGbn enables per-TID buffer size reporting of a larger queue in UHR.
	+ Note: It is an optional feature.
	+ Note: In the baseline, the maximum approximate per-TID queue size to report is 2,147,328 octets

Motion 257

* Define an Enhanced BSR Control subfield in A-ctrl to report a larger per TID queue size
	+ The Enhanced BSR Control subfield consists of at least a TID subfield and an unsigned value subfield to report the larger queue size (QS) of the TID
	+ The reported QS is equal to 2147328 Octets + the value reported in the Queue Size field of the defined Enhanced BSR Control subfield
	+ When the QoS Control with the same TID as the Enhanced BSR Control subfield is present in the same MPDU, the QS subfield of the QoS Control is set to value 254
	+ TBD if the Enhanced BSR Control subfield shares the control ID with other Control subfield proposals in UHR
	+ Note: The baseline rules which regulate HT control field to be the same in all MPDUs of the same frame type in an A-MPDU do not change
	+ Note: Encoding of the baseline QS subfield in QoS Control does not change.
	+ Note: Length of the Enhanced BSR Control subfield allows to aggregate the UPH in the same A-Control subfield

**Reference Documents**

11-23/2007 Enhancement of BSR

11-24/0963 Enhancement of BSR follow-up

11-24/2022 PDT MAC BSR Enhancement

11-25/0298 PDT MAC BSR Enhancement Follow-up

**CC50 Comments**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 175 | Ke Zhong | 37.5 | 69.02 | Unclear meaning in sentence "When the queue size for a given TID is greater than canbe indicated in ..." | Add "that" between "than" and "can" in sentence "When the queue size for a given TID is greater than canbe indicated in ...", to make this sentence more understandable. | **Revised.**Agree with the comment in principle.Replace 'greater than can be' to 'greater than the largest value that can be'.*TGbn editor: please implement changes as shown in this document tagged 175.*  |
| 1537 | yajun CHENG | 37.5 | 69.02 | The word "that" is missing between "than" and "can". | As in comment. | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 2111 | Vishnu Ratnam | 37.5 | 69.04 | The current text reads: " When the queue size for a given TID is greater than can be indicated in the QoS Control field or in the BSR Control field, the UHR non-AP STA may deliver". Replace with " When the queue size for a given TID is greater than can be indicated in the QoS Control field or in the BSR Control field, the UHR non-AP STA with dot11UHRBSREImplemented set to true may deliver" | As in comment. | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 2582 | Minyoung Park | 37.5 | 69.02 | Replace '... is greater than can be ...' to '... is greater than the largest value that can be...' | As in the comment | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 2635 | Yue Qi | 37.5 | 69.02 | The sentense is not readable. "When the queue size for a given TID is greater than can be indicated... " | As in comment | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 2827 | Serhat Erkucuk | 37.5 | 69.02 | Grammatically incorrect: When the queue size for a given TID is greater than canbe indicated in the QoS Control field or in the BSR Control field, ... | As in the comment. The sentence should be revised. | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 3279 | Hanqing Lou | 37.5 | 69.02 | The sentence "when the queue size for a given TID is greater than can be indicated in the Qos..." seems incomplete. | Change to "when the queue size for a given TID is greater than the maximum value that can be indicated either in the Qos..." | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 3437 | Muhammad Kumail Haider | 37.5 | 69.02 | "When the queue size for a given TID is greater than can be indicated..." -> "When the queue size for a given TID is greater than what can be indicated..." | As in comment | **Revised**Agree with the comment in principle.The change has been implemented as the similar comment, CID 175.*TGbn editor: no change is needed to the comment.* |
| 195 | Chunyu Hu | 37.5 | 69.05 | In the "a BSR Enhancement field of a frame", "a" seems to hint there can be more such fields. | Change "a" to "the" BSR Enhancement field | **Revised**Agree with the comment in principle.*TGbn editor: please implement changes as shown in this document tagged 195.* |
| 1538 | yajun CHENG | 37.5 | 69.05 | The BSR Enhancement field should be defined in advance, for example, in subclause 9.4.1. | As in comment. | **Revised**Agree with the comment in principle.Based on Motion 257, EBSR Control field is added in the proposed draft texts. *TGbn editor: no change is needed to the comment.* |
| 1684 | Gaius Wee | 37.5 | 68.62 | dot11UHRBSREImplemented may not be understood easily | For "dot11UHRBSREImplemented", spell out "Enhancement" or define an abbreviation for BSRE | **Revised**Based on Motion 257, the name, Enhanced BSR (EBSR), is used to define a new Control field to indicate larger BSR size. EBSR and dot11UHREBSRImplemented should be clear to indicate the corresponding feature and operation in 11bn.*TGbn editor: no change is needed to the comment.* |
| 1685 | Gaius Wee | 37.5 | 69.01 | The relationship between the dot11 attribute and the non-AP STA is unclear | Insert a new paragraph before the behaviour description. "A UHR STA with dot11UHRBSREImplemented equal to true shall follow the rules defined below." | **Revised**Agree with the comment in principle.*TGbn editor: please implement changes as shown in this document tagged 1685.* |
| 2080 | Liangxiao Xin | 37.5 | 68.59 | can we use buffer status report enhancemnet to report buffer status of a SCS traffic stream? | same as comment | **Rejected**The comment is asking a question. It is not proposing a change that can in any sense be interpreted as “specific wording”. |
| 2581 | Minyoung Park | 37.5 | 68.61 | The BSR Enhancement Support field in the UHR Capabilities element' should be 'The BSR Enhancement Support field in the UHR MAC Capabilities Information field of the UHR Capabilities element.' Make similar changes throughout the subclause. | As in the comment | **Revised**Agree with the comment in principle.*TGbn editor: please implement changes as shown in this document tagged 2581.* |
| 2583 | Minyoung Park | 37.5 | 69.05 | Definition of the BSR Enhancement field is missing. | Define the BSR Enhancement field based on the passed motion in TGbn. | **Revised**Agree with the comment in principle.Based on Motion 257, EBSR Control field is added in the proposed texts. *TGbn editor: no change is needed to the comment.* |
| 2584 | Minyoung Park | 37.5 | 69.06 | Resolve TBD by defining the format of the BSR Enhancement field. | Please define the format of the BSR Enhancement field based on the passed motion below:Motion 257 (MAC)"Move to add to the TGbn SFD the following:Define an Enhanced BSR Control subfield in A-ctrl to report a larger per TID queue sizeThe Enhanced BSR Control subfield consists of at least a TID subfield and an unsigned value subfield to report the larger queue size (QS) of the TIDThe reported QS is equal to 2147328 Octets + the value reported in the Queue Size field of the defined Enhanced BSR Control subfieldWhen the QoS Control with the same TID as the Enhanced BSR Control subfield is present in the same MPDU, the QS subfield of the QoS Control is set to value 254TBD if the Enhanced BSR Control subfield shares the control ID with other Control subfield proposals in UHRNote: The baseline rules which regulate HT control field to be the same in all MPDUs of the same frame type in an A-MPDU do not changeNote: Encoding of the baseline QS subfield in QoS Control does not change.Note: Length of the Enhanced BSR Control subfield allows to aggregate the UPH in the same A-Control subfield" | **Revised**Agree with the comment in principle.Based on Motion 257, extra proposed draft texts are added in the proposed texts.*TGbn editor: no change is needed to the comment.* |
| 2585 | Minyoung Park | 37.5 | 69.10 | The BSR Enhancement Support field is in the UHR MAC Capabilities Information field.Please specify the field where the BSR Enhancement Support field is located. | As in the comment | **Revised**Agree with the comment in principle. The change has been implemented as the similar comment, CID 2581.*TGbn editor: no change is needed to the comment.* |
| 2636 | Yue Qi | 37.5 | 69.04 | of a frame is unclear. | Add "of the TBD frame" | **Revised**The frame is able to carry EBSR Control field is added in the proposed texts based on Motion 257 in this document.*TGbn editor: no change is needed to the comment.* |
| 2976 | Mark RISON | 37.5 | 69.04 | "so that the AP can allocate accurate resources to the non-AP STA" is already in the previous sentence | Delete the cited text | **Accepted** |
| 2637 | Yue Qi | 37.5 | 69.05 | accurate resource is unclear. What resources can be considered accurate? Does we need to reasoning AP's behavior? | propose to remove "so that the AP can allocate accurate resources to the non-AP STA" | **Revised.**UL MU resources are mentioned in the paragraph. Thus, the part the comment suggests to be removed is deleted as the comment CID 2976’s proposed change. *TGbn editor:* *no change is needed to the comment.* |
| 2638 | Yue Qi | 37.5 | 69.06 | The format of and the container for the BSR Enhancement field is TBD should be "are" | remove 'of', and change "is" to "are". | **Revised**The quoted sentence is deleted because more PDT are added to remove the TBD.*TGbn editor: no change is needed to the comment.* |
| 2975 | Mark RISON | 37.5 | 68.61 | "A UHR STA shall set the BSR Enhancement Support field in the UHR Capabilities element transmitted by the STA to 1 if dot11UHRBSREImplemented is true; otherwise, the UHR STA shall set the BSR Enhancement Support field to 0." is a bit weird and verbose | Change to "A UHR STA shall set the BSR Enhancement Support field in the UHR Capabilities element it transmits to 1 if dot11UHRBSREImplemented is true; otherwise, it shall set the it to 0." | **Rejected**Using “it” may cause ambiguity though the current texts could be verbose but are clear to the readers.  |
| 2977 | Mark RISON | 37.5 | 69.08 | "a frame with the BSR Enhancement field" should be "... with a ..." | As it says in the comment | **Revised**Agree with the comment in principle.*TGbn editor: please implement changes as shown in this document tagged 2977.* |
| 3165 | Yunbo Li | 37.5 | 69.08 | should clarify the AP is the associated AP | as in comment | **Revised**Agree with the comment in principle.*TGbn editor: please implement changes as shown in this document tagged 3165.* |
| 3577 | Malcolm Smith | 37.5 | 68.59 | Market experience with BSRP/BSR in conjunctinn with TUA (WiFi6) and TUA-O (WiFi7) indicates APs can strruggle in high-density-client (HDC) scenarios (e.g, 100s per BSS) to choose the best set of STA to serve in the next UL TB ODFMA PPDU as a) the STA may not be polled and/or triggered in time to meet the Delay bound or deadline of the flows associated with the TID or b) a STA with deadlines about to expire if not served imminently reports BSR response along with many other STA in the same AC/TID without dsuch a deadline. Unfortunately, BSR QSize does not meaningfully communicate this condition.and in some BSR schedulers, periodic flows are underserved since the QSize reported is often zero and thus treated as less important to poll in the future. | An indication of imminence/deadline (including a missed deadline) should be added to BSR Enhancement (or an appropriate element elsewhere in the BSR response) such that that AP can achieve the best QOS by selecting not only the UL MU respiurces but also the time order of the STA to serve that might lower tail latency for user TIDs or flows tha require it. | **Rejected**Based on Motion 257, EBSR Control field is added in this document and to transmit EBSR and UPH Control fields together in TB PPDU, there is no extra room to carry deadline information in EBSR. The commenter is encouraged to bring a proposal to carry BSR with deadline information to address the market experiences.  |
| 3648 | Alfred Asterjadhi | 37.5 | 69.01 | Since the BSRE format is still undefined there are several dependencies that are not clear. Please define the format and call out the explicit rules, solicited, unsolictred BSR and s on/ | As in comment. | **Revised**Agree with the comment in principle. Based on Motion 257, extra proposed draft texts are added, including rules and EBSR format.*TGbn editor: no change is needed to the comment.* |
| 3870 | Abhishek Patil | 37.5 | 68.62 | Fix typo in the MIB variable name. It doesn't match the one in Annex C. | As in comment | **Revised**Agree with the comment in principle.*TGbn editor: please implement changes as shown in this document tagged 3870.* |

**Proposed Draft Texts (PDT) and Comment Resolutions**

***TGbn editor: Please modify the following subclause 9.2.4.6.4 HE variant***

**9.2.4.6.4 HE variant
*Change Table 9-25 (Control ID subfield values) as follows:***

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

|  |  |  |  |
| --- | --- | --- | --- |
| **ControlID value**  | **Meaning** | **Length of theControlInformationsubfield (bits)** | **Content of the Control Informationsubfield** |
| **…** |  |  |  |
| 10 | Multi-link power management (MLPM) | TBD | See 9.2.4.7.12 (MLPM Control) |
| (M257)11 | Enhanced buffer status report (EBSR) | 14 | See 9.2.4.7.x (EBSR Control) |
| 12–14~~7–14~~ | Reserved |  |  |
| 15  | Ones need expansion surely (ONES)  | 26  | Set to all 1s |

***TGbn editor: Please add the following subclause 9.2.4.7.x EBSR Control after 9.2.4.7.12 MLPM Control***

**(M257) 9.2.4.7.x EBSR Control**

The Control Information field in an EBSR Control field contains buffer status information used for UL MU operation (see 26.5.2 (UL MU operation)) and enhanced BSR operation (see 37.4 (Enhanced BSR operation)) when the amount of buffered traffic of a given TID is larger than the amount that the QoS Control field ~~or the BSR Control field~~ can indicate.

The format of the EBSR Control field is shown in Figure 9-33xx (Control Information field format in an EBSR Control field).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  B0 B3 | B4 B11 | B12 B13 |
|  | TID | Queue Size Indicator  | Reserved |
| Bits: | 4 | 8 | 2 |

**Figure 9-33xx—Control Information field format in a EBSR Control field**

The TID field indicates the TID (see 9.2.4.5.2 (TID subfield)) for which the buffer status is reported.

The Queue Size Indicator field indicates the unscaled amount of buffered traffic for the TID identified in the TID field that is intended for the STA identified by the receiver address of the frame containing the EBSR Control field.

A queue size, QS, is the approximate total size, in octets, of all MSDUs and A-MSDUs buffered at the STA (including the MSDUs or A-MSDUs in the same PSDU as the frame containing the EBSR Control field) in the delivery queue used for MSDUs and A-MSDUs with a TID value equal to the value indicated in the TID field of this EBSR Control field.

NOTE 1—The queue 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.

A STA determines the amount of buffered traffic in octets from a received Queue Size Indicator field in an EBSR Control field as follows:

where QSI is the value indicated in the Queue Size Indicator field.

NOTE 3—Length design of the EBSR Control field is to allow an EBSR Control field to be aggregated with a UPH Control field in an A-Control subfield if the frame is carried in a TB PPDU.

***TGbn editor: Please change the subclause as follows:***

* UHR MAC Capabilities Information field

The format of the UHR MAC Capabilities Information field is defined in Figure9-aa5 (UHR MAC Capabilities Information field format). [TBD]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B4 | B5 | B6 Bx |
|  | DPS Support | DPS Assisting Support | Multi-Link Power Management | NPCA Supported | (M257) Enhanced BSR Support | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 3 |
| * UHR MAC Capabilities Information field format
 |

The subfields of the EHT MAC Capabilities Information field are defined in Table9-130a (Subfields of the UHR MAC Capabilities Information field).

|  |
| --- |
| * Subfields of the UHR MAC Capabilities Information field (continued)
 |
| Subfield | Definition | Encoding |
| … | … | … |
| (M257) Enhanced BSR Support | For an AP, indicates support for receiving a frame with an EBSR Control field. For a non-AP STA, indicates support for transmitting a frame with an EBSR Control field. | If the +HTC-HE Support subfield is 1:Set to 1 if supported.Set to 0 otherwise.Reserved if the +HTC-HE Support subfield is 0. |

***TGbn editor: Please change the subclause as follows:***

**10.8** **HT Control field operation**

**Table 10-12—Conditions for including Control subfield variants**

|  |  |
| --- | --- |
| **Control subfield variant** | **Condition** |
| … | … |
|  (M257) EBSR | The transmitting non-AP STA follows the corresponding enhanced buffer status report procedure, as described in 37.4 (Enhanced buffer status report operation) and the recipient AP has set the Enhanced BSR Support field in the UHR MAC Capabilities Information field in the UHR Capabilities elements it transmits to 1. |
| ONES | … |

***TGbn editor: Please change the subclause as follows:***

**37.4 Enhanced Buffer status report (M257) operation**

A UHR STA shall set the Enhanced BSR (M257)Support field in the UHR MAC Capabilities Information field of (#2581) the UHR Capabilities element transmitted by the STA to 1 if dot11UHREBSRImplemented is true; otherwise, the UHR STA shall set the Enhanced BSR (M257)Support field to 0.

A UHR STA with dot11UHREBSRImplemented equal to true shall follow the rules defined in 26.5.5 (Buffer status report operation) and the rules defined below. (#1685)

A UHR non-AP STA may provide buffer status reports defined in the EBSR Control field to assist its associated AP in allocating UL MU resources (see 26.5.5 Buffer status report operation). When the queue size for a given TID is greater than the largest value that(#175) can be indicated in the QoS Control field, the UHR non-AP STA may indicate the queue size in the(#195) EBSR Control(M257) field of a frame that is sent to the AP.(#2976) (M257)

A UHR non-AP STA shall not transmit a frame with an(#2977) EBSR Control (M257)field to its associated (#3165) AP unless the UHR non-AP STA has received from the AP a UHR Capabilities element with the Enhanced BSR (M257)Support field in the UHR MAC Capabilities Information field (#2581) equal to 1.

(M257)A UHR non-AP STA reports the buffer status in the EBSR Control field of a frame (see 10.8 (HT Control field operation)) transmitted to its associated AP (unsolicited EBSR) or in response to a BSRP Trigger frame addressed to the UHR non-AP STA with one or more QoS Null frames carrying the EBSR Control field (solicited EBSR) as defined in 10.8 (HT Control field operation), 26.5.5 (Buffer status report operation) and as defined below.

•For the TID indicated in the TID field of the EBSR Control field, the UHR non-AP STA shall indicate the queue size in the Queue Size Indicator field of the EBSR Control field; if the non-AP STA intends to indicate a queue size greater than 35 570 688 octets for that TID, then the non-AP STA shall set the value of the Queue Size Indicator field to 255.

•If there is a Queue Size subfield in a QoS Control field transmitted in the same MPDU or A-MPDU as an EBSR Control field, and the TID indicated in the TID subfield of the QoS Control field is the same as the TID indicated in the TID field of the EBSR Control field, the value of the Queue Size subfield of the QoS Control subfield with that TID shall be set to 254.

NOTE 1—A UHR non-AP STA can report the buffer status of one TID in the QoS Control subfield and of another TID in the EBSR Control field of the same MPDU.

***TGbn editor: Please change the subclause as follows:***

Annex C

(normative)

## ASN.1 encoding of the MAC and PHY MIB

### C.3 MIB Detail

…

dot11UHRStationConfigEntry OBJECT-TYPE

SYNTAX Dot11EHTStationConfigEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) in the dot11UHRStationConfig Table.

ifIndex - Each IEEE 802.11 interface is represented by an ifEntry. Interface

tables in this MIB module are indexed by ifIndex."

INDEX { ifIndex }

::= { dot11UHRStationConfigTable 1 }

Dot11UHRStationConfigEntry ::=

SEQUENCE {

dot11CoRTWTOptionImplemented TruthValue,

dot11NPCAOptionImplemented TruthValue,

dot11DUOOptionImplemented TruthValue,

(#3870)dot11UHREBSRImplemented TruthValue,

}

…

(#3870)dot11UHREBSRImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

""This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates the ability of the STA to support (M257)enhanced BSR operation. If the attribute is false, the STA does not support enhanced BSR operation."

::= { dot11EHTStationConfigEntry 4 }