IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CR for EHT TRS | | | | |
| Date: Apr. 13, 2021 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Jason Yuchen Guo | Huawei |  |  | guoyuchen@huawei.com |
| Ming Gan | Huawei |  |  |  |
| Yunbo Li | Huawei |  |  |  |
| Guogang Huang | Huawei |  |  |  |
| Yiqing Li | Huawei |  |  |  |
| Ross Jian Yu | Huawei |  |  |  |
| Mengshi Hu | Huawei |  |  |  |
| Mengyao Ma | Huawei |  |  |  |
| Hongjia Su | Huawei |  |  |  |
| Jianhui Li | Huawei |  |  |  |
| Edward Au | Huawei |  |  |  |
| Stephen McCann | Huawei |  |  |  |
| Alfred Asterjadhi | Qualcomm |  |  |  |

Abstract

This submission proposes resolutions for following CIDs received for TGbe CC34:

1650, 2003, 2012

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Remove some TBDs in the PHY clause related with EHT TRS
* Rev 2: Add a new capability bit for EHT TRS
* Rev 3: Further clarify the setting of the RU\_ALLOCATION parameter

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.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 1650 | Geonjung Ko | 146.47 | 35.4.1.1 | It is unclear that TRS Control subfield here is the same with the TRS Control subfield defined in 11ax.  TRS Control subfield was designed to solicit HE TB PPDU in 11ax. | Need a clarification whether the TRS Control subfield that solicits EHT TB PPDU uses the Control ID 0 or not. | Revised.  The TRS Control subfield is extended to support EHT TB PPDU.  TGbe editor: Please implement changes as shown in this document. |
| 2003 | JINYOUNG CHUN | 51.29 | 9.2.4.6a | We need to update TRS Control subfield for EHT because the contents in TRS Control (9.2.4.6a.1) are not fit to 11be system such as Enhanced Trigger frame. | Let's make TRS Control subfield for EHT | Revised.  The TRS Control subfield is extended to support EHT TB PPDU.  TGbe editor: Please implement changes as shown in this document. |
| 2012 | JINYOUNG CHUN | 146.49 | 35.4.1.1 | There's no description about TRS Control subfield in D0.3. And we need to update TRS Control subfield for EHT because the contents in TRS Control (9.2.4.6a.1) are not fit to 11be system such as Enhanced Trigger frame. | Let's make TRS Control subfield for EHT and then fill the section | Revised.  The TRS Control subfield is extended to support EHT TB PPDU.  TGbe editor: Please implement changes as shown in this document. |

Discussion 1: Does EHT TRS need a new control ID?

Since most contents in HE TRS and EHT TRS are the same, the only difference is that the EHT TRS needs to support 320MHz. We propose to use the same TRS control subfield to serve as HE TRS control and EHT TRS control at the same time.

Discussion 2: How to differentiate EHT TRS control subfield and HE TRS control subfield?

In 11ax, only HE PPDU carries TRS control subfield to solicit HE TB PPDU. In 11be, only EHT MU PPDU carries a TRS control subfield to solicit an EHT TB PPDU. Hence, we can use the PPDU format of the soliciting PPDU to determine whether the TRS control subfield is soliciting an HE TB PPDU or an EHT TB PPDU. If the soliciting PPDU is an EHT MU PPDU, then the solicited response frame is an EHT TB PPDU, otherwise, the solicited response frame is an HE TB PPDU.

In the case of EHT TB PPDU, the RU Allocation subfield in the TRS control subfield corresponds to the same 160MHz as the RU that carries the TRS control subfield, for the sake of simplicity.

The proposed text is based on the above discussions.

***TGbe editor: Please note baselines are REVmd D5.0, 11ax D8.0 and 11be D0.4***

***TGbe editor: Please update the subclause as shown below***

**26.5.2.3.4 TXVECTOR parameters for HE TB PPDU response to TRS Control subfield**

A non-AP STA transmitting an HE TB PPDU in response to a frame containing a TRS Control subfield shall set the TXVECTOR parameters as follows:

— The FORMAT parameter is set to HE\_TB if the RXVECTOR parameter FORMAT of the PPDU carrying the frame with the TRS Control subfield is HE\_MU, HE\_SU, or HE\_ER\_SU

**35.4.2 UL MU operation**

**35.4.2.3** Non-AP STA behavior for UL MU operation

**35.4.2.3.2 TXVECTOR parameters for EHT TB PPDU response to TRS Control subfield**

A non-AP STA transmitting an EHT TB PPDU in response to a frame containing a TRS Control subfield shall set the TXVECTOR parameters as follows:

— The FORMAT parameter is set to EHT\_TB if the RXVECTOR parameter FORMAT of the PPDU carrying the frame with the TRS Control subfield is EHT\_MU

— The TRIGGER\_METHOD parameter is set to TRS

— The L\_LENGTH parameter is computed as described in Equation (27-11) using the TXTIME value, where m is equal to 2. The TXTIME is defined by Equation (36-97) where NSYM is set to FVAL + 1, where FVAL is the value of the UL Data Symbols subfield of the TRS Control subfield.

— The RU\_ALLOCATION parameter is set to the value of the RU Allocation subfield of the TRS Control subfield. The RU location is specified by the RU\_ALLOCATION parameter and a PS160 bit which is determined based on the RU allocation of the EHT MU PPDU carrying the TRS control subfield.

— The MCS parameter is set to the value of the UL MCS subfield of the TRS Control subfield.

— The CH\_BANDWITDTH parameter is set to the value of the RXVECTOR parameter CH\_BANDWIDTH of the soliciting DL EHT PPDU (see Table 36-1 (TXVECTOR and RXVECTOR parameters))

— The BSS\_COLOR parameter is set to the values of the RXVECTOR parameter BSS\_COLOR of the soliciting DL EHT PPDU

— The NUM\_EHT\_LTF parameter is set to 1

— The STARTING\_STS\_NUM parameter is set to 0

— The NUM\_STS parameter is set to 1

— The FEC\_CODING parameter is set to BCC\_CODING if the RU Allocation subfield indicates an RU or MRU that is smaller than a 484-tone RU; otherwise set to LDPC\_CODING

— The LDPC\_EXTRA\_SYMBOL parameter is set to 0 if the RU Allocation subfield indicates an RU or MRU that is smaller than a 484-tone RU; otherwise set to 1

— The SPATIAL\_REUSE parameter is set to PSR\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED

— The TXOP\_DURATION parameter is set as defined in 26.11.5 (TXOP\_DURATION)

— If the RXVECTOR parameters EHT\_LTF\_TYPE and GI\_TYPE of EHT MU PPDU carrying the frame with the TRS Control subfield are either 4xEHT-LTF and 3u2s\_GI, respectively, or 2xEHT-LTF and 1u6s\_GI, respectively, then the EHT\_LTF\_TYPE and GI\_TYPE parameters are set to 4xEHT-LTF and 3u2s\_GI, respectively. Otherwise, the EHT\_LTF\_TYPE and GI\_TYPE parameters are set to 2xEHT-LTF and 1u6s\_GI, respectively.

— The TXPWR\_LEVEL\_INDEX parameter is set to a value based on the computed transmission power (see 27.3.15.2 (Power pre-correction)) for an EHT TB PPDU and the value of the AP Tx Power subfield of the TRS Control subfield and the UL Target Receive Power subfield of the TRS Control subfield.

NOTE—A non-AP STA transmitting an EHT TB PPDU in response to a frame carrying a TRS Control subfield considers that both the physical CS and the virtual CS are set to 0 (see 26.5.2.5 (UL MU CS mechanism)).

* Ack Policy Indicator subfield

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * Ack policy | | | | |
| Ack policy | Bits in QoS Control field | | Other conditions | Meaning |
| Bit 5 | Bit 6 |
| No Explicit Acknowledgment | 0 | 1 | Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is equal to 1 and the frame is not carried in an HE MU PPDU, HE SU PPDU or HE ER SU PPDU or EHT MU PPDU that contains a frame that solicits a response in an HE TB PPDU or EHT TB PPDU | There might be a response frame to the frame that is received, but it is neither the Ack frame nor any Data frame of subtype +CF-Ack.  This ack policy is used for QoS CF-Poll and QoS CF-Ack +CF-Poll Data frames.  NOTE—Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) indicates the absence of a Frame Body field in a QoS Data frame. ~~When~~ If equal to 1, the QoS Data frame contains no Frame Body field, and any response is generated in response to a QoS CF-Poll or QoS CF-Ack +CF-Poll frame, but does not signify an acknowledgment of data. |
| PSMP Ack | 0 | 1 | Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is equal to 0 and the frame is not carried in an HE MU PPDU, HE SU PPDU or HE ER SU PPDU or EHT MU PPDU that contains a frame that solicits a response in an HE TB PPDU or EHT TB PPDU | The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP downlink transmission time (PSMP-DTT) is to be received in a later PSMP uplink transmission time (PSMP-UTT).  The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP-UTT is to be received in a later PSMP-DTT.  See 10.31.2.7 (PSMP acknowledgment rules). |
| TP Ack(#24057) | 0 | 1 | The frame is carried in an HE MU PPDU, HE SU PPDU or HE ER SU PPDU or EHT MU PPDU that contains a frame that solicits a response in an HE TB PPDU or EHT TB PPDU | The addressed recipient returns an Ack, Compressed BlockAck, or Multi-STA BlockAck frame carried in an HE TB PPDU or EHT TB PPDU a SIFS after the PPDU, subject to reception of a Trigger frame or TRS Control subfield in the PPDU, as defined in 10.3.2.13.2 (Acknowledgment procedure for DL MU PPDU in MU format), 26.5.2 (UL MU operation), and 35.5.2 (UL MU operation). |

* Control subfield variants of an A-Control subfield
* TRS Control

The Control Information subfield in a TRS Control subfield contains triggered response scheduling (TRS) information for soliciting an HE TB PPDU that follows an HE MU PPDU, HE SU PPDU or HE ER SU PPDU carrying the Control subfield (see 26.5.2.2 (Rules for soliciting UL MU frames)) or for soliciting an EHT TB PPDU that follows an EHT MU PPDU carrying the Control subfield (see 35.4.2.2 (Rules for soliciting UL MU frames). See 26.5.2.4 (A-MPDU contents in an HE TB PPDU) for details on allowed content in an A-MPDU carried in an HE TB PPDU and in an EHT TB PPDU. The format of the subfield is shown in Figure 9-22a (Control Information subfield format in a TRS Control subfield).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0            B4 | B5             B12 | B13          B17 | B18                  B22 | B23      B24 | B25 |
|  | UL Data Symbols | RU Allocation | AP Tx Power | UL Target Receive Power(#24417) | UL MCS | Reserved |
| Bits: | 5 | 8 | 5 | 5 | 2 | 1 |
| * Control Information subfield format in a TRS Control subfield | | | | | | |

NOTE—A TRS Control subfield is not included in a PPDU that is not an HE PPDU or an EHT PPDU.(#24425)

The UL Data Symbols subfield indicates the number of OFDM symbols in the Data field of the HE TB PPDU response or EHT TB PPDU response and is set to the number of OFDM symbols minus 1.

The RU Allocation subfield indicates the resource unit (RU) assigned for transmitting the HE TB PPDU response or EHT TB PPDU response and the encoding is defined in 9.3.1.22.1 (General).

The UL Target Receive Power subfield indicates the expected receive signal power, measured at the AP's antenna connector and averaged over the antennas, for the HE portion of the HE TB PPDU or the EHT portion of the EHT TB PPDU transmitted on the assigned RU as defined in Table 9-24a (UL Target Receive Power subfield in TRS Control field).

|  |  |
| --- | --- |
| * UL Target Receive Power subfield in TRS Control field | |
| UL Target Receive Power subfield | Description |
| 0–30 | The expected receive signal power, in units of dBm, is *Targetpwr* = –90 + 2 × *Fval*, where *Fval* is the subfield value |
| 31 | The STA transmits the TB PPDU at the STA’s maximum transmit power for the assigned UL MCS.  NOTE—The expected receive signal power is then the STA's maximum transmit power for the assigned UL MCS minus the path loss. |

NOTE—It is possible that a STA is unable to transmit the TB PPDU at a transmit power that will meet the expected receive signal power due to its hardware or regulatory limitation (see 27.3.15.2 (Power pre-correction) for an HE TB PPDU and 36.3.16.2 (Power pre-correction) for an EHT TB PPDU).

The UL MCS subfield indicates the MCS, in the range MCS 0 to 3, to be used by the receiving STA for the HE TB PPDU or EHT TB PPDU is set to the HE-MCS index (see 27.5 (Parameters for HE-MCSs)) or the EHT-MCS index (see 36.4 (Parameters for EHT-MCSs)).

* EHT MAC Capabilities Information field(#1126)

The format of the EHT MAC Capabilities Information field is defined in Figure 9-788em (EHT MAC Capabilities Information field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 | | B1 | B2 | B3 | B4 B15 |
|  | NSEP Priority Access Supported | | EHT OM Control Support | Triggered TXOP Sharing Support | EHT TRS Support | Reserved |
| Bits: | 1 | | 1 | 1 | 1 | 12 |
|  | | * EHT MAC Capabilities Information field format | | | | |

The subfields of the EHT MAC Capabilities Information field are defined in Table 9-322ao (Subfields of the EHT MAC Capabilities Information field).

|  |  |  |
| --- | --- | --- |
| * Subfields of the EHT MAC Capabilities Information field | | |
| Subfield | Definition | Encoding |
| NSEP Priority Access Supported | Indicates support for NSEP priority access. | Set to 1 if dot11EHTNSEPPriorityAccessActivated is true (see 35.13 (NSEP priority access)).  Set to 0 otherwise. |
| EHT OM Control Support | Indicates support for receiving a frame with an EHT OM Control subfield. | If the +HTC-HE Support subfield is 1 in a STA:  Set to 1 if the STA supports reception of the EHT OM Control subfield.  Set to 0 otherwise.  Reserved if the +HTC-HE Support subfield is 0 in a STA. |
| Triggered TXOP Sharing Support | Indicates support for transmitting or responding to a TXOP sharing trigger frame that does not solicit TB PPDU. | The Neighbor AP TBTT Offset subfield and the BSS Parameters  Set to the maximum number of spatial streams that the STA is capable of receiving in an EHT sounding NDP minus 1. The minimum value of this field is 3.  Set to 0 otherwise.  For an non-AP EHT STA:  Set to 1 to indicate that the non-AP STA is capable of responding to a modified MU-RTS frame that allocates time to a STA to transmit non-TB PPDUs (see 35.2.1.3 (Triggered TXOP sharing procedure)).  Set to 0 otherwise. |
| EHT TRS Support | For a non-AP STA, indicates support for transmitting EHT TB PPDU after receiving a frame with a TRS Control subfield. | For a non-AP STA that has set the +HTC-HE Support subfield to 1: Set to 1 if the STA supports transmitting EHT TB PPDU after receiving a frame with a TRS Control subfield. Set to 0 otherwise.  Reserved for an AP or if the +HTC-HE Support subfield is 0. |

* HT Control field operation

|  |  |
| --- | --- |
| * Conditions for including Control subfield variants | |
| Control subfield variant | Condition |
| TRS | The transmitting AP expects an HE TB PPDU that follows the TRS information as described in 26.5.2.2 (Rules for soliciting UL MU frames) and the recipient non-AP STA has set the TRS Support subfield in the HE MAC Capabilities Information field in(#Ed) the HE Capabilities elements it transmits to 1.  The transmitting AP expects an EHT TB PPDU that follows the TRS information as described in 35.4.2.2 (Rules for soliciting UL MU frames) and the recipient non-AP STA has set the EHT TRS Support subfield in the EHT MAC Capabilities Information field in(#Ed) the EHT Capabilities elements it transmits to 1. (#24161) |

**35.4.2 UL MU operation**

**35.4.2.1 General**

***TGbe editor: Please add the following paragraph at the end of this subclause***

A non-AP EHT STA shall set the EHT TRS Support subfield in the EHT Capabilities element it transmits to 1 if its  
dot11EHTTRSOptionImplemented is true; otherwise the STA shall set it to 0.

**35.4.2.2 Rules for soliciting UL MU frames**

**35.4.2.2.1 Allowed settings of the Trigger frame fields and TRS Control subfield**

***TGbe editor: Please add the following paragraph at the end of this subclause***

An AP shall not send a frame that carries a TRS Control subfield that solicits an EHT TB PPDU to a non-AP STA that has not set the EHT TRS Support subfield to 1 in the EHT MAC Capabilities Information field in the EHT Capabilities element it transmits.

**36.3.13.3 Coding**

**36.3.13.3.1 General**

The Data field shall be encoded using either BCC defined in 36.3.13.3.2 (BCC coding) or the LDPC code defined in 36.3.13.3.3 (LDPC coding). For an EHT MU PPDU, the coding type is selected by the Coding subfield in the User field of EHT-SIG, as defined in 36.3.12.8 (EHT-SIG). For an EHT TB PPDU, the coding type is selected by the UL FEC Coding Type subfield in User Info field in the soliciting Trigger frame, or the RU size indicated in RU Allocation subfield in the soliciting frame carrying a TRS Control subfield, as defined in 9.3.1.22 (Trigger frame format) and 35.4.2.3.1 (TXVECTOR parameters for EHT TB PPDU response to TRS Control subfield), respectively. (#2642)The coding type can be either BCC or LDPC if the size of the RU or MRU assigned to the STA is less than or equal to 242 tones, otherwise it shall be LDPC.

* Encoding process for an EHT TB PPDU

For an EHT TB PPDU with LDPC encoding, follow the EHT MU padding and encoding process as described in 36.3.13.3.5 (Encoding process for an EHT MU PPDU) with initial parameters as follows:

* If the TXVECTOR parameter TRIGGER\_METHOD is TRIGGER\_FRAME and the LDPC Extra Symbol Segment field in the Trigger frame is 1, set the initial parameter using Equation (36-66).

 (36-66)

Then continue with the LDPC encoding process as in 36.3.13.3.5 (Encoding process for an EHT MU PPDU), during which  is always incremented as in Equation (36-55), and  is always recomputed as in Equation (36-56).

* If the TXVECTOR parameter TRIGGER\_METHOD is TRIGGER\_FRAME and the LDPC Extra Symbol Segment field in the Trigger frame is 0, set initial parameters to  and . Then continue with the LDPC encoding process as in 36.3.13.3.5 (Encoding process for an EHT MU PPDU), during which  and  are not changed.
* If the TXVECTOR parameter TRIGGER\_METHOD is TRS, then the parameter LDPC\_EXTRA\_SYMBOL is 1, and initial parameters are set to  and , where  is the value of the UL Data Symbols subfield of the TRS Control subfield. Then continue with the LDPC encoding process as in 36.3.13.3.5 (Encoding process for an EHT MU PPDU), during which  is always incremented as in Equation (36-55), and  is always recomputed as in Equation (36-56).
* Packet extension

If transmitting an EHT TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRIG-GER\_FRAME, each transmitter of an EHT TB PPDU shall append a PE field with a duration  calculated using Equation (36-88) except for an EHT TB feedback NDP, which has  (TBD). [#653r1]

If transmitting an EHT TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRS, each transmitter of the EHT TB PPDU shall append a PE field with the duration equal to the value specified in the TXVECTOR parameter DEFAULT\_PE\_DURATION.

**36.3.16.2 Power pre-correction**

A STA transmits an EHT TB PPDU at the STA’s maximum transmit power for the assigned EHT-MCS if the UL Target Receive Power subfield of the User Info field in the Trigger frame that solicits the EHT TB PPDU or the UL Target Receive Power subfield of the TRS Control field of the frame that solicits a response in an EHT TB PPDU indicates that the maximum transmit power is needed.

is the expected receive signal power indicated in the UL Target Receive Power subfield in the User Info field in the Trigger frame or the UL Target Receive Power subfield in the TRS Control field.

…

 is the AP’s transmit power, in units of dBm/20 MHz, as indicated by the AP Tx Power subfield of the Common Info field in the Trigger frame, the encoding of which is specified in 9.3.1.22 (Trigger frame format), or the AP Tx Power subfield of the TRS Control field, the encoding of which is specified in 9.2.4.6a.1 (TRS Control).

…

A STA includes its UL power headroom in the EHT TB PPDU following the rules defined in 35.4.2.3 (Non-AP STA behavior for UL MU operation).

**Straw Poll: Do you support to incorporate the proposed draft text in this document 11-21/0663r3 to the next revision of TGbe draft?**

**Result: Yes/No/Abstain**