### IEEE P802.11 Wireless LANs

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| Proposed Draft Specification for leftover TBDs | | | | |
| Date: 2021-04-02 | | | | |
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Abstract

This document keeps track of the TBDs in P802.11be D0.4.

Revisions:

* Rev 0: Initial version of the document. Contains all TBDs in D0.4, accounting for documents pending motions (highlighted in green) and those scheduled for discussion in any of the queues (highlighted in yellow). PHY subclauses are yet to be completed. Pending availability of the RTF files. Same for Annex B. Document will be updated to account for ongoing progress.
* Rev 1: Updated with PHY subclauses, and Annex B. Included 5 Fixes (can be found by searching THIS-FIX that should be straightforward). Added expected POCs for subclauses that have not had a contribution so far to solve the TBD (POC is my best guess so please double check and let me know if I misclassified). And PHY is still missing some of the POCs (search for ??). Everytime all documents for a given subclause have either been approved (motioned) or R4Med then the subclause is classified as **DONE**.

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 subsequent 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.***

**Discussion:**

**Propose:**

## MAC

### 3.2 Definitions specific to IEEE 802.11 – 1 TBD [1-None] *POC: Minyoung*

single link/radio non-access-point (non-AP) multi-link device (MLD): A non-AP MLD that supports operation on more than one link but receives or transmits frames only on one link at a time.

Editor’s Note: Per the authors of 20/1291r12, the name of the definition “single link/radio non-AP MLD” is TBD.

### **6.5 PLME SAP interface – Placeholder POC: Edward**

Editor’s Note: It is a placeholder subclause.

### 9.3.1.2 RTS frame format – 1 TBD *[1-494r5]* POC: Kaiying

***Change the third paragraph as follows:***

The TA field is the address of the STA transmitting the RTS frame or the bandwidth signaling TA of the STA transmitting the RTS frame. In an RTS frame transmitted by a VHT STA or an HE STA or an EHT STA in a non-HT or non-HT duplicate format to another VHT STA or HE STA or an EHT STA, the scrambling sequence carries the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT (see 10.3.2.7 (VHT and SIG RTS procedure)) and the TA field is a bandwidth signaling TA. In an RTS frame transmitted by an EHT STA in a non-HT duplicate format with bandwidth greater than 160 MHz to another EHT STA, the TBD field in the SERVICE field carriers the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT as in Table 36-1 (TXVECTOR and RXVECTOR parameters)and the TA field is a bandwidth signaling TA.*[494r5]*

### 9.3.1.5 PS-Poll frame format – 1 TBD *[1-494r5]* POC: Kaiying

**9.3.1.5.1 General**

***Change the second paragraph as follows:***

The BSSID (RA) field is set to the address of the STA contained in the AP. The TA field value is the address of the STA transmitting the frame or a bandwidth signaling TA. In a PS-Poll frame transmitted by a VHT STA or an HE STA or an EHT STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT, the TA field value is a bandwidth signaling TA. In a PS-Poll frame transmitted by an EHT STA in a non-HT duplicate format with bandwidth greater than 160 MHz to another EHT STA, the TBD field in the SERVICE field carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT as in Table 36-1 (TXVECTOR and RXVECTOR parameters) and the TA field value is a bandwidth signaling TA. *[494r5]*

### 9.3.1.6 CF-End frame format – 1 TBD *[1-494r5]* POC: Kaiying

***Change the last paragraph as follows:***

If transmitted by a non-DMG STA, the BSSID (TA) field is the address of the STA contained in the AP except that the Individual/Group bit of the BSSID (TA) field is set to 1 in a CF-End frame transmitted by a VHT STA to a VHT AP or an HE STA or an EHT STA to an EHT AP to an HE AP in a non-HT or non-HT duplicate format to indicate that the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT. If transmitted by a DMG STA, the TA field is the MAC address of the STA transmitting the frame. In a CF-End frame transmitted by an EHT STA in a non-HT duplicate format with bandwidth greater than 160 MHz, the TBD field in the SERVICE field carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT as in Table 36-1 (TXVECTOR and RXVECTOR parameters) and the TA field value is a bandwidth signaling TA.*[494r5]*

### 9.3.1.7 BlockAckReq frame format – 1 TBD *[1-494r5]* POC: Kaiying

**9.3.1.7.1 Overview**

***Change the fourth paragraph as follows:***

The TA field value is the address of the STA transmitting the BlockAckReq frame or a bandwidth signaling TA. In a BlockAckReq frame transmitted by a VHT STA or an HE STA or an EHT STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT, the TA field value is a bandwidth signaling TA. In a BlockAckReq frame transmitted by an EHT STA in a non-HT duplicate format with bandwidth greater than 160 MHz, the TBD field in the SERVICE field carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT as in Table 36-1 (TXVECTOR and RXVECTOR parameters) and the TA field value is a bandwidth signaling TA.*[494r5]*

### 9.3.1.19 VHT/HE/EHT NDP Announcement frame format – 1 TBD *[1-494r5]* POC: Kaiying

**…**

The TA field is set to the address of the STA transmitting the VHT/HE/EHT NDP Announcement frame or the bandwidth signaling TA of the STA transmitting the VHT/HE/EHT NDP Announcement frame. In a VHT/HE/EHT NDP Announcement frame transmitted by a VHT, ~~or~~ HE or EHT STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT, the TA field is set to a bandwidth signaling TA. In an EHT NDP Announcement frame transmitted by an EHT STA in a non-HT duplicate format with bandwidth greater than 160 MHz, the TBD field in the SERVICE field carries the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT as in Table 36-1 (TXVECTOR and RXVECTOR parameters) and the TA field value is a bandwidth signaling TA.*[494r5]*

### 9.3.1.22.1.2 User Info List field – 1 TBD [1-490r0]-DONE

***…***

***Insert the following paragraphs as the second and third paragraphs of this second child subclause:***

All User Info fields in the User Info List field of a Trigger frame have the same length unless the Trigger frame is an MU BAR Trigger frame (see 9.3.1.22.4 (MU-BAR Trigger frame format) and 9.3.1.22.1.3 (Special User Info field)).

A User Info field that is addressed to a non-AP STA is either an HE variant or EHT variant. The User Info field is an EHT variant if it is addressed to an EHT non-AP STA and a Special User Info field is present in the Trigger frame (see 9.3.1.22.1.3 (Special User Info field)); otherwise it is an HE variant (TBD).*[ 490r0]*

### 9.3.1.22.1.3 Special User Info field – 2 TBD [2-490r0]-DONE

***Insert the following paragraphs as follows***

If the Special User Info field is included in the Trigger frame, then the Special User Info field present subfield of the EHT variant of the Common Info Field is set to 0, otherwise it is set to 1.

The Special User Info field is identified by an AID12 value of 2007 and is optionally present in a Trigger frame that is generated by an EHT AP.

NOTE 1—An EHT AP does not use the value 2007 as an AID for any STA associated to it (see 35.4.2 (UL MU operation)).

NOTE 2— The length of the Special User Info field is equal to the length of the other User Info fields present in the same Trigger frame, except when the Trigger frame is an MU-BAR Trigger frame, since the lengths of the User Info fields in the MU-BAR are not necessarily the same.

The Special User Info field, if present, is located immediately after the Common Info field of the Trigger frame and carries the nonderived subfields of the U-SIG field of a solicited EHT TB PPDU, and the Special User Info Field Present subfield of the Common Info Field is set to 0.

If HE/EHT P160 subfield of the Common Info field is set to 0 then a User Info field addressed to an EHT STA is an EHT variant User Info field (TBD). *[ 490r0]* The addressed EHT STA responds to the Trigger frame with an EHT TB PPDU as defined in 35.4.2 (UL MU operation), except for an MU-RTS in which case the EHT STA responds to the Trigger frame with a non-HT duplicate PPDU.

If HE/EHT P160 subfield of the Common Info field is set to 1 then a User Info field addressed to an EHT STA is an HE variant User Info field (TBD). *[ 490r0]* The addressed EHT STA responds to the Trigger frame with an HE TB PPDU as defined in 26.5.2 (UL MU operation), except for an MU-RTS in which case the EHT STA responds to the Trigger frame with a non-HT duplicate PPDU.

### 9.3.1.22.5 MU-RTS Trigger frame format – 3 TBD *[3-268r0]* POC: Dibakar

***Insert the following paragraphs after the third paragraph (“The UL Length, GI And HE-LTF Type, MU-MIMO HE-LTF Mode, ...”):***

The GI And HE-LTF Mode subfield in the Common Info field is set to a TBD nonzero***[268r0]*** value to signal an MU-RTS Trigger frame by an EHT AP that allocates time within an obtained TXOP to an EHT non-AP STA for transmitting one or more non-TB PPDUs sequentially (see 35.2.1.3 (Triggered TXOP sharing procedure)); an EHT AP sets it to 0 otherwise.

An MU-RTS Trigger frame with the GI And HE-LTF Mode subfield set to TBD nonzero***[268r0]*** value is called an MU-RTS TXOP Sharing (TXS) Trigger frame for the remainder of this subclause and Clause 35 (Extremely high throughput (EHT) MAC specification).

A TBD subfield***[268r0]*** in the MU-RTS TXS Trigger frame indicates the time duration allocated to the non-AP STA within the TXOP obtained by the AP.

### 9.3.3.2 Beacon frame format – 1 TBD *[1-254r0]* POC: Abhishek

***Insert a new row to Table 9-32 (Beacon frame body(#1004)(#2246)(#3352)):***.

|  |  |  |
| --- | --- | --- |
| * Beacon frame body(#1004)(#2246)(#3352) | | |
| Order | Information | Notes |
| <ANA> | Multi-Link | The Basic variant Multi-Link element is TBD ***[254r0]***present if the AP is affiliated with an AP MLD. Otherwise it is not present. |
| <ANA> | EHT Capabilities | The EHT Capabilities element is present if dot11EHTOptionImplemented is true; otherwise it is not present. |
| <ANA> | EHT Operation | The EHT Operation element is present if dot11EHTOptionImplemented is true; otherwise it is not present. |

### 9.4.1.67a EHT MIMO Control field – 1 TBD [1-THIS-FIX 1] POC: Wook Bong

The EHT MIMO Control field is defined in Figure 9-144b (EHT MIMO Control field format).

***DISCUSSION FOR TBD-FIX 1: Size and encoding of the partial BW Info was finalized in 272r3. Propose to remove leftover TBD below since there is nothing TBD.***

***TGbe editor: Please change figure below as follows [#Fix 1]:***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 B7 | B8 B10 | B11 | B12 B13 | B14 B16 |
|  | Nc Index | Nr Index | BW | Grouping | Feedback Type | Reserved |
| Bits: | 4 | 4 | 3 | 1 | 2 | 3 |
|  | B17 B19 | B20 | B21 B29 | B30 B35 | B36 | B37 B39 |
|  | Remaining Feedback Segments | First Feedback Segment | Partial BW Info*[#Fix 1]* | Sounding Dialog Token Number | Codebook Information | Reserved |
| Bits: | 3 | 1 | 9 | 6 | 1 | 3 |
| **Figure 9-144b EHT MIMO Control field format** | | | | | | |

### 9.4.1.67d EHT CQI Report field –1 TBD [1-272r3]-DONE

…

 is the number of RU indices for which the CQI report is sent back to the beamformer.  is based on the number of 26-tone RU indicated in the Partial BW Info subfield of the EHT MIMO Control field (TBD).*[272r3]* The 26-tone RU subcarrier indices for 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 320 MHz are defined in Table 27-7 (Data and pilot subcarrier indices for RUs in a 20 MHz HE PPDU and in a non-OFDMA 20 MHz HE PPDU), Table 27-8 (Data and pilot subcarrier indices for RUs in a 40 MHz HE PPDU and in a non-OFDMA 40 MHz HE PPDU), Table 36-5 (Data and pilot subcarrier indices for RUs in an 80 MHz EHT PPDU), Table 36-6 (Data and pilot subcarrier indices for RUs in a 160 MHz EHT PPDU), and Table 36-7 (Data and pilot subcarrier indices for RUs in a 320 MHz EHT PPDU), respectively.

### 9.4.2.295a EHT Operation element – 3 TBD [3-None] *POC: Guogang*

…

The format of the EHT Operation element is shown in Figure 9-788ee (EHT Operation element format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EHT Operation Information |
| Octets: | 1 | 1 | 1 | TBD |
| * EHT Operation element format | | | | |

…

The EHT STA obtains the channel configuration information from the EHT Operation element if operating in the 6 GHz band. The subfields of EHT Operation Information field are defined in Table 9-322al (EHT Operation Information subfields).

|  |  |  |
| --- | --- | --- |
| * EHT Operation Information subfields | | |
| Subfield | Definition | Encoding |
| Channel Width | This field defines the EHT BSS bandwidth. | Set to 0 for 20 MHz EHT BSS bandwidth.  Set to 1 for 40 MHz EHT BSS bandwidth.  Set to 2 for 80 MHz EHT BSS bandwidth.  Set to 3 for 160 MHz EHT BSS bandwidth.  Set to 4 for 320 MHz EHT BSS bandwidth.  Other values are reserved. |
| CCFS | TBD | TBD |

### 9.4.2.295b Multi-Link element – 6 TBD *[3-397r7, 3-THIS-FIX 2]* POC: Rojan

**9.4.2.295b.1 General**

The format of the Multi-Link Control field is defined in Figure 9-788eg (Multi-Link Control field).

***DISCUSSION FOR TBD-FIX 2: Figure below is based on D0.4 and 397r7. In the D0.4 several field locations were as TBD due to the dependency on the Type subfield size. Then 397r7 removes the TBDs and created dependency on the incognita x. Subsequently 319r3 is adding another bit to indicate presence of EML Capabilities field. Proposal in this fix is to set the Type field size to 3 bits (currently 2 types are defined and another 6 possible values are more than enough for any other future variants).***

***TGbe editor: Please change figure below as follows (noting that if x is present in the figure, as a result of 397r7, then simply replace x with 3 and add appropriately this value to all remaining bit locations) [#Fix 2]:***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 B2 | B3 | B4 (for 319r3) | B5 (for 397r7) | B6 (for 397r7) | B7 B15 |
|  | Type | MLD MAC Address Present | ELM Capabilities Present | Link ID Info Present | Change Sequence Present | Reserved |
| Bits: | 3 | 1 | 1 | 1 | 1 | 9 |
| * Multi-Link Control field*[397r7, 319r3, #Fix 2]* | | | | | | |

The Type subfield is defined in Table 9-322am (Type subfield encoding) and is used to differentiate the various variants of the Multi-Link element. Different variants of the Multi-Link element are used for different multi-link operations.

***TGbe editor: Please change table below as follows [#Fix 2]:***

|  |  |
| --- | --- |
| * Type subfield encoding | |
| Type subfield value | Multi-Link element variant name |
| 0 | Basic |
| 1 | Probe Request |
| 2-7 | Reserved *[#Fix 2]* |

### 9.4.2.295b.2 Basic variant Multi-Link element – 6 TBD *[1-254r0, 5-506r0]* POC: Abhishek

The format of the Common Info field of the Basic variant Multi-Link element is defined in Figure 9-788eh (Common Info field of the Basic variant Multi-Link element format).

|  |  |  |
| --- | --- | --- |
|  | MLD MAC Address | TBD.***[254r0]*** |
| Octets: | 0 or 6 | TBD.***[254r0]*** |
| * Common Info field of the Basic variant Multi-Link element format | | |

…

Other fields are TBD.***[254r0]***

…

The format of the Per-STA Control field is defined in Figure 9-788ej (Per-STA Control field format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 TBD.***[254r0]*** |
|  | Link ID | Complete Profile | Reserved |
| Bits: | 4 | 1 | TBD.***[254r0]*** |
| * Per-STA Control field format | | | |

The Link ID subfield specifies a value that uniquely identifies the link where the reported STA is operating on.

The Complete Profile subfield is set to 1 when the Per-STA Profile subelement of the Multi-Link element is complete as defined in 35.3.2.2 (Complete or partial per-STA profile). Otherwise the subfield is set to 0.

Other subfields are TBD. ***[254r0]***

### 9.4.2.295b.3 Probe Request variant Multi-Link element – 2 TBD *[2-None] POC: Rojan*

…

The subfields of the Multi-Link Control field of the Probe Request variant Multi-Link element except the Type subfield are TBD.

The presence and format of the Common Info field in the Probe Request variant Multi-Link element are TBD.

### 9.4.2.295c EHT Capabilities element

### 9.4.2.295c.1 General–3 TBD [3-THIS-FIX 3] POC: Abhishek

A STA declares that it is an EHT STA by transmitting the EHT Capabilities element.

The EHT Capabilities element contains a number of fields that are used to advertise the EHT capabilities of an EHT STA. The EHT Capabilities element is defined in Figure 9-788el (EHT Capabilities element format).

***DISCUSSION FOR TBD-FIX 3: Size of EHT MAC, EHT PHY, Supported EHT-MCS And NSS Set is still TBD.***

* ***For EHT MAC Capabilities Information there are currently 3 caps bits defined. Proposal is to allocate 2 bytes for the EHT MAC Capabilities Information field (which should be enough for non-MLD MAC level capabilities since MLD level caps are signaled in the ML element).***
* ***For EHT PHY Capabilities Information field the field is decided to be 8 octets (see 9.4.2.295c.3)***
* ***For Supported EHT-MCS And NSS Set the field is decided to be variable (see 11-21-468r1)***

***TGbe editor: Please change figure below as follows [#Fix 3]:***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element | Length | Element ID Extension | EHT MAC Capabilities Information | EHT PHY Capabilities Information | Supported EHT-MCS And NSS Set | EHT PPE Thresholds (Optional) |
| Octets: | 1 | 1 | 1 | 2 | 8 | variable | variable |
| * EHT Capabilities element format*[#Fix 3]* | | | | | | | |

### 9.4.2.295c.2 EHT MAC Capabilities Information field – 3 TBD *[3*-THIS-FIX 4*]* POC: Abhishek

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

***DISCUSSION FOR TBD-FIX 4: For EHT MAC Capabilities Information there are currently 3 caps bits defined. Proposal is to allocate 2 bytes for the EHT MAC Capabilities Information field (which should be enough for non-MLD MAC level capabilities since MLD level caps are signaled in the ML element).***

***TGbe editor: Please change figure below as follows [#Fix 4]:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3-B15 |
|  | NSEP Priority Access Supported | EHT OM Control Support | Triggered TXOP Sharing Support | Reserved |
| Bits: | 1 | 1 | 1 | 13 |
| **Figure 9-788em EHT MAC Capabilities Information field format*[#Fix 4]*** | | | | |

### 9.4.2.295c.3 EHT PHY Capabilities Information field – 4 TBD *[4-None] POC: Steve*

The format of the EHT PHY Capabilities Information field is defined in Figure 9-788en (EHT PHY Capabilities Information field format),

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| B0 | B1 | B2 | B3 | B4 | B5 |
| Reserved | Support For 320 MHz  In  6 GHz | Support for  242-tone RU In BW Wider Than 20 MHz | NDP With 4´ EHT-LTF And 3.2 µs GI | Partial Bandwidth UL  MU-MIMO | SU Beamformer |
| Bits: 1 | 1 | 1 | 1 | 1 | 1 |
| B6 | B7 | B8 B10 | B11 B13 | B14 B16 | B17 B19 |
| SU Beamformee | MU Beamformer | Beamformee SS (≤ 80 MHz) | Beamformee SS (= 160 MHz) | Beamformee SS (= 320 MHz) | Number Of Sounding Dimensions (≤ 80 MHz) |
| Bits: 1 | 1 | 3 | 3 | 3 | 3 |
| B20 B22 | B23 B25 | B26 | B27 | B28 | B29 |
| Number Of Sounding Dimensions (= 160 MHz) | Number Of Sounding Dimensions (= 320 MHz) | Ng = 16 SU Feedback | Ng = 32 SU Feedback | Codebook Size  SU Feedback | Codebook Size  SU Feedback |
| Bits: 3 | 3 | 1 | 1 | 1 | 1 |
| B30 | B31 | B32 | B33 | B34 | B35 |
| Triggered SU Beamforming Feedback | Triggered MU Beamforming Partial BW Feedback | Triggered CQI Feedback | Partial Bandwidth DL MU-MIMO | PSR-Based SR Support | Power Boost Factor Support (TBD) |
| Bits: 1 | 1 | 1 | 1 | 1 | 1 |
| B36 | B37 B39 | B40 | B41 | B42 | B43 |
| EHT MU PPDU With  4´ EHT-LTF And 0.8 µs GI | Max Nc | Non-Triggered CQI Feedback | Tx 1024-QAM And 4096-QAM < 242-tone RU Support | Rx 1024-QAM And 4096-QAM < 242-tone RU Support | PPE Thresholds Present |
| Bits: 1 | 3 | 1 | 1 | 1 | 1 |
| B44 B45 | B46 B50 | B51 B54 | B55 | B56 | B57 B63 |
| Common Nominal Packet Padding | Maximum Number Of Supported  EHT-LTFs | Support of MCS 15 | Support Of EHT DUP In 6 GHz | Support For 20 MHz Operating STA Receiving NDP With Wider Bandwidth | Reserved |
| Bits: 2 | 5 | 4 | 1 | 1 | 7 |
| * EHT PHY Capabilities Information field format | | | | | |

The subfields of the EHT PHY Capabilities Information field are defined in Table 9-322ap (Subfield of the EHT PHY Capabilities Information field).

|  |  |  |
| --- | --- | --- |
| * Subfield of the EHT PHY Capabilities Information field | | |
| Subfield | Definition | Encoding |
| … | .. | ... |
| Power Boost Factor Support (TBD) | Indicates that the STA supports a power boost factor for the RUs in an EHT MU PPDU in the range [0.5, 2]. (TBD) | Set to 0 if not supported.  Set to 1 if supported. (TBD) |
| EHT MU PPDU With 4´ EHT-LTF And 0.8 µs GI | Indicates support for the reception of an EHT MU PPDU with 4´ EHT-LTF and 0.8 µs guard interval duration. | Set to 0 if not supported.  Set to 1 if supported. |

### 9.4.2.295c.4 Supported EHT-MCS And NSS Set – 1 TBD [1-468r1]-DONE

TBD*[ 468r1]*

### 12.7.2 EAPOL-Key frames - 6 TBD [6-483r0] POC: Duncan



***[483r0]***



***[483r0]***



***[483r0]***

### 35.2.1.3.3 Non-AP STA behavior – 1 TBD *[1-268r0]* POC: Dibakar

After a non-AP STA receives an MU-RTS TXS Trigger frame from its associated AP and addressed to it, the STA shall transmit one or more non-TB PPDUs within the time allocation signaled in the TBD field of the MU-RTS TXS Trigger frame. The first PPDU of the exchange shall be a CTS frame transmitted per the rules defined in 26.2.6.3 (CTS frame response to an MU-RTS Trigger frame).***[268r0]***

### 35.3.2.2 Complete or partial per-STA profile – 1 TBD *[1-254r0]* POC: Abhishek

(#2295)A STA affiliated with an MLD may provide complete or partial information of another STA of its MLD in the Per-STA Profile subelement of the Basic variant Multi-Link element that it transmits. The exact set of elements/fields that constitute partial information is TBD. ***[254r0]***

### 35.3.2.3 Inheritance in a per-STA profile – 2 TBD *[2-254r0]* POC: Abhishek

When carried in a Management frame transmitted by an MLD(#2295), each Per-STA Profile subelement in a Basic variant Multi-Link element that is a complete profile shall contain a list of elements as follows:

The Per-STA Control field is the first field

* TBD fields in fixed order ***[254r0]***
* TBD elements in fixed order ***[254r0]***

### 35.3.4.2 Use of ML probe request and response – 1 TBD *[1-None] POC: Laurent*

An ML probe request is a Probe Request frame that is sent outside the context of active scanning that is used to discover an AP:

* (#1045)(#1187)(#1673)(#2150)with the Address 1 field set to the broadcast address and the Address 3 field set to the BSSID of an AP, or with the Address 1 field set to the BSSID of an AP’s BSS.
* (#1808)(#2124)(#3217)and that includes a Probe Request variant Multi-Link element defined in 9.4.2.295b.3 (Probe Request variant Multi-Link element).

NOTE 1—If and how the transmitting AP info can be explicitly requested or not requested is TBD.

### 35.3.4.4 Multi-link element usage rules in the context of discovery–1 TBD *[1-254r0]* POC: Laurent

An AP affiliated with an AP MLD should include, in a Beacon frame or a Probe Response frame, which is not an ML probe response, only the Common Info field of the Basic variant Multi-Link element as defined in 9.4.2.247b (Multi-Link element).

NOTE—Whether the Basic variant Multi-Link element is always present in a Beacon frame or a Probe Response frame, which is not an ML probe response, or is optionally present is TBD. ***[254r0]***

### 35.3.6.1 TID-to-link mapping POC: Yongho, Laurent

### 35.3.6.1.1 General – 1 TBD *[1-19r7]* POC: Yongho

By default, all TIDs shall be mapped to all setup links for both UL and DL (see 35.3.6.1.2 (Default mapping mode)).

NOTE 1—It is TBD whether the negotiation for TID-to-link mapping other than default mapping is optional or mandatory.***[19r7****]*

### 35.3.6.1.2 Default mapping mode–1 TBD *[1-19r7]* POC: Laurent

This mode refers to the default mapping described in 35.3.6.1.1 (General). Under this mode, all TIDs are mapped to all links for DL and UL, and all setup links are enabled. A non-AP MLD and an AP MLD that performed multi-link setup shall operate under this mode if a TID-to-link mapping negotiation for a different mapping did not occur or was not successful or was torn down.

NOTE—It is TBD if support for TID-to-link mapping negotiation is mandatory or optional*[19r7]*

### 35.3.6.1.4 Power state after enablement – 1 TBD *[1-None] POC: Laurent*

When a link is enabled for a STA that is part of a non-AP MLD through signaling (multi-link setup or TID to link mapping update) send on another link, the initial power management mode of the STA, immediately after the exchange, is power save mode, and its power state is doze, unless TBD.

### 35.3.8 BSS parameter critical update procedure – 7 TBD *[7-None] POC: Ming*

An AP within an AP MLD shall include in the Beacon and Probe Response frames it transmits a Change Sequence field for each of all APs in the same AP MLD.

* The Change Sequence field for each of other APs of the MLD shall be carried in the MLD Parameters subfield in the TBTT Information field of the Reduced Neighbor Report element corresponding to that AP.
* The Change Sequence field for the AP shall be carried in the TBD field.

If an AP within an AP MLD is transmitted BSSID in a multiple BSSID set, then the AP shall include in the Beacon and Probe Response frames it transmits a Change Sequence field for each of nontransmitted BSSIDs in the same multiple BSSID set.

* The Change Sequence field for each of the nontransmitted BSSIDs shall be carried in the TBD field.

An AP within an AP MLD shall increase the value (modulo TBD maximum value) of the Change Sequence field for the AP when a critical update occurs to any of the elements for the AP. An AP within an AP MLD shall increase the value (modulo TBD maximum value) of the Change Sequence field for another AP in the same AP MLD when a critical update occurs to any of the elements for that AP. An AP within an AP MLD that is transmitted BSSID shall increase the value (modulo TBD maximum value) of the Change Sequence field for a nontransmitted BSSID in the same multiple BSSID set when a critical update occurs to any of the elements for the nontrasnmitted BSSID.The critical updates are defined in 11.2.3.15 (TIM Broadcast) and the TBD additional update can be added. The name and format of the Change Sequence field are TBD.

NOTE—The Change Sequence field is at most 1 octet in length.

### 35.3.10.4 Traffic indication – 1 TBD *[1-None] POC: Minyoung*

An AP MLD may recommend a non-AP MLD to use one or more enabled links. The AP’s indication may be carried in a broadcast or a unicast frame. The format of the indication is TBD.

### 35.3.12.1 Beacon transmission - Placeholder POC: Duncan

* It is a placeholder subclause.

### 35.3.13.3 Nonsimultaneous transmit and receive (NSTR) operation – 2 TBD *[2- 558r2] POC: Matt*

* As per the author of 20/1395r14, the following two paragraphs are TBD.

An MLD may indicate a pair of links as STR by setting the TBD field in the TBD elements that it transmits if the receiver requirements specified in Clause 36 (Extremely high throughput (EHT) PHY specification) on one link are met whenever it is transmitting on the other link.

A pair of links that is not indicated as STR shall be indicated as NSTR.***[558r2]***

An AP that is affiliated with an MLD should not transmit to a STA affiliated with a non-AP MLD, a frame on a link of an NSTR link pair of the non-AP MLD at the same time that the non-AP MLD is transmitting a frame on the other link of the NSTR link pair.

### 35.3.13.4 Capability signaling – 3 TBD [1-373r7, 2-None] POC: Yunbo

An MLD can indicate capability to support exchanging frames simultaneously by affiliated STAs on a set of links to another MLD in TBD capability field/element*[Fixed in 373r7]*. The capability field/element indicates the MLD is a multi-radio MLD or other types of MLD. A multi-radio MLD operating on multiple links can announce whether it supports transmission on one link concurrent with reception on the other link for each pair of links, in which case the pair of link is STR or NSTR. The two links of each link pair are on different channels.

NOTE—If an MLD supports transmission on link 1 concurrent with reception on link 2, but cannot support transmission on link 2 concurrent with reception on link 1, this pair of links is NSTR.

The ability of a non-AP MLD to perform STR on a pair of setup links may change after multi-link setup. The non-AP MLD may use TBD signaling on any enabled link to inform the AP MLD about the ability change to perform STR.

The limitation of updating frequency of the ability to perform STR as well as the switching delay is TBD.

### 35.3.13.5 PPDU end time alignment – 2 TBD *[2-None] POC: Yongho*

When an AP MLD simultaneously transmits more than one PPDU to the same NSTR non-AP MLD and at least one of the PPDUs carries a frame that is a QoS data soliciting an immediate response, then

* The AP shall align the end time of the PPDUs soliciting an immediate response per the rules defined in this subclause, except if the PPDU carries a high priority frame (the definition of the high priority frame is TBD).
* The end time of the PPDU that does not solicit an immediate response shall meet the TBD condition.

### 35.3.13.6 Start time sync PPDUs medium access – 1 TBD *[1-None] POC: Duncan*

A non-STR MLD contending for the WM to become a TXOP holder and that aligns the start times of the PPDUs scheduled for transmission on more than one link shall ensure that the EDCA count down procedure is completed in all the links.

NOTE 1—The backoff counters for each link count down as specified in 10.23.2.4 (Obtaining an EDCA TXOP).

NOTE 2—Whether to extend this mechanism to STR MLD is TBD.

### 35.3.13.7 Medium synchronization recovery procedure – 6 TBD *[??-221r7, [2-267]-* POC: ??

A STA that has lost medium synchronization due to transmission by another STA affiliated with the same MLD shall start a MediumSyncDelay timer at the end of that transmission event. It is TBD whether the STA is required to start the MediumSyncDelay timer if the transmission event is shorter than TBD duration.***[267]***

The MediumSyncDelay timer is a single timer, shared by all EDCAFs within a non-AP STA, which is initialized with a default TBD value. The STA shall update the timer duration value with the one contained in the TBD field of the TBD element in the most recent frame received from its associated AP. In addition, the timer resets to zero when any of the following events occur:

* The STA receives a PPDU with a valid MPDU.
* The STA receives a PPDU whose corresponding RXVECTOR parameter TXOP\_DURATION is not UNSPECIFIED.

While the MediumSyncDelay timer is running at a STA, it shall perform CCA and shall not transmit a frame that initiates a TXOP except under TBD conditions.

### 35.3.14 Enhanced multi-link single radio operation – 3 TBD *[2-160r0, 1-288r3]* POC: Minyoung

A non-AP MLD may operate in the EMLSR mode on the enabled links between the non-AP MLD and its associated AP MLD.

* Per the authors of 20/1291r12, the name of the EMLSR mode is TBD. [288r3]

An MLD with dot11EHTEMLSROptionImplemented equal to true shall set the EMLSR mode subfield of the Common Info field of the Basic variant Multi-Link element to 1; otherwise, the MLD shall set the EMLSR mode subfield to 0.

When a non-AP MLD is operating in the EMLSR mode with an AP MLD supporting the EMLSR mode the following applies:

* The non-AP MLD shall be able to listen on the enabled links, by having its affiliated STA(s) corresponding to those links in the awake state. The listening operation includes CCA and receiving the initial Control frame of a frame exchange sequence that is initiated by an AP MLD.
* The initial Control frame of a frame exchange sequence shall be sent in the OFDM PPDU or non-HT duplicate PPDU format using a rate of 6 Mbps, 12 Mbps, or 24 Mbps.
* The initial Control frame shall be an MU-RTS Trigger frame or a BSRP Trigger frame.

NOTE 1—Mandatory or optional support for the non-AP MLD of reception of MU-RTS and BSRP Trigger frames is TBD.*[160r0]*

NOTE 2—Optional support for the non-AP MLD of reception of Basic Trigger frame is TBD.*[160r0]*

* The non-AP MLD shall indicate the delay time needed by the non-AP MLD in the EMLSR Delay field in the Common Info field of the Basic variant Multi-Link element. The value in the EMLSR Delay field indicates the MAC padding duration of the Padding field of the initial Control field. The EMLSR Delay field is 3 bits and set to 0 for 0 µs, set to 1 for 32 µs, set to 2 for 64 µs, set to 3 for 128 µs, set to 4 for 256 µs, and the values 5 to 7 are reserved.
* The AP MLD shall initiate a frame exchange sequence with the non-AP MLD on one of the enabled links by transmitting an initial Control frame to the non-AP MLD with the limitations specified above.
* After receiving the initial Control frame of a frame exchange sequence, the non-AP MLD shall be able to transmit or receive frames on the link in which the initial Control frame was received and shall not transmit or receive on the other link(s) until the end of the frame exchange sequence, and subject to its spatial stream capabilities, operation mode, and link switch delay, the non-AP MLD shall be capable of receiving a PPDU that is sent using more than one spatial stream a SIFS after the end of its response frame transmission solicited by the initial Control frame. During the frame exchange sequence, the AP MLD shall not transmit frames to the non-AP MLD on the other link(s). The non-AP MLD switches back to the listening operation on the enabled links immediately after the end of the frame exchange sequence.

### 35.3.15 Enhanced multi-link multi-radio operation– 8 TBD [4-335r4, 4-None] POC: Young Hoon

A non-AP MLD may operate in the EMLMR mode on a specified set of the enabled links between the     non-AP MLD and its associated AP MLD. The specified set of the enabled links in which the EMLMR mode is applied is called EMLMR links.

* Per the authors of 20/1440r7, the name of the EMLMR mode is TBD.[335r4]

An MLD with dot11EHTEMLMROptionImplemented equal to true shall set the EMLMR Support subfield of the TBD Capabilities element, which indicates MLD level capabilities, to 1; otherwise, the MLD shall set the EMLMR Support subfield to 0.***[335r4]***

A non-AP MLD with dot11EHTEMLMROptionImplemented equal to true shall set the EMLMR Rx NSS subfield of TBD element to dot11SupportedEMLMRRxNSS and the EMLMR Tx NSS subfield of TBD element to dot11SupportedEMLMRTxNSS, which indicate MLD level capabilities.

A non-AP MLD with dot11EHTEMLMROptionImplemented equal to true operates in the EMLMR mode by TBD signaling. ***[335r4]***

A non-AP MLD with dot11EHTEMLMROptionImplemented equal to true may indicate its link switch delay in a TBD management frame***.[335r4]***

When a non-AP MLD operates in the EMLMR mode, after initial frame exchange subject to its per-link spatial stream capabilities and operating mode on one of the EMLMR links, the non-AP MLD shall be able to support the following until the end of the frame exchange sequence initiated by the initial frame exchange:

* Receive PPDUs with the number of spatial streams up to the value as indicated in the EMLMR Rx NSS subfield of TBD element at a time on the link for which the initial frame exchange was made.
* Transmit PPDUs with the number of spatial streams up to the value as indicated in the EMLMR Tx NSS subfield of TBD element at a time on the link for which the initial frame exchange was made.

### 35.3.16 NSTR soft AP MLD operation – Placeholder POC: Kaiying

* General
* It is a placeholder subclause.

### 35.4.2.2.1 Allowed settings of the Trigger frame fields and TRS Control subfield – 3 TBD [3-490r0]-Done

An EHT AP shall include a Special User Info field immediately after the Common Info field of a Trigger frame to indicate that the Trigger frame is soliciting an EHT TB PPDU (TBD). *[ 490r0]* The AID12 subfield of the Special User Info field shall be set to 2007. An EHT AP that includes the Special User Info field in a Trigger frame shall set Special User Info Field present to 0. An EHT AP that includes the Special User Info field in a Trigger frame shall set HE/EHT P160 subfield of the Common Info Field of the Trigger frame to 0. An EHT AP that includes the Special User Info field in a Trigger frame shall set HE/EHT P160 subfield of the Common Info Field of the Trigger frame to 0 (TBD). *[ 490r0]*

An EHT AP shall not assign an AID value of 2007 to any STA

An EHT AP shall set the UL Length subfield of a transmitted Trigger frame that solicits an EHT TB PPDU to the value given by Equation (27-11) with .

NOTE—This is the same rule as that of an AP that transmits a Trigger frame that solicits an HE TB PPDU (see 26.5.2.2.4 (Allowed settings of the Trigger frame fields and TRS Control field)).

An EHT non-AP STA that transmits a TB PPDU shall satisfy the conditions defined in 26.5.2.3 (Non-AP STA behavior for UL MU operation). If HE/EHT P160 subfield of the Common Info field in the Trigger frame is set to 1 then the TB PPDU shall be an HE TB PPDU; otherwise, the TB PPDU shall be an EHT TB PPDU (TBD). *[ 490r0]*

### 35.5.3 Rules for EHT sounding protocol sequences – 7 TBD [6-272r3, *[1*-THIS-FIX 5*]*] POC: Wook Bong

…

An EHT beamformer that transmits an EHT NDP Announcement frame as part of an EHT TB sounding sequence shall set the Nc subfield of the STA Info field to indicate a value less than or equal to the minimum of:

* The maximum number of supported spatial streams according to the corresponding EHT beamformee’s Rx EHT-MCS Map ≤ 80 MHz, Rx EHT-MCS Map = 160 MHz, and Rx EHT-MCS Map = 320 MHz subfields in the Supported EHT-MCS And NSS Set field in the EHT Capabilities element sent by the EHT beamformee.
* The maximum number of supported spatial streams according to the Rx NSS subfield value in the most recently received Operating Mode Notification frame, Operating Mode Notification element with the Rx NSS Type subfield equal to 0, or OM Control subfield sent by the corresponding EHT beamformee (see 35.x (Operating mode indication) (TBD)). *[Fixed in 272r3]*
* The maximum indicated by the Max Nc subfield in the EHT PHY Capabilities Information field in the EHT Capabilities element sent by the EHT beamformee.

…

The EHT beamformer shall use the lowest , which is the lower bound of the  indicated by the Partial BW Info subfield of a STA Info field that is equal to the maximum of:

* The minimum subcarrier index located within the channel width indicated in the VHT Operation Information field of either the HE Operation element or the VHT Operation element, whichever is present, and within the channel width indicated in the HT Operation element
* The minimum subcarrier index located within the channel width indicated in the most recently received Operating Mode Notification frame, Operating Mode Notification element with the Rx NSS Type subfield equal to 0, or OM Control subfield sent by the corresponding EHT beamformee (see 35.x (Operating mode indication) (TBD)).*[Fixed in 272r3]*

The EHT beamformer shall use the highest , which is the upper bound of the  indicated by the Partial BW Info subfield of a STA Info field that is equal to the minimum of:

* The maximum subcarrier index located within the channel width indicated in the VHT Operation Information field of either the HE Operation element or the VHT Operation element, whichever is present, and within the channel width indicated in the HT Operation element
* .
* The maximum subcarrier index located within the channel width indicated in the most recently received Operating Mode Notification frame, Operating Mode Notification element with the Rx NSS Type subfield equal to 0, or OM Control field sent by the corresponding EHT beamformee (see 35.x (Operating mode indication) (TBD)).*[Fixed in 272r3]*

**…**

***DISCUSSION FOR TBD-FIX 5: For EHT sounding the same rules as for HE sounding are expected for the setting of the RA field of the CBF/CQI report. Hence the current reference is correct. Proposal is to simply remove the TBD since the RA field settings are going to be the same.***

***TGbe editor: Please change the paragraph below as follows [#Fix 5]:***

An EHT beamformee that receives an EHT NDP Announcement frame as part of an EHT TB sounding sequence with a STA Info field identifying it soliciting SU or MU feedback shall generate an EHT compressed beamforming/CQI report using the feedback type, , codebook size, and  indicated in the STA Info field. If the EHT beamformee then receives a BFRP Trigger frame with a matching STA Info field, the EHT beamformee transmits an EHT TB PPDU containing th EHT compressed beamforming/CQI report following the rules defined in 26.5.2.3 (Non-AP STA behavior for UL MU operation) (TBD). *[Fixed in 272r3]* If the EHT NDP Announcement frame has the TA field set to the transmitted BSSID, and the EHT beamformee is a non-AP STA associated with an AP corresponding to a nontransmitted BSSID that supports receiving Control frames with TA field set to the transmitted BSSID, then the EHT compressed beamforming/CQI report sent in response shall have the RA field set to as defined in 26.5.2.3.5 (RA field for frame carried in an HE TB PPDU)*[# Fix 5]*.

NOTE 1—A non-AP EHT beamformee that transmits an OM Control subfield with the UL MU Disable field set to 1 does not respond to BFRP Trigger frames (see 35.x (Operating mode indication) (TBD)). *[Fixed in 272r3]*

An EHT beamformer that sends a BFRP Trigger frame shall set the Feedback Segment Retransmission Bitmap fields of the BFRP Trigger frame to all 1s.

NOTE 2—The BFRP Trigger frame contains one or more User Info fields, each of which identifies an EHT beamformee.

The SNR per subcarrier computation should be done on at least four subcarriers in a 26-tone RU. (TBD) *[Fixed in 272r3]*

### 35.6.1 EHT subchannel selective transmission - Placeholder POC: Yongho

* It is a placeholder subclause.

### 35.7.2 Restricted TWT agreement setup *POC: Chunyu*

### 35.7.2.1 General – 1 TBD *[1-None] POC: Chunyu*

TBD

### 35.7.3 Restricted TWT service periods announcement – 4 TBD *[4-None] POC: Chunyu*

If there is any restricted TWT agreement set up, the EHT AP shall announce the restricted TWT service period schedule information in the modified broadcast TWT element contained in transmitted Beacon, TBD (broadcast and/or individual) Probe response frames, (Re)Association frames, and other TBD frames as described in TBD.

In order to provide additional protection for restricted TWT service periods, subject to TBD rules, the EHT AP may announce quiet intervals by including Quiet elements in Management frames that it transmits, that overlap with restricted TWT service periods. Non-AP EHT STAs may ignore the quiet intervals that overlap with restricted TWT service periods following the rules below:

* Non-AP EHT STAs with dot11RestrictedTWTOptionImplemented set to true shall follow channel access rules as defined in 35.7.4 (Channel access rules for restricted TWT service periods).
* Non-AP EHT STAs with dot11RestrictedTWTOptionImplemented set to false may behave as if such overlapping quiet intervals do not exist.

### 35.9 Spatial reuse operation – Placeholder POC: Laurent

### 35.9.1 General – Placeholder POC: Laurent

* It is a placeholder subclause.

### 35.9.2 General operation with non-SRG OBSS PD level – Placeholder POC: Laurent

* It is a placeholder subclause.

### 35.9.3 General operation with SRG OBSS PD level – Placeholder POC: Laurent

* It is a placeholder subclause.

### 35.9.4 Adjustment of OBSS PD and transmit power – Placeholder POC: Laurent

* It is a placeholder subclause.

### 35.10.1 Setting TXVECTOR parameters for an EHT PPDU

### 35.10.1.1 STA\_ID – 3 TBD *[3-None] POC: Yongho*

For an individually addressed RU that is addressed to an associated non-AP STA the parameter STA\_ID shall be set to the TBD value that identifies the STA receiving the PSDU contained in that RU. If an RU is intended for an AP (i.e., the TXVECTOR parameter UPLINK\_FLAG is 1), then the parameter STA\_ID shall contain only one element that is set to the TBD value that identifies the non-AP STA transmitting the PPDU.

The behavior of the STAs depending on the STA\_ID values upon reception of an EHT PPDU is TBD.

### 35.11 Nominal packet padding values selection rules – 1 TBD *[1-None] POC: ??*

The nominal packet padding value shall be 0 for all RU or MRU with size less than 242 unless the RU size is 106 or MRU size is 132 and EHT-MCS 15 is applied to the RU or MRU (TBD).

### 35.13.3 NSEP priority access procedure – 3 TBD *[3-None] POC: Subir*

If the negotiation to enable NSEP priority access between an AP STA and a non-AP STA is successful, then both the AP STA and the non-AP STA shall apply NSEP priority access to NSEP traffic using a TBD procedure. The AP shall ensure that only authorized non-AP STAs can invoke NSEP priority access. An AP STA may apply NSEP priority access to NSEP traffic using the same TBD procedure prior to completion of the negotiation to enable NSEP priority access.

Additional details regarding NSEP priority access operation between non-AP MLD and AP MLD is TBD.

### 35.15 Multi-AP operation– Placeholder *POC: Edward*

### 35.15.1 Introduction– Placeholder *POC: Edward*

* It is a placeholder subclause.

### 35.15.2 Setup– Placeholder *POC: Edward*

* It is a placeholder subclause.

### 35.15.3 Channel sounding– Placeholder *POC: Edward*

It is a placeholder subclause.

### 35.15.4 Coordinated transmission– Placeholder *POC: Edward*

* It is a placeholder subclause.

## PHY

### 36.2.2 TXVECTOR and RXVECTOR parameters- 78 TBD [78-None] POC: Bo

The parameters in Table 36-1 (TXVECTOR and RXVECTOR parameters) are defined as part of the TXVECTOR parameter list in the PHY-TXSTART.request primitive and/or as part of the RXVECTOR parameter list in the PHY-RXSTART.indication and PHY-RXEND.indication primitives.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * TXVECTOR and RXVECTOR parameters | | | | |
| Parameter | Condition | Value | TXVECTOR | RXVECTOR |
|  | … |  |  |  |
| NON\_HT\_  MODULATION | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters). (TBD) | | | |
| L\_LENGTH | FORMAT is EHT\_MU | Not present. | N | N |
| FORMAT is EHT\_TB | TBD | TBD | TBD |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
|  | … |  |  |  |
| … |  | | |
| EXPANTION\_MAT | FORMAT is EHT\_MU | TBD | TBD | TBD |
| FORMAT is EHT\_TB | TBD | TBD | TBD |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| CHAN\_MAT | FORMAT is EHT\_MU | TBD | TBD | TBD |
| FORMAT is EHT\_TB | TBD | TBD | TBD |
| Otherwise | TBD |  |  |
| DELTA\_SNR | FORMAT is EHT\_MU | TBD | TBD | TBD |
| FORMAT is EHT\_TB | TBD | TBD | TBD |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
|  | … |  |  |  |
| … |  | | |
| SNR | FORMAT is EHT\_MU | TBD |  |  |
| FORMAT is EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| CQI | FORMAT is EHT\_MU | TBD |  |  |
| FORMAT is EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| STBC | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| GI\_  TYPE | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
|  | … |  |  |  |
| … |  | | |
| MU\_COMPRE  SSION\_MODE (TBD) | FORMAT is EHT\_MU | Indicates whether or not the RU Allocation subfield(s) is included in the Common field of the EHT-SIG.  Integer:  0 indicates that the RU Allocation subfield is present  1 indicates that the RU Allocation subfield is not present | Y | N |
| Otherwise | Not present. | | |
|  | … |  |  |  |
| … |  | | |
| MCS | FORMAT is EHT\_MU or EHT\_TB | Indicates the modulation and coding schemes used in the transmission of the PPDU.  Integer: range 0 to TBD. | MU | MU |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| DCM (TBD) | FORMAT is EHT\_MU or EHT\_TB | TBD | MU | MU |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| MCS\_  EHT\_SIG | FORMAT is EHT\_MU or EHT\_TB | Indicates the modulation and coding scheme used for the EHT\_SIG field.  Integer: TBD | Y | Y |
| Otherwise | Not present. | | |
|  | … |  |  |  |
| … |  |  |  |
| … |  | | |
| CH\_  BANDWIDTH | FORMAT is EHT\_MU | TBD | Y | Y |
| FORMAT is EHT\_TB | TBD | Y | Y |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| INACTIVE\_  SUBCHANNELS | FORMAT is EHT\_MU | TBD | Y | Y |
| FORMAT is EHT\_TB | TBD | Y | Y |
| FORMAT is NON\_HT and NON\_HT\_MODULATION is equal to NON\_HT\_DUP\_  OFDM | TBD |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| DYN\_BANDWIDTH  \_IN\_NON\_HT (TBD) | FORMAT is EHT\_MU or EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| CH\_BANDWIDTH  \_IN\_NON\_HT (TBD) | FORMAT is EHT\_MU or EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| LENGTH (TBD) | FORMAT is EHT\_MU or EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| APEP\_  LENGTH | FORMAT is EHT\_MU or EHT\_TB | TBD | MU | O |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| PSDU\_  LENGTH | FORMAT is EHT\_MU or EHT\_TB | TBD | N | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| USER\_  POSITION (TBD) | FORMAT is EHT\_MU or EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| NUM\_STS | FORMAT is EHT\_MU | Indicates the number of spatial streams. Note that the EHT PHY does not support STBC, the terms “space-time stream” and “spatial streams” are equivalent in EHT.  Integer in the range:  1–4 per user per MU-MIMO RU in the TXVECTOR  1–4 per MU-MIMO RU in the RXVECTOR  1–TBD per RU assigned to no more than 1 user in the TXVECTOR and RXVECTOR  NUM\_STS summed over all users per RU is not greater than TBD. | MU | Y |
| FORMAT is EHT\_TB | Indicates the number of spatial streams.  Integer in the  range:  1–4 for a MU-MIMO RU  1–TBD for an RU assigned to no more than 1 user  NUM\_STS summed over all users per RU is not greater than TBD. | Y | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| GROUP  \_ID (TBD) | FORMAT is EHT\_MU or EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| PARTIAL  \_AID (TBD) | FORMAT is EHT\_MU or EHT\_TB | Not present. | N | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| TXOP\_  DURATION | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| SPATIAL\_  REUSE | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| DOPPLER | FORMAT is EHT\_MU or EHT\_TB | TBD | Y | Y |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| NUM\_  USERS | FORMAT is EHT\_MU or EHT\_TB | Not present (TBD). |  |  |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| RU\_  ALLOCATION | FORMAT is EHT\_MU | TBD |  |  |
| FORMAT is EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| BEAMFORMED | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
|  | … |  |  |  |
| … |  | | |
| E  HT\_LTF\_  MODE | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | Not present. | | |
| NUM\_  EHT\_LTF | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | Not present. | | |
| STARTING\_  STS\_NUM | FORMAT is EHT\_MU | Set to the starting spatial stream number minus 1 (spatial streams in a given PPDU transmission are numbered starting from 1) | Y | N |
| FORMAT is EHT\_TB | Not present (TBD). |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| NOMINAL\_  PACKET\_PADDING | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| TRIGGER\_  METHOD | FORMAT is EHT\_TB | TBD |  |  |
| FORMAT is EHT\_MU | Not present (TBD). |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| DEFAULT\_PE\_  DURATION | FORMAT is EHT\_TB | TBD |  |  |
| FORMAT is EHT\_MU | Not present (TBD). |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| BSS\_  COLOR | FORMAT is EHT\_MU or EHT\_TB | TBD |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| UPLINK\_  FLAG | FORMAT is EHT\_MU | TBD |  |  |
| FORMAT is EHT\_TB | Not present (TBD). |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| STA\_ID | FORMAT is EHT\_MU | TBD |  |  |
| FORMAT is EHT\_TB | Not present (TBD). |  |  |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| NDP\_REPORT | FORMAT is EHT\_TB and PSDU\_LENGTH=0 | TBD | N | Y |
| FORMAT is EHT\_MU | Not present (TBD). | N | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| FEEDBACK\_  STATUS | FORMAT is EHT\_TB and APEP\_LENGTH=0 | TBD | Y | N |
| FORMAT is EHT\_MU | Not present (TBD). | N | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| RU\_TONE\_  SET\_INDEX | FORMAT is EHT\_TB and APEP\_LENGTH=0 | TBD | Y | N |
| FORMAT is EHT\_MU | Not present (TBD). | N | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| MIDAMBLE\_  PERIODICITY | FORMAT is EHT\_MU or EHT\_TB, and DOPPLER is 1 | TBD | Y | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters). | | |
| EHT\_PRE\_FEC\_  PADDING\_FACTOR | FORMAT is EHT\_TB | TBD |  |  |
| Otherwise | Not present. | N | N |
| EHT\_TB\_PE\_  DISAMBIGUITY | FORMAT is EHT\_TB | TBD | Y | N |
| Otherwise | Not present. | N | N |
| NOTE—In the “TXVECTOR” and “RXVECTOR” columns, the following apply:  Y = Present;  N = Not present;  O = Optional; | | | | |

### 36.2.3 TRIGVECTOR parameters – 17 TBD [17-None] POC: Bo

The TRIGVECTOR is carried in a PHY-TRIGGER.request primitive and provides the PHY of the AP with the parameters needed to receive an EHT TB PPDU over each assigned RU. The parameters in Table 36-2 (TRIGVECTOR parameters) are defined as part of the TRIGVECTOR parameter list in the                     PHY-TRIGGER.request primitive.

|  |  |
| --- | --- |
| * TRIGVECTOR parameters | |
| Parameter | Value |
| CH\_BANDWIDTH | TBD |
| UL\_LENGTH | TBD |
| GI\_AND\_EHT\_LTF\_TYPE | TBD |
| MU\_MIMO\_EHT\_LTF\_MODE | TBD |
| NUM\_EHT\_LTF\_SYMBOLS | TBD |
| MIDAMBLE\_PERIODICITY | TBD |
| LDPC\_EXTRA\_SYMBOL | TBD |
| PRE\_FEC\_PADDING\_FACTOR | Indicates the pre-FEC padding factor for the expected EHT TB PPDU.  Value range TBD |
| PE\_DISAMBIGUITY | Indicates the PE disambiguity of the expected EHT TB PPDU.  Value range TBD |
| DOPPLER | TBD |
| AID12\_LIST | TBD |
| RU\_ALLOCATION\_LIST | TBD |
| FEC\_CODING\_LIST | TBD |
| EHT\_MCS\_LIST | TBD |
| UL\_DCM\_LIST (TBD) | TBD |
| SS\_ALLOCATION\_LIST | TBD |

### 36.2.4 PHY CONFIG\_VECTOR - 1 TBD [1-None] POC: Bo

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an EHT PHY contains an OPERATING\_CHANNEL parameter, which identifies the operating or primary channel. The PHY shall set dot11CurrentPrimaryChannel to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an EHT PHY contains a CHANNEL\_WIDTH parameter, which identifies the operating channel width and takes one of the values 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 320 MHz. The PHY shall set dot11CurrentChannelWidth to the value of this parameter. The PHY shall set dot11EHTCurrentChannelWidthSet to a value that is obtained from the Supported Channel Width Set subfield of a transmitted EHT Capabilities element (TBD).

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an EHT PHY contains a CENTER\_FREQUENCY\_SEGMENT parameter, which identifies the center frequency of the channel and takes a value between 1 and 255. The PHY shall set dot11CurrentChannelCenterFrequencyIndex0 to the value of this parameter.

### 36.2.5 Effect of CH\_BANDWIDTH parameter on PPDU format - 1 TBD [1-157r0] *POC: Yujin*

* It is a placeholder subclause.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * Interpretation of FORMAT, NON\_HT\_MODULATION and CH\_BANDWIDTH parameters (TBD) | | | | |
| FORMAT | NON\_HT\_  MODULATION | CH\_BANDWIDTH | CH\_OFFSET | PPDU format |
|  |  |  |  |  |
|  |  |  |  |  |

### 36.2.6.5 Support for HE format - 1 TBD [1-None] POC: Bo

The behavior of an EHT PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the TXVECTOR parameter FORMAT equal to HE\_SU, HE\_ER\_SU, HE\_MU, or HE\_TB is defined in Clause 27 (High Efficiency (HE) PHY specification) with the following additional requirements:

* TBD.

…

### 36.3.2.2 Support of wide bandwidth OFDM operation - 7 TBD [7-None] POC: Yan Xin

A 20 MHz, 80 MHz, or 160 MHz operating non-AP EHT STA is a non-AP EHT STA that supports for 20 MHz, 80 MHz, or 160 MHz channel width, respectively (see 36.1.1 (Introduction to the EHT PHY)). Currently supported channel width of a non-AP EHT STA is indicated in the EHT Capabilities element (see 9.4.2.295c.3 (EHT PHY Capabilities Information field) or Channel Width field in an OM Control subfield (See 9.2.4.6a.2 (OM Control)) (TBD).

…

A 20 MHz operating non-AP STA shall be able to support the reception of the preamble and data in the allocated RU or MRU on the 20 MHz channel assigned by the EHT AP in a 40 MHz, 80 MHz, 160 MHz, or 320 MHz EHT MU PPDU (some restrictions TBD).

A 20 MHz operating non-AP EHT STA shall operate in the primary 20 MHz channel with exception TBD.

An 80 MHz operating non-AP EHT STA shall be able to participate in 160 MHz and 320 MHz, EHT DL and UL OFDMA transmissions. An EHT AP shall be able to allocate an RU (see 36.3.2.1 (Subcarriers and resource allocation for wideband) or MRU (see 36.3.2.3 (Subcarriers and resource allocation for multiple RUs)) on one 80 MHz channel within the BSS bandwidth in a 160 MHz or 320 MHz EHT MU or EHT TB PPDU to an 80 MHz operating non-AP EHT STA. An EHT AP shall not allocate an RU outside of the primary 80 MHz in a 160 MHz or 320 MHz EHT MU or EHT TB PPDU to an 80 MHz operating non-AP EHT STA if the 80 MHz operating non-AP EHT STA has not set up SST operation on the nonprimary 80 MHz channel with the EHT AP (TBD).

…

An 80 MHz operating non-AP STA shall be able to support the reception of the preamble and data in the allocated RU or MRU on the 80 MHz channel assigned by the EHT AP in a 160 MHz or 320 MHz EHT MU PPDU (some restrictions TBD).

A 160 MHz operating non-AP EHT STA shall be able to participate in 320 MHz EHT DL and UL OFDMA transmissions. An EHT AP shall be able to allocate an RU or MRU on the primary 160 MHz channel within the BSS bandwidth in a 320 MHz EHT MU or EHT TB PPDU to a 160 MHz operating non-AP EHT STA. An EHT AP shall not allocate an RU or MRU on the secondary 160 MHz in a 320 MHz EHT MU or EHT TB PPDU to a 160 MHz operating non-AP EHT STA if the 160 MHz operating non-AP EHT STA has not set up SST operation on the secondary 160 MHz channel with the EHT AP (TBD).

…

A 160 MHz operating non-AP STA shall be able to support the reception of the preamble and data in the allocated RU or MRU on the 160 MHz channel assigned by an EHT AP in a 320 MHz EHT MU PPDU (some restrictions TBD).

### 36.3.6 Transmitter block diagram - 1 TBD [1-556r0] *POC: Xiaogang*

…

Figure 36-26 (Transmitter block diagram for the EHT-SIG field) shows the transmit process for the       EHT-SIG field of an EHT MU PPDU using one frequency segment. This block diagram is for transmitting EHT-SIG in one 20 MHz subchannel. Refer to 36.3.12.8.2 (EHT-SIG content channels) for the methods of transmitting EHT-SIG in 40 MHz, 80 MHz, 160 MHz, and 320 MHz. The DCM tone mapper, which is defined in 36.3.13.7 (Constellation mapping(#3115)), is applied only if the EHT-SIG-MCS field in the U-SIG field indicates EHT-SIG-MCS is TBD. ***[556r0]***

### 36.3.11.4 Transmitted signal - 3 TBD [3-None] POC: Yan Zhang

…

In an EHT MU PPDU, for each field excluding the PE field,  is defined as the summation of one or more subfields. Each subfield, , is defined to be an inverse Fourier transform in Equation (36-9).

* Per the authors of 20/1337r3,  in Equation (36-9) is TBD.

In Equation (36-9) and Equation (36-10), the following notations are used:

 is a windowing function. An example function, , is given in 17.3.2.5 (Mathematical conventions in the signal descriptions).

(#1336) is  for L-STF,  for L-LTF,  for L-SIG,  for RL-SIG,  for U-SIG,  for EHT-SIG,  for EHT-STF of EHT MU PPDU,  for EHT-STF of EHT TB PPDU,  for EHT-LTF, or  for EHT-Data.

 is defined in Table 36-22 (Frequently used parameters).

 For pre-EHT modulated fields, . For EHT modulated fields,  for an EHT MU PPDU, and  for an EHT TB PPDU, where  and  are given in Table 36-22 (Frequently used parameters).

 is the power boost factor in the range [0.5, 2] of the *r*-th occupied RU or MRU in an EHT MU PPDU. For an EHT MU PPDU, an AP shall limit the ratio between the maximum value of  and the minimum value of  to 2 unless the Power Boost Factor Support subfield of the EHT PHY Capabilities Information field in the EHT Capabilities element from all recipient STAs is 1, in which case the AP can use a ratio of up to 4. For an EHT MU PPDU transmitted to single user,  is always set to 1 (TBD).

 (#1335)For pre-EHT modulated fields,  is the set of subcarriers indices for all the tones in the corresponding 20 MHz channels where EHT modulated fields are located for the *r*-th occupied RU or MRU. For EHT modulated fields in a nonpunctured non-OFDMA EHT PPDU that is not in EHT DUP mode,  is the set of subcarriers indices from  to  as defined in Table 36-18 (Subcarrier allocation related constants for the EHT-modulated fields in a full bandwidth non-OFDMA EHT PPDU) excluding DC subcarriers. For EHT modulated fields in a nonpunctured non-OFDMA EHT MU PPDU transmitted in EHT DUP mode,  is the set of subcarriers indices for the tones in the *r*-th RU. For EHT modulated fields in a punctured      non-OFDMA EHT PPDU and an OFDMA EHT PPDU,  is the set of subcarriers indices for the tones in the *r*-th RU or MRU. Data and pilot subcarrier indices for RUs are defined in Table 27-7 (Data and pilot subcarrier indices for RUs in a 20 MHz HE PPDU and in a non-OFDMA 20 MHz HE PPDU), Table 27-8 (Data and pilot subcarrier indices for RUs in a 40 MHz HE PPDU and in a non-OFDMA 40 MHz HE PPDU), Table 36-5 (Data and pilot subcarrier indices for RUs in an 80 MHz EHT PPDU), Table 36-6 (Data and pilot subcarrier indices for RUs in a 160 MHz EHT PPDU), and Table 36-7 (Data and pilot subcarrier indices for RUs in a 320 MHz EHT PPDU). Data and pilot subcarrier indices for MRUs consist of the data and pilot subcarrier indices of all component RUs.

 (#1339)(#1341)is the power normalization factor of the corresponding field in the *r*-th occupied RU or MRU and is defined in Equation (36-11)(#1339)(#1341).

* Per the authors of 20/1337r2,  in Equation (36-11) is TBD.



 (#1339)(#1341)is the number of tones in the corresponding field. Table 36-25 (Number of modulated subcarriers and guard interval duration values for EHT PPDU fields) summarizes the various values of  as a function of bandwidth.

…

### 36.3.12.9 EHT-STF - 1 TBD [1-None] POC: Yan Zhang

(#2815)The time domain representation of the signal for EHT MU PPDU on transmit chain ** shall be as specified in Equation (36-33).





where

 is defined in 36.3.11.4 (Transmitted signal). (TBD)

### 36.3.13.2 EHT PHY DATA scrambler and descrambler - 3 TBD [3-None] POC: Chenchen Liu

…



NOTE—The 2047-bit sequence generated repeatedly by the scrambler is (leftmost used first) 0000000001100000001111000001100110001111111101100000010111000010010110010110011110011111001111000111100110110011111011111000101000110100010111001010010111000110010110111110011010001111100101100011100111011011110101101001000110011010111111100010000011010100011100001011011001001101111011110100101001001100011011111011101000101010010100000110001000111101010110010000011110100011001001011111011001000101111010100100100001101101001110110011101011111010001000100101010101100000000111000000110110000111011100110101011111000001000110001010111101000010010010010110110110011011011111101101000010110010010011110110111001011010111001100010111111010010000100110100101111001100100111111101110000010101100010000111010100110100001111001001100111011111110101000001000010001010010101000110000010111100010010011010110111100011010011011100111101011110010001001110101011101000001010010001000110101010111000000010110000010011100010111011010010101100110000111111100110000011111100011000011011110011101001111010011100100111011101110101010101000000000010000000010100000010001000010101010010000000110100000111001000110111010111010100010100001010001001000101011010100001100001001111001011100111001011110111001001010111011000010101110010000101110100100101001101100011110111011001010101111000000100110000101111100100100011101101011010110001100011101111011010100101100001100111001111110111100001010011001000111111010110000100011100101011011100001101011001110001111101101100010110111010011010100111100001110011001101111111110100000001001000001011010001001100101011111100001000011001010011111000111000110110110111011011010101101100000110111000111010110110100011011001011101111001010100111000001110110001101011101110001010101101000000110010000111110100110001001111101011100010001011010101001100000011111000011000110011110111111001010000111000100110110101111011000100101110101100101000111100010110011010011111100111000011110110011001011111111001000000111010000110100100111001101110111110101010001000000101010000100000100101000101100010100111010001110100101101001100110011111111111, when the all 1s initial state (set by the 11 initialization bits as shown in Figure 36-53 (Data scrambler (TBD))) is used. (TBD).

The same scrambler is used to scramble transmit data and to descramble receive data. When transmitting, the initial state of the scrambler shall be set to a pseudorandom nonzero state. During reception by an EHT STA, the initial state can be estimated from the 11 LSB of the service field (TBD).

…

* Coding

### 36.3.13.3.1 General - 1 TBD [1-None] POC: Yan Zhang

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 (TBD).

…

### 36.3.13.3.6 Encoding process for an EHT TB PPDU - 3 TBD [3-None] POC: Bo

…

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 (TBD) and the LDPC Extra Symbol Segment field in the Trigger frame is 1, set the initial parameter using Equation (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 (TBD) 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 (TBD), 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).

### 36.3.13.8 LDPC tone mapper - 1 TBD [1-None] POC: Yan Zhang

…

where

 for the portion of an RU/MRU in the *l*-th subblock that corresponds to 26‑, 52‑, 52+26‑, 106‑, 106+26‑, 242‑, 484‑, 484+242‑, and 996‑tone.











* is the number of data tones in the portion of *r*-th RU/MRU located in the *l*-th subblock if DCM is applied defined in TBD.

### 36.3.13.9 Segment deparser - Placeholder

* It is a placeholder subclause.

### 36.3.13.12 OFDM modulation- 1 TBD [1-None] POC: Yan Zhang

…

where

 is defined in Table 36-17 (Timing-related constants).

 is defined in 17.3.5.10 (OFDM modulation).

 is defined based on the RU/MRU size. For any RU/MRU smaller than 4´996, except 52+26-tone MRU and 106+26-tone MRU, the value is defined for each component RU using Equation (27-101) to Equation (27-107) in 27.3.12.13 (Pilot subcarriers). For 52+26-tone MRU and 106+26-tone MRU, the value is defined from Equation (36-78) to Equation (36-81). For 4´996-tone MRU, the value is defined in Equation (36-76) in 36.3.13.11 (Pilot subcarriers).

 represents the cyclic shift for spatial stream  as defined in 36.3.12.2.2 (Cyclic shift for EHT modulated fields).

 is the guard interval duration as defined in Table 36-17 (Timing-related constants).

 is the transmitted constellation for user *u* in the *r*-th RU/MRU at subcarrier *k*, spatial stream *m*, and Data field OFDM symbol *n* and is defined by Equation (36-84).

* (TBD)

### 36.3.14 Packet extension - 6 TBD [1-527r0, 5-None] POC: Yan Zhang

If transmitting an EHT TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRIGGER\_FRAME (TBD), 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).





where

 is the value indicated by UL Length subfield of the Common Info field in the Trigger frame (TBD).*[527r0]*

 is the value for an EHT TB PPDU in Equation (36-93).





 is the value of the TXVECTOR parameter EHT\_TB\_PE\_DISAMBIGUITY.

If transmitting an EHT TB PPDU for which the TXVECTOR parameter TRIGGER\_METHOD is TRS (TBD), 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.

…

The PE Disambiguity subfield in the Common Info field (TBD) of the Trigger frame shall be set to 1 if the condition in Equation (36-90) is met for the EHT TB PPDU solicited by the Trigger frame. Otherwise, it shall be set to 0.

…

, , , , , and  are defined in Table 36-17 (Timing-related constants).

 and  are defined in Table 36-22 (Frequently used parameters).

 is the value indicated by the PE Disambiguity subfield of the EHT-SIG field for an EHT MU PPDU, or the value indicated by the PE Disambiguity subfield in the Common Info field (TBD) in the Trigger frame for an EHT TB PPDU.

### 36.3.15 Non-HT duplicate transmission- 3 TBD [3-None] POC: Rui Cao

If the TXVECTOR parameter FORMAT is NON\_HT and the TXVECTOR parameter NON\_HT\_MODULATION is NON\_HT\_DUP\_OFDM, the transmitted PPDU is a non-HT duplicate.    Non-HT duplicate transmission is used to transmit to non-HT STAs, HT STAs, VHT STAs, HE STAs, and EHT STAs that may be present in a part of a 40 MHz, 80 MHz, 160 MHz, or 320 MHz channel (see Table 36-3 (Interpretation of FORMAT, NON\_HT\_MODULATION and CH\_BANDWIDTH parameters (TBD))). The RL-SIG, U-SIG, EHT-SIG, EHT-STF, EHT-LTF, and PE fields are not transmitted.

* Per the author of 20/1867r1,  needs to be defined in Table 36-25 (Number of modulated subcarriers and guard interval duration values for EHT PPDU fields).

 is bit *x* of the TXVECTOR parameter INACTIVE\_SUBCHANNELS if present, and is 0 otherwise.

 is, if the TXVECTOR parameter INACTIVE\_SUBCHANNELS is present, equal to the number of bits with value 0 in the TXVECTOR parameter INACTIVE\_SUBCHANNELS. Otherwise, it is equal to .

For each non-HT duplicate PPDU transmission that is a preamble punctured PPDU, each punctured 20 MHz subchannel is indicated as punctured by including the value of 26 (000011010 in binary representation)(TBD) in the 9 bits of the TXVECTOR parameter RU\_ALLOCATION corresponding to the 242-tone RU that is most closely aligned with the punctured 20 MHz subchannel. Each 20 MHz subchannel that is not punctured is indicated as such by including the value of 128 (001000000 in binary representation) in the 9 bits of the TXVECTOR parameter RU\_ALLOCATION corresponding to the 242-tone RU that is most closely aligned with that 20 MHz subchannel.

* Transmit requirements for PPDUs sent in response to a triggering frame

### 36.3.16.1 Introduction - 1 TBD [1-None] POC: Mengshi Liu

An AP may solicit simultaneous EHT TB PPDU transmissions, or simultaneous non-HT or non-HT duplicate PPDU transmissions from multiple non-AP STAs using a triggering frame. Since there are multiple transmitters, transmission time, frequency, sampling symbol clock, and power pre-correction (in the case of an EHT TB PPDU) by the non-AP STAs are necessary to mitigate synchronization and interference issues at the AP. Frequency and sampling clock pre-corrections are needed to prevent           inter-carrier interference. Power pre-correction is necessary to control interference between EHT TB PPDU transmissions from the non-AP STAs. An AP may solicit simultaneous EHT TB PPDU transmissions from both Class A and Class B devices (see 35.x (General) (TBD)). A non-AP STA that supports EHT TB PPDU transmission shall support power pre-correction as described in 36.3.16.2 (Power pre-correction) and shall meet the pre-correction accuracy requirements described in 36.3.16.3 (Pre-correction accuracy requirements).

### 36.3.16.2 Power pre-correction - 3 TBD [3-None] POC: Mengshi Liu

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 (TBD) indicates that the maximum transmit power is needed.

Otherwise, the STA calculates the transmit power, , of the EHT TB PPDU for the assigned EHT-MCS using Equation (36-95).





where

 is the downlink pathloss.

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 (TBD).

A STA includes its UL power headroom in the EHT TB PPDU following the rules defined in 35.x (Non-AP STA behavior for UL MU operation) (TBD).

### 36.3.17.2 EHT beamforming feedback matrix V - 1 TBD [1-None] POC: Edward

Upon receipt of an EHT sounding NDP, the beamformee computes a set of matrices for feedback to the beamformer as described in 27.3.16.2 (Beamforming feedback matrix V). The eligible beamformees shall remove the spatial stream CSD in Table 36-xx (Cyclic shift values for the EHT modulated fields of a PPDU) (TBD) from the measured channel before computing a set of matrices for feedback to the beamformer.

…

### 36.3.19.4.4 Transmitter modulation accuracy (EVM) test - 3 TBD [3-None] POC: Wook Bong

…





* Per the authors of 20/1253r6, Equation (36-102) is TBD.



* Per the authors of 20/1253r6, Equation (36-103) is TBD.

...

In case of a noncontinuous MRU, how to perform the transmit modulation accuracy test for the unoccupied subcarriers of the PPDU is TBD.

### 36.3.20.3 Adjacent channel rejection - 4 TBD [4-None] POC: Wook Bong

|  |  |  |  |
| --- | --- | --- | --- |
| * Minimum required adjacent and nonadjacent channel rejection levels | | | |
| Modulation | Rate (*R*) | Adjacent channel rejection (dB) | Nonadjacent channel rejection (dB) |
| 20/40/80/160/320 MHz channel | 20/40/80/160/320 MHz channel |
| … |  |  |  |
| 4096-QAM | 3/4 | –17 (TBD) | –1 (TBD) |
| 4096-QAM | 5/6 | –20 (TBD) | –4 (TBD) |
| BPSK-DCM (EHT-MCS 15) | 1/2 | 16 | 32 |
| BPSK-DCM (EHT-MCS 14) | 1/2 | 16 | 32 |

* EHT PLME

### 36.4.1 PLME\_SAP sublayer management primitives - 3 TBD [3-None] POC:Youhan

Table 36-67 (EHT PHY MIB attributes) lists the MIB attributes that may be accessed by the PHY entities and the intralayer of higher level LMEs. These attributes are accessed via the PLME-GET, PLME-SET, PLME-RESET, and PLME-CHARACTERISTICS primitives defined in 6.5 (PLME SAP interface).

|  |  |  |
| --- | --- | --- |
| * EHT PHY MIB attributes | | |
| Managed object | Default value/range | Operational semantics |
| **dot11PHYOperationTable** | | |
| … |  |  |
| **dot11PHYTxPowerTable** | | |
| … |  |  |
| **dot11PHYOFDMTable** | | |
| … |  |  |
| **dot11PHYHTTable** | | |
| … |  |  |
| **dot11PHYVHTTable** | | |
| … |  |  |
| **dot11TransmitBeamformingConfigTable** | | |
| … |  |  |
| **dot11VHTTransmitBeamformingConfigTable** | | |
| … |  |  |
| **dot11PHYHETable** | | |
| … |  |  |
| **dot11HETransmitBeamformingConfigTable** | | |
| … |  |  |
| **dot11PHYEHTTable** | | |
| … |  |  |
| **dot11EHTTransmitBeamformingConfigTable** | | |
| TBD | TBD | TBD |

### 36.4.4 EHT PHY - 2 TBD [2-None] POC:Youhan

|  |  |
| --- | --- |
| * EHT PHY characteristics | |
| Characteristics | Value |
| aPSDUMaxLength | TBD |
| aRxPHYStartDelay | TBD |

## Annex B

(normative)

**Protocol Implementation Conformance Statement (PICS) proforma**

* PICS proforma—IEEE Std 802.11-<year>

***Insert the following new subclause at the end of subclause B.4:***

* Extremely High Throughput (EHT) features

### B.4.36a.1 EHT MAC features – Placeholder

***Editor’s Note: It is a placeholder subclause.***

### B.4.36a.2 EHT PHY features – 10 TBDs *[10-None]* POC: Sigurd

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Protocol capability | References | Status | Support |
| **EHTP1** | **PHY operating modes** |  |  |  |
|  | … |  |  |  |
| **EHTP2** | **EHT PPDU formats** |  |  |  |
|  | **…** |  |  |  |
| EHTP2.7 | MU-MIMO transmission on an RU/MRU in an EHT MU PPDU where there are multiple RU/MRUs in the PPDU bandwidth (DL MU-MIMO within OFDMA) | TBD | CFEHT and CFAP: O | Yes o No o N/A o |
| EHTP2.8 | MU-MIMO reception on an RU/MRU in an EHT MU PPDU where there are multiple RU/MRUs in the PPDU bandwidth (DL MU-MIMO within OFDMA) | 36.3.3.1.1 | CFEHT AND CFSTAofAP: O | Yes o No o N/A o |
| EHTP2.9 | Transmission of an EHT TB PPDU where the RU/MRU allocated to the non-AP STA is not utilizing MU-MIMO (UL OFDMA) | TBD | CFEHT AND CFSTAofAP: M | Yes o No o N/A o |
| EHTP2.10 | Reception of an EHT TB PPDU where none of the RUs or MRUs utilize MU-MIMO (UL OFDMA) | TBD | CFEHT and CFAP: M | Yes o No o N/A o |
| EHTP2.11 | Transmission of an EHT TB PPDU consisting of a single RU or MRU spanning the entire PPDU bandwidth and utilizing MU-MIMO (UL MU-MIMO) | 36.3.3.2.4 | CFEHT and CFSTAofAP: M | Yes o No o N/A o |
| EHTP2.12 | Reception of an EHT TB PPDU consisting of a single RU or MRU spanning the entire PPDU bandwidth and utilizing MU-MIMO (UL MU-MIMO) | 36.3.3.3 | CFEHT and CFAP AND EHTP7.22: O | Yes o No o N/A o |
| EHTP2.13 | Transmission of an EHT TB PPDU where the RU/MRU allocated to the non-AP STA is utilizing MU-MIMO (UL MU-MIMO within OFDMA) | TBD | CFEHT and CFSTAofAP: O | Yes o No o N/A o |
| EHTP2.14 | Reception of an EHT TB PPDU where RU/MRU allocated to a non-AP STA are utilizing MU-MIMO (UL MU-MIMO within OFDMA) | TBD | CFEHT and CFAP AND EHTP7.22: O | Yes o No o N/A o |
| **EHTP3** | **BSS bandwidth** |  |  |  |
| EHTP3.13 | Ability to participate in 320 MHz UL OFDMA | 36.3.2.3 | CFEHT20: M  CFEHT80: M  EHTP3.4: M | Yes o No o N/A o |
| **EHTP4** | **EHT LTF formats** |  |  |  |
|  | … |  |  |  |
| EHTP4.19 | Support of extra EHT-LTF for non-OFDMA transmissions | TBD | CFEHT: O | Yes o No o N/A o |
| **EHTP5** | **RU support** |  |  |  |
| EHTP5.1 | (single) RU support in all applicable locations |  |  |  |
|  | … |  |  |  |
| **EHTP6** | **Coding** |  |  |  |
|  | … |  |  |  |
| **EHTP7** | **EHT MCS support** |  |  |  |
|  | … |  |  |  |
| **EHTP8** | **Preamble** |  |  |  |
| EHTP8.1 | Reception of the EHT-SIG field in an EHT MU PPDU at EHT-MCSs 0, 1, 3, and 15 | 36.1.1 | CFEHT: M | Yes o No o N/A o |
| EHTP8.2 | Transmission and reception of a non-OFDMA EHT MU PPDU with any preamble puncturing pattern needed to support mandatory MRU for non-OFDMA | 36.1.1 | CFEHT AND CFAP: M | Yes o No o N/A o |
| EHTP8.3 | Transmission of an OFDMA EHT MU PPDU with any preamble puncturing pattern needed to support mandatory MRU for non-OFDMA | 36.1.1 | CFEHT AND CFAP: M | Yes o No o N/A o |
| EHTP8.4 | Transmission of an OFDMA EHT MU PPDU with any preamble puncturing pattern as specified in subclause 36.3.12.11 but excluding any pattern needed to support mandatory MRU for non-OFDMA | 36.1.1 | CFEHT AND CFAP: O | Yes o No o N/A o |
| EHTP8.5 | Transmission and reception of a non-OFDMA EHT MU PPDU with any preamble puncturing pattern needed to support mandatory MRU for non-OFDMA | 36.1.1 | CFEHT AND CFSTAofAP: M | Yes o No o N/A o |
| EHTP8.6 | Reception of an OFDMA EHT MU PPDU with any preamble puncturing pattern | 36.1.1 | CFEHT AND CFSTAofAP: M | Yes o No o N/A o |
| **EHTP9** | **Sounding** |  |  |  |
| EHTP9.1 | Punctured sounding operation | TBD | CFEHT: O | Yes o No o N/A o |
| EHTP9.2 | Responding with requested beamforming feedback in an EHT sounding procedure with the maximum number of space-time streams in the EHT sounding NDP that the non-AP EHT STA can respond to equal to at least 4 | TBD | CFEHT AND CFSTAofAP: M | Yes o No o N/A o |
|  | … |  |  |  |
| **EHTP10** | **Transmit beamforming** |  |  |  |
|  | … |  |  |  |
| **EHTP11** | **Spatial reuse** |  |  |  |
| EHTP11.1 | PSR-based SR support | TBD | CFEHT AND CFSTAofAP: O | Yes o No o N/A o |
| **EHTP12** | **Power boost factor** | TBD | CFEHT: O | Yes o No o N/A o |