IEEE P802.11
Wireless LANs

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| --- |
| Large Bandwidth Support |
| Date: 2022-1-04 |
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Abstract

This submission proposes MCS level limitation in downlink large bandwidth support:

*

Baseline documents: TGbe D1.31.

Revisions:

* Rev 0: Initial version of the document. Use D1.31 as baseline spec text.
* Rev 1: Update based on offline discussion.

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.***

***Discussion***

Discussion can be found in [1].

* **Option 2: Add another capability which indicates maximum MCS level when receiving larger bandwidth MU PPDU.**

***Proposed Change #1***

*Modify 9.4.2.313.1 as follows*

* + - 1. **EHT Capabilities element**
				1. **General**

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 9-1002r (EHT Capabilities element for-](#bookmark144) [mat)](#bookmark144).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Element | Length | Element ID Extension | EHT MACCapabilities Information | EHT PHYCapabilities Information | Supported EHT-MCSAnd NSS Set | EHT PPEThresholds (Optional) |

Octets: 1 1 1 2 9 variable variable

**Figure 9-1002r—EHT Capabilities element format**

The Element ID, Length, and Element ID Extension fields are defined in [9.4.2.1 (General)](#bookmark85).

The EHT MAC Capabilities Information, EHT PHY Capabilities Information, Supported EHT-MCS And NSS Set, and EHT PPE Thresholds fields are defined in the subclauses below.

***Proposed Change #2***

*Update Figure 9-1002t as follows:*

B0 B1 B2 B3 B4 B5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reserved | Support For 320 MHzIn 6 GHz | Support for 242-tone RU In BW Wider Than20 MHz | NDP With4 EHT-LTF And3.2 µs GI | Partial Bandwidth UL MU-MIMO | SU Beamformer |

Bits: 1 1 1 1 1 1

B6 B7 B9 B10 B12 B13 B15 B16 B18 B19 B21

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SU Beamformee | Beamformee SS (≤ 80 MHz) | Beamformee SS (= 160 MHz) | Beamformee SS (= 320 MHz) | Number Of Sounding Dimensions (≤ 80 MHz) | Number Of Sounding Dimensions (= 160 MHz) |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bits: 1 |  | 3 | 3 | 3 | 3 | 3 |
| B22 |  | B24 | B25 | B26 | B27 | B28 | B29 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number Of Sounding Dimensions (= 320 MHz) | Ng = 16 SUFeedback | Ng = 16 MUFeedback | Codebook Size,  = 4, 2 SU Feedback | Codebook Size,  = 7, 5 MU Feedback | Triggered SU Beamforming Feedback |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bits: 3 | 1 | 1 | 1 | 1 | 1 |
| B30 | B31 | B32 | B33 | B34 | B35 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Triggered MU Beamforming Partial BW Feedback | Triggered CQI Feedback | Partial Bandwidth DL MU-MIMO | (#5444)EHTPSR-Based SR Support | Power Boost Factor Support | EHT MU PPDUWith4 EHT-LTF And0.8 µs GI |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bits: 1 |  | 1 | 1 | 1 | 1 |  | 1 |  |
| B36 |  | B39 | B40 | B41 | B42 | B43 | B44 |  | B45 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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 | Common Nominal Packet Padding |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bits: 4 |  |  | 1 |  | 1 | 1 | 1 | 2 |
| B46 |  | B50 | B51 |  | B54 | B55 | B56 | B57 | B58 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Maximum Number Of Supported EHT-LTFs | ( #4968)Support Of MCS 15 | (#5709)Support Of EHT DUP (MCS 14) In6 GHz | Support For 20 MHzOperating STA Receiving NDP With Wider Bandwidth | Non-OFDMA UL MU-MIMO (BW ≤ 80 MHz) | Non-OFDMA UL MU-MIMO(BW = 160 MHz) |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bits: 5 | 4 | 1 | 1 | 1 | 1 |
| B59 | B60 | B61 | B62 | B63 | B64 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Non-OFDMA UL MU-MIMO (BW = 320 MHz) | MU Beamformer (BW ≤ 80 MHz) | MU Beamformer (BW = 160 MHz) | MU Beamformer (BW = 320 MHz) | (#5770)TBSounding Feedback Rate Limit | RX 1024-QAM in Wider Bandwidth DL OFDMA Support |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bits: 1 | 4 | 1 | 1 | 1 | 1 |
| B65 | B66 B71  |  |  |  |  |

|  |  |
| --- | --- |
| RX 4096-QAM in Wider Bandwidth DL OFDMA Support | Reserved |

Bits: 1 5

**Figure 9-1002t—EHT PHY Capabilities Information field format**

***Proposed Change #3***

*Modify Table 9-401j as follows:*

**Table 9-401j—Subfield of the EHT PHY Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| Support For320 MHz In 6 GHz | Indicates support for non-OFDMA 320 MHz PPDUs when operating in the 6 GHz frequency band. | Set to 0 if not supported.Set to 1 if supported. |
| … | … | … |
| RX 1024-QAM in Wider Bandwidth DL OFDMA Support | Indicates support for the reception of 1024-QAM in an EHT DL OFDMA with PPDU bandwidth wider than the operating bandwidth of the non-AP STA.  |  Set to 0 if 1024-QAM is not supported regardless the indication in the Rx EHT-MCS Map subfield.  Set to 1 if support of 1024-QAM is the same as that indicated in the EHT-MCS Map (20 MHz-Only Non-AP STA) for a 20 MHz-only non-AP STA, the EHT-MCS Map (BW ≤ 80 MHz, Except 20 MHz-Only Non-AP STA) for a 20 MHz or 80 MHz operating non-AP STA, and the EHT-MCS Map (BW = 160 MHz) for a 160 MHz operating non-AP STA. Reserved for an AP. |
| RX 4096-QAM in Wider Bandwidth DL OFDMA Support | Indicates support for the reception of 4096-QAM in an EHT DL OFDMA with PPDU bandwidth wider than the operating bandwidth of the non-AP STA.  |  Set to 0 if 4096-QAM is not supported regardless the indication in the Rx EHT-MCS Map subfield.  Set to 1 if support of 4096-QAM is the same as that indicated in the EHT-MCS Map (20 MHz-Only Non-AP STA) for a 20 MHz-only non-AP STA, the EHT-MCS Map (BW ≤ 80 MHz, Except 20 MHz-Only Non-AP STA) for a 20 MHz or 80 MHz operating non-AP STA, and the EHT-MCS Map (BW = 160 MHz) for a 160 MHz operating non-AP STA. Reserved for an AP. |

***Proposed Change #4***

*Modify Table 9-401k as follows:*

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| EHT-MCS Map(20 MHz-Only Non-AP STA)(#5872) | For a 20 MHz-only non-AP STA(#5872), indicates the maximum number of spatial streams supported for reception and the maximum num- ber of spatial streams that the STA can transmit, for each MCS value in a PPDU with a bandwidth of 20 MHz, 40 MHz, 80 MHz, or 160 MHz with the following additional restrictions: * Support for the reception of 1024-QAM in a 40 MHz, 80 MHz, or 160 MHz EHT DL OFDMA is indicated jointly with the RX 1024-QAM in Wider Bandwidth DL OFDMA Support subfield.
* Support for the reception of 4096-QAM in a 40 MHz, 80 MHz, or 160 MHz EHT DL OFDMA is indicated jointly with the RX 4096-QAM in Wider Bandwidth DL OFDMA Support subfield.
 | The format and encoding of this subfield are defined in [Figure 9-1002u (Supported](#bookmark150) [EHT-MCS and NSS Set field format)](#bookmark150) and the associated description.In 5 GHz, if B1, B2, and B3 of the Sup- ported Channel Width Set field in the HE PHY Capabilities Information field are all 0, then this field is present; otherwise, it is not present.In 2.4 GHz, if B0 of the Supported Channel Width Set field in the HE PHY Capabilities Information field is 0, then this field is pres- ent; otherwise, it is not present. |
| EHT-MCS Map(BW ≤ 80 MHz, Except 20 MHz-Only Non-AP STA(#5872)) | Except for a 20 MHz-only non-AP STA(#5872), indicates the maximum number of spatial streams supported for reception and the maximum num- ber of spatial streams that the STA can transmit, for each MCS value, in a PPDU with a bandwidth of 20 MHz, 40 MHz, or 80 MHz with the following additional restrictions: * Support for the transmission of 1024-QAM and 4096-QAM on a 26-, 52-, and 106-tone RU and on a 52+26-tone and 106+26-tone MRU is indicated jointly with the Tx 1024-QAM And 4096-QAM < 242-tone RU support subfield.
* Support for the reception of 1024-QAM and 4096-QAM on a 26-, 52-, and 106-tone RU and on a 52+26-tone and 106+26-tone MRU is indicated jointly with the Rx 1024-QAM And 4096-QAM < 242-tone RU support subfield.

 For a 20 MHz or 80 MHz operating non-AP STA, additionally indicates the maximum number of spatial streams supported for reception and the maximum number of spatial streams that the non-AP STA can transmit, for each MCS value, in a PPDU with a bandwidth of 160 MHz or 320 MHz with the following additional restriction: * Support for the reception of 1024-QAM in a 160 MHz, or 320 MHz EHT DL OFDMA is indicated jointly with the RX 1024-QAM in Wider Bandwidth DL OFDMA Support subfield.
* Support for the reception of 4096-QAM in a 160 MHz, or 320 MHz EHT DL OFDMA is indicated jointly with the RX 4096-QAM in Wider Bandwidth DL OFDMA Support subfield.
 | The format and encoding of this subfield are defined in [Figure 9-1002u (Supported](#bookmark150) [EHT-MCS and NSS Set field format)](#bookmark150) and the associated description.In 5 GHz or 6 GHz, if B1 of the Supported Channel Width Set field in the HE PHY Capabilities Information field is 1, then this field is present; otherwise, it is not present.In 2.4 GHz, if B0 of the Supported Channel Width Set field in the HE PHY Capabilities Information field is 1, then this field is pres- ent; otherwise it is not present. |
| EHT-MCS Map (BW = 160 MHz) | If the operating channel width of the STA is greater than or equal to160 MHz, indicates the maximum number of spatial streams supported for reception and the maximum num- ber of spatial streams that the STA can transmit, for each MCS value, in a PPDU with a bandwidth of 160 MHz.For a 160 MHz operating non-AP STA, additionally indicates the maxi- mum number of spatial streams sup- ported for reception and the maximum number of spatial streams that the non-AP STA can transmit, for each MCS value, in a PPDU with a band- width of 320 MHz with the following additional restrictions: * Support for the reception of 1024-QAM in a 320 MHz EHT DL OFDMA is indicated jointly with the RX 1024-QAM in Wider Bandwidth DL OFDMA Support subfield.
* Support for the reception of 4096-QAM in a 320 MHz EHT DL OFDMA is indicated jointly with the RX 4096-QAM in Wider Bandwidth DL OFDMA Support subfield.
 | The format and encoding of this subfield are defined in [Figure 9-1002u (Supported](#bookmark150) [EHT-MCS and NSS Set field format)](#bookmark150) and the associated description.If B2 of the Supported Channel Width Set field in the HE PHY Capabilities Informa- tion field is 1, then this field is present; oth- erwise, it is not present. |
| EHT-MCS Map (BW = 320 MHz) | If the operating channel width of the STA is 320 MHz, indicates the maxi- mum number of spatial streams sup- ported for reception and the maximum number of spatial streams that the STA can transmit, for each MCS value, in a PPDU with a bandwidth of 320 MHz. | The format and encoding of this subfield are defined in [Figure 9-1002u (Supported](#bookmark150) [EHT-MCS and NSS Set field format)](#bookmark150) and the associated description.If the Support For 320 MHz In 6 GHz sub- field, in the EHT PHY Capabilities Infor- mation field is 1, then this field is present; otherwise, it is not present. |

***Reference***

[1] 11-21-1943-00-00be-Issue of large BW support.