### IEEE P802.11Wireless LANs

|  |
| --- |
| Proposed Draft Specification for EHT OM in A-control |
| Date: 2021-01-20 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel Corporation | 2200 Mission College Blvd, Santa Clara, CA 950542200  |  | po-kai.huang@intel.com |
| Arik Klein  | Huawei |  |  | arik.klein@huawei.com |
| Alfred Asterjadhi | Qualcomm |  |  | aasterja@qti.qualcomm.com |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

We propose pdt for EHT OM in A-Control based on the following motion.

***A new Control ID in A-Control is defined for EHT Operating mode (OM) that enables indication of 320 MHz, Tx NSTS larger than 8, and Rx NSS larger than 8.***

***Signaling TBD.***

***[Motion 137, #SP277, [3] and [167]]***

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on comments by Arik to clarify that clause 35 is for EHT STA and OMI originator/responder definition in Clause 26.9 will apply.
* Rev 2: Revision on discussion to add clear reasoning
* Rev 3: resolve one comment about OM.
* Rev 4: Accommodate further feedback from Alfred.
* Rev 5: Further revision based on discussion to resolve EHT TB PPDU and non-EHT PPDU rule for non-EHT PPDU bandwidth greater than 80 MHz.

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 0.4 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D0.4 Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 2004 | JINYOUNG CHUN | 51.29 | 9.2.4.6a | We need to update OM Control subfield for EHT because OM Control in 9.2.4.6a.2 can't support 320MHz channel width. | Let's make OM Control subfield for EHT | Revised – Agree in principle with the commenter. TGbe editor to make the changes shown in 11-21/0131r5 under all headings that include CID 2004 |

Discussion: There are two options on the table for the frame format of EHT OM that can preserve the current implementation consideration of only seeing fixed length control information and enable all the exiting functionalities of legacy OM.

Option 1: Extend one bit of Rx NSS, Channel Width and Tx NSTS followed by existing OM

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Control ID (EHT OM)** | **Rx NSS** | **Channel Width** | **Tx NSTS** | Reserved | **Control ID (OM)** | **Rx NSS** | **Channel Width** | **UL MU Disable** | **Tx NSTS** | **ER SU Disable** | **DL MU-MIMO Resound Recommendation** | **UL MU Data Disable** |
| Bits: | 4 | 1 | 1 | 1 | TBD | 4 | 3 | 2 | **1** | 3 | **1** | **1** | **1** |

* Since legacy OM always follows EHT OM. Implementation can still assume fixed control information after seeing EHT OM control ID. At the same time, all the bits of legacy OM are still there without the need of further debate.

Option 2: Copy everything and expand size of Rx NSS, Channel Width and Tx NSTS

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Control ID (EHT OM)** | **Rx NSS** | **Channel Width** | **UL MU Disable** | **Tx NSS** | **ER SU Disable** | **DL MU-MIMO Resound Recommendation** | **UL MU Data Disable** | **Rserved** |
| **Bits:** | **4** | **4** | **3** | **1** | **4** | **1** | **1** | **1** | TBD |

* Putting everything we need in one EHT OM. There may be discussion again on downselecting existing functionalities. We can also put everything there by default.

We hear people want option 1 to preserve functionalities of legacy OM directly and propose texts for option 1.***TGbe editor: Modify Table 9-22a as follows: (Track change on)***

* HE variant

(…existing texts…)

|  |
| --- |
| * Control ID subfield values
 |
| Control ID value | Meaning | Length of the Control Information subfield (bits) | Content of the Control Information subfield |
| 0 | Triggered response scheduling (TRS) | 26 | See 9.2.4.6a.1 (TRS Control) |
| 1 | Operating mode (OM) | 12 | See 9.2.4.6a.2 (OM Control) |
| 2 | HE link adaptation (HLA) | 26 | See 9.2.4.6a.3 (HLA Control) |
| 3 | Buffer status report (BSR) | 26 | See 9.2.4.6a.4 (BSR Control) |
| 4 | UL power headroom (UPH) | 8 | See 9.2.4.6a.5 (UPH Control) |
| 5 | Bandwidth query report (BQR) | 10 | See 9.2.4.6a.6 (BQR Control) |
| 6 | Command and status (CAS) | 8 | See 9.2.4.6a.7 (CAS Control)) |
| 7 | EHT Operating Mode (EHT OM) | 6 | See 9.2.4.6a.8 (EHT OM)(#2004) |
| 8-14 | Reserved |  |  |
| 15 | Ones need expansion surely (ONES) | 26 | See 10.8 (HT Control field operation) |

***TGbe editor: Insert new subclause in 9.2.4.6a HE variant***

9.2.4.6a.x EHT OM Control(#2004)

The Control Information subfield in an EHT OM Control subfield contains information related to the operating mode (OM) changes for bandwidth of 320 MHz, Tx NSS larger than 8, and Rx NSS larger than 8 for the STA transmitting the frame containing this information (see 35.x (Operating mode indication)). The format of the subfield is shown in Figure 9-xxx (Control Information subfield format in an EHT OM Control subfield).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 |  |
|  | Rx NSS Extension |  Channel Width Extension | Tx NSTS Extension | Reserved |
| Bits: | 1 | 1 | 1 | 3 |

Figure 9-xxx (Control Information subfield format in an EHT OM Control subfield)

If the operating channel width of the STA is greater than 80 MHz, then the Rx NSS Extension subfield in EHT OM Control subfield together with the Rx NSS subfield in OM Control subfield indicate the maximum number of spatial streams, *NSS*, that the STA supports in reception, where the RX NSS Extension subfield provides the MSB of the *NSS* and the RX NSS subfield provides the 3 LSBs of the *NSS*, for PPDU bandwidths less than or equal to 80 MHz and is set to Nss-1.

If the operating channel width of the STA is less than or equal to 80 MHz, then the Rx NSS Extension subfield in EHT OM Control subfield together with the Rx NSS subfiled in OM Control subfield indicate the maximum number of spatial streams, *NSS*, that the STA supports in reception, where the RX NSS Extension subfield provides the MSB of the *NSS* and the RX NSS subfield provides the 3 LSBs of the *NSS*, and is set to Nss-1.

If the operating channel width of the STA is greater than 80 MHz, then the maximum number of spatial
streams that the STA supports in reception for non-EHT PPDU bandwidths greater than 80 MHz is defined in 26.9
(Operating mode indication).

The Channel Width Extension subfield in EHT OM Control subfield together with the Channel Width subfield in OM Control subfield indicates the operating channel width supported by the STA for both reception and transmission.

The encoding of the Channel Width Extension subfield in EHT OM Control subfield together with the Channel Width subfield in OM Control subfield is described in Table xxx

Table xxx – The encoding of the Channel Width Extension subfield in EHT OM Control subfield together with the Channel Width subfield in OM subifled

|  |  |  |
| --- | --- | --- |
| Channel Width Extension subfield in EHT OM Control subfield | Channel Width subfield in OM subfield | Indication of the operating channel width |
| 0 | 0 | Primary 20 MHz  |
| 0 | 1 | Primary 40 MHz |
| 0 | 2 | Primary 80 MHz |
| 0 | 3 | Primary 160 MHz |
| 1 | 0 | Primary 320 MHz |
| 1 | 1-3 | Reserved |

The Tx NSTS Extension subfield in EHT OM Control subfield together with the Tx NSTS subfield in OM subfield indicates the maximum number of space-time streams, *NSTS*, that the STA supports in transmission, where the TX NSTS Extension subfield provides the MSB of the *NSTS* and the TX NSTS subfield provides the 3 LSBs of the NSTS, and is set to NSTS -1.

***TGbe editor: Add one bit in Figure 9-xxx (EHT MAC Capabilities Information field format) of 9.4.2.295c.2 EHT MAC Capabilities Information field as follows:***

***note to the TGbe editor that B0 and clause 9.4.2.295c.2 EHT MAC Capabilities Information field is proposed in 11-21-0253. For the bit number of EHT OM Control Support, the number of the next available bit will be sufficient.***

|  |  |
| --- | --- |
|  | B1 |
|  | EHT OM Control Support |
| Bits: | 1(#2004) |

|  |
| --- |
| Figure 9-xxx - EHT MAC Capabilities Information field format |

***TGbe editor: Add one row in Table 9-xxxa Subfields of the EHT MAC Capabilities Information field ) of 9.4.2.295c.2 EHT MAC Capabilities Information field as follows:***

***note to the TGbe editor that 9.4.2.295c.2 EHT MAC Capabilities Information field is proposed in 11-21-0253.***

|  |
| --- |
| Table 9-xxxa Subfields of the EHT MAC Capabilities Information field  |
| Subfield | Definition | Encoding |
| EHT OM Control Support | Indicates support for receiving a frame with an EHT OM Control subfield. | If the +HTC-HE Support subfield is 1 in a STA:Set to 1 if the STA supports reception of the EHT OM Control subfield.Set to 0 otherwise.Reserved if the +HTC-HE Support subfield is 0 in a STA. (#2004)  |

***TGbe editor: Insert new subclause in clause 35.x Operating mode indication as follows: (Track change on)***

35. Extremely high throughput (EHT) MAC specification

35.x Operating mode indication(#2004)

35.x.1 General

An EHT STA with dot11EHTOMIOptionImplemented equals to true shall set the EHT OM Control Support subfield in the EHT MAC Capabilities Information field in(#Ed) the EHT Capabilities element it transmits to 1; otherwise the EHT STA shall set the EHT OM Control Support subfield to 0.

An EHT STA with dot11EHTOMIOptionImplemented equals to true shall set the OM Control Support subfield in the HE MAC Capabilities Information field in(#Ed) the HE Capabilities element it transmits to 1.

An EHT AP that supports 320 MHz or a number of spatial streams that is greater than 8 shall set dot11EHTOMIOptionImplemented to true and the EHT AP shall implement the reception of the EHT OM Control subfield.

An EHT STA that transmits a frame with A-Control subfield of HE variant HT Control field, which includes an EHT OM Control subfield shall concatenate the OM Control subfield within the same A-Control subfield after the EHT OM control field. An EHT STA shall not include an EHT OM Control field in an A-Control field unless the OM Control field is present in the same A-Control field.

NOTE - An EHT STA is an HE STA and as such inherits all the functionalities defined in 26.9 (Operating mode indication).

NOTE - Based on the requirement to concatenate the OM Control subfield after an EHT OM control subfield and the definition of OMI initiator and OMI responder in 26.9 (Operatring mode indicaiton), an EHT STA that transmits a frame including an EHT OM Control subfield is an OMI initiator, and an EHT STA with dot11EHTOMIOptionImplemented to true that receives a frame including an EHT OM Control subfield is an OMI responder.

For an EHT STA that is an OMI initiator or an OMI responder, the rule described in 26.9 (Operating mode indication) that applies to HE TB PPDU shall apply to EHT TB PPDU.

An OMI initiator that transmits a frame including an EHT OM Control subfield and a OMI responder that receives a frame including an EHT OM Control field shall follow the rules defined in 26.9 (Operating mode indication), except that the *NSS , NSTS ,* and/or the maximum operating channel widthshall be calculated by EHT OM Control subfield together with the OM Control subfield as defined in 9.2.4.6a.x (EHT OM Control).

**Straw Poll: Do you support to incorporate the proposed draft text in 11-21-0131r5 to the TGbe Draft?**