IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Comment Resolutions on PHY INTRODUCTION  Part 5 | | | | |
| Date: 2018-03-03 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Lochan Verma | Qualcomm Inc. | 5775 Morehouse Dr, San Diego, CA 92121 | +1-858-845-7832 | lverma@qti.qualcomm.com |
| Youhan Kim |  |  | youhank@qca.qualcomm.com |
| Bin Tian |  |  | btian@qti.qualcomm.com |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes resolutions for the following comments on section HE PHY Capabilities of TGax D2.0:

11904, 12659, 11900, 11901, 13403

Revisions:

* Rev 0: Initial version of the document.

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

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

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clause Number** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 11904 | 9.4.2.237.3 | 141.53 | If a device claims DCM up to 1SS and up to BPSK, it may not get much additional benefit by doing DCM for wider bandwidth (RU size). | Add additioal capabilties for max RU size supported for DCM Tx and Rx | Revised—  Agree with the commenter. Propose to add two capability bits to indicate DCM (transmit and receive) support for all RU sizes on 40/80 MHz and 160/80+80 MHz, respectively.  Tgax Editor to make the changes for CID11904 as suggested in proposed resolution in IEEE 802.11-18/0409r0 |
| 12659 | 9.4.2.237.2 | 138.15 | There are DCM Max Constellation Rx and DCM Max NSS Tx/Rx capability fields, but no normative behaviour associated with them | Delete these fields from the referenced subclause (table and figure) | Revised—  Agree with commenter that normative text is required.  Tgax Editor to make the changes for CID12659 as suggested in proposed resolution in IEEE 802.11-18/0409r0 |
| 11900 | 28.1.1 | 329.21 | "Transmission of an HE MU PPDU where none of the RUs utilize MU-MIMO (DL OFDMA)", what if an AP only supports one user DL-OFDMA? May add some lower bound on the supported number of DL-OFDMA users, for example 4 users. | Add "and is able to transmit an HE MU PPDU with at least 4 RUs" | Reject—  IEEE 802.11ax defines procedures enabling OFDMA (DL and UL). The decision to support 1 or more users should left to implementation and also to WFA, which may decide an appropriate number of OFDMA user support for marketing.  Furthermore, 11ax spec., does not distinguish b/w mobile APs (e.g., smartphones) vs. traditional wall-powered APs. |
| 11901 | 28.1.1 | 329.21 | "Reception of an HE TB PPDU where none of the RUs utilize MU-MIMO (UL OFDMA)", what if an AP only supports one user UL-OFDMA? May add some lower bound on the supported number of UL-OFDMA users, for example 4 users. | Add "and is able to trigger and receive an HE TB PPDU with at least 4 RUs" | Reject—  IEEE 802.11ax defines procedures enabling OFDMA (DL and UL). The decision to support 1 or more users should left to implementation and also to WFA, which may decide an appropriate number of OFDMA user support for marketing.  Furthermore, 11ax spec., does not distinguish b/w mobile APs (e.g., smartphones) vs. traditional wall-powered APs. |
| 13403 | 28.3.11.9 | 462.39 | 1024QAM should be supported for RU less than 242 in order to maximize OFDMA Tput | delete "for RUs equal to or larger than 242 subcarriers" | Revised—  The discussion on enabling 1024-QAM on small RU sizes is presented in 11-18/359r0.  Here, we propose to add capability bit to indicate support of 1024-QAM on small RU.  Tgax Editor to make the changes for CID13403 as suggested in proposed resolution in IEEE 802.11-18/0409r0 |

**==============================================================================**

**Resolution on CID 11904**

Discussion: DCM up to 20 MHz bandwidth is helpful for robustness and overall system performance. However, if using DCM on wider bandwidths, the overall system performance may degrade since DCM uses more frequency resources. Hence suggest, to introduce a signalling to indicate DCM maximum BW support.

**TGax Editor: In Figure 9-589cl (HE PHY Capabilities Information field format), replace ‘Reserved’ bit B70-B71 with “DCM Max BW Support”**

**TGax Editor: Please make the following changes to Table 9-262aa (CIDs: 11904)**

**Table 9-262aa—Subfields of the HE PHY Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| **DCM Max BW (#11904)** | **It indicates maximum PPDU bandwidth to which DCM is applied by the STA.** | **Set to 0, for 20 MHz.**  **Set to 1, for 40 MHz.**  **Set to 2, for 80 MHz.**  **Set to 3, for 160/80+80 MHz.**  **Note 1— This field indicates DCM Max BW (transmit), if DCM Max Constellation Tx set greater than 0.**  **Note 2 – This field indicates DCM Max BW (receive), if DCM Max Constellation Rx set greater than 0.**  **Note 3—This field indicates DCM Max BW (transmit and receive), if DCM Max Constellation Tx and DCM Max Constellation Rx set greater than 0, respectively.**  **Note 4—This field is reserved, if DCM Max Constellation Tx and DCM Max Constellation Rx set to 0, respectively.** |

**27.15.3 MCS, NSS, BW, and DCM selection**

**TGax Editor: Please make the following changes to 27.15.3**

An HE STA may transmit an HE PPDU with DCM to a peer STA if it has received from the peer STA an HE Capabilities element with the DCM Max Constellation Rx subfield(#12536) in the HE PHY Capabilities Information field greater than 0; otherwise the STA shall not transmit an HE PPDU with DCM to the peer STA. In this case, the maximum PPDU bandwidth of the HE PPDU with DCM that HE STA may transmit to a peer STA is indicated by the peer STA in the DCM Max BW subfield in the HE PHY Capabilities Information field.

[PARA BREAK]

An HE STA transmits an HE TB PPDU with DCM as defined in 27.5.3.3 (STA ehaviour for UL MU operation). When sending a Trigger Frame, the HE AP shall not set the DCM subfield of User Info field in the Trigger Frame to 1 if the destination non-AP HE STA(#14217) sets the DCM Max Constellation Tx field to 0 in the HE PHY Capabilities Information field.

[PARA BREAK]

An HE STA that transmits an HE PPDU with DCM to a peer STA shall use an NSS that is supported by the receiving STA as indicated by the DCM Max NSS Rx subfield in the HE PHY Capabilitites Information field. When sending a Trigger frame, the HE AP shall set the Number of Spatial Streams subfield in the Trigger Frame to less than or equal to the value indicated in the DCM Max NSS Rx subfield in HE PHY Capabilities Information field.

**Resolution to CID13403**

**Discussion on increasing number of reserved bits in HE PHY capabilities Information field: The HE PHY capabilities have run of out reserved bits. More capabilities are being defined. Hence it is necessary that we increase the number of available reserved bits in HE PHY Capabilities Information field.**

**Propose to add 1 reserved byte at the end of the HE PHY Capabilities Information field.**

**Discussion on introducing 1024 QAM Capabilities: 1024-QAM modulation is optional to support in 11ax. Currently, through HE-MCS And NSS set field an 11ax device indicates support of 1024-QAM (transmit and receive) for different NSS for BW80 MHz and BWMHz. Hence, there is no explicit capability in HE PHY Capabilities Information field to indicate support of 1024-QAM.**

**However, the spec., restricts use of 1024-QAM for RU sizes tone. In 11-18/359r0, use of 1024-QAM on RU sizes tone is enabled. This is optional feature and requires a signalling capability.**

**Propose to add a ‘1024-QAM support < 242-tone RU’, capability. Also, normative text to this capability is provided.**

**Resolution:**

**Tgax Editor: In Figure 9-589cl (HE PHY Capabilities Information field format), add 1 reserved byte after bit, B71, i.e., B72-80 are to be added and marked ‘reserved’.**

**Tgax Editor: In Figure 9-589cl (HE PHY Capabilities Information field format), replace, bit B72 and B73, ‘Reserved’ with ‘1024-QAM Support < 242-tone RU Tx’ and ‘1024-QAM Support < 242-tone RU Rx’, respectively.**

**Tgax Editor: Please add the following to the end of Table 9-262aa**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| **Tx 1024-QAM Support < 242-tone RU (#13403)** | **It indicates if STA supports transmission of 1024-QAM on 26-,52-, and 106-tone RU.** | **Set to 0, if not supported.**  **Set to 1, if supported.** |
| **Rx 1024-QAM Support < 242-tone RU** | **It indicates if STA supports reception of 1024-QAM on 26-,52-, and 106-tone RU.** | **Set to 0, if not supported.**  **Set to 1, if supported.** |

**27.15.3 PPDU format, BW, MCS, NSS, and DCM selection rules**

**TGax Editor: Please add the following paragraph to section 27.15.3**

**…**

**An HE STA may transmit an HE PPDU with 1024-QAM on 26-, 52-, and 106-tone RU to a peer STA if it has received from the peer STA an HE Capabilities element with Rx 1024-QAM Support < 242-tone RU subfield in the HE PHY Capabilities Information field set to 1; otherwise the STA shall not transmit an HE PPDU with 1024-QAM on RU size less than 242-tone.**

**[PARA BREAK]**

**When sending a Trigger Frame, the HE AP shall not set MCS subfield of the User Info field in the Trigger frame to 10 or 11, if the destination HE non-AP STA is assigned 26-, 52-, or 106-tone RU and the destination HE non-AP STA sets the Tx 1024-QAM Support < 242-tone RU to 0 in the HE PHY Capabilities Information field.**

**An HE STA that sends a Control frame….**

**References:**

1. **IEEE P802.11axTM/D2.0, Oct 2017.**