IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Comment resolutions for HE BSS operation in 6 GHz | | | | |
| Date: 2019-05-01 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Alfred Asterjadhi | Qualcomm Inc. | 5775 Morehouse Dr, San Diego, CA 92109 | +1-858-658-5302 | aasterja@qti.qualcomm.com |
| Abhishek Patil | Qualcomm Inc. |  |  |  |
| George Cherian | Qualcomm Inc. |  |  |  |

Abstract

This submission proposes resolutions for multiple comments related to TGax D4.0 with the following CIDs (14 CIDs):

* 20241, 20411, 20980, 21280, 21281,21282, 21283, 21350,
* 21351, 21352, 21510, 21511, 21524, 21553,

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revised version that incorporates changes suggested during the presentation and fixed the issue highlighted for CID 20411 by indicating that the BW of the non-HT dup beacon is up to the BSS channel width rather than equal to the BSS channel width. The follow two CIDs remain as deferred and not addressed in this document: 20074, 20130. Changes in green.
* Rev 2: Amended as per suggestions during the presentation. Changes highlighted in this color.

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** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 20241 | Huizhao Wang | 429.58 | Allow 20MHz-only STA in 6GHz | Remove the statements | Rejected –  The requirement of supporting at least 80 MHz applies to APs. Quoting:  “An HE AP operating in the 6 GHz band shall indicate support for at least 80 MHz channel width.”  20 MHz-only STAs are non-AP STAs as such this requirement does not apply to them, i.e., 20 MHz-only STAs are already allowed. |
| 20411 | Liwen Chu | 429.46 | It helps STA's SST operation if an AP announces its duplicate beacon transmission | As in comment | Revised –  Agree in principle with the comment. Proposed resolution is to add a bit in the HE Operation element that is used by the AP to declare non-HT duplicate beacon generation in 6 GHz band.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 20411. |
| 20980 | Mark RISON | 430.01 | "A 6 GHz HE STA shall not transmit to another 6 GHz HE STA an MPDU in an HE PPDU that exceeds the maximum MPDU length capability indicated in the Extended HE Capabilities element received from the receiving STA." -- the limit might be exceeded for CBR/CQI frames | As it says in the comment | Revised –  Agree in principle with the comment. Proposed resolution is inline with the proposed change.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 20980. |
| 21280 | Robert Stacey | 429.51 | This is backwards. The MIB reflects what's implemented; the implementation does not magically appear because the MIB object is set a certain way. | Change to "An HE STA that supports operation in the 6 GHz band sets dot11HE6GOptionImplemented to true." | Accepted |
| 21281 | Robert Stacey | 429.55 | "with dot11HE6GOptionImplemented equal to true" is superfluous. Also, in the baseline, the terms "HT STA 2G4" and "HT STA 5G" are used for band-specific STAs. For consistency, continue this naming practise. I, personally, am not a fan of very specific STA names and would rather see "An HE STA operating in the 6 GHz band" for band specific reqruiements. | Change to "An HE STA operating in the 6 GHz band is an HE STA 6G" and change all "6 GHz HE STA" to "HE STA 6G". Alternatively, remove statement and change all "6 GHz HE STA" to "HE STA operating in the 6 GHz band". | Revised –  Agree with the comment. Proposed resolution accounts for the suggested change while preserving STA, non-AP STA, and AP categories in the changes.  TGax editor: Please incorporate the changes as proposed by the commenter throughout the dratft, while maintainining the current “STA”, “non-AP STA”, and “AP” classifications intact. |
| 21282 | Robert Stacey | 430.06 | Setting the present field is an encoding detail. The real requirement is that the 6 GHz Operation Informaion field be present. | Change to "shall set the 6 GHz Operation Information Present field to 1" to "shall include the 6 GHz Operation Information field" | Accepted |
| 21283 | Robert Stacey | 430.52 | Calling out a requirement to abide by the rules in 11.1 seems silly -- we don't do this for non-HE STAs. And why is it in the 6 GHz band operation section? Also, it is not clear to which rules in 10.6 the exception in the second part of the sentence applies. | Remove this statement. Modify the rules in 10.6 to permit use of non-HT duplicate PPDUs in the 6 GHz band. For example, the statement in REVmd D2.0 at 1743.14 might become "For a STA operating in the 2.4 GHz or 5 GHz bands, if the BSSBasicRateSet parameter is empty, then the STA shall transmit a Beacon frame in a non-HT PPDU. For a STA operating in the 6 GHz band, if the BSSBasicRateSet parameter is empty then the STA shall transmit the Beacon frame in either a non-HT PPDU or an non-HT duplicate PPDU. The STA shall use one of the mandatory PHY rates for the non-HT or non-HT duplciate PPDU that carries the Beacon frame." | Revised –  The paragraph follows the new editorial style guide, which asks to call out baseline subclauses and add exceptions that are applicable to 11ax only.  Proposed resolution is to move all beacon related text to the subclause related to beacon rules and add the requirements and exceptions there, citing the appropriate subclauses wherever necessary.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 21283. |
| 21350 | Rojan Chitrakar | 430.11 | Is the "Rx HE-MCS Map 80 MHz" supposed to be "Rx HE-MCS Map <= 80 MHz"? | Change to "Rx HE-MCS Map <= 80 MHz". Also please indicate that these field is in the Supported HE-MCS And NSS Set field in the HE Capability Element. | Revised –  Agree in principle with the comment. Proposed resolution accounts for the suggested change.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 21350. |
| 21351 | Rojan Chitrakar | 430.40 | It is not clear from 27.3.22.2 (Channel allocation in the 6 GHz band)) that nch in 27-134 represents the channel number of the primary channel indicated in the 6Hz operation element. | Clarify that nch in 27-134 represents the channel number of the primary channel indicated in the 6Hz operation element. | Revised –  Agree in principle with the comment. The channelization is determined not only based on the primary channel but also in the channel width and channel center frequencies 0 and 1. Proposed resolution clarifies this aspect by using language that is similar to that of VHT STAs:  “A VHT STA shall determine the channelization using the combination of the information in the HT Operation element Primary Channel field and the VHT Operation element VHT Operation Information field Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields (see 21.3.14 (Channelization)).”  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 21351. |
| 21352 | Rojan Chitrakar | 430.52 | "An HE STA transmits Beacon frames as defined in 11.1 (Synchronization),...", is this specifically referring to Beacon transmissions in the 6 GHz band? Also is it necessary to transmit Beacons in non-HT duplicate PPDUs in the 6Hz band since there are no legacy STAs operating in this band? | Clarify that this sentence is specifically referring to Beacon transmissions in the 6 GHz band. Additionally, limit the beacon transmissions in the 6 GHz band to HE Beacon. If this sentence is refereing to HE STAs in general, delete the sentence from this sub-clause and move to 26.17.2.1. | Revised –  The comment and the proposed change is asking multiple questions the answers to which are as follows: 1) Yes, the sentence in question is for the 6 GHz band in particular because the rules are under the 6 GHz band subclauses. 2) It is not necessary to transmit Beacons in non-HT duplicate PPDU but it is explicitly allowed since it is beneficial for when the AP operates SST (we propose some more clarifications in the proposed resolution for this case as suggested by CID 20411. 3) disagree in limiting the beacon transmissions to HE beacon because it is up to the AP to chose what PPDU format to use from the types that are allowed (non-HT, non-HT duplicate, and HE SU). Since this sentence is related to 6 GHz band the resolution moves it under the subclause that defines rules for beacon generation in the 6 GHz band.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 21352. |
| 21510 | Yonggang Fang | 429.61 | Multi-BSSID (or Co-Hosted BSS) is independent from the operation in 6 GHz band. It should be supported in 6 GHz. |  | Rejected –  MultiBSSID is mandatory for 6 GHz since all STAs in the 6 GHz band are HE STAs (for which MBSSID is mandatory), for which we have the following in P427L5:  “A non-AP STA that sets dot11HEOptionImplemented to true shall set dot11MultiBSSIDImplemented to true.”  Co-hosted BSS is a feature that is defined so that the AP can support both HE and legacy devices, and has inferior performance compared to multiBSS. Since there are no legacy devices in the 6 GHz band and all devices support multiBSSID then co-hosted BSS is not allowed. |
| 21511 | Yonggang Fang | 430.52 | From the sentence "An HE STA transmits Beacon frames as defined in 11.1 (Synchronization), following the rules defined in 10.6 (Multiple rate support) except that the Beacon frames may be sent in non-HT duplicate PPDUs.", it seems that an HE AP operating on 6 GHz band is allowed to transmit a non-HT PPDU beacon. In the following clause 26.17.2.2, it defines an HE beacon in 6 GHz band. Please clarify whether an HE AP is allowed to transmit dual beacon (i.e. non-HT beacon and HE beacon), or only HE beacon, or ether one in 6 GHz band? | Please clarify that | Revised –  Agree in principle with the comment. Proposed resolution explicitly calls out the types of PPDU formats that can contain the beacon frame for the 6 GHz band.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 21511. |
| 21524 | Yongho Seok | 429.47 | Since there is no legacy STA in 6 GHz band, an use of EPD instead of LPD is encouraged. | As in comment. | Rejected –  The comment fails to identify a technical issue. EPD can already be used if the receiving STA supports the reception of MSDUs with EPD. Please refer to 4.3.29 (Ethertype protocol discrimination (EPD). |
| 21553 | Youhan Kim | 430.53 | What is the purpose of sending Beacon frames using non-HT duplicate PPDU format? | Either justify why Beacon frames in non-HT duplicate PPDU format is needed, or remove the mode of sending Beacon frames in non-HT duplicate PPDU. | Revised –  The AP can transmit non-HT duplicate Beacon frames when it has STAs using SST to temporary reside in subchannels, and to not require them to move to the primary channel to determine if there is DL BUs for it or not.  Proposes resolution adds further clarifications for this particular purpose as suggested by CID 20411.  TGax editor to make the changes shown in 11-19/0304r2 under all headings that include CID 20411. |

**Discussion: *None.***

* + 1. HE BSS operation in the 6 GHz band

26.17.2.1General

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21280):***

An HE STA that supports operation in the 6 GHz band sets dot11HE6GOptionImplemented to true.*(#21280)*

An HE STA with dot11HE6GOptionImplemented equal to true and operating in the 6 GHz band is a 6 GHz HE STA.

An HE AP operating in the 6 GHz band shall indicate support for at least 80 MHz channel width.

An HE AP operating in the 6 GHz band shall set the Co-Hosted BSS subfield in HE Operation element to 0.

A 6 GHz HE STA shall not transmit an HT Capabilities element, VHT Capabilities element, HT Operation element, VHT Operation element or an HE Operation element that contains a VHT Operation Information field.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20980):***

A 6 GHz HE STA shall not transmit in an HE PPDU an MPDU other than an HE Compressed Beamforming/CQI frame (see 26.7.3 (Rules for HE sounding protocol sequences)) that exceeds the maximum MPDU length capability indicated in the Extended HE Capabilities element received from the recipientHE STA 6G.*(#20980)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21282, 21350):***

An AP or mesh STA operating in the 6 GHz band shall include the 6 GHz Operation Information field in the HE Operation elements it transmits. The AP or mesh STA shall set the Channel Width subfield, the Channel Center Frequency Segment 0, and the Channel Center Frequency Segment 1 subfields of the 6 GHz Operation Information field as defined in Table 26-14 (6 GHz BSS channel width), based on the Rx HE-MCS Map <=80 MHz, Rx HE-MCS Map 160 MHz, and Rx HE-MCS Map 80+80 MHz subfields of the Supported HE MCS And NSS Set field of the HE Capabilities element transmitted by the AP.*(#21282, 21350)*

|  |  |  |
| --- | --- | --- |
| * 6 GHz BSS channel width | | |
| Channel Width field | Center Frequency Segment 1 field | BSS channel width |
| 0 | 0 | 20 MHz |
| 1 | 0 | 40 MHz |
| 2 | 0 | 80 MHz |
| 3 | CCFS1 > 0 and  |CCFS1 – CCFS0| = 8 | 160 MHz |
| 3 | CCFS1 > 0 and  |CCFS1 – CCFS0| > 16 | 80+80 MHz |
| NOTE 1—CCFS0 represents the value of the Channel Center Frequency Segment 0 field and CCFS1 represents the value of the Channel Center Frequency Segment 1 field. | | |

**TGax Editor: *Change the paragraph below in this subclause as follows (#CID 21351):***

A 6 GHz HE STA shall determine the channelization using the combination of the information in the Primary Channel, Channel Center Frequency Segment 0 and Channel Center Frequency Segment 1 subfields in the 6 GHz Operation Information field in the HE Operation element when operating in 6 GHz band (see 21.3.14 (Channelization) for the channelization and 27.3.22.2 (Channel allocation in the 6 GHz band)) for the equation regarding the channel center frequencies in the 6 GHz band.*(#21351)*

A STA shall not transmit an HT PPDU in the 6 GHz band. A STA shall not transmit a VHT PPDU in the 6 GHz band. A STA shall not transmit a DSSS, HR/DSSS, or ERP-OFDM PPDU in the 6 GHz band.

A 6 GHz HE STA shall set dot11SpectrumManagementRequired to true and operate as defined in 11.7 (TPC procedures).(#15120, #15166, #15177, #14824, #15827, #15828)

**TGax Editor: *Change the paragraph below in this subclause as follows (#CID 20411, 21283, 21352, 21511, 20411):***

(18/1489r4)*(#20411, 21283, 21352, 21511, 20411)*

**TGax Editor: *Change the heading and the paragraphs below in this subclause as follows (#CID 20411, 21283, 21352, 21511, 20411):***

**26.17.2.2 Beacons in the 6 GHz band**

An HE AP 6G transmits Beacon frames as defined in 11.1 (Synchronization), which may be contained in either non-HT PPDU, non-HT duplicate PPDU, or HE SU PPDU.

An HE AP 6G that transmits a Beacon frame in non-HT PPDU follows the rules defined in 10.6.5.1 (Rate selection for non-STBC Beacon and non-STBC PSMP frames).

An HE AP 6G that transmits a Beacon frame in non-HT duplicate PPDU shall follow the rules defined in 10.6.5.1 (Rate selection for non-STBC beacon and non-STBC PSMP frames) and shall set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to a value that is up to the operating channel width of the BSS.

If an HE AP 6G schedules for transmission the Beacon frame in non-HT duplicate PPDU then it shall set the Duplicate Beacon subfield to 1 in the 6 GHz Operation Information field of the HE Operation element it transmits; otherwise the AP shall set the Duplicate Beacon subfield to 0.

An HE AP 6G that transmits a Beacon frame in HE SU PPDU shall follow the rules defined in 26.15.6 (Additional rules for HE SU beacons in the 6 GHz band).

An AP shall not transmit a Beacon frame contained in an HE SU PPDU or in a non-HT duplicate PPDU in the 2.4 GHz or 5 GHz bands. *(#20411, 21283, 21352, 21511, 20411)*

* HE Operation element

**TGax Editor: *Change the figure below in this subclause as follows (#CID 20411):***

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0         B1 | B2 | B3         B7 |
|  | Channel Width | Duplicate Beacon | Reserved |
| Bits: | 2 | 1 | 5 |
| * Control field*(#20411)* | | | |

The Channel Width field indicates the BSS channel width and is set to 0 for 20 MHz, 1 for 40 MHz, 2 for 80 MHz, and 3 for 80+80 or 160 MHz.

**TGax Editor: *Insert the following paragraph in this subclause as follows (#CID 20411):***

The Duplicate Beacon subfield is set to 1 if the AP transmits Beacon frames in non-HT duplicate PPDU with a TXVECTOR parameter CH\_BANDWIDTH value that is up to the BSS bandwidth and set to 0 otherwise.*(#20411)*