IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | SA2 CID 25039, 25040 | | | | | | Date: 2020-10-27 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm |  |  | youhank@qti.qualcomm.com | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from the SA2 on P802.11ax D7.0:

25039, 25040

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version.

# CID 25039, 25040

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 25039 | 9.4.2.161 | 177.51 | The comment requested by a non-member of this TGax SA Ballot (Young-hoon Kwon).  It is possible that AP's operating BSS bandwidth is greater than HE BSS bandwidth in the future. (e.g., AP is an EHT AP. And the AP's operating BW includes channel puncturing.) As the Transmit Power Envelope element can be used for both HE STAs and future (e.g., EHT STAs), it is too restrictive if we don't allow cases that N\*20MHz is greater than HE BSS bandwidth. | Need a mechanism that HE STA can identify PSD of HE BSS bandwidth when the AP's operating BSS bandwidth is greater than HE BSS bandwidth and the HE BSS bandwidth is less than 160MHz. |
| 25040 | 9.4.2.161 | 178.7 | The comment requested by a non-member of this TGax SA Ballot (Young-hoon Kwon).  N>8 corresponds to a case that the AP's operating BSS bandwidth is greater than HE BSS bandwidth such as 320MHz, and in this case non-AP STAs only checks PSD values that correspond to HE BSS bandwidth. However, AP's operating BSS bandwidth can be greater than HE BSS bandwidth even when HE BSS bandwidth is less than 160MHz (e.g., if there's a channel puncturing). | Need a mechanism that HE STA can identify PSD of HE BSS bandwidth when the AP's operating BSS bandwidth is greater than HE BSS bandwidth and the HE BSS bandwidth is less than 160MHz. |

**Proposed Resolution: CIDs 25039, 25040**

**Revised**

<https://mentor.ieee.org/802.11/dcn/20/11-20-0822-06-00ax-miscellaneous-6ghz-channelization-cids.docx> had updated the Transmit Power Envelope (TPE) element to allow WLAN STAs to operate in the 6 GHz bands while adhering to the new regulatory requirements. And the intention was that when future WLAN generations such as 11be introduced wider BSS bandwidths, those new APs could still use the TPE element to signal the necessary TX power requirements for the wider BSS bandwidths, while allowing HE STAs to understand enough portions of the TPE element to operate within BSS bandwidth allowed for HE STAs. For example, the Maximum Transmit Power Count for Maximum Transmit Power Interpretation of PSD had allocated values 5-7 for future use such that if a 320 MHz EHT AP sent a TPE element, HE STAs could still parse portions of the TPE element needed to retrieve the TX power requirements for 160 MHz.

The commenter is noting that 11be D0.1 also allows scenarios where, for example, a 160 MHz EHT BSS has the secondary 40 MHz punctured, and thus indicates BSS bandwidth of only 40 MHz for HE STAs. Such scenarios are not explicitly covered in 11ax D7.0 as such scenarios were not foreseen during the writing of 11-20-0822-06.

To allow seamless interoperation between EHT APs and HE STAs, the proposed text updates below extend the intent of 11-20-0822-06 to cover the additional cases allowed in 11be.

Instruction to Editor: Implement the proposed text update for CIDs 25039 and 25040 in <https://mentor.ieee.org/802.11/dcn/20/11-20-1710-00-00ax-sa2-cid-25039-25040.docx>

**Proposed Text Updates: CIDs 25039, 25040**

*Instruction to Editor: Update 11ax D7.0 P177L51 as shown below.  
(The entire subclause 9.4.2.161 is shown below for the convenience of readers.)*

* Transmit Power Envelope element

(24558)Change the 1st paragraph and Figure 9-616 as follows:

The Transmit Power Envelope element conveys the local or regulatory maximum transmit powers for various transmission bandwidths or channels within the bandwidth of the BSS. The format of the Transmit Power Envelope element is shown in Figure 9-616 (Transmit Power Envelope element format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Transmit Power Information | ~~Local~~ Maximum Transmit Power ~~For 20 MHz~~ | ~~Local Maximum Transmit Power For 40 MHz~~ | ~~Local Maximum Transmit Power For 80 MHz~~ | ~~Local Maximum Transmit Power For 160/80+80 MHz~~ |
| Octets: | 1 | 1 | 1 | ~~1~~ variable | ~~0 or 1~~ | ~~0 or 1~~ | ~~0 or 1~~ |
| * Transmit Power Envelope element format | | | | | | | |

Change Figure 9-617 (Transmit Power Information field format) as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B2 | B3 B5 | B6 B7 |
|  | ~~Local~~ Maximum Transmit Power Count | ~~Local~~ Maximum Transmit Power ~~Unit~~ Interpretation | ~~Reserved~~  Maximum Transmit Power Category |
| Bits: | 3 | 3 | 2 |
| * Transmit Power Information field format | | | |

Change “Local Maximum Transmit Power Unit Interpretation subfield” to “Maximum Transmit Power Interpretation subfield” throughout.

Insert the following after the 3rd paragraph:

The Maximum Transmit Power Interpretation subfield indicates the contents of the Maximum Transmit Power field and interpretation of the Maximum Transmit Power Count field, and is defined in Table 9-277a (Maximum Transmit Power Interpretation subfield encoding).

|  |  |
| --- | --- |
| * Maximum Transmit Power Interpretation subfield encoding | |
| Value | Interpretation of the Maximum Transmit Power field |
| 0 | Local EIRP |
| 1 | Local EIRP PSD (power spectral density) |
| 2 | Regulatory client EIRP |
| 3 | Regulatory client EIRP PSD |
| 4-7 | Reserved |
| NOTE—This table is expected to be updated only if regulatory domains mandate the use of transmit power control with limits that cannot be converted into one of the currently defined interpretations. | |

The Maximum Transmit Power Category subfield indicates a category for which the maximum transmit powers apply. A value of 0 indicates the default category; the interpretation of other values depends on the country; see E.2.7 (6 GHz band) for 6 GHz operation for specific countries. In bands other than the 6 GHz band, this subfield is reserved.

Change the 4th paragraph and Table 9-278 (Meaning of the Local Maximum Transmit Power Count subfield if the Maximum Transmit Power Interpretation subfield is 0 or 2) as follows:

~~The~~ If the Maximum Transmit Power Interpretation subfield is 0 or 2 (EIRP), the ~~Local~~ Maximum Transmit Power Count subfield indicates the number of ~~Local~~ Maximum Transmit Power For *X* MHz fields (where *X* = 20, 40, 80, or 160/80+80) minus 1 in the Maximum Transmit Power field of the Transmit Power Envelope element, as shown in Table 9-278 (Meaning of the Local Maximum Transmit Power Count subfield if the Maximum Transmit Power Interpretation subfield is 0 or 2).

|  |  |
| --- | --- |
| * Meaning of the ~~Local~~ Maximum Transmit Power Count subfield if the Maximum Transmit Power Interpretation subfield is 0 or 2 | |
| Value | Field(s) present |
| 0 | ~~Local~~ Maximum Transmit Power For 20 MHz. |
| 1 | ~~Local~~ Maximum Transmit Power For 20 MHz and  ~~Local~~ Maximum Transmit Power For 40 MHz. |
| 2 | ~~Local~~ Maximum Transmit Power For 20 MHz,  ~~Local~~ Maximum Transmit Power For 40 MHz, and  ~~Local~~ Maximum Transmit Power For 80 MHz. |
| 3 | ~~Local~~ Maximum Transmit Power For 20 MHz,  ~~Local~~ Maximum Transmit Power For 40 MHz,  ~~Local~~ Maximum Transmit Power For 80 MHz, and  ~~Local~~ Maximum Transmit Power For 160/80+80 MHz.  For TVHT STAs, reserved. |
| 4–7 | Reserved |

Delete the 5th paragraph (“The Local Maximum Transmit Power Unit Interpretation subfield provides...”) and Table 9-279 (Definition of Local Maximum Transmit Power Unit Interpretation subfield).

Insert the following paragraph and figure:

If the Maximum Transmit Power Interpretation subfield is 0 or 2 (EIRP), the format of the Maximum Transmit Power field is defined in Figure 9-617a (Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Maximum Transmit Power For 20 MHz | Maximum Transmit Power For 40 MHz | Maximum Transmit Power For 80 MHz | Maximum Transmit Power For 160/80+80 MHz |
| Octets: | 1 | 0 or 1 | 0 or 1 | 0 or 1 |
| * Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2 | | | | |

Change paragraphs 6-7 as follows:

~~Local~~ Maximum Transmit Power For *X* MHz fields (where *X* = 20, 40, 80, or 160/80+80) define the local maximum transmit power limit of *X* MHz PPDUs, except for an HE TB PPDU where *X* MHz is the bandwidth of the pre-HE modulated fields of the HE TB PPDU transmitted by a STA. Each ~~Local~~ Maximum Transmit Power For *X* MHz field is encoded as an 8-bit 2s complement signed integer in the range –64 dBm to 63 dBm with a 0.5 dB step. Setting this field to 63.5 dBm indicates 63.5 dBm or higher (i.e., no local maximum transmit power constraint).

In frames transmitted by a TVHT STA the ~~Local~~ Maximum Transmit Power for 20 MHz field indicates the Local Maximum Transmit Power for TVHT\_W bandwidth; the ~~Local~~ Maximum Transmit Power for 40 MHz field indicates the Local Maximum Transmit Power for TVHT\_2W or TVHT\_W+W bandwidth; the Local Maximum Transmit Power for 80 MHz field indicates the ~~Local~~ Maximum Transmit Power for TVHT\_4W or TVHT\_2W+2W bandwidth; the ~~Local~~ Maximum Transmit Power for 160/80+80 MHz field is not included in the Transmit Power Envelope element.

Insert the following paragraphs and figure after paragraph 7:

If the Maximum Transmit Power Interpretation subfield is 1 or 3 (EIRP PSD), the format of the Maximum Transmit Power field is shown in Table 9-617b (Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 1 or 3).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Maximum Transmit PSD 1 | Maximum Transmit PSD 2 | ... | Maximum Transmit PSD *N* |
| Octets: | 1 | 0 or 1 |  | 0 or 1 |
| * Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 1 or 3 | | | | |

The Maximum Transmit Power Count subfield determines the value of an integer *N* as defined in Table 9-278a (Meaning of Maximum Transmit Power Count subfield if the Maximum Transmit Power Interpretation subfield is 1 or 3) which specifies the format and interpretation of the Maximum Transmit Power field as described below.

|  |  |
| --- | --- |
| * Meaning of Maximum Transmit Power Count subfield if the Maximum Transmit Power Interpretation subfield is 1 or 3 | |
| Value | *N* |
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 4 |
| 4 | 8 |
| 5-7 | Reserved to indicate values of *N* greater than 8 |

If *N* is 0, then the Maximum Transmit Power field contains one Maximum Transmit PSD subfield that represents the maximum transmit PSD for a PPDU of any bandwidth within the BSS bandwidth.

If *N* is greater than 0, then the Maximum Transmit Power field has *N* octets, with *N* representing the number of 20 MHz channels for which a maximum transmit PSD is indicated. The *X*-th octet (*X* = integer ranging from 1 to *N*) of the Maximum Transmit Power field is the Maximum Transmit PSD *X* subfield, which indicates the maximum transmit PSD for the *X*-th 20 MHz channel.

If the BSS bandwidth is 20, 40, 80 or 160 MHz, the Maximum Transmit PSD 1-*N* subfields correspond to 20 MHz channels from lowest to highest frequency, respectively, within the indicated bandwidth. If *N* is equal to 1, 2, 4 or 8 for 20, 40, 80 or 160 MHz BSS bandwidth, respectively, the indicated bandwidth is the BSS bandwidth. If *N* is greater than 0 and less than 2, 4 or 8 for 40, 80 or 160 MHz BSS bandwidth, respectively, then the indicated bandwidth is the primary 20 MHz, primary 40 MHz or primary 80 MHz channel for *N* equal to 1, 2 or 4, respectively. If *N* is greater than 1, 2 or 4 for 20, 40 or 80 MHz BSS bandwidth, respectively, then the indicated bandwidth is wider than the BSS bandwidth. In this case, the Maximum Transmit PSD 1-*M* subfields correspond to the 20 MHz channels from lowest to highest frequency, respectively, within the BSS bandwidth where *M* is 1, 2 or 4 for 20, 40 or 80 MHz BSS bandwidth, respectively. And the Maximum Transmit PSD (*M*+1)-*N* subfields are reserved for future use – see 10.22.4 (Operation with the Transmit Power Envelope element).

If the BSS bandwidth is 80+80 MHz, *N* is less than or equal to 8. If *N* is equal to 8 and the BSS bandwidth is 80+80 MHz, the Maximum Transmit PSD 1-4 subfields correspond to the 20 MHz channels from lowest to highest frequency, respectively, within the 80 MHz segment lower in frequency; the Maximum Transmit PSD 5-8 subfields correspond to the 20 MHz channels from lowest to highest frequency, respectively, within the 80 MHz segment higher in frequency. If *N* is greater than 0 and less than 8 for 80+80 MHz BSS bandwidth, then the bandwidth indicated by the Maximum Transmit PSD 1-*N* subfields is the primary 20 MHz, primary 40 MHz or primary 80 MHz channel for *N* equal to 1, 2 or 4, respectively. In this case, the Maximum Transmit PSD 1-*N* subfields correspond to 20 MHz channels from lowest to highest frequency, respectively, within the indicated bandwidth.

Values of the Maximum Transmit Power Count field between 5 and 7 are reserved for future use to indicate values of *N* greater than 8. If *N* is greater than 8, the Maximum Transmit PSD 1-8 subfields correspond to the 20 MHz channels from lowest to highest frequency, respectively, within the 160 MHz channel containing the primary 20 MHz channel. See 10.22.4 (Operation with the Transmit Power Envelope element).

The Maximum Transmit PSD *X* subfield is encoded as an 8-bit 2s complement signed integer. The value –128 indicates that the corresponding 20 MHz channel cannot be used for transmission. The value of +127 indicates that no maximum PSD limit is specified for the corresponding 20 MHz channel. For all other values *Y* of the subfield (i.e. –127 to +126, inclusive), the maximum transmit PSD in the corresponding 20 MHz channel is *Y*/2 dBm/MHz (i.e. ranging from –63.5 to +63 dBm/MHz).

*Instruction to Editor: Update 11ax D7.0 P284L47 as shown below.  
(The entire subclause 10.22.4 is shown below for the convenience of readers.)*

* Operation with the Transmit Power Envelope element

Change as follows:(#24558)

A STA that is not operating in the 6 GHz band and is extended spectrum management capable and that has dot11SpectrumManagementRequired or dot11RadioMeasurementActivated equal to true shall determine a local maximum transmit power from a Transmit Power Envelope element for which the ~~Local~~ Maximum Transmit Power ~~Unit~~ Interpretation subfield indicates EIRP.

A STA that is operating in the 6 GHz band shall determine local and regulatory client maximum transmit powers from Transmit Power Envelope element(s) according to local regulations known at the STA (see Annex E.2.7). A STA shall ignore Transmit Power Envelope element(s) indicating transmit power category values that the STA is unable to interpret for the current country.

NOTE—The Default category value (0) is applicable to, and so can be interpreted for, all countries (see 11.7.5 (Specification of regulatory and local maximum transmit power levels)). An AP in the 6 GHz band has dot11SpectrumManagementRequired equal to true, and so transmits a Country element in Beacon and Probe Response frames.

A STA that sends two or more Transmit Power Envelope elements in a frame shall order the elements by increasing values of their ~~Local~~ Maximum Transmit Power ~~Unit~~ Interpretation subfields.

A STA that is operating in the 6 GHz band that sends two or more Transmit Power Envelope elements in a frame with the same value in the Maximum Transmit Power Interpretation subfield shall order the elements by increasing values of their Maximum Transmit Power Category subfields.

NOTE—The Maximum Transmit Power Category subfield is reserved except in the 6 GHz band.

If a STA that is extended spectrum management capable finds an unknown value in the ~~Local~~ Maximum Transmit Power ~~Unit~~ Interpretation subfield in a Transmit Power Envelope element, then the STA shall ignore that and subsequent Transmit Power Envelope elements.

A STA that receives two or more Transmit Power Envelope elements in the same frame with known values in their ~~Local~~ Maximum Transmit Power ~~Unit~~ Interpretation subfields shall process all of the elements according to the local regulations known at the STA.

NOTE—If a STA receives two Transmit Power Envelope elements, each with a known value in the ~~Local~~ Maximum Transmit Power ~~Unit~~ Interpretation subfield, then the expected possibilities are as follows:

* The STA complies with either element (shared spectrum),
* The STA complies with both elements (tightened regulations), or
* The STA complies with the second element (changed regulations).

If a STA receives a Transmit Power Envelope element with the Local Maximum Transmit Power Interpretation subfield equal to 1 or 3 (EIRP PSD) and the Maximum Transmit Power Count subfield indicating a value of *N* greater than 1, 2, 4 or 8 from an AP that the STA identifies to have BSS bandwidth of 20, 40, 80 or 160/80+80 MHz, respectively, then the STA shall use the Maximum Transmit PSD 1-*M* subfields (*M* equal to 1, 2, 4 or 8 for BSS bandwidth of 20, 40, 80 or 160/80+80 MHz, respectively) to determine the maximum transmit PSD for each 20 MHz channel within the BSS bandwidth. The STA shall ignore the Maximum Transmit PSD *X* subfields with *X* > *M*.

NOTE—This might occur when the AP supports PHY mode(s) unknown to the STA, and the actual BSS bandwidth is wider than the BSS bandwidth reconized by the STA.

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