### **IEEE P802.11 Wireless LANs**

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| LB266 CR for preamble puncturing | | | | |
| Date: 2022-10-17 | | | | |
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**Abstract**

This submission proposes resolutions for the following 9 CIDs for TGbe LB266:

* 11014,11930,11931,13450,10988,11011,13562,12693,12193

**Revisions:**

* Rev 0: Initial version of the document.

***TGbe editor: Please note Baseline is REVme\_D1.3 and 11be D2.1.1***

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| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Clause | Page | Comment | Proposed Change | Resolution |
| 11014 | Yanjun Sun | 35.16.2 | 532.57 | Please to replace " Disabled Subchannel Bitmap field" with " Disabled Subchannel Bitmap subfield" throughout this subclause to aligned with the latest EHT Option element format | As in comment | Accepted |
| 11930 | Alfred Asterjadhi | 35.16.2 | 533.02 | Sentence is a bit confusing as it states "for the PPDU bandwidth that is equal to the operating channel width of the BSS". What about for PPDUs with BW less than the width of the BSS? Please clarify | As in comment. | Revised  Agree with the commenter in principle that the current text may cause confusion. The text has been revised to clarify that it refers to the PPDU bandwidth column in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions) .  Tgbe editor please implement changes as shown in doc 11-22/1482r0 tagged as #11930 |
| 13450 | Liwen Chu | 35.16.2 | 533.11 | Based on the paragraphes starting from P33L11, the following dynamic chennal puncture are allowed: 1, DL EHT MU PPDU addressed to a single STA (or multiple STAs) without soliciting any responding frame or with soliciting responding frame(s) by using Trigger frame. 2, UL EHT MU PPDU addressed to a single STA without soliciting responding frame. 3, EHT TB PPDU from a single STA or multiple STAs solicited by Trigger frame. 4, non-HT duplicate PPDU without carrying TRigger frame addressed to single or multiple STAs without solciting any frame.  One simplification is that DL/UL EHT MU PPDU addressed to a single STA and MU-RTS and solicited CTS can't use dynamic channel puncture. | As in comment. | Revised  Agree with the commenter in principle. We adopted the simplification suggested by the commenter and added clarifications for different PPDU types..  Tgbe editor please implement changes as shown in doc 11-22/1482r0 tagged as #13450 |
| 11931 | Alfred Asterjadhi | 35.16.2 | 533.22 | This paragraph is a bit too generic and may cause confusion. Suggest to explicitly call out the cases when the additional puncturing patterns can be used within PPDU exchange sequences, e.g., when this can happen in an EHT MU PPDU, TB PPDU, or non-HT dup PPDU cases. Similar consideration for the last paragraph of this subclause. | As in comment. | Revised  Agree with the commenter in principle. We added more clarifications for different PPDU types.  Tgbe editor please implement changes as shown in doc 11-22/1482r0 tagged as #11931 |
| 10988 | Yanjun Sun | 9.4.2.157 | 201.43 | Extension of Transmit Power Envelope element for 320MHz and puncturing is missing. | Please add the extension for completeness. | Revised  Agree with the commenter in principle. Details on TPE for EHT has been added.  Tgbe editor please implement changes as shown in doc 11-22/1482r0 tagged as #10988 |
| 11011 | Yanjun Sun | 35.16.2 | 533.56 | Details are missing on how TPE are indicated if an EHT includes the Disabled Subchannel Bitmap subfield in management frames | Please add the missing details | Revised  Agree with the commenter in principle. Details on TPE for EHT has been added.  Tgbe editor please implement changes as shown in doc 11-22/1482r0 tagged as #10988 |
| 13562 | Jian Yu | 35.16.2 | 533.64 | The supported puncturing pattern is too restricted. If there are multiple static holes or interferences, then it is difficult to do sounding for OFDMA transmission. | Enable more patterns, e.g., the one supported in OFDMA | Rejected  First, in D2.1.1, there is not support for sounding NDP with multiple static holes based on the following text: “In the EHT sounding NDP, the 242-tone RUs overlapping the 20 MHz channels that are signaled as punctured through the Punctured Channel Indication field of the U-SIG field are punctured. The allowed punctured patterns are given in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions).”  Second, there was related discussion in 21/1778r2 but the TG couldn’t reach consensus. |
| 12693 | Arik Klein | 35.16.2 | 532.62 | It is not clear why "..the Disabled Subchannel Bitmap field of the EHT Operation element shall be one of the non-OFDMA puncturing patterns defined in Table 36-30" as a mandatory requirement? For instance, the common use case of having more than a single punctured RU in each 80 MHz segment (especially if BW equals or above 160) can't be described in the Disabled Channel bitmap which directly reduces the actual BW to be used for the entire EHT sounding sequence (i.e. the NDPA frame, sounding NDP and the corresponding BFRP) | Add the OFDMA puncturing pattern to be supported in the Disabled Channel Bitmap as a minimum, in order to support the use cases of more than a single punctured RU-242 (especially in 5GHz bands and 6 GHz bands) | Rejected  First, in D2.1.1, there is not support for sounding with multiple static holes based on the following text: “In the EHT sounding NDP, the 242-tone RUs overlapping the 20 MHz channels that are signaled as punctured through the Punctured Channel Indication field of the U-SIG field are punctured. The allowed punctured patterns are given in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions).”  Second, there was related discussion in 21/1778r2 but the TG couldn’t reach consensus. |
| 12193 | Shimi Shilo | 35.16.2 | 533.62 | According to D2.0, the puncturing pattern indicated via the Disabled Subchannel Bitmap field must conform to a valid non-OFDMA puncturing patterns. However, this can - in some cases - severely reduce the effective BW, because multiple 'holes', which are supported in OFDMA (different puncturing pattern per 80MHz subblock) can no longer be used because of the setting in the Disabled Subchannel Bitmap. For example, if in a 160MHz PPDU there is a 20MHz 'hole' in the P80 channel and a 20MHz 'hole' in the S80 channel, although OFDMA could've been used in a data PPDU, the Disabled Subchannel Bitmap rules limit all PPDU bandwidths to 80MHz. | Change the Disabled Subchannel Bitmap to be more flexible just like the OFDMA puncturing patterns. | Rejected  First, in D2.1.1, there is not support for sounding with multiple static holes based on the following text: “In the EHT sounding NDP, the 242-tone RUs overlapping the 20 MHz channels that are signaled as punctured through the Punctured Channel Indication field of the U-SIG field are punctured. The allowed punctured patterns are given in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions).”  Second, there was related discussion in 21/1778r2 but the TG couldn’t reach consensus. |

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:***

*Our resolution below is based on the EHT SU transmission in D2.2. There were questions on whether EHT SU transmission covers the case when a MPDU has group addressed RA. As We propose 3 changes to address the CIDs:*

*Although the NOTE below prohibits dynamic*

(#13113)**extremely high throughput (EHT) single user (SU) transmission**: A transmission to a single user using the non-orthogonal frequency division multiple access (non-OFDMA) EHT multi-user (MU) physical layer (PHY) protocol data unit (PPDU) format that is not an EHT sounding null data PPDU (NDP). See 36.3.19 (EHT SU transmission(#13113)).

***TGbe editor: Please update the 2nd last sentence 1st paragraph of 35.16.2 (P548L50 in D2.1.1) as follows (track change enabled):***

**35.16.2 Preamble puncturing operation**

… …

The puncturing pattern indicated in the Disabled Subchannel Bitmap field of the EHT Operation element shall be one of the non-OFDMA puncturing patterns defined in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions) whose corresponding PPDU bandwidth value in the Table is equal to the operating channel width of the BSS. (#11930)

… …

***Discussion for CIDs 13450 and 11931:***

*We propose 3 changes to address the CIDs:*

* *Although the NOTE below prohibits dynamic puncturing for “SU” transmission implicitly, it was unclear. Based on suggestion in CID 13450, normative text has been added for clarity and simplicity, based on the new “EHT SU transmission” term approved in 22/1546/r3 (*(i.e., non-OFDMA EHT MU PPDU to a single user)*). Similarly, as an immediate acknowledge to a MU transmission without a triggering frame cannot learn dynamic puncturing pattern (e.g. DL MU PPDU (with implicit BAR to one STA)*🡪*BA), a similar rule has been added.*
* *The sentence starting with “in this case” wasn’t clear enough and has been revised for clarity.*
* *In addition, we added a NOTE to summarize the cases in which dynamic puncturing is disallowed based on rules in other subclauses so that readers can refer to all these puncturing rules in one place. They include MU-RTS and its solicited CTS, EHT sounding NDP and CF-End for which questions were often received. CF-End cannot have dynamic puncturing mainly due to the following behavior in the baseline spec: “After receiving a CF-End frame with a matching BSSID(TA) without comparing Individual/Group bit, an AP may respond by transmitting a CF-End frame after SIFS”.*

***TGbe editor: Please update the following paragraph and NOTE in 35.16.2 as follows (track change enabled)*** (#13450 #11931)***:***

An EHT SU transmission shall not puncture 20 MHz subchannels which are not indicated to be punctured in the Disabled Subchannel Bitmap in the EHT Operation element.

An EHT MU PPDU that is not an EHT SU transmission and solicits an immediate response from a STA without including a triggering frame shall not puncture 20 MHz subchannels which are not indicated to be punctured in the Disabled Subchannel Bitmap in the EHT Operation element.

NOTE – For example, an EHT MU PPDU using DL OFDMA that sets the ACK policy to implicit BAR to one of the users without including a triggering frame cannot puncture 20 MHz subchannels which are not indicated to be punctured in the Disabled Subchannel Bitmap in the EHT Operation element.

Otherwise, an EHT STA may puncture other subchannels in addition to those indicated in the Disabled Subchannel Bitmap field in the EHT Operation element in an EHT MU PPDU or a non-HT duplicate PPDU. If the EHT STA punctures other subchannels in an EHT MU PPDU or a non-HT duplicate PPDU in addition to those indicated in the Disabled Subchannel Bitmap field and solicits a response to the PPDU, the EHT STA shall use a triggering frame to solicit the response in a TB PPDU and assign an RU or MRU within the nonpunctured subchannel set to a responding EHT STA.

NOTE—No other subchannels can be punctured in addition to those indicated in the Disabled Subchannel Bitmap field (if present) in the EHT Operation element in the following cases:

* A PPDU carrying an MU-RTS Trigger frame or the solicited CTS frame (see 35.2.2.1 (MU-RTS Trigger frame transmission)).
* An EHT sounding NDP for non-TB sounding (see 35.7.2 (EHT sounding protocol)).
* A PPDU that carries a CF-End frame from a non-AP EHT STA, as it might be followed by another CF-End frame after SIFS (see 10.23.2.10 (Truncation of TXOP)).

… …

**NOTE: the following changes are copied from the text on TPE in** [**22/1208**](https://mentor.ieee.org/802.11/dcn/21/11-21-1208-13-00be-cc36-resolution-for-cids-for-35-3-4-2.docx) **in case you’ve reviewed it before. The only editorial change has been highlighted by a comment**

TGbe Editor: modify paragraph 6 in 9.4.2.161 Transmit Power Envelope element as follows (track change enabled)

~~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 and for an EHT TB PPDU where *X* MHz is the bandwidth of the pre-HE and pre-EHT modulated fields of the HE TB PPDU and EHT 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).(#10988)

TGbe Editor: modify Table 9-691 Transmit Power Envelope element format as follows (track change enabled)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Transmit Power Information | Maximum Transmit Power | Extension Maximum Transmit Power |
| Octets: | 1 | 1 | 1 | variable | variable(#10988) |
| * **Transmit Power Envelope element format(11ax)** | | | | |  |

TGbe Editor: add a new Figure 9-xxx-Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2 as follows

|  |  |
| --- | --- |
|  | Maximum Transmit Power For 320 MHz |
| Octets: | 1 |

**Figure 9-xxx-Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2**(#10988)

TGbe Editor: add the following paragraph after the Figure 9-xxx-Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2

(#10988)Maximum Transmit Power For 320 MHz fields define the local maximum transmit power limit of 320 MHz PPDUs, except for an EHT TB PPDU where 320 MHz is the bandwidth of the pre-EHT modulated fields of the EHT TB PPDU transmitted by a STA. The Maximum Transmit Power For 320 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).

TGbe Editor: Add the following paragraphs at the end of 9.4.2.161 Transmit Power Envelope element

(#10988)The format of the Extension Maximum Transmit Power field is defined in Figure 9-xxx (Extension Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 0 or 2) if the Maximum Transmit Power Interpretation subfield is 0 or 2 and is the same as the Maximum Transmit Power field if the Maximum Transmit Power Interpretation subfield is 1 or 3, as defined in Figure 9-617b (Maximum Transmit Power field format if the Maximum Transmit Power Interpretation subfield is 1 or 3).

(#10988)The Extension Maximum Transmit Power field is included only following conditions defined in 35.16.3 (EHT operation with the Transmit Power Envelope element).

TGbe Editor: Add the following subclause 35.16.3 EHT operation with the Transmit Power Envelope element

(#10988)**35.16.3 EHT operation with the Transmit Power Envelope element**

An EHT STA follows the rules defined in 10.22.4 (Operation with the Transmit Power Envelope element) and the rules defined in this subclause.

The Extension Maximum Transmit Power field shall be included in the Transmit Power Envelope element by an AP only if one of the following conditions is met:

* the AP is operating in the 6 GHz band, the AP is announcing a BSS operating channel width to EHT non-AP STAs in EHT Operation element that is different from the BSS operating channel width that it announces to non-EHT non-AP STAs (see 35.16.1 Basic EHT BSS operation), the Maximum Transmit Power Interpretation subfield is 0 or 2 and the EHT BSS operating channel width is 320 MHz.
* the AP is operating in the 5GHz or 6 GHz band, the AP is announcing a BSS operating channel width to EHT non-AP STAs in EHT Operation element that is different from the BSS operating channel width that it announces to non-EHT non-AP STAs (see 35.16.1 Basic EHT BSS operation) and the Maximum Transmit Power Interpretation subfield is 1 or 3 and the value of *N* determined from the Maximum Transmit Power Count subfield is greater than 0.

If the Extension Maximum Transmit Power field is included and if the Maximum Transmit Power Interpretation subfield is 1 or 3, then:

* the Transmit Power Information field and the Maximum Transmit Power field shall be computed with the BSS operating channel width of the AP that is different from the EHT BSS operating channel width.
* the Extension Maximum Transmit Power field shall be computed as follows:
  + the value of *K*, corresponding to the length in octets of the Extension Maximum Transmit Power field is set to the number of 20 MHz subchannels contained within the EHT BSS operating channel minus the number of 20 MHz subchannels contained within the BSS operating channel.
  + the Maximum Transmit PSD 1-*K* subfields correspond  
    to 20 MHz channels from lowest to highest frequency, respectively, within the EHT BSS operating channel, excluding the 20 MHz channels within the BSS operating channel.

If the Extension Maximum Transmit Power field is included and if the Maximum Transmit Power Interpretation subfield is 0 or 2, then the Maximum Transmit Power Count field shall be set to 3.

In a Transmit Power Envelope element transmitted by an EHT AP with the Maximum Transmit Power Interpretation subfield set to 0 or 2, the Maximum Transmit Power For X MHz subfield shall be included (where X = 20, 40, 80, 160/80+80, or 320) if X is less than or equal to the operating channel width of the corresponding EHT BSS.