IEEE P802.11
Wireless LANs

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| D2.0 PHY Comment Resolution – Part 4 |
| Date: 2018-05-08 |
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Abstract

This submission proposes resolutions for the following comments from the letter ballot on P802.11ax D2.0:

11418, 12796, 12580, 13764, 13428, 13952, 14159

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

**Revision History:**

R0: Continuation from 11-18/0779r3

R1: Updated per discussion during TGax AM1 session on 5/9/2018

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 11418 | 28.3.3.2 | 363.40 | In HE80 tone plan, the boundary of RU242s is not aligned with the 20MHz physical channel boundary. If a RU has a few tones into the 20MHz channel of punctured preamble, can this RU still be transmitted in the preamble puncturing transmission? | Need to add RU transmission and/or tone puncutring rules for preamble puncturing |
| 12796 |  |  | Preamble puncturing is inadequately defined and described. Needs to be clearer that it's basically about using OFDMA and restricting the allocated RUs | Define the terms "subchannel is punctured", "[RU is] zeroed out", "channels removed". Clarify whether tx is restricted to APs (as suggested by 28.1.1) or also allowed for STAs (as suggested by 9.4.2.237.3)? (Presumably not restricted to APs, since then what's the point, since the STAs will transmit in the not-to-be-messed-with 20 MHz channel?) Clarify whether the payload also punctured. (Presumably yes, otherwise what's the point w.r.t. the not-to-be-messed-with 20 MHz channel.) Clarify what the PHY rate is per the MCS tables in 28.5 |
| 12580 | 28.3.10.8.3 | 424.54 | It should be made clear that when preamble puncturing is used no RU is allocated in "punctured" subchannels so that the data is also "punctured" too | At the end of the referenced subclause add a para "When preamble puncturing is present, no RU shall be allocated that overlaps with any 20 MHz sub-channel that is punctured." |
| 13764 | 28.3.10.7 | 412.33 | Since 20MHz channel is not aligned with 242 tone RU in 80MHz,the 20MHz channel cannot be fully punctured because some RU in adjacent 20MHz may overlap with the punctured 20MHz.Currently, the spec doesn't specify how to handle this case. | Add the following clarifications after P.L. 412.33"If an AP indicate preamble puncture in a HE MU PPDU by setting the Bandwidth field in HE-SIG-A in the range 4 to 7,the AP is recommended to avoid allocate resources on the tones that could interfere the punctured channel." |

**Discussion**

When a 20 MHz subchannel has its preamble punctured, the RU Allocation field in the HE-SIG-B Common field should indicate that either

* The 242-tones are empty (B7…B0 = 01110001), or
* The 484-tones which uses the 20 MHz subchannel has zero *total* users
	+ Both HE-SIG-B content channels should indicate that the 484-tones has zero users (B7…B0 = 01110010)

The Center 26-tone RU should not be used if the adjacent 20 MHz has its preamble punctured.

**Proposed Resolution: CIDs 11418, 12580, 13764**

**Revised**.

Proposed text update in 11-18/0934r1 clarifies preamble punctured transmissions.

Instruction Editor: Implement the proposed text update for CIDs 11418, 12580, 12796 and 13764 in 11-18/0934r1.

**Proposed Resolution: CID 12796**

**Revised**.

Proposed text update in 11-18/0934r1 clarifies preamble punctured transmissions. Note that 28.5 shows the PHY rate per RU, hence does not need to be updated for preamble punctured transmissions.

Instruction Editor: Implement the proposed text update for CIDs 11418, 12580, 12796 and 13764 in 11-18/0934r1.

**Proposed Text Updates: CIDs 11418, 12580, 12796, 13764**

*TGax Editor: Update D2.3 P367L46 (28.1.1 – Introduction to the HE PHY) as shown below.*

For PPDU bandwidths greater than or equal to 80 MHz, the HE PHY supports preamble punctured transmissions where pre-HE modulated fields (see Figure 28-22) are not transmitted in one or more of the non-primary 20 MHz channels, and RUs associated with those punctured 20 MHz channels are not allocated to any users in an HE MU PPDU.

*TGax Editor: Add the following at D2.3 P476L40 (28.3.10.8.5 – HE-SIG-B common content).*

Pre-HE modulated fields (see Figure 28-22) are not transmitted in 20 MHz subchannels in which the preamble is punctured.

Preamble is punctured in a 20 MHz subchannel *S1* of an HE MU PPDU if and only if either

* The RU Allocation subfield value corresponding to the 20 MHz subchannel *S1* is B7…B0 = 01110001 (242-tone empty), or
* The RU Allocation subfield values corresponding to the 20 MHz subchannels *S1* and *S2* are both B7…B0 = 01110010 (484-tone RU with zero User fields indicated in this RU Allocation subfield of the HE-SIG-B content channel) where
	+ The 20 MHz subchannels *S1* and *S2* are adjacent to each other and comprises the 40 MHz subchannel in which the 484-tone RU is located.
	+ In this case, both 20 MHz subchannels *S1* and *S2* have preamble punctured.

NOTE – Preamble puncturing over the 40 MHz comprising of the adjacent 20 MHz subchannels *S1* and *S2* can also be indicated by using the value B7…B0 = 01110001 for both RU Allocation subfields corresponding to the 20 MHz subchannels *S1* and *S2*.

The Center 26-tone RU in a preamble punctured 80, 160 or 80+80 MHz HE MU PPDU shall not be allocated to any user if either of the two 20 MHz subchannels which the Center 26-tone RU straddles have the preamble punctured.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** |
| 13428 | 28.3.3.2 | 364.55 | "at least N x 4 x 26 subcarriers (contiguous or non-contiguous) shall be occupied". While this is correct, the subcarriers should still consist of entire RUs. It's not allowed to just randomly occupy subcarriers till the required number is met. | Clarify |
| 13952 | 28.3.3.2 | 364.55 | "In an HE MU PPDU, at least Nx4x26 subcarriers (contiguous or non-contiguous) shall be occupied throughout the signaled BW, where N is the number of 20 MHz subchannels occupied by non-HE portions of the HE PPDU preamble."It does not forbid that an HE MU PPDU occupies 26-tone RU in an 20MHz.But, in 11-16/910r0, original proposal was to require a minimum of four RU26 (or equivalently other sized RUs) in each 20MHz.It seems that current spec text is not correctly captured. | As in comment. |
| 14159 | 28.3.3.2 | 364.55 | make it clear whether the sentence "In an HE MU PPDU, at least N x 4 x 26 subcarriers (contiguous or non-contiguous) shall be occupiedthroughout the signaled BW, where N is the number of 20 MHz subchannels occupied by non-HE portions of the HE PPDU preamble." properly reflects its original intention by 16/0910r0. Its proposal in the document is "Proposal - require a minimum of four RU26 (or equivalently other sized RUs) in each 20MHz."For example, the current text seems to allow 6 x 26 on the primary 20MHz channel and 2 x 26 on the secondary 20MHz. | as in comment |

**Discussion**

Except for 20 MHz operating STAs, a receiver is expected to use an FFT whose size is large enough to cover the entire PPDU bandwidth. In this case, there is no need to specify the minimum number of tones allocation requirement per 20 MHz.

In case of 20 MHz operating STAs, the FFT size is not large to begin with – covers only 20 MHz. Hence, receivers are not expected to experience FFT dynamic range issue identified in 11-16/910r0.

However, if there is a 20 MHz OBSS when the BSS is operating in a DFS channel, then allocating only few tones in a 20 MHz may increase the DFS false detection rate for those APs which declare to be narrow BW UL OFDMA intolerant (see 27.5.3). Hence, we should adopt the same mechanism used for UL OFDMA to protect OBSS from DFS false detection.

In addition, Primary 20 MHz should always have an RU allocated to prevent other STAs from falsely thinking that the BSS is idle.

**Proposed Resolution: CIDs 13428, 13952, 14159**

**Revised**.

Proposed text update in 11-18/0934r1 clarifies the requirement on the minimum number of subcarriers to be modulated in an HE MU PPDU.

Instruction Editor: Implement the proposed text update for CIDs 13428, 13952 and 14159 in 11-18/0934r1.

**Proposed Text Updates: CIDs 13428, 13952, 14159**

*TGax Editor: Change “UL OFDMA Tolerance” to “OFDMA Tolerance” at the following locations in D2.3.*

*P131L28 (Table 9-135, last row, 2nd column)*

*P131L29 (Table 9-135, last row, 3rd column)*

*P131L33 (Table 9-135, last row, 3rd column)*

*P275L48*

*P275L51*

*P279L39*

*P279L41*

*TGax Editor: Change “dot11OBSSNarrowBWRUinULOFDMATolerated” to “dot11OBSSNarrowBWRUinOFDMATolerated” (change ULOFDMA to OFDMA) at the following locations in D2.3.*

*P131L30 (Table 9-135, last row, 3rd column)*

*P625L30*

*P625L48*

*TGax Editor: Add a new subclause 27.5.1.3 at D2.3 P272L51 as shown below.*

**27.5.1.3 RU Allocation in an HE MU PPDU**

An HE MU PPDU shall have sufficient number of RUs allocated to users such that all of the following conditions are satisfied.

* At least *N* 4  26 subcarriers are modulated by the allocated RUs within the entire PPDU, where *N* is the number of 20 MHz subchannels which are not preamble punctured in the PPDU.
* For each 20 MHz subchannel *S* within the bandwidth of the HE MU PPDU, at least 2  26 subcarriers are modulated by the allocated RUs in the 20 MHz subchannel *S* if all of the following are true:
	+ At least one RU is allocated in the 20 MHz subchannel *S.*
	+ Transmitter is an AP.
	+ The AP is operating in an operating class for which the behavior limits set listed in Annex E includes the DFS\_50\_100\_Behavior.
	+ The AP has received at least one Beacon frame from OBSS *B* within the past dot11ObssNbRuToleranceTime in the current operating channel in which any of the following are true:
		- The Extended Capabilities element is not present.
		- The OBSS Narrow Bandwidth RU in OFDMA Tolerance Support bit in the Extended Capabilities element is not present.
		- The OBSS Narrow Bandwidth RU in OFDMA Tolerance Support bit in the Extended Capabilities element is 0.
	+ The 20 MHz subchannel *S* overlaps with the operating bandwidth of the OBSS *B.*
* At least one RU is allocated in the Primary 20 MHz.

*TGax Editor: Delete D2.3 P407L62-65.*

*TGax Editor: Add the following at D2.3 P476L39 (28.3.10.8.5 – HE-SIG-B common content).*

In an HE MU PPDU, an RU which is not allocated to any user can be indicated using the Center 26-tone RU subfield in the HE-SIG-B Common field (see Table 28-23), certain RU Allocation subfield values in the the HE-SIG-B Common field (see Table 28-24), or value 2046 for the STA-ID subfield in the HE-SIG-B User field (see 27.11.1 and 28.3.10.8.6). Subcarriers corresponding to such unallocated RUs shall not be modulated in HE-STF, HE-LTF and Data.

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