IEEE P802.11
Wireless LANs

|  |
| --- |
| Proposed Draft Text (PDT-PHY) : Update to EHT Sounding NDP |
| Date: 2021-01-14 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Sameer Vermani | Qualcomm |  |  | svverman@qti.qualcomm.com |
| Alice Li Chen | Qualcomm |  |  | alicel@qti.qualcomm.com |
| Bin Tian | Qualcomm |  |  | btian@qti.qualcomm.com |
| Youhan Kim | Qualcomm |  |  | youhank@qti.qualcomm.com |

Abstract

This document proposes updates to EHT Sounding NDP draft spec section.

* EHT sounding NDP

The EHT sounding NDP is a variant of the EHT MU PPDU. The format of an EHT sounding NDP is defined in Figure 36-48 (EHT sounding NDP format).

NOTE—The number of EHT-LTF symbols in the EHT sounding NDP is indicated in the Number Of EHT-LTF Symbols field of EHT-SIG

.

The EHT sounding NDP has the following properties:

* Uses the EHT MU PPDU with EHT-SIG field contents of the NDP mode, without the Data field and a single EHT SIG symbol encoded using EHT-MCS 0
* Has a PE field that is given as follows.
* 4 µs when the PPDU bandwidth is less than or equal to 160 MHz and the number of spatial streams is less than or equal to 8.
* 8 µs for all the other cases.

In the EHT sounding NDP, the EHT-LTF populated tones depends on the non-OFDMA puncturing pattern signaled through the Punctured Channel Indication field of the U-SIG. In an 80 MHz sounding NDP, if none of the 20 MHz subchannels is punctured, all EHT-LTF tones in that 80 MHz are populated. If one of the 20 MHz subchannels is punctured in an 80MHz NDP, only the EHT-LTF tones within the RU242+484 formed by the remaining unpunctured 20 MHz subchannels are populated. In an 160 MHz sounding NDP, if none of the 20 MHz subchannels of an 80MHz segment is punctured, all EHT-LTF tones in that 80 MHz segment are populated. If one of the 20 MHz subchannels is punctured in an 80MHz segment of the 160MHz NDP, only the EHT-LTF tones within the RU242+484 formed by the remaining unpunctured 20 MHz subchannels of the 80MHz segment are populated. If one of the 40 MHz subchannel is punctured in an 80MHz segment in a 160MHz or 320MHz NDP, only the EHT-LTF tones within the RU484 formed by the remaining unpunctured 40MHz subchannel in the 80MHz segment are populated. If an 80 MHz subchannel is punctured in a 320 MHz sounding NDP, none of the EHT-LTF tones in that punctured 80 MHz subchannel are populated. In Table XXX the EHT-LTF populated tones are listed for an 80 MHz segment of a sounding NDP for various puncturing possibilities, the indices of the tones being defined in a local manner to the 80MHz segment. The sets of indices defined in Table XXX act as intermediate variables in Table YYY, where the final sets of EHT-LTF populated tones are listed for all the defined values of the Punctured Channel Indication field in the U-SIG as well as for different PPDU bandwidths.

Table XXX EHT-LTF Populated Tones in an 80 MHz Sounding NDP or in an 80 MHz segment of a 160/320 MHz sounding NDP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **(M)RU & Tone Indices** | **1x EHT-LTF Tone Indices** | **2x EHT-LTF Tone Indices** | **4x EHT-LTF Tone Indices** |
| Non-punctured | RU996, [-500:-3, 3:500] | A=[-500:4:-4, 4:4:+500] | A=[-500:2:-4, 4:2:500] | A=[-500:-3, 3:500] |
| 1st 20MHz punctured | RU242+484, [-253:-12, 12:253, 259:500] | B1=[-252:4:-12, 12:4:252, 260:4:500] | B1=[-252:2:-12, 12:2:252, 260:2:500] | B1=[-253:-12, 12:253, 259:500] |
| 2nd 20MHz punctured | RU242+484, [-500:-259, 12:253, 259:500] | B2=[-500:4:-260, 12:4:252, 260:4:500] | B2=[-500:2:-260, 12:2:252, 260:2:500] | B2=[-500:-259, 12:253, 259:500] |
| 3rd 20MHz punctured | RU242+484, [-500:-259, -253:-12, 259:500] | B3=[-500:4:-260, -252:4:-12, 260:4:500] | B3=[-500:2:-260, -252:2:-12, 260:2:500] | B3=[-500:-259, -253:-12, 259:500] |
| 4th 20MHz punctured | RU242+484, [-500:-259, -253:-12, 12:253] | B4=[-500:4:-260, -252:4:-12, 12:4:252] | B4=[-500:2:-260, -252:2:-12, 12:2:252] | B4=[-500:-259, -253:-12, 12:253] |
| 1st 40MHz punctured | RU484, [12:253, 259:500] | C1=[12:4:252, 260:4:500] | C1=[12:2:252, 260:2:500] | C1=[12:253, 259:500] |
| 2nd 40MHz punctured | RU484, [-500:-259, -253:-12] | C2=[-500:4:-260, -252:4:-12] | C2=[-500:2:-260, -252:2:-12] | C2=[-500:-259, -253:-12] |

Note—In a 160/320 MHz sounding NDP, the EHT-LTF tone indices in this table are local to each 80 MHz segment being considered.

Table YYY EHT-LTF populated tones for each punctured channel indication in an EHT Sounding NDP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PPDU bandwidth | Cases | Puncturing pattern | Punctured channel indication field value | EHT-LTF Tone Indices |
| 1x EHT-LTF | 2x EHT-LTF | 4x EHT-LTF |
| 20 MHz | No puncturing | [1 1 1 1] | 0 | [-120:4:-4, 4:4:120] | [-122:2:-2, 2:2:122] | [-122:-2, 2:122] |
| 40 MHz | No puncturing | [1 1 1 1] | 0 | [-244:4:-4, 4:4:244] | [-244:2:-4, 4:2:244] | [-244:-3, 3:244] |
| 80 MHz | No puncturing | [1 1 1 1] | 0 | A |
| 20 MHz puncturing | [x 1 1 1] | 1 | B1 |
| [1 x 1 1] | 2 | B2 |
| [1 1 x 1] | 3 | B3 |
| [1 1 1 x] | 4 | B4 |
| 160 MHz | No puncturing | [1 1 1 1 1 1 1 1] | 0 | [A-512, A+512] |
| 20 MHz puncturing | [x 1 1 1 1 1 1 1] | 1 | [B1-512, A+512] |
| [1 x 1 1 1 1 1 1] | 2 | [B2-512, A+512] |
| [1 1 x 1 1 1 1 1] | 3 | [B3-512, A+512] |
| [1 1 1 x 1 1 1 1] | 4 | [B4-512, A+512] |
| [1 1 1 1 x 1 1 1] | 5 | [A-512, B1+512] |
| [1 1 1 1 1 x 1 1] | 6 | [A-512, B2+512] |
| [1 1 1 1 1 1 x 1] | 7 | [A-512, B3+512] |
| [1 1 1 1 1 1 1 x] | 8 | [A-512, B4+512] |
| 40 MHz puncturing | [x x 1 1 1 1 1 1] | 9 | [C1-512, A+512] |
| [1 1 x x 1 1 1 1] | 10 | [C2-512, A+512] |
| [1 1 1 1 x x 1 1] | 11 | [A-512, C1+512] |
| [1 1 1 1 1 1 x x] | 12 | [A-512, C2+512] |
| 320 MHz | No puncturing | [1 1 1 1 1 1 1 1] | 0 | [A-1536, A-512, A+512, A+1536] |
| 40 MHz puncturing | [x 1 1 1 1 1 1 1] | 1 | [C1-1536, A-512, A+512, A+1536] |
| [1 x 1 1 1 1 1 1] | 2 | [C2-1536, A-512, A+512, A+1536] |
| [1 1 x 1 1 1 1 1] | 3 | [A-1536, C1-512, A+512, A+1536] |
| [1 1 1 x 1 1 1 1] | 4 | [A-1536, C2-512, A+512, A+1536] |
| [1 1 1 1 x 1 1 1] | 5 | [A-1536, A-512, C1+512, A+1536] |
| [1 1 1 1 1 x 1 1] | 6 | [A-1536, A-512, C2+512, A+1536] |
| [1 1 1 1 1 1 x 1] | 7 | [A-1536, A-512, A+512, C1+1536] |
| [1 1 1 1 1 1 1 x] | 8 | [A-1536, A-512, A+512, C2+1536] |
| 80 MHz puncturing | [x x 1 1 1 1 1 1] | 9 | [A-512, A+512, A+1536] |
| [1 1 x x 1 1 1 1] | 10 | [A-1536, A+512, A+1536] |
| [1 1 1 1 x x 1 1] | 11 | [A-1536, A-512, A+1536] |
| [1 1 1 1 1 1 x x] | 12 | [A-1536, A-512, A+512] |
| 320–80–40 | [x x x 1 1 1 1 1] | 13 | [C1-512, A+512, A+1536] |
| [x x 1 x 1 1 1 1] | 14 | [C2-512, A+512, A+1536] |
| [x x 1 1 x 1 1 1] | 15 | [A-512, C1+512, A+1536] |
| [x x 1 1 1 x 1 1] | 16 | [A-512, C2+512, A+1536] |
| [x x 1 1 1 1 x 1] | 17 | [A-512, A+512, C1+1536] |
| [x x 1 1 1 1 1 x] | 18 | [A-512, A+512, C2+1536] |
| [x 1 1 1 1 1 x x] | 19 | [C1-1536, A-512, A+512] |
| [1 x 1 1 1 1 x x] | 20 | [C2-1536, A-512, A+512] |
| [1 1 x 1 1 1 x x] | 21 | [A-1536, C1-512, A+512] |
| [1 1 1 x 1 1 x x] | 22 | [A-1536, C2-512, A+512] |
| [1 1 1 1 x 1 x x] | 23 | [A-1536, A-512, C1+512] |
| [1 1 1 1 1 x x x] | 24 | [A-1536, A-512, C2+512] |

NOTE1—In the puncturing patterns in the above table, a “1” denotes a non-punctured subchannel and an “x” denotes a punctured subchannel. The puncturing granularity for 80 MHz and 160 MHz PPDU bandwidth is 20 MHz, and the puncturing granularity for 320 MHz PPDU bandwidth is 40 MHz.

NOTE2—For an 80/160/320 MHz sounding NDP, the EHT-LTF populated tone indices are defined as functions of A, B1, B2, B3, B4, C1, and C2, given in Table XXX for the corresponding symbol duration (i.e., 1x/2x/4x symbol duration).

It is mandatory to support the 2´ EHT-LTF with 0.8 µs GI and 2´ EHT-LTF with 1.6 µs GI. It is optional to support the 4´ EHT-LTF with 3.2 µs GI. The other combinations of EHT-LTF type and GI duration are disallowed.

If the Beamforming field in EHT-SIG of an EHT sounding NDP is 1, then the receiver of the EHT sounding NDP should not perform channel smoothing when generating the compressed beamforming feedback report.