IEEE P802.11
Wireless LANs

|  |
| --- |
| Support for Puncturing Patterns |
| Date: 2023-11-14 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Christian Berger | NXP | 350 Holger Way, San Jose, CA |  | christian.berger@nxp.com |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes a change of to indicate support for mandatory/optional puncturing patterns, changes are relative to Draft P802.11be\_D4.0, IEEE802.11az-2022 and Draft P802.11bk D0.7.

Revisions:

1. Include feedback during presentation and fix typos
2. More improvements after discussoin

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 TGbk Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbk Editor: Editing instructions preceded by “TGbk Editor” are instructions to the TGbk editor to modify existing material in the TGaz draft. As a result of adopting the changes, the TGbk editor will execute the instructions rather than copy them to the TGbk Draft.***

**The text preceded by “Discussion” is not part of the adopted changes.**

1. ***TGbk Editor: Change clause 9.4.2.298 as follows:***

***Insert the following definitions for the two new sublements to the end of this subclause. (#202308-01)***

The Transmit Power Envelope subelement has the same definition as the Transmit Power Envelope element (see 9.4.2.161 (Transmit Power Envelope element)).

The format of the 320 MHz Ranging subelement is as shown in Figure 9-7xx (320 MHz Ranging subelement format).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B7 | B8 B15 | B16 B18 | B19 B21 | B22  | B23 | B24 B39 |
|  | Subelement ID | Length | Max R2INss =320 MHz | Max I2RNss =320 MHz | Puncturing Pattern Support | Reserved | Puncturing Pattern |
| Bits: | 8 | 8 | 3 | 3 | 1 | 1 | 16 |

**Figure 9-7xx—****320 MHz Ranging subelement format**

The Subelement ID and Length fields are defined in 9.4.3 (Subelements).

The Max R2I Nss = 320 MHz field indicates for the bandwidth of 320 MHz the maximum number of spatial streams to be used in R2I NDP in the session.

The Max I2R Nss = 320 MHz field indicates for the bandwidth of 320 MHz the maximum number of spatial streams to be used in I2R NDP in the session.

The Puncturing Pattern Support field is set to one to indicate support of all valid puncturing patterns as listed in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions); it is set to zero to indicate support of only the subset of puncturing patterns defined inTable xx-x1 (Subset of puncturing patterns in 320MHz Ranging when Puncturing Pattern Support field set to 0).

The Puncturing Pattern field is used by the RSTA to convey the Disabled Subchannel Bitmap to the ISTA in the IFTM frame. It is reserved when included in the IFTMR frame by the ISTA.

1. ***TGbk Editor: Change clause 11.21.6.3.3 as follows:***

***Change subclause 11.21.6.3.3 in paragraph 8 as follows. (#202308-01)***

When a Ranging Parameters element is included in the IFTMR frame, the ISTA shall indicate the following parameters in the Ranging Parameters field:

* … …
* Maximum number of space-time streams it is capable of receiving in the R2I NDP for 160 MHz bandwidth~~s greater than 80 MHz~~, in the Max R2I STS ~~> 80~~=160 MHz subfield.
* Maximum number of space-time streams it is capable of transmitting in the I2R NDP for bandwidths less than or equal to 80 MHz, in the Max I2R STS ≤ 80 MHz subfield.
* Maximum number of space-time streams it is capable of transmitting in the I2R NDP for 160 MHz bandwidth~~s greater than 80 MHz~~, in the Max I2R STS ~~> 80~~=160 MHz subfield.
* … …

To indicate support for 320 MHz Ranging an ISTA shall include a 320 MHz Ranging subelement together with the Ranging Parameters element in the IFTMR frame and set the Format and Bandwidth subfield to a value of 5 or less. In the subelement:

* The Max R2I Nss = 320 MHz field is set to the maximum number of spatial streams the ISTA is capable of receiving in the R2I NDP for 320 MHz bandwidth minus 1.
* The Max I2R Nss = 320 MHz field is set to the maximum number of spatial streams the ISTA is capable of transmitting in the I2R NDP for 320 MHz bandwidth minus 1.
* The Puncturing Pattern Support field is set to 1 to indicate support of all puncturing patterns, or it is set to 0 to indicate support of only the subset of puncturing patterns defined in Table xx-x1 (Subset of puncturing patterns in 320MHz Ranging when Puncturing Pattern Support field set to 0).

The ISTA shall not include a Transmit Power Envelope subelement in the IFTMR frame.

… …

 ***Change subclause 11.21.6.3.3 in paragraph 21 as follows. (#202308-01)***

When the negotiation is successful for TB ranging and non-TB ranging, the corresponding IFTM frame from the RSTA shall include a Ranging Parameters element with the parameters that defines the negotiated range measurement session. The RSTA shall indicate the following parameters in the Ranging Parameters field:

* In the Format and Bandwidth subfield, it assigns the maximum allowed bandwidth used during measurement exchanges (referred to as RSTA Assigned Max Bandwidth). This value shall not be greater than the value in the corresponding IFTMR frame. If the IFTMR included a 320 MHz Ranging subelement, the bandwidth may be assigned as 320 MHz regardless of the Format and Bandwidth subfield value in the IFTMR frame.
* … …
* In the Max R2I STS ~~> 80~~=160 MHz subfield, either the maximum number of space-time streams it is capable of transmitting in the R2I NDP for 160 MHz bandwidth~~s greater than 80 MHz~~, or the value in the corresponding IFTMR frame, whichever is smaller (referred to as RSTA Assigned R2I STS ~~> 80~~=160 MHz).
* In the Max I2R STS ~~> 80~~=160 MHz subfield, either the maximum number of space-time streams it is capable of receiving in the I2R NDP for 160 MHz bandwidth~~s greater than 80 MHz~~, or the value in the corresponding IFTMR frame, whichever is smaller (referred to as RSTA Assigned I2R STS ~~> 80~~=160 MHz).
* … …

If the Format and Bandwidth subfield is set to a value of 8, in the same IFTM frame, the RSTA shall include a 320 MHz Ranging subelement together with the Ranging Parameters element. In the 320 MHz Ranging subelement:

* The Max R2I Nss = 320 MHz field is set to either the maximum number of spatial streams it is capable of transmitting in the R2I NDP for 320 MHz bandwidth minus 1, or the value in the corresponding IFTMR frame, whichever is smaller (referred to as RSTA Assigned R2I Nss =320 MHz).
* The Max I2R Nss = 320 MHz field is set to either the maximum number of spatial streams it is capable of receiving in the I2R NDP for 320 MHz bandwidth minus 1, or the value in the corresponding IFTMR frame, whichever is smaller (referred to as RSTA Assigned I2R Nss =320 MHz).
* The Puncturing Pattern Support field is set to 1 to indicate support of all puncturing patterns, or it is set to 0 to indicate support of only the subset of puncturing patterns defined in Table xx-x1 (Subset of puncturing patterns in 320MHz Ranging when Puncturing Pattern Support field set to 0).
* If the RSTA has included the Disabled Subchannel Bitmap subfield in the EHT Operation element, the Puncturing Pattern field is set to the same value; otherwise the Puncturing Pattern field is set to 0xffff.

If the RSTA is an EHT AP that has included the Disabled Subchannel Bitmap subfield in the EHT Operation element, and the ISTA has set the Puncturing Pattern Support field in the 320 MHz Ranging subelement of the IFTMR frame to 0, the RSTA shall not assign a 320 MHz bandwidth option unless the Disabled Subchannel Bitmap subfield in the EHT Operation element corresponds to one of the entries of Table xx-x1 (Subset of puncturing patterns in 320MHz Ranging when Puncturing Pattern Support field set to 0).

Table xx-x1 Subset of puncturing patterns in 320MHz Ranging when Puncturing Pattern Support field set to 0

|  |  |  |
| --- | --- | --- |
| PPDUbandwidth | Case | Puncturing pattern(RU or MRU index) |
| 320MHz | 80MHz puncturing | [x x 1 1 1 1 1 1](3x996-tone MRU 1) |
| [1 1 1 1 1 1 x x](3x996-tone MRU 4) |

… …

***Change subclause 11.21.6.3.3 in paragraph 28 as follows. (#202308-01)***

Upon reception of an IFTMR frame with the Format and Bandwidth subfield set to a value of 3, 4 or 5 representing the ISTA’s support for one of the 160 MHz BW options, the RSTA shall respond with the same requested value in the Format and Bandwidth subfield in the IFTM frame, if it supports the requested 160 MHz BW option, otherwise respond with a value less than 3. Upon reception of an IFTMR frame with the Ranging Parameters element including a 320 MHz Ranging subelement, representing the ISTA’s support for 320 MHz Ranging, the RSTA shall respond with the value of 8 in the Format and Bandwidth subfield in the Ranging Parameters element and include a 320 MHz Ranging subelement in the IFTM frame, if it supports the requested 320 MHz BW option.

**11.21.6.4.6 Transmission of a ranging NDP**

1. ***TGbk Editor: Change clause 11.21.6.4.6 as follows:***
2. An RSTA transmitting an HE Ranging NDP or EHT Ranging NDP to one or more peer ISTAs shall set the TXVECTOR parameter as follows:
3. …
* The CH\_BANDWIDTH parameter is set as follows:
	+ In the TB ranging measurement exchange ([11.21.6.4.3](#H11o21o6o4o3)), and TB ranging measurement exchange with secure ~~HE-~~LTF ([11.21.6.4.5.2](#H11o21o6o4o5o2)), set to the same value as the TXVECTOR parameter CH\_BANDWIDTH in the preceding Ranging Sounding Trigger frame
	+ In the non-TB ranging measurement exchange ([11.21.6.4.4](#H11o21o6o4o4)) and non-TB ranging measurement exchange with secure ~~HE-~~LTF ([11.21.6.4.5.3](#H11o21o6o4o5o3)), set to the same value as the TXVECTOR parameter CH\_BANDWIDTH in the preceding Ranging NDP Announcement frame
* If the FORMAT parameter is set to EHT\_MU the INACTIVE\_SUBCHANNELS parameter is set to the value of the Puncturing Pattern field in the 320 MHz Ranging subelement of the IFTM frame.

…

An ISTA transmitting an HE Ranging NDP or EHT Ranging NDP shall set the TXVECTOR parameter as follows:

…

* The CH\_BANDWIDTH set to the same value as the TXVECTOR parameter CH\_BANDWIDTH in the preceding Ranging NDP Announcement frame.
* If the FORMAT parameter is set to EHT\_MU the INACTIVE\_SUBCHANNELS parameter is set to the value of the Puncturing Pattern field in the 320 MHz Ranging subelement of the IFTM frame.

…

An ISTA transmitting an HE TB Ranging NDP or an EHT TB Ranging NDP to an RSTA shall set the TXVECTOR parameter as follows:

…

* The CH\_BANDWIDTH parameter is set to the same value as the TXVECTOR parameter CH\_BANDWIDTH in the preceding Ranging Sounding Trigger frame.
* If the FORMAT parameter is set to EHT\_MU the INACTIVE\_SUBCHANNELS parameter is set to the value of the Puncturing Pattern field in the 320 MHz Ranging subelement of the IFTM frame.