IEEE P802.11
Wireless LANs

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| Proposed Draft Specification for WideBand BW Signaling |
| Date: 2021-03-04 |
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1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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).***

**Discussion:**

The following Motion on this item passed:

*802.11be supports indicating BW larger than 160 MHz through scrambler sequence in non-HT or non-HT duplicated frames.*

*[Motion 115, #SP102, [16] and [156]]*

The scrambler sequence is located in the first 7 bits (B0 to B6) of the Service field:



**Straw Poll 1: which option do you prefer for the 320MHz BW indication in non-HT duplicated PPDU?**

* Opt 1: B3 in scrambing sequence
* Opt 2: one or more bits in SERVICE field
* Opt 3: want to see other options
* Abstain

**SP results:**

**Opt 1: 18**

**Opt 2: 42**

**Opt 3: 16**

**Abstain: 22**

Base on the straw poll result, most people prefer to use SERVICE field for the indication. The proposed spec text is based on the indication through B7 in SERVICE field.

During the discussion, one or more bits are mentioned for indication. Since that when B7 is used, we can get 4 extra mode by redefine B5B6 in scrambling sequence, after one of them is used for indication of 320MHz, there are still 3 modes are reserved for future use. So I think using one bit in SERVICE field for indication is good enough.

During the presentation, some members point out that current reserved SERVICE bits are not protected, so CRC or pairty may needed. Considering that it is not mentioned in the passed motion. Here the parity issue is not touched in this document. We can discuss it separately later.

1. **Proposed spec text**

***TGbe editor: Please change the subclauses below as follows:***

* Control frames
* RTS frame format

***Change the third paragraph as follows:***

The TA field is the address of the STA transmitting the RTS frame or the bandwidth signaling TA of the STA transmitting the RTS frame. In an RTS frame transmitted by a VHT STA, an HE STA or an EHT STA in a non-HT or non-HT duplicate format to another VHT STA, HE STA or EHT STA, the scrambling sequence carries the bits 0 and 1 of CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR (see 10.3.2.7 (VHT and SIG RTS procedure)), the scrambling sequence carries the bit 2 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, and the TA field is a bandwidth signaling TA.

* PS-Poll frame format
* General

***Change the second paragraph as follows:***

The BSSID (RA) field is set to the address of the STA contained in the AP. The TA field value is the address of the STA transmitting the frame or a bandwidth signaling TA. In a PS-Poll frame transmitted by a VHT STA, an HE STA or an EHT STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the bits 0 and 1 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, the scrambling sequence carries the bit 2 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, and the TA field value is a bandwidth signaling TA.

* CF-End frame format

***Change the last paragraph as follows:***

If transmitted by a non-DMG STA, the BSSID (TA) field is the address of the STA contained in the AP except that the Individual/Group bit of the BSSID (TA) field is set to 1 in a CF-End frame transmitted by a VHT STA to a VHT AP, or an HE STA to an HE AP or an EHT STA to an EHT AP in a non-HT or non-HT duplicate format to indicate that the scrambling sequence carries the bits 0 and 1 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, and the scrambling sequence carries the bit 2 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR. If transmitted by a DMG STA, the TA field is the MAC address of the STA transmitting the frame.

* BlockAckReq frame format
* Overview

***Change the fourth paragraph as follows:***

The TA field value is the address of the STA transmitting the BlockAckReq frame or a bandwidth signaling TA. In a BlockAckReq frame transmitted by a VHT STA, an HE STA or an EHT STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the bits 0 and 1 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, and the scrambling sequence carries the bit 2 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, and the TA field value is a bandwidth signaling TA.

***Change the title of the subclause 9.3.1.19 as follows:***

* VHT/HE/EHT NDP Announcement frame format

***Change the fourth paragraph as follows:***

The TA field is set to the address of the STA transmitting the VHT/HE NDP Announcement frame or the bandwidth signaling TA of the STA transmitting the VHT/HE/EHT NDP Announcement frame. In a VHT/HE/EHT NDP Announcement frame transmitted by a VHT, HE or EHT STA in a non-HT or non-HT duplicate format and where the scrambling sequence carries the bits 0 and 1 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, the scrambling sequence carries the bit 2 of CH\_BANDWIDTH\_IN\_NON\_HT in TXVECTOR, and the TA field is set to a bandwidth signaling TA.

***TGbe editor: Please change the subclauses below as follows:***

Table 17-1—TXVECTOR parameters

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Associated primitive** | **Value** |
| SERVICE | PHY-TXSTART.request (TXVECTOR) | Null |
| CH\_BANDWIDTH\_ IN\_NON\_HT | PHY-TXSTART.request (TXVECTOR) | Not present if none of dot11VHTOptionImplemented, dot11HEOptionImplemented, and dot11EHTOptionImplemented are present or equal to true.Optionally present (see 9.3.1 (Control frames)) if at least one of dot11VHTOptionImplemented, dot11HEOptionImplemented and dot11EHTOptionImplemented is present and equal to true.If dot11EHTOptionImplemented is not present or equal to false, then the allowed values are CBW20, CBW40, CBW80, CBW160, or CBW80+80.If dot11EHTOptionImplemented is equal to true and dot11EHT6GOptionImplemented is equal to false then the allowed values are CBW20, CBW40, CBW80, CBW160, or CBW80+80 and if dot11EHT6GOptionImplemented is equal to true then the allowed values are CBW20, CBW40, CBW80, CBW160, or CBW320. |
| DYN\_BANDWIDTH\_ IN\_NON\_HT | PHY-TXSTART.request (TXVECTOR) | Not present if none of dot11VHTOptionImplemented, dot11HEOptionImplemented, and dot11EHTOptionImplemented are present or equal to true.Optionally present (see 9.3.1.2 (RTS frame format)) if at least one of dot11VHTOptionImplemented, dot11HEOptionImplemented and dot11EHTOptionImplemented is present and equal to true, then the allowed values are Static or Dynamic |

**17.2.2.4 TXVECTOR SERVICE**

The SERVICE parameter shall be null.

NOTE – Modifications to the transmitted SERVICE field are made using other TXVECTOR parameters, such as the CH\_BANDWIDTH\_ IN\_NON\_HT parameter when it is not equal to CBW20, CBW40, CBW80, CBW160, or CBW80+80.

**17.2.2.7 TXVECTOR CH\_BANDWIDTH\_IN\_NON\_HT**

If present, the allowed values for CH\_BANDWIDTH\_IN\_NON\_HT are CBW20, CBW40, CBW80, CBW160, CBW80+80, and CBW320 subject to the limitations specified in Table 17-1(TXVECTOR parameters). If present, this parameter is used to modify the first 7 bits of the scrambling sequence and B7 of the SERVICE field for CBW320, to indicate the bandwidth of the non-HT duplicate PPDU.

NOTE—The CH\_BANDWIDTH\_IN\_NON\_HT parameter is not present when the frame is transmitted by a non-VHT STA. The CH\_BANDWIDTH\_IN\_NON\_HT parameter is not present when the frame is transmitted by a VHT STA to a non-VHT STA. See 10.6.12 (Channel Width in non-HT and non-HT duplicate PPDUs).

Table 17-2—RXVECTOR parameters

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Associated primitive** | **Value** |
| SERVICE | PHY-RXSTART.request (RXVECTOR) | Null |
| CH\_BANDWIDTH\_ IN\_NON\_HT | PHY-RXSTART.request (RXVECTOR) | Not present if none of dot11VHTOptionImplemented, dot11HEOptionImplemented, and dot11EHTOptionImplemented are present or equal to true.Present if at least one of dot11VHTOptionImplemented, dot11HEOptionImplemented, and dot11EHTOptionImplemented are present and equal to true.If dot11EHTOptionImplemented is not present or equal to false, then the allowed values are CBW20, CBW40, CBW80, CBW160, or CBW80+80.If dot11EHTOptionImplemented is equal to true and dot11EHT6GOptionImplemented is equal to false then the allowed values are CBW20, CBW40, CBW80, CBW160, or CBW80+80 and if dot11EHT6GOptionImplemented is equal to true then the allowed values are CBW20, CBW40, CBW80, CBW160, or CBW320. |
| DYN\_BANDWIDTH\_ IN\_NON\_HT | PHY-RXSTART.request (RXVECTOR) | Not present if none of dot11VHTOptionImplemented, dot11HEOptionImplemented, and dot11HEOptionImplemented are present or equal to true.Present if at least one of dot11VHTOptionImplemented, dot11HEOptionImplemented and dot11EHTOptionImplemented are present and equal to true, then the allowed values are Static or Dynamic |

***TGbe editor: Please change the subclauses below as follows:***

**17.3.5.2 SERVICE field**

The SERVICE field has 16 bits, which shall be denoted as bits 0–15. The bit 0 shall be transmitted first in time. The bits from 0–6 of the SERVICE field, which are transmitted first, are set to 0s and are used to synchronize the descrambler in the receiver. If the CH\_BANDWIDTH\_ IN\_NON\_HT parameter in the TXVECTOR primitive is not present or is present and is equal to CBW20, CBW40, CBW80, CBW160, or CBW80+80, then bit 7 of the SERVICE field is set to 0. If the CH\_BANDWIDTH\_ IN\_NON\_HT parameter in the TXVECTOR primitive is present and is equal to CBW320, then bit 7 of the SERVICE field is set to 1. The remaining 8 bits (8–15) of the SERVICE field shall be reserved for future use. All reserved bits shall be set to 0 on transmission and ignored on reception. Refer to Figure 17-6 (SERVICE field bit assignment).

|  |  |  |
| --- | --- | --- |
| Condition | Scrambler Initialization | Remaining SERVICE bits |
| A | “0” | “0” | “0” | “0” | “0” | “0” | “0” | R | R | R | R | R | R | R | R | R |
| B | If TX: Bit 2 of CBINH; if RX: Bit 2 of CBINHI |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|  | Transmit order 🡪 |
| R: reservedCBINH: CH\_BANDWIDTH\_ IN\_NON\_HTCBINHI: CH\_BANDWIDTH\_ IN\_NON\_HT\_INDICATORB: CH\_BANDWIDTH\_ IN\_NON\_HT is present, and operating channel is in 6GHzA: Otherwises of condition B |

***TGbe editor: Please change the subclauses below as follows:***

**17.3.5.5 PHY DATA scrambler and descrambler**

The same scrambler is used to scramble transmit data and to descramble receive data. If the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT is not present, when transmitting, the initial state of the scrambler shall be set to a pseudorandom nonzero state. If the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT is present,

— The first 7 bits of the scrambling sequence shall be set as shown in Table 17-7 (Contents of the first 7 bits of the scrambling sequence) (with field values defined in Table 17-8 (TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT values and Table 17-10 (DYN\_BANDWIDTH\_IN\_NON\_HT values)) and shall be also used to initialize the state of the scrambler

— The scrambler with this initialization shall generate the remainder (i.e., after the first 7 bits) of the scrambling sequence as shown in Figure 17-7 (Data scrambler)

— CH\_BANDWIDTH\_IN\_NON\_HT is transmitted LSB first. For example, if CBW80 has a value of 2, which is 10 in binary representation, then B5=0 and B6=1

**Table 17-7—Contents of the first 7 bits of the scrambling sequence**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Condition** | **First 7 bits of scrambling sequence** |
| **B0 B3** | **B4** | **B5 B6** |
| **Transmit order** |
| TXVECTOR | CH\_BANDWIDTH\_IN\_NON\_HT is present and DYN\_BANDWIDTH\_IN\_NOT\_HT is notpresent in TXVECTOR | 5-bit pseudorandom nonzero integer if CH\_BANDWIDTH\_IN\_NON\_HT equals CBW20 or CBW320 and a 5-bit pseudorandom integer otherwise | Bits 0 and 1 of CH\_BANDWIDTH\_ IN\_NON\_HT |
| TXVECTOR | CH\_BANDWIDTH\_IN\_NON\_HT is present and DYN\_BANDWIDTH\_IN\_NOT\_HT is present in TXVECTOR | 4-bit pseudorandom nonzero integer if CH\_BANDWIDTH\_IN\_ NON\_HT equals CBW20 or CBW320 and DYN\_BANDWIDTH\_IN \_NON\_HT equals Static, and a 4-bit pseudorandom integer otherwise | DYN\_BANDWIDTH \_IN\_NON\_HT |
| RXVECTOR | CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NOT\_HT are present in RXVECTOR | — | DYN\_BANDWIDTH \_IN\_NON\_HT | Bits 0 and 1 of CH\_BAND WIDTH\_IN\_NON\_ HT\_INDICATOR (see Table 17-9 (RXVECTOR parameterCH\_BANDWIDTH\_ IN\_NON\_HT values)). |

**Table 17-8—TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT values**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Enumerated value** | **Value**  | **Value in Bits 0 and 1 of CH\_BANDWIDTH\_ IN\_NON\_HT** | **Value in Bit 2 of CH\_BANDWIDTH\_ IN\_NON\_HT** | **Notes** |
| CBW20 | **0** | **0** | **0** |  |
| CBW40 | **1** | **1** | **0** |  |
| CBW80 | **2** | **2** | **0** |  |
| CBW160 or CBW80+80 | **3** | **3** | **0** |  |
| CBW320 | **4** | **0** | **1** |  |
| Reserved | **5-7** | **1-3** | **1** | **Disregard (see 36.3.11.7.2 (Content))** |

If the TXVECTOR parameter SCRAMBLER\_RESET is set to RESET\_SCRAMBLER and dot11MACPrivacyActivated is true, the initial state of the scrambler shall be set to a nonzero random value not based on the scrambler value at the end of the last transmitted PPDU, before changes based on CH\_BANDWIDTH\_IN\_NON\_HT defined above are applied.

During reception by a VHT or HE STA, RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT shall be determined from selected bits in the scrambling sequence as shown in Table 17-7 (Contents of the first 7 bits of the scrambling sequence) and Table 17-9 (RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT values for a VHT or HE STA). During reception by a VHT STA, the RXVECTOR parameter DYN\_BANDWIDTH\_IN\_NON\_HT shall be set to selected bits in the scrambling sequence as shown in Table 17-7 (Contents of the first 7 bits of the scrambling sequence). The fields shall be interpreted as being sent LSB-first.

**Table 17-9—RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT values for a VHT or HE STA**

|  |  |  |
| --- | --- | --- |
| **CH\_BANDWIDTH\_ IN\_NON\_HT\_INDICATOR field of first 7 bits of scrambling sequence** | **dot11CurrentChannelCenter FrequencyIndex1** | **RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT** |
| 0 | 0 |  CBW20 |
| 1 | 0 | CBW40 |
| 2 | 0 | CBW80 |
| 3 | 0 | CBW160 |
| 3 | 1 to 200 | CBW80+80 |

During reception by an EHT STA, the RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT shall be determined from selected bits in the scrambling sequence as shown in Figure 17-6 (SERVICE field bit assignment), Table 17-7 (Contents of the first 7 bits of the scrambling sequence) and Table 17-9a (RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT values for an EHT STA). During reception by an EHT STA, the RXVECTOR parameter DYN\_BANDWIDTH\_IN\_NON\_HT shall be set to selected bits in the scrambling sequence as shown in Table 17-7 (Contents of the first 7 bits of the scrambling sequence). The fields shall be interpreted as being sent LSB-first.

**Table 17-9a—RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT values for an EHT STA**

|  |  |  |
| --- | --- | --- |
| **Bits 0 and 1 of CH\_BANDWIDTH\_ IN\_NON\_HT\_INDICATOR field of first 7 bits of scrambling sequence** | Bit 2 of **CH\_BANDWIDTH\_ IN\_NON\_HT\_INDICATOR field (**B7 in SERVICE field) | **RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT** |
| 0 | 0 |  CBW20 |
| 1 | 0 | CBW40 |
| 2 | 0 | CBW80 |
| 3 | 0 | CBW160 |
| 0 | 1 | CBW320 |

**Table 17-10—DYN\_BANDWIDTH\_IN\_NON\_HT values**

|  |  |
| --- | --- |
| **Enumerated value** | **Value** |
| Static | 0 |
| Dynamic | 1 |

NOTE 1—The receiving PHY cannot determine whether the CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT parameters were present in the TXVECTOR of the transmitting PHY; therefore, the receiving PHY in a VHT STA always includes values for the CH\_BANDWIDTH\_IN\_NON\_HT and

DYN\_BANDWIDTH\_IN\_NON\_HT parameters in the RXVECTOR if the PPDU is a non-HT PPDU. It is the responsibility of the MAC to determine the validity of the RXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT.

NOTE 2—The receiving PHY cannot determine whether the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT was present, but it does not matter since descrambling the DATA field is the same either way.

The seven LSBs of the SERVICE field shall be set to all 0s prior to scrambling to enable estimation of the initial state of the scrambler in the receiver.

An example of the scrambler output is illustrated in I.1.5.2 (Scrambling the BCC example) with CH\_BANDWIDTH\_IN\_NON\_HT not present.

***TGbe editor: Please change the subclauses below as follows:***

**36.2.2 TXVECTOR and RXVECTOR parameters**

**Table 36-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | TXVECTOR | RXCECTOR |
| CH\_BANDWIDTH\_IN\_NON\_HT | FORMAT is NON-HT | In TXVECTOR, if present, indicates the channel width of the transmitted PPDU, which is signaled via the scrambling sequence and SERVICE field.In RXVECTOR, if valid, indicates the channel width of the received PPDU, which is signaled via the scrambling sequence and SERVICE field.Enumerated type:CBW20, CBW40, CBW80, CBW160, CBW320NOTE—In the RXVECTOR, the validity of this parameter is determined by the MAC based on the contents of the currently received MPDU (e.g., RTS) or the previous MPDU in an exchange (e.g., the RTS preceding a CTS). | O | Y |
| Otherwise | Not present | N | N |

***End of change***