IEEE P802.11  
Wireless LANs

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| 11bn PDT PHY UHR PHY Service Interface | | | | |
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Abstract

This document contains Proposed Draft Text (PDT) for the subclause 38.2 (UHR PHY Service Interface) of the proposed TGbn (UHR, Ultra High Reliability) amendment to the 802.11 standard.

**Revision information**

The following is a summary of the important changes that occurred within each revision of this document:

|  |  |
| --- | --- |
| **Revision** | **Major changes** |
| 0 | Initial revision |
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**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 TGbn Draft. The abstract, revision information, introduction, explanation of the proposed changes and references sections are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbn Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

**Explanation of the proposed changes:**

The PHY service interface sub-clause is a composite summary of interface between all UHR PHY features and their MAC counterpart. The proposed changes to the 802.11 TGbn draft within this document are based on approved PHY feature PDTs and the following motions adopted by the TGbn task group:

**Relevant passing motions:**

*T.B.D.*

**Text to be adopted begins here.**

***TGbn editor: Please add the following new subclause 38.xxx Null subcarriers to generate the 802.11bn draft D0.1:***

# Ultra high reliability (UHR) PHY specification

## Introduction

## UHR PHY service interface

### Introduction

The UHR PHY provides an interface to the UHR MAC through an extension of the generic PHY service interface defined in 8.3.4 (Basic service and options). The interface includes TXVECTOR, RXVECTOR, PHYCONFIG\_VECTOR, and TRIGVECTOR.

The UHR MAC uses the TXVECTOR to supply the UHR PHY with per-PPDU transmit parameters. The UHR PHY uses the RXVECTOR to inform the UHR MAC of the received PPDU parameters. The UHR MAC uses the PHYCONFIG\_VECTOR to configure the UHR PHY for operation that is independent of PPDU transmission or reception. The UHR MAC uses the TRIGVECTOR to configure the UHR PHY to receive UHR TB PPDUs over each assigned RU.

### TXVECTOR and RXVECTOR parameters

The parameters in [Table 38-1 (TXVECTOR and RXVECTOR parameters)](#_bookmark4) are defined as part of the TXVECTOR parameter list in the PHY-TXSTART.request primitive for PPDU transmitting and/or as part of the RXVECTOR parameter list in the PHY-RXSTART.indication and PHY-RXEND.indication primitives for PPDU receiving. An UHR STA may receive a PPDU that contains the L-STF, L-LTF, L-SIG, RL-SIG, and U-SIG fields, but has a PHY Version Identifier field in the U-SIG field other than 0 or 1. In such cases, for forward compatibility, it shall still report the information from the version independent fields in the U-SIG field within the RXVECTOR. A value of PHY\_VER\_UNKNOWN is defined in the RXVECTOR parameter FORMAT to indicate such a PPDU format. When the RXVECTOR parameter FORMAT is PHY\_VER\_UNKNOWN, the RXVECTOR contains only six parameters – FORMAT, RSSI\_LEGACY, CH\_BANDWIDTH, TXOP\_DURATION, BSS\_COLOR, and UPLINK\_FLAG.

**Table 38-1—TXVECTOR and RXVECTOR parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| FORMAT |  | Determines the format of the PPDU. Enumerated type:  NON\_HT indicates Clause 15, Clause 16, Clause 17, Clause 18, or non-HT duplicate PPDU format. In this case, the modulation is determined by the NON\_HT\_MODULA- TION parameter defined in Table 19-1 (TXVECTOR and RXVECTOR parameters).  HT\_MF indicates HT-mixed format. HT\_GF indicates HT-greenfield format. VHT indicates VHT format.  HE\_SU indicates HE SU PPDU format. HE\_MU indicates HE MU PPDU format. HE\_ER\_SU indicates HE ER SU PPDU format. HE\_TB indicates HE TB PPDU format.  EHT\_MU indicates EHT MU PPDU format. EHT\_TB indicates EHT TB PPDU format.  UHR\_MU indicates UHR MU PPDU format.  UHR\_TB indicates UHR TB PPDU format.  UHR\_ELR indicates UHR ELR PPDU format.  PHY\_VER\_UNKNOWN indicates a PPDU format that contains the L-STF, L-LTF, L-SIG, RL-SIG and U-SIG fields, and has the PHY Version Identifier field in the U- SIG field set to a Validate value. Refer to [Table 38-28 (U-](#_bookmark102) [SIG field of an UHR MU PPDU)](#_bookmark102) and [Table 38-31 (U-SIG](#_bookmark105) [field of an UHR TB PPDU)](#_bookmark105).  The enumerated type PHY\_VER\_UNKNOWN is not used in the TXVECTOR. | Y | Y |
| PPDU\_TYPE | FORMAT is UHR\_MU or UHR\_ELR, and UPLINK\_FLAG is 0 | Set to 0 to indicate a DL OFDMA transmission (including non-MU-MIMO and MU-MIMO).  Set to 1 to indicate a UHR SU transmission ~~or UHR sounding NDP~~ not addressed to an AP.  Set to 2 to indicate a DL MU-MIMO (non-OFDMA) transmission. | Y | Y |
| FORMAT is UHR\_MU or UHR\_ELR, and UPLINK\_FLAG is 1 | Set to 1 to indicate a UHR SU transmission ~~or UHR sounding NDP~~ addressed to an AP. | Y | Y |
| FORMAT is UHR\_TB | Set to 0. | O | O |
| Otherwise | See corresponding entry in Table 36-1 (TXVECTOR and RXVECTOR parameters).. | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| L\_LENGTH | FORMAT is UHR\_MU or UHR\_ELR | Not present.  NOTE—The LENGTH field of the L-SIG field for UHR MU or UHR ELR PPDU is defined in [Equation (38-17)](#_bookmark96) using the TXTIME value defined in [38.4.3 (TXTIME and PSDU\_LENGTH](#_bookmark331) [calculation)](#_bookmark331), which in turn depend on other parameters including the TXVECTOR parameter APEP\_LENGTH. | N | N |
| FORMAT is UHR\_TB | Indicates the value used to calculate the LENGTH field of the L-SIG field. See [38.3.12.5 (L-SIG)](#_bookmark95) for details.  The value of this parameter comes from the triggering frame to which the UHR TB PPDU is the response (see 9.3.1.22.2 (Common Info field) for details). | Y | N |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters),rTable 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| N\_TX | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the number of transmit chains. | Y | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| EXPANSION\_MAT | FORMAT is UHR\_MU or UHR\_ELR, and APEP\_LENGTH > 0 | For each user, contains a vector in the number of all the subcarriers in an RU that is assigned to this user. The vector for each subcarrier contains feedback matrices as defined in [38.3.17.2 (UHR beamforming feedback matrix V)](#_bookmark273) based on the channel measured during the training symbols of previous ~~UHR sounding NDPs,~~ EHT sounding NDPs, HE sounding NDPs or VHT NDPs. | MU | N |
| FORMAT is UHR\_TB | Contains a vector in the number of all the subcarriers in an RU that is assigned to this user. The vector for each subcarrier contains feedback matrices as defined in [38.3.17.2](#_bookmark273) [(UHR beamforming feedback matrix V)](#_bookmark273) based on the channel measured during the training symbols of previous ~~UHR sounding NDPs,~~ EHT sounding NDPs, HE sounding NDPs or VHT NDPs. | O | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| ~~CHAN\_MAT~~ | ~~FORMAT is UHR\_MU or UHR\_ELR, and PSDU\_LENGTH is 0~~ | ~~Contains a vector in the number of selected subcarriers containing feedback matrices as defined in [38.3.17.2 (](#_bookmark273)UHR [beamforming feedback matrix V)](#_bookmark273) based on the channel measured during the training symbols of the currently received UHR sounding NDP.~~ | ~~N~~ | ~~Y~~ |
| ~~FORMAT is UHR\_TB, or~~  ~~FORMAT is UHR\_MU and PSDU\_LENGTH is greater than 0, or FORMAT is UHR\_ELR and PSDU\_LENGTH is greater than 0, or FORMAT is PHY\_VER\_UNKNOWN~~ | ~~Not present.~~ | | |
| ~~Otherwise~~ | ~~See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters).~~ | | |
| ~~DELTA\_SNR~~ | ~~FORMAT is UHR\_MU or UHR\_ELR, and PSDU\_LENGTH is 0~~ | ~~Contains an array of delta SNR values as defined in 9.4.1.83 (UHR MU Exclusive Beamforming Report field) based on the channel measured during the training symbols of the currently received UHR sounding NDP.~~ | ~~N~~ | ~~Y~~ |
| ~~FORMAT is UHR\_TB, or~~  ~~FORMAT is UHR\_MU and PSDU\_LENGTH is greater than 0, or FORMAT is UHR\_ELR and PSDU\_LENGTH is greater than 0, or FORMAT is PHY\_VER\_UNKNOWN~~ | ~~Not present.~~ | | |
| ~~Otherwise~~ | ~~See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters).~~ | | |
| NO\_SIG\_EXTN | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates whether signal extension needs to be applied at the end of transmission.  Boolean:  *true* indicates that no signal extension is present. *false* indicates that a signal extension is present. | Y | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| ~~SNR~~ | ~~FORMAT is UHR\_MU or UHR\_ELR, and PSDU\_LENGTH is 0~~ | ~~Contains an array of average values of received SNR measurements for each spatial stream, where each average SNR value is the arithmetic mean of the per-subcarrier SNR in decibels in the corresponding spatial stream as described in~~  ~~9.4.1.82 (UHR Compressed Beamforming Report field). The average SNR values of 8 bits are supported.~~ | ~~N~~ | ~~Y~~ |
| ~~FORMAT is UHR\_TB, or~~  ~~FORMAT is UHR\_MU and PSDU\_LENGTH is greater than 0, or FORMAT is UHR\_ELR and PSDU\_LENGTH is greater than 0, or FORMAT is PHY\_VER\_UNKNOWN~~ | ~~Not present.~~ | | |
| ~~Otherwise~~ | ~~See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters).~~ | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| ~~CQI~~ | ~~FORMAT is UHR\_MU or UHR\_ELR, and PSDU\_LENGTH is 0~~ | ~~Contains an array of received per-RU average SNRs for each spatial stream, where each per-RU average SNR is the arithmetic mean of the SNR in decibels over a 26-tone RRU as described in 9.4.1.84 (UHR CQI Report field).~~ | ~~N~~ | ~~Y~~ |
| ~~FORMAT is UHR\_TB, or~~  ~~FORMAT is UHR\_MU and PSDU\_LENGTH is greater than 0, or FORMAT is UHR\_ELR and PSDU\_LENGTH is greater than 0, or FORMAT is PHY\_VER\_UNKNOWN~~ | ~~Not present.~~ | | |
| ~~Otherwise~~ | ~~See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters).~~ | | |
| GI\_TYPE | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the length of the GI for the UHR-LTF and Data fields. Enumerated type:  0u8s\_GI indicates 0.8 µs. 1u6s\_GI indicates 1.6 µs. 3u2s\_GI indicates 3.2 µs.  NOTE—The length of GI for pre-UHR modulated fields is  0.8 µs | Y | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| FEC\_CODING | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the FEC encoding used. Enumerated type:  BCC\_CODING indicates BCC coding. LDPC\_CODING indicates LDPC coding. | MU | MU |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| LDPC\_EXTRA\_SYMBOL | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the presence of the LDPC extra symbol segment.  Integer:  1 indicates that an LDPC extra symbol segment is present. 0 indicates that an LDPC extra symbol segment is not pres- ent. | Y | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| TXPWR\_LEVEL\_INDEX | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | The allowed values for the TXPWR\_LEVEL\_INDEX parameter are in the range 1 to *N*/2, where *N* is the number of octets in dot11TxPowerLevelExtended. This parameter is used to indicate which of the available transmit power levels defined in dot11TxPowerLevelExtended shall be used for the current transmission. | Y | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| RSSI | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | The allowed values for the RSSI parameter are in the range 0 to 255 inclusive. This parameter is a measurement by the PHY of the power observed at the antennas used to receive the current PPDU measured during the reception of the UHR-LTF field. RSSI is intended to be used in a relative manner, and it is a monotonically increasing function of the received power. | N | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| RSSI\_LEGACY | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | The allowed values for the RSSI\_LEGACY parameter are in the range 0 to 255 inclusive. This parameter is a measurement by the PHY of the power observed at the antennas used to receive the current PPDU measured during the reception of non-UHR portion of the UHR PPDU preamble.  RSSI\_LEGACY is intended to be used in a relative manner, and it is a monotonically increasing function of the received power. | N | Y |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| MCS | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the modulation and coding schemes used in the transmission of the Data field of the PPDU.  Integer: range 0 to 31.  NOTE 1 – the value 14 is reserved when FORMAT is UHR\_TB.  NOTE 2 – the values from 20 to 31 are reserved. | MU | MU |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| MCS\_UHR\_SIG | FORMAT is UHR\_MU | Indicates the modulation and coding scheme used for the UHR\_SIG field.  Integer:   1. indicates UHR-MCS 0. 2. indicates UHR-MCS 1. 3. indicates UHR-MCS 3. 4. indicates UHR-MCS 15. | Y | N |
| Otherwise | Not present. | | |
| CH\_BANDWIDTH | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the channel width of the PPDU. Enumerated type:  CBW20 for 20 MHz. CBW40 for 40 MHz. CBW80 for 80 MHz. CBW160 for 160 MHz. CBW320-1 for 320 MHz-1. CBW320-2 for 320 MHz-2.  Note, CBW20 is the only valid value for UHR\_ELR | Y | Y |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters), Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| INACTIVE\_SUBCHANNELS | FORMAT is UHR\_MU, or UHR\_ELR, or UHR\_TB, or  FORMAT is NON\_HT and NON\_HT\_MODULATION is NON\_HT\_DUP\_  OFDM | Indicates the 20 MHz subchannels that are punctured.  A bitmap indexed by the 20 MHz subchannels in ascending order with the LSB indicating the lowest frequency 20 MHz subchannel. A bit is set to 1 to indicate that the corresponding 20 MHz subchannel is punctured and set to 0 to indicate the corresponding 20 MHz subchannel is not punctured.  See 37.11.5 (INACTIVE\_SUBCHANNELS) for details. | Y | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| APEP\_LENGTH | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Integer.  ~~If 0 and FORMAT is UHR\_MU or UHR\_ELR, indicates an UHR sounding NDP. Otherwise,~~ indicates the number of octets in the range 1 to aPSDUMaxLength in the A-MPDU pre-EOF padding (see [Table 38-70 (UHR PHY characteristics)](#_bookmark345)) that is carried in the PSDU. | MU | N |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| PSDU\_LENGTH | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the number of octets in the PSDU in the range 0 to aPSDUMaxLength octets (see [Table 38-70 (UHR PHY](#_bookmark345) [characteristics)](#_bookmark345)). | N | Y |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| NUM\_STS | FORMAT is UHR\_MU | Indicates the number of spatial streams. Note that the terms “space-time stream” and “spatial streams” are equivalent because STBC is not supported in UHR PPDUs.  Integer in the range  1 to 4 per user per MU-MIMO RU in the TXVECTOR.  1 to 4 per MU-MIMO RU in the RXVECTOR.  1 to 8 per RU assigned to single user in the TXVECTOR and RXVECTOR.  In each RU, NUM\_STS summed over all users is not greater than 8. | MU | Y |
| FORMAT is UHR\_TB | Indicates the number of spatial streams. Integer in the range:  1 to 4 for an MU-MIMO RRU.  1 to 8 for an RRU assigned to single user. | Y | N |
| FORMAT is UHR\_ELR | Not present. | | |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters), Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| TXOP\_DURATION | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the TXOP duration. Enumerated type or integer:  UNSPECIFIED indicates no NAV value specified. 0–8448 indicates a value in units of 1 µs that is used to update the NAV for this TXOP (see 26.2.4 (Updating two NAVs)).  The TXOP subfield in U-SIG is computed from the TXVECTOR parameter TXOP\_DURATION as follows:  TXOP\_DURATION = UNSPECIFIED: TXOP = 127. TXOP\_DURATION < 512:  TXOP = 2  TXOP\_DURATION  8  Otherwise:  TXOP = 2  TXOP\_DURATION–512  128 + 1 .  The RXVECTOR parameter TXOP\_DURATION is computed from the value of the TXOP subfield in U-SIG as follows:  TXOP = 127: TXOP\_DURATION = UNSPECIFIED.  TXOP is an even number: TXOP\_DURATION = 8  TXOP/2.  Otherwise: TXOP\_DURATION = 512 + 128  (TXOP – 1)/2. | Y | Y |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| SPATIAL\_REUSE | FORMAT is UHR\_MU or UHR\_ELR | Indicates the spatial reuse parameter value.  A tuple consisting one integer element in the range 0 to 15. See the Spatial Reuse field definition [38.3.12.8.3 (Common field for OFDMA](#_bookmark120) [transmission)](#_bookmark120) and [38.3.12.8.4 (Common field for non-](#_bookmark124) [OFDMA transmission)](#_bookmark124).  See 37.10 (UHR Spatial reuse operation) and 37.11.2 (SPATIAL\_REUSE). | Y | Y |
| FORMAT is UHR\_TB | Indicates the spatial reuse parameter value.  A tuple consisting one or two integer elements in the range 0 to 15. The number of elements present depends on the bandwidth of the PPDU. See the Spatial Reuse field definition in [38.3.12.7.2](#_bookmark101) [(Content)](#_bookmark101).  See 37.10 (UHR Spatial reuse operation) and 37.11.2 (SPATIAL\_REUSE). | Y | Y |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| RU\_ALLOCATION | FORMAT is UHR\_MU and PPDU\_TYPE is equal to 0 | For the TXVECTOR, indicates the 9-bit RU Allocation-A and RU Allocation-B (if present) subfields in the Common field for a DL OFDMA transmission.  9 bits for a 20 MHz PPDU; 18 bits for a 40 MHz PPDU; 36 bits for an 80 MHz PPDU;  72 bits for every 80 MHz frequency subblock of a 160 MHz PPDU;  144 bits for every 80 MHz frequency subblock of a 320 MHz PPDU.  See [38.3.14.9.3 (Common field for OFDMA transmission)](#_bookmark120) for details.  For the RXVECTOR, 9 bits are used to indicate the RU allocated to the user in the whole band using the same encoding of PS160 (B39) and RU Allocation (B12–B19) subfields in the UHR variant User Info field of a Trigger frame.  See 9.3.1.22 (Trigger frame format) for details. | Y | Y |
| FORMAT is UHR\_MU and PPDU\_TYPE is not equal to 0, or FORMAT is UHR\_ELR, | Not present. | | |
| FORMAT is UHR\_TB | 9 bits are used to indicate the RU allocated to the user in the whole band using the same encoding of PS160 (B39) and RU Allocation (B12–B19) subfields in the UHR variant User Info field of a Trigger frame.  See 9.3.1.22 (Trigger frame format) for details. | Y | N |
| FORMAT is NON\_HT, NON\_HT\_MODULATION is  NON\_HT\_DUP\_OFDM, and CH\_BANDWIDTH is not CBW20 or CBW40 | For the TXVECTOR, indicates the active RU(s).  36 bits for an 80 MHz PPDU; 72 bits for a 160 MHz PPDU; 144 bits for a 320 MHz PPDU.  For each 9 bits, only the following values are allowed: 26 (000011010 in binary representation)  64 (001000000 in binary representation)  See [38.3.12.8.3 (Common field for OFDMA transmission)](#_bookmark120) and  [38.3.15 (Non-HT duplicate transmission)](#_bookmark264) for details. | O | N |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| BEAMFORMED | FORMAT is UHR\_MU | For an RU with a single user allocated, set to 1 if a beamforming steering matrix is applied to this non-MU MIMO allocation and set to 0 otherwise. | MU | O |
| FORMAT is UHR\_ELR | Not present | Y | O |
| FORMAT is UHR\_TB | For an RRU with a single user allocated, set to 1 if a beamforming steering matrix is applied to this non-MU MIMO allocation and set to 0 otherwise. | Y | O |
| Otherwise | See corresponding entry in Table 21-1 (TXVECTOR and RXVECTOR parameters) or Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| UHR\_LTF\_TYPE | FORMAT is UHR\_MU or UHR\_ELR | Indicates the type of UHR-LTF. Enumerated type:  2UHR-LTF indicates a 2 UHR-LTF.  4UHR-LTF indicates a 4 UHR-LTF.  See [38.3.12.10 (UHR-LTF)](#_bookmark156). | Y | Y |
| FORMAT is UHR\_TB | Indicates the type of UHR-LTF. Enumerated type:  1UHR-LTF indicates a 1 UHR-LTF.  2UHR-LTF indicates a 2 UHR-LTF.  4UHR-LTF indicates a 4 UHR-LTF.  See [38.3.12.10 (UHR-LTF)](#_bookmark156). | Y | Y |
| Otherwise | Not present. | | |
| NUM\_UHR\_LTF | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Indicates the number of OFDM symbols in the UHR-LTF field. Integer in the range 1 to 8.  See [Table 38-33 (Common field for OFDMA transmission)](#_bookmark121), [Table 38-36 (Common field for a UHR SU transmission and](#_bookmark125) [non-OFDMA transmission to multiple users)](#_bookmark125), [Table 38-37](#_bookmark126) [(Common field for UHR sounding NDP)](#_bookmark126), and [38.3.12.10](#_bookmark156) [(UHR-LTF)](#_bookmark156). | Y | N |
| Otherwise | Not present. | | |
| STARTING\_STS\_NUM | FORMAT is UHR\_TB | Set to the starting spatial stream number minus 1 (spatial streams in a given PPDU transmission are numbered starting from 1) | Y | N |
| FORMAT is UHR\_MU, UHR\_ELR, or PHY\_VER\_UNKNOWN | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| NOMINAL\_ PACKET\_PADDING | FORMAT is UHR\_MU or UHR\_ELR | Indicates the nominal packing padding duration as defined in 9.4.2.322.5 (UHR PPE Thresholds field).  Enumerated type: 0\_us for 0 µs; 8\_us for 8 µs; 16\_us for 16 µs; 20\_us for 20 µs. | MU | N |
| FORMAT is UHR\_TB or PHY\_VER\_UNKNOWN | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| TRIGGER\_METHOD | FORMAT is UHR\_TB | Indicates the method used to trigger this UHR TB PPDU transmission.  Enumerated type:  TRIGGER\_FRAME for Trigger frame. TRS for TRS Control subfield. | Y | N |
| FORMAT is UHR\_MU, UHR\_ELR, or PHY\_VER\_UNKNOWN | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| DEFAULT\_PE\_ DURATION | FORMAT is UHR\_TB | When TRIGGER\_METHOD is TRS, indicates the duration of the PE field to be transmitted.  Enumerated type: 0\_us for 0 µs; 4\_us for 4 µs; 8\_us for 8 µs; 12\_us for 12 µs; 16\_us for 16 µs; 20\_us for 20 µs. | Y | N |
| FORMAT is UHR\_MU, UHR\_ELR, or PHY\_VER\_UNKNOWN | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| BSS\_COLOR | FORMAT is UHR\_MU, UHR\_ELR, or UHR\_TB | Set to a value in the range 0 to 63 (see 37.11.1.4 (BSS\_COLOR)). | Y | Y |
| FORMAT is PHY\_VER\_UNKNOWN | A value in the range 0 to 63 (see 37.11.1.4 (BSS\_COLOR)). | N | Y |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| UPLINK\_FLAG | FORMAT is UHR\_MU or UHR\_ELR | Set to 1 if the PPDU is addressed to an AP. Set to 0 otherwise. | Y | Y |
| FORMAT is PHY\_VER\_UNKNOWN | A value of 1 indicates the PPDU is addressed to an AP.  A value of 0 indicates the PPDU is addressed to a non-AP STA. | N | Y |
| FORMAT is UHR\_TB | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| STA\_ID | FORMAT is UHR\_MU or UHR\_ELR | Indicates the list of STA-IDs for an UHR MU PPDU (see  37.11.1.1 (STA\_ID)). | MU | Y |
| FORMAT is UHR\_TB or PHY\_VER\_UNKNOWN | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| UHR\_PRE\_FEC\_ PADDING\_FACTOR | FORMAT is UHR\_TB | When TRIGGER\_METHOD is TRIGGER\_FRAME,  indicates the pre-FEC padding factor used by the UHR TB PPDU transmission.  Integer in the range 0 to 3   1. for a pre-FEC padding factor of 4; 2. for a pre-FEC padding factor of 1; 3. for a pre-FEC padding factor of 2; 4. for a pre-FEC padding factor of 3;   Otherwise, not present. | Y | N |
|  |  | | |
| Otherwise | Not present. | | |
| UHR\_TB\_PE\_ DISAMBIGUITY | FORMAT is UHR\_TB and TRIGGER\_METHOD is TRIGGER\_FRAME | Indicates PE disambiguity for the UHR TB PPDU transmission.  Set to 0 to indicate no PE disambiguity Set to 1 to indicate PE disambiguity | Y | N |
| Otherwise | Not present. | | |
| TB\_DISREGARD\_ IN\_USIG1 | FORMAT is UHR\_TB | Indicates the values to be set for the Disregard field in U-SIG- 1.  See 37.5.2.2.4 (Allowed settings of the Trigger frame fields and TRS Control subfield). | Y | N |
| Otherwise | See corresponding entry in Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| TB\_VALIDATE\_ IN\_USIG2 | FORMAT is UHR\_TB | Indicates the values to be set for the Validate field in U-SIG-2.  See [38.3.12.7.2 (Content)](#_bookmark101). | Y | N |
| Otherwise | See corresponding entry in Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| TB\_DISREGARD\_ IN\_USIG2 | FORMAT is UHR\_TB | Indicates the values to be set for the Disregard field in U-SIG- 2.  See 37.5.2.2.4 (Allowed settings of the Trigger frame fields and TRS Control subfield). | Y | N |
| Otherwise | See corresponding entry in Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| POWER\_BOOST  \_FACTOR | FORMAT is UHR\_MU | For an RU, set the power boost factor of the occupied RU according to the rules in 37.11.1.2 (POWER\_BOOST\_FACTOR). | MR | N |
| Otherwise | See corresponding entry in Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |

**Table 38-1—TXVECTOR and RXVECTOR parameters *(continued)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Condition** | **Value** | **TXVECTOR** | **RXVECTOR** |
| SCRAMBLER\_ INITIAL\_VALUE | FORMAT is UHR\_MU or UHR\_ELR | Indicates the first 11 bits of the scrambling sequence (the eleven LSB bits of the Scrambler Initialization field prior to descrambling), with the first bit of the scrambling sequence being the LSB of SCRAMBLER\_INITIAL\_VALUE. | N | Y |
| FORMAT is UHR\_TB or PHY\_VER\_UNKNOWN | Not present. | | |
| Otherwise | See corresponding entry in Table 27-1 (TXVECTOR and RXVECTOR parameters), or Table 36-1 (TXVECTOR and RXVECTOR parameters). | | |
| UEQM | FORMAT is UHR\_MU and BEAMFORMED is 1 | Indicates whether EQM or UEQM is used.  If the STA-ID subfield is not equal to 2046,  Set to 0 to indicate EQM is used  Set to 1 to indicate UEQM is used  If the STA-ID subfield is equal to 2046, set to an arbitrary value. | Y | Y |
| Otherwise | Not present. | | |
|  |  | | |
| UEQM\_PATTERN | FORMAT is UHR\_MU | Indicates the UEQM pattern bitmap for the number of spatial streams indicated by NUM\_STS.  See Table 38-X3 (UEQM pattern subfield encoding) for the definition of the UEQM pattern bitmap. | Y | Y |
| Otherwise | Not present. | | |
|  |  | | |
| Further TXVECTOR and RXVECTOR parameters for transmitting or receiving a DSSS, HR/DSSS, OFDM, ERP, HT, VHT, HE or EHT PPDU, as determined by the FORMAT and NON\_HT\_MODULATION parameters, are defined in:   * DSSS PPDU: Table 15-1 (TXVECTOR parameters) and Table 15-2 (RXVECTOR parameters), excepting the LENGTH and DATARATE parameters * HR/DSSS PPDU: Table 16-5 (Parameter vectors), excepting the LENGTH and DATARATE parameters * OFDM PPDU: Table 17-1 (TXVECTOR parameters) and Table 17-2 (RXVECTOR parameters), excepting the LENGTH and DATARATE parameters * ERP PPDU: Table 18-1 (TXVECTOR parameters) and Table 18-3 (RXVECTOR parameters), excepting the LENGTH and DATARATE parameters * HT PPDU: Table 19-1 (TXVECTOR and RXVECTOR parameters) * VHT PPDU: Table 21-1 (TXVECTOR and RXVECTOR parameters) * HE PPDU: Table 27-1 (TXVECTOR and RXVECTOR parameters) * EHT PPDU: Table 36-1 (TXVECTOR and RXVECTOR parameters) | | | | |
| NOTE—In the “TXVECTOR” and “RXVECTOR” columns, the following apply:  Y = Present; N = Not present; O = Optional;  MU is only present in the TXVECTOR column for an UHR MU PPDU and indicates that the TXVECTOR parameter is present per user. Parameters specified to be present per user are conceptually supplied as an array of values indexed by *u*, where *u* takes values 0 to the number of users minus 1.  MR is only present in the TXVECTOR column for an UHR MU PPDU and indicates that the TXVECTOR parameter is present per RU. Parameters specified to be present per RU are conceptually supplied as an array of values indexed by *r*, where *r* takes values 0 to the number of RU minus 1. | | | | |

### TRIGVECTOR parameters

The TRIGVECTOR is carried in a PHY-TRIGGER.request primitive and provides the PHY of the AP with the parameters needed to receive a TB PPDU over each assigned RU. The parameters in [Table 38-2 (TRIGVECTOR parameters)](#_bookmark5) are defined as part of the TRIGVECTOR parameter list in the PHY-TRIGGER.request primitive for receiving an UHR TB PPDU.

Further TRIGVECTOR parameters for receiving an HE or EHT TB PPDU, as determined by the FORMAT and NON\_HT\_MODULATION parameters, are defined in:

* HE PPDU: Table 27-2 (TXVECTOR and RXVECTOR parameters)
* EHT PPDU: Table 36-2 (TRIGVECTOR parameters)

**Table 38-2—TRIGVECTOR parameters**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| CH\_BANDWIDTH | Indicates the bandwidth in the U-SIG of the expected UHR TB PPDU(s). Enumerated type:  CBW20 for 20 MHz. CBW40 for 40 MHz. CBW80 for 80 MHz. CBW160 for 160 MHz.  CBW320-1 for 320 MHz, corresponding to 320 MHz-1 defined in  [38.3.24.2 (Channelization for 320 MHz channel)](#_bookmark328).  CBW320-2 for 320 MHz, corresponding to 320 MHz-2 defined in  [38.3.24.2 (Channelization for 320 MHz channel)](#_bookmark328). |
| UL\_LENGTH | Indicates the value of the L-SIG LENGTH field of the expected UHR TB PPDU(s).  NOTE—The UL\_LENGTH in TRIGVECTOR is equal to the value of the UL LENGTH subfield in a Trigger frame plus 2. |
| GI\_AND\_UHR\_LTF\_TYPE | Indicates the UHR-LTF type and GI duration combination of the expected UHR TB PPDU(s).  Enumerated type:  1UHR-LTF + 1.6 µs GI.  2UHR-LTF + 1.6 µs GI.  4UHR-LTF + 3.2 µs GI. |
| NUM\_UHR\_LTF\_SYMBOLS | Indicates the number of OFDM symbols present in the UHR-LTF field of the expected UHR TB PPDU(s).  Set to 0 for 1 OFDM symbol. Set to 1 for 2 OFDM symbols. Set to 2 for 4 OFDM symbols. Set to 3 for 6 OFDM symbols. Set to 4 for 8 OFDM symbols. |
| LDPC\_EXTRA\_SYMBOL | Indicates the status of the LDPC extra symbol segment in the expected UHR TB PPDU(s).  Set to 1 if LDPC extra symbol segment is present. Set to 0 otherwise. |
| PRE\_FEC\_PADDING\_FACTOR | Indicates the pre-FEC padding factor for the expected UHR TB PPDU. Value range:  Set to 0 to indicate a pre-FEC padding factor of 4. Set to 1 to indicate a pre-FEC padding factor of 1. Set to 2 to indicate a pre-FEC padding factor of 2. Set to 3 to indicate a pre-FEC padding factor of 3. |
| PE\_DISAMBIGUITY | Indicates the PE disambiguity of the expected UHR TB PPDU. Value range:  Set to 0 to indicate no PE disambiguity. Set to 1 to indicate PE disambiguity. |
| AID12\_LIST | Each entry of AID12\_LIST is (12-bit) AID of the corresponding UHR TB PPDU.  See the AID12 subfield description in 9.3.1.23.5 (UHR variant User Info field) and Table 9-46i (AID12 subfield encoding) for more information of each entry. |

**Table 38-2—TRIGVECTOR parameters *(continued)***

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| RU\_ALLOCATION\_LIST | 9 bits are used per STA to indicate the RU allocated in the whole bandwidth using the same encoding of PS160 (B39) and RU Allocation (B12–B19) subfields in the UHR variant User Info field of a Trigger frame. See the RU Allocation subfield description in 9.3.1.23.5 (UHR variant User Info field) for more information of each entry. |
| FEC\_CODING\_LIST | Each entry of FEC\_CODING\_LIST indicates the coding type of the corresponding UHR TB PPDU from an UHR STA. See the UL FEC Coding Type subfield description in 9.3.1.23.5 (UHR variant User Info field) for more information of each entry |
| UHR\_MCS\_LIST | Each entry of UHR\_MCS\_LIST indicates the UHR-MCS of the corresponding UHR TB PPDU from an UHR STA. See the UL UHR-MCS subfield description in 9.3.1.23.5 (UHR variant User Info field) for more information of each entry. |
| SS\_ALLOCATION\_LIST | Each entry of SS\_ALLOCATION\_LIST indicates the spatial streams of the corresponding UHR TB PPDU from an UHR STA. See the SS Allocation subfield description in 9.3.1.23.5 (UHR variant User Info field) for more information of each entry. |

### PHYCONFIG\_VECTOR

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an UHR PHY contains an OPERATING\_CHANNEL parameter, which identifies the operating or primary channel. The PHY shall set dot11CurrentPrimaryChannel to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an UHR PHY contains a CHANNEL\_WIDTH parameter, which identifies the operating channel width and takes one of the values 20 MHz, 40 MHz, 80 MHz, 160 MHz, and 320 MHz. The PHY shall set dot11UHRCurrentChannelWidth to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an UHR PHY contains a CENTER\_FREQUENCY\_SEGMENT\_0 parameter, which identifies the center frequency of the channel and takes a value between 1 and 255. The PHY shall set dot11UHRCurrentChannelCenterFrequencyIndex0 to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an UHR PHY contains a DISABLED\_SUBCHANNEL\_BITMAP parameter, which carries the value of the Disabled Subchannel Bitmap subfield in an UHR Operation element and identifies the 20 MHz subchannels that are punctured in an UHR BSS. The PHY shall set dot11UHRDisabledSubchannelBitmap to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an UHR PHY contains a NPCA\_PRIMARY\_CHANNEL parameter, which identifies the NPCA primary channel and indicates whether operating on the NPCA primary channel or not. The PHY shall set dot11NPCAPrimaryChannel to the value of this parameter.

### Effect of CH\_BANDWIDTH parameter on PPDU format

[Table 38-3 (Interpretation of FORMAT, NON\_HT\_MODULATION, and CH\_BANDWIDTH parameters)](#_bookmark7) shows the valid combinations of the FORMAT, NON\_HT\_MODULATION, and CH\_BANDWIDTH parameters and the corresponding PPDU format. Other combinations are reserved.

**Table 38-3—Interpretation of FORMAT, NON\_HT\_MODULATION, and CH\_BANDWIDTH parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **FORMAT** | **NON\_HT\_ MODULATION** | **CH\_BANDWIDTH** | **PPDU format** |
| UHR\_MU, UHR\_ELR, UHR\_TB | N/A | CBW20 | The STA transmits an UHR PPDU of 20 MHz bandwidth. If the BSS bandwidth is wider than  20 MHz, then the transmission shall use the primary 20 MHz channel. |
| UHR\_MU, UHR\_ELR, UHR\_TB | N/A | CBW40 | The STA transmits an UHR PPDU of 40 MHz bandwidth. If the BSS bandwidth is wider than  40 MHz, then the transmission shall use the primary 40 MHz channel. |
| UHR\_MU, UHR\_ELR, UHR\_TB | N/A | CBW80 | The STA transmits an UHR PPDU of 80 MHz bandwidth. If the BSS bandwidth is wider than  80 MHz, then the transmission shall use the primary 80 MHz channel. |
| UHR\_MU, UHR\_ELR, UHR\_TB | N/A | CBW160 | The STA transmits an UHR PPDU of 160 MHz bandwidth. If the BSS bandwidth is wider than 160 MHz, then the transmission shall use the primary 160 MHz channel. |
| UHR\_MU, UHR\_ELR, UHR\_TB | N/A | CBW320-1 CBW320-2 | The STA transmits an UHR PPDU of 320 MHz bandwidth.  NOTE—The CH\_BANDWIDTH of CBW320-1  and CBW320-2 is interpreted as 320 MHz bandwidth for the transmission of an UHR PPDU of 320 MHz bandwidth. |
| NON\_HT | OFDM | CBW20 | See Table 21-2 (Interpretation of FORMAT, NON\_HT\_MODULATION, CH\_BANDWIDTH,  and CH\_OFFSET parameters). |
| NON\_HT | NON\_HT\_DUP\_ OFDM | CBW40 | See Table 21-2 (Interpretation of FORMAT, NON\_HT\_MODULATION, CH\_BANDWIDTH,  and CH\_OFFSET parameters). |
| NON\_HT | NON\_HT\_DUP\_ OFDM | CBW80 | If INACTIVE\_SUBCHANNELS is not present, see Table 21-2 (Interpretation of FORMAT, NON\_HT\_MODULATION, CH\_BANDWIDTH,  and CH\_OFFSET parameters).  If INACTIVE\_SUBCHANNELS is present (see  35.11.5 (INACTIVE\_SUBCHANNELS) and  26.11.7 (INACTIVE\_SUBCHANNELS and  RU\_ALLOCATION)), the STA transmits a punctured NON-HT PPDU of 80 MHz bandwidth. If the BSS bandwidth is wider than 80 MHz, then the transmission shall use the primary 80 MHz channel. Primary 20 MHz is not punctured. |

**Table 38-3—Interpretation of FORMAT, NON\_HT\_MODULATION, and CH\_BANDWIDTH parameters *(continued)***

|  |  |  |  |
| --- | --- | --- | --- |
| **FORMAT** | **NON\_HT\_ MODULATION** | **CH\_BANDWIDTH** | **PPDU format** |
| NON\_HT | NON\_HT\_DUP\_ OFDM | CBW160 | If INACTIVE\_SUBCHANNELS is not present, see Table 21-2 (Interpretation of FORMAT, NON\_HT\_MODULATION, CH\_BANDWIDTH,  and CH\_OFFSET parameters).  If INACTIVE\_SUBCHANNELS is present (see  35.11.5 (INACTIVE\_SUBCHANNELS) and  26.11.7 (INACTIVE\_SUBCHANNELS and  RU\_ALLOCATION)), the STA transmits a punctured NON-HT PPDU of 160 MHz bandwidth. If the BSS bandwidth is wider than 160 MHz, then the transmission shall use the primary 160 MHz channel. Primary 20 MHz is not punctured. |
| NON\_HT | NON\_HT\_DUP\_ OFDM | CBW320 | If INACTIVE\_SUBCHANNELS is not present, the STA transmits a NON-HT PPDU of 320 MHz bandwidth using sixteen adjacent 20 MHz channels as defined in [36.3.15 (Non-HT duplicate](#_bookmark264) [transmission)](#_bookmark264).  If INACTIVE\_SUBCHANNELS is present (see  35.11.5 (INACTIVE\_SUBCHANNELS)), the STA  transmits a punctured NON-HT PPDU of 320 MHz bandwidth. Primary 20 MHz is not punctured. |
| HT\_MF, HT\_GF, VHT, HE\_SU, HE\_MU, HE\_ER\_SU, HE\_TB  EHT\_MU  EHT\_TB | See Table 27-4 (Interpretation of FORMAT, NON\_HT\_MODULATION, CH\_BANDWIDTH, and CH\_OFFSET parameters), Table 21-2 (Interpretation of FORMAT, NON\_HT\_MODULATION, CH\_BANDWIDTH, and CH\_OFFSET parameters), and Table 19-2 (Interpretation of FORMAT, CH\_BANDWIDTH, and CH\_OFFSET parameters). | | |

### Support for non-HT, HT, VHT, HE and EHT formats

#### General

When an UHR STA is working on a frequency band that is applicable to a PHY clause, the UHR STA logically contains Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), Clause 18 (Extended Rate PHY (ERP) specification), Clause 19 (High Throughput (HT) PHY specification), Clause 21 (Very High Throughput (VHT) PHY specification), Clause 27 (High Efficiency (HE) PHY specification), [Clause 36 (Extremely high throughput (EHT) PHY specification)](#_bookmark0) and Clause 38 (Ultra High Reliability (UHR) PHY specification) PHYs. The MAC interacts with the PHYs via the [Clause 38 (Ultra High Reliability (UHR) PHY specification)](#_bookmark0) PHY service interface, which in turn interacts with the Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), Clause 18 (Extended Rate PHY (ERP) specification), Clause 19 (High Throughput (HT) PHY specification), Clause 21 (Very High Throughput (VHT) PHY specification), Clause 27 (High Efficiency (HE) PHY specification) and [Clause 36 (Extremely high throughput (EHT) PHY specification)](#_bookmark0) PHY service interfaces when applicable as shown in [Figure 38-1 (PHY interaction on transmit for various PPDU](#_bookmark9) [formats)](#_bookmark9), [Figure 38-2 (PHY interaction on receive for various PPDU formats)](#_bookmark10), and [Figure 38-3 (PHY-](#_bookmark11) [CONFIG and CCA interaction with various PPDU formats)](#_bookmark11).

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**Figure 38-1—PHY interaction on transmit for various PPDU formats**



**Figure 38-2—PHY interaction on receive for various PPDU formats**



**Figure 38-3—PHY-CONFIG and CCA interaction with various PPDU formats**

NOTE—[Figure 38-1 (PHY interaction on transmit for various PPDU formats)](#_bookmark9), [Figure 38-2 (PHY interaction on receive](#_bookmark10) [for various PPDU formats)](#_bookmark10), and [Figure 38-3 (PHY-CONFIG and CCA interaction with various PPDU formats)](#_bookmark11) show all possible PHY clauses, not all of which are applicable to any given band.

#### Support for non-HT format

The behavior of the UHR PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the FORMAT parameter equal to NON\_HT and the NON\_HT\_MODULATION parameter not equal to NON\_HT\_DUP\_OFDM is defined in Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), and Clause 18 (Extended Rate PHY (ERP) specification) and depends on the parameter NON\_HT\_MODULATION. If the parameter NON\_HT\_MODULATION is OFDM or NON\_HT\_DUP\_OFDM, then the following additional requirements apply:

* The requirements in 21.3.9.1 (Transmission of 20 MHz non-HT PPDUs with more than one transmit chain)
* The requirements in 21.3.17.1 (Transmit spectrum mask) and [38.3.20.1 (Transmit spectral mask)](#_bookmark276) instead of the requirements in 17.3.9.3 (Transmit spectrum mask)
* The requirements in [38.3.20.3 (Transmit center frequency and symbol clock frequency tolerance)](#_bookmark298) instead of the requirements in 17.3.9.5 (Transmit center frequency tolerance) and 17.3.9.6 (Symbol clock frequency tolerance)
* The requirements in [38.3.20.4.2 (Transmit center frequency leakage)](#_bookmark300) instead of the requirements in

17.3.9.7.2 (Transmitter center frequency leakage)

* The requirements in [38.3.20.2 (Spectral flatness)](#_bookmark295) and the requirements in 17.3.9.7.3 (Transmitter spectral flatness)
* The requirements in [38.3.20.1.3 (Additional restrictions of preamble puncturing for non-HT](#_bookmark290) [duplicate PPDU)](#_bookmark290)

The modulation equation for non-HT duplicate transmission is defined in [38.3.15 (Non-HT duplicate](#_bookmark264) [transmission)](#_bookmark264).

When the TXVECTOR parameter FORMAT equals to HT\_MF or HT\_GF, the Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications) TXVECTOR parameters defined in Table 15-, the Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification) TXVECTOR parameters defined in Table, the Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) TXVECTOR parameters defined in Table () , and the Clause 18 (Extended Rate PHY (ERP) specification) TXVECTOR parameters are directly used, depending on the parameter NON\_HT\_MODULATION. The TXVECTOR parameters not listed in those tables are not present.

The behavior of the UHR PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the FORMAT parameter equal to NON\_HT and the NON\_HT\_MODULATION parameter equal to NON\_HT\_DUP\_OFDM is defined in [38.3.15 (Non-HT duplicate transmission)](#_bookmark264).

On receipt of a PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the UHR PHY behaves as if it were a Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), or Clause 18 (Extended Rate PHY (ERP) specification) PHY that had received a PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive but without the PHYCONFIG\_VECTOR parameters CHANNEL\_WIDTH, CENTER\_FREQUENCY\_SEGMENT\_0, and DISABLED\_SUBCHANNEL\_BITMAP.

As defined in [38.3.23 (UHR receive procedure)](#_bookmark322), once a PPDU is received and detected as a non-HT PPDU, the behavior of the UHR PHY is defined in Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), or Clause 18 (Extended Rate PHY (ERP) specification) depending on the PPDU format. The RXVECTOR parameters from the Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), and Clause 18 (Extended Rate PHY (ERP) specification) are directly used, and the PHY parameters not listed in the table are not present.

#### Support for HT format

The behavior of a UHR PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the TXVECTOR parameter FORMAT equal to HT\_MF or HT\_GF is defined in Clause 19 (High Throughput (HT) PHY specification) with the following additional requirements:

* The requirements in 21.3.9.2 (Transmission of HT PPDUs with more than four transmit chains)
* The requirements in [38.3.20.3 (Transmit center frequency and symbol clock frequency tolerance)](#_bookmark298) instead of the requirements in 19.3.18.4 (Transmit center frequency tolerance)

When the TXVECTOR parameter FORMAT equals to HT\_MF or HT\_GF, the the Clause 19 (High Throughput (HT) PHY specification) TXVECTOR parameters in [Table 19-1 (TXVECTOR and RXVECTOR parameters)](#_bookmark4) are directly used, and the TXVECTOR parameters not listed in Table 19- 1 (TXVECTOR and RXVECTOR parameters) are not present. The PHY shall use a value of CH\_OFFSET in the Clause 19 (High Throughput (HT) PHY specification) TXVECTOR that is consistent with [Table 38-3](#_bookmark7) [(Interpretation of FORMAT, NON\_HT\_MODULATION, and CH\_BANDWIDTH parameters)](#_bookmark7). A 20 MHz- only non-AP UHR STA supports HT transmission only on 20 MHz channel width.

On receipt of a PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the UHR PHY behaves, for the purposes of HT PPDU transmission and reception, as if it were a Clause 19 (High Throughput (HT) PHY specification) PHY that had received PHY-CONFIG.request (PHYCONFIG\_VECTOR) primitive but without the PHYCONFIG\_VECTOR parameters CHANNEL\_WIDTH, CENTER\_FREQUENCY\_SEGMENT\_0, and DISABLED\_SUBCHANNEL\_BITMAP, and with the PHYCONFIG\_VECTOR parameter SECONDARY\_CHANNEL\_OFFSET set to SECONDARY\_CHANNEL\_NONE if dot11CurrentChannelWidth indicates 20 MHz, to SECONDARY\_CHANNEL\_ABOVE if fP20,idx < fS20,idex, or to SECONDARY\_CHANNEL\_BELOW otherwise.

As defined in [38.3.23 (UHR receive procedure)](#_bookmark322), once a PPDU is received and detected as an HT PPDU, the behavior of the UHR PHY is defined in Clause 19 (High Throughput (HT) PHY specification). The RXVECTOR parameters in Table 19-1 (TXVECTOR and RXVECTOR parameters) are directly used, and the RXVECTOR parameters not listed in Table 19-1 (TXVECTOR and RXVECTOR parameters) are not present. A 20 MHz-only non-AP UHR STA supports HT reception only on 20 MHz channel width.

#### Support for VHT format

The behavior of a UHR PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the TXVECTOR parameter FORMAT equal to VHT is defined in Clause 21 (Very High Throughput (VHT) PHY specification) except that the requirements in [38.3.20.3 (Transmit center frequency and symbol clock](#_bookmark298) [frequency tolerance)](#_bookmark298) apply instead of the requirements in 21.3.17.3 (Transmit center frequency and symbol clock frequency tolerance).

When the TXVECTOR parameter FORMAT equals to VHT, the Clause 21 (Very High Throughput (VHT) PHY specification) TXVECTOR parameters in Table 21-1 (TXVECTOR and RXVECTOR parameters) are directly used, and the TXVECTOR parameters not listed in Table 21- 1 (TXVECTOR and RXVECTOR parameters) are not present. The 20 MHz-only non-AP UHR STA supports VHT transmission only on 20 MHz channel width.

On receipt of a PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the UHR PHY behaves, for the purposes of VHT PPDU transmission and reception, as if it were a Clause 21 (Very High Throughput (VHT) PHY specification) PHY that received the PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive except that:

* the PHYCONFIG\_VECTOR parameter DISABLED\_SUBCHANNEL\_BITMAP is ignored
* the CHANNEL\_WIDTH parameter, if it is equal to 320 MHz, is replaced by 160 MHz
* the CENTER\_FREQUENCY\_SEGMENT\_0 parameter, if the CHANNEL\_WIDTH parameter is equal to 320 MHz, is replaced by the center of the primary 160 MHz channel.

As defined in [38.3.23 (UHR receive procedure)](#_bookmark322), once a PPDU is received and detected as an VHT PPDU, the behavior of the UHR PHY is defined in Clause 21 (Very High Throughput (VHT) PHY specification). The RXVECTOR parameters in Table 21-1 (TXVECTOR and RXVECTOR parameters) are directly used, and the UHR PHY parameters not listed in Table 21-1 (TXVECTOR and RXVECTOR parameters) are not present. A 20 MHz-only non-AP UHR STA supports VHT reception only on 20 MHz channel width.

#### Support for HE format

The behavior of a UHR PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the TXVECTOR parameter FORMAT equal to HE\_SU, HE\_ER\_SU, HE\_MU, or HE\_TB is defined in Clause 27 (High Efficiency (HE) PHY specification) except that the requirements in [38.3.20.3 (Transmit](#_bookmark298) [center frequency and symbol clock frequency tolerance)](#_bookmark298) apply instead of the requirements in 27.3.21.3 (Transmit center frequency and symbol clock frequency tolerance).

When the TXVECTOR parameter FORMAT equals to VHT, the Clause 27 (High Efficiency (HE) PHY specification) TXVECTOR parameters in Table 27- 1 (TXVECTOR and RXVECTOR parameters) are directly used. The TXVECTOR parameters not listed in Table 27- 1 (TXVECTOR and RXVECTOR parameters) are not present.

On receipt of a PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the UHR PHY behaves, for the purposes of HE PPDU transmission and reception, as if it were a Clause 27 (High Efficiency (HE) PHY specification) PHY that received the PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive except that:

* the PHYCONFIG\_VECTOR parameter DISABLED\_SUBCHANNEL\_BITMAP is ignored
* the CHANNEL\_WIDTH parameter, if it is equal to 320 MHz, is replaced by 160 MHz
* the CENTER\_FREQUENCY\_SEGMENT\_0 parameter, if the CHANNEL\_WIDTH parameter is equal to 320 MHz, is replaced by the center of the primary 160 MHz channel.

As defined in [38.3.23 (UHR receive procedure)](#_bookmark322), once a PPDU is received and detected as an HE PPDU, the behavior of the UHR PHY is defined in Clause 27 (High Efficiency (HE) PHY specification). The RXVECTOR parameters in Table 27-1 (TXVECTOR and RXVECTOR parameters) are directly used, and the RXVECTOR parameters not listed in Table 27-1 (TXVECTOR and RXVECTOR parameters) are not present.

#### Support for EHT format

The behavior of a UHR PHY on receipt of a PHY-TXSTART.request(TXVECTOR) primitive with the TXVECTOR parameter FORMAT equal to EHT\_MU or EHT\_TB is defined in Clause 36 (Extremely high throughput (EHT) PHY specification) except that the requirements in [38.3.20.3 (Transmit](#_bookmark298) [center frequency and symbol clock frequency tolerance)](#_bookmark298) apply instead of the requirements in 36.3.20.3 (Transmit center frequency and symbol clock frequency tolerance).

When the TXVECTOR parameter FORMAT equals to VHT, the Clause 36 (Extremely high throughput (EHT) PHY specification) TXVECTOR parameters in Table 36-1 (TXVECTOR and RXVECTOR parameters) are directly used. The TXVECTOR parameters not listed in Table 36-1 (TXVECTOR and RXVECTOR parameters) are not present.

On receipt of a PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the UHR PHY behaves, for the purposes of EHT PPDU transmission and reception, as if it were a Clause 36 (Extremely high throughput (EHT) PHY specification) PHY that received the PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive.

As defined in [38.3.23 (UHR receive procedure)](#_bookmark322), once a PPDU is received and detected as an EHT PPDU, the behavior of the UHR PHY is defined in Clause 36 (Extremely high throughput (EHT) PHY specification). The RXVECTOR parameters in Table 36-1 (TXVECTOR and RXVECTOR parameters) are directly used, and the RXVECTOR parameters not listed in Table 36-1 (TXVECTOR and RXVECTOR parameters) are not present.

**Text to be adopted ends here.**

**References:**

1. [11-24-0171r21](https://mentor.ieee.org/802.11/dcn/24/11-24-0171-21-00bn-tgbn-motions-list-part-1.pptx): 11-24-0171-21-00bn-tgbn-motions-list-part-1, Alfred Asterjadhi (Qualcomm Inc.)