IEEE P802.11  
Wireless LANs

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| CIDs 7106 | | | | |
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|  |  |  |  |  |

Abstract

This submission proposes a resolution for CID 7106.

The resolution also affects CIDs 7311, 7312 and 7313.

CID 166

# CID 7106

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| --- | --- | --- | --- | --- | --- | --- |
| 7106 | Stephens, Adrian | 2330 | 39 | 19.2.5 | "the MAC shall set the CH\_BANDWIDTH" - this is a normative requirement on the MAC buried in the guts of a PHY subclause.  Ditto at 2504.27 | Move this normative requirement to a MAC subclause. |

The comment is about the opening sentence of 19.2.5:



And 21.2.5.2:



Note that there is also a similar occurrence on page 2506, line 9, which discussed transmission of HT PPDUs by a VHT STA.



Also not the following CIDs that are related to the same issue:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 7311 | RISON, Mark | 19.2.5 | 2330 | 39 | "the MAC shall" in a PHY clause | Move to a MAC clause |
| 7312 | RISON, Mark | 21.2.5.2 | 2504 | 27 | "the MAC shall" in a PHY clause | Move to a MAC clause |

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| --- | --- | --- | --- | --- | --- | --- |
| 7313 | RISON, Mark | 21.2.5.3 | 2506 | 9 | "the MAC shall" in a PHY clause | Move to a MAC clause |

These comments all point out that it is inappropriate to have a mandatory requirement on the MAC included in the PHY sections.

In reality, the three statements are not so much about expected behavior from the MAC as about constraining the valid combinations of TXVECTOR parameters. For instance, in case of non-HT transmission by an HT STA, CH\_BANDWIDTH and CH\_OFFSET can not take arbitrary value.

A Table to capture those restrictions could be added in 19.2.5 and 21.2.5.2. However, similar Tables already exist (Table 19-2 and Table 21-2 respectively). As such, the proposal is to update these Tables to show the valid combinations of all relevant parameters. This would then automatically capture the three cases where we currently use the wording “the MAC shall set”, namely:

* Non-HT PPDU sent by HT STA
* Non-HT PPDU sent by VHT STA
* HT PPDU send by VHT STA

With that, the paragraphs starting at page 2330.39, page 2504.27 and page 2506.9 can be removed.

**Proposed Resolution for CIDs 7106, 7311, 7312 and 7313**

Revised

Make changes as shown below to 19.2.4 and 19.2.5

**19.2.4 Effect of CH\_BANDWIDTH, CH\_OFFSET, and MCS parameters on PPDU format**

The structure of the PPDU transmitted by an HT STA is determined by the TXVECTOR FORMAT, CH\_BANDWIDTH, CH\_OFFSET, and MCS parameters as defined in Table 19-1 (TXVECTOR and RXVECTOR parameters). The effect of the FORMAT parameter is described in 19.1.4 (PPDU formats).

The operation of the PHY in the frequency domain is determined by the FORMAT, CH\_BANDWIDTH and CH\_OFFSET parameters. Table 19-2 (~~PPDU format as a function~~ Interpretation of FORMAT, CH\_BANDWIDTH and CH\_OFFSET parameters) shows the valid combinations of FORMAT, CH\_BANDWIDTH and CH\_OFFSET and the corresponding PPDU format ~~parameters that are supported~~. Other combinations are reserved.

**Table 19-2—~~PPDU format as a function~~ Interpretation of FORMAT, CH\_BANDWIDTH and**

**CH\_OFFSET parameters**

|  |  |  |
| --- | --- | --- |
| **FORMAT** | **CH\_BANDWIDTH** | **CH\_OFFSET** |
| HT\_MF  HT\_GF | HT\_CBW20 | CH\_OFF\_20: *20 MHz HT format*—A STA that has a 20 MHz operating channel width transmits an HT-mixed or HT-greenfield format packet of 20 MHz bandwidth with one to four spatial streams.  ~~CH\_OFF\_40:~~ *~~Not defined~~*  CH\_OFF\_20U: *40 MHz HT upper format*—The STA transmits an HT-mixed or HTgreenfield format packet of 20 MHz bandwidth with one to four spatial streams in the upper 20 MHz of a 40 MHz channel.  CH\_OFF\_20L: *40 MHz HT lower format*—The STA transmits an HT-mixed or HTgreenfield format packet of 20 MHz bandwidth with one to four spatial streams in the lower 20 MHz of a 40 MHz channel. |
| HT\_MF  HT\_GF | HT\_CBW40 | ~~CH\_OFF\_20:~~ *~~Not defined~~*  CH\_OFF\_40: *40 MHz HT format*—A PPDU of this format occupies a 40 MHz channel to transmit an HT-mixed or HT-greenfield format packet of 40 MHz bandwidth with one to four spatial streams.  ~~CH\_OFF\_20U:~~ *~~Not defined~~*  ~~CH\_OFF\_20L:~~ *~~Not defined~~* |
| NON\_HT | NON\_HT\_CBW20 and the SECONDARY\_CHANNEL\_OFFSET parameter of the PHYCONFIG\_VECTOR is SECONDARY\_CHANNEL\_NONE | CH\_OFF\_20: *20 MHz non-HT format*—A STA ~~that has a 20 MHz operating channel width~~ transmits a non-HT format packet according to Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) or Clause 18 (Extended Rate PHY (ERP) specification) operation. |
| NON\_HT | NON\_HT\_CBW20 and the SECONDARY\_CHANNEL\_OFFSET parameter of the PHYCONFIG\_VECTOR is SECONDARY\_CHANNEL\_BELOW | CH\_OFF\_20U: *40 MHz non-HT upper format*—The STA transmits a non-HT packet of type ERP-DSSS, ERP-CCK, ERP-OFDM, or OFDM in the upper 20 MHz of a 40 MHz channel. |
| NON\_HT | NON\_HT\_CBW20 and the SECONDARY\_CHANNEL\_OFFSET parameter of the PHYCONFIG\_VECTOR is SECONDARY\_CHANNEL\_ABOVE | CH\_OFF\_20L: *40 MHz non-HT lower format*—The STA transmits a non-HT packet of type ERP-DSSS, ERP-CCK, ERP-OFDM, or OFDM in the lower 20 MHz of a 40 MHz channel. |
| NON\_HT | NON\_HT\_CBW40 | CH\_OFF\_40: *Non-HT duplicate format*—The STA operates in a 40 MHz channel composed of two adjacent 20 MHz channels. The packets to be sent are in the Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) format in each of the 20 MHz channels. The upper channel (higher frequency) is rotated by +90° relative to the lower channel. See 19.3.11.12 (Non-HT duplicate transmission). |

NOTE—Support of 20 MHz non-HT format and 20 MHz HT format with one and two spatial streams is mandatory at APs. Support of 20 MHz non-HT format and 20 MHz HT format with one spatial stream is mandatory at non-AP STAs.

**19.2.5 Support for NON\_HT formats**

~~In order to transmit a non-HT PPDU, the MAC shall set the CH\_BANDWIDTH and CH\_OFFSET in the TXVECTOR to achieve the required non-HT PPDU format (see Table 19-2 (PPDU format as a function of CH\_BANDWIDTH and CH\_OFFSET parameters)); for 20 MHz bandwidth transmissions in a 40 MHz channel, the CH\_OFFSET shall be CH\_OFF\_20U if the SECONDARY\_CHANNEL\_OFFSET parameter of the PHYCONFIG\_VECTOR was SECONDARY\_CHANNEL\_ABOVE, or CH\_OFF\_20L otherwise.~~

When the FORMAT parameter is equal to NON\_HT, the behavior of the HT PHY is defined in other clauses as shown in Table 19-3 (Mapping of the HT PHY parameters for NON\_HT operation), dependent on the operational band. In this case, the PHY-TXSTART.request primitive is handled by mapping the TXVECTOR parameters as defined in Table 19-3 (Mapping of the HT PHY parameters for NON\_HT operation) and following the operation as defined in the referenced clause. Likewise the PHYRXSTART. indication primitive emitted when a non-HT PPDU is received is defined in the referenced (…)

Make changes as shown below in 21.2.4

NOTE:

1. For Table 21-2, Add an extra column labelled “CH\_OFFSET” and for the rows that are not explicitly shown below indicate N/A in this column.
2. Changes below are relative to D5.3

**21.2.4 Effects of CH\_BANDWIDTH parameter on PPDU format**

Table 21-2 (PPDU format as a function of CH\_BANDWIDTH parameter (11ac)) shows the valid combinations ~~PPDU format as a function~~ of the FORMAT, NON-HT MODULATION, CH\_OFFSET and CH\_BANDWIDTH parameters and the corresponding PPDU format. Other combinations are reserved.

**Table 21-2— ~~PPDU format as a function~~ Interpretation of FORMAT, NON\_HT MODULATION, CH\_BANDWIDTH and CH\_OFFSET parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| FORMAT | NON-HT MODULATION | CH\_BANDWIDTH | CH\_OFFSET | PPDU FORMAT |
| VHT  ~~HT\_MF or~~  ~~HT\_GF~~ | N/A | CBW20 ~~when FORMAT is VHT;~~  ~~HT\_CBW20 when FORMAT is HT\_MF or HT\_GF(#~~ | N/A | The STA transmits a~~n HT-mixed PPDU (when FORMAT is HT\_MF) or HT-greenfield PPDU (when FORMAT is HT\_GF) or~~ VHT PPDU ~~(when FORMAT is VHT)~~ of 20 MHz bandwidth. If the (#6508)BSS bandwidth is wider than 20 MHz, then the transmission shall use the primary 20 MHz channel. |
| VHT  ~~HT\_MF or~~  ~~HT\_GF~~ | N/A | CBW40 ~~when FORMAT is VHT;~~  ~~HT\_CBW40 when FORMAT is HT\_MF or HT\_GF~~ | N/A | The STA transmits a~~n HT-mixed PPDU (when FORMAT is HT\_MF) or HT-greenfield PPDU (when FORMAT is HT\_GF) or~~ VHT PPDU ~~(when FORMAT is VHT)~~ of 40 MHz bandwidth. If the (#6508)BSS bandwidth is wider than 40 MHz, then the transmission shall use the primary 40 MHz channel. |
| HT\_MF or  HT\_GF | N/A | HT\_CBW20 and CHANNEL\_WIDTH in PHYCONFIG\_VECTOR > 20 MHz and *f*S20,idx < *f*P20,idx. | CH\_OFF\_20U | The STA transmits an HT-mixed PPDU (when FORMAT is HT\_MF) or HT-greenfield PPDU (when FORMAT is HT\_GF) of 20 MHz bandwidth. The transmission shall use the primary 20 MHz channel. |
| HT\_MF or  HT\_GF | N/A | HT\_CBW20 and CHANNEL\_WIDTH in PHYCONFIG\_VECTOR > 20 MHz and *f*S20,idx > *f*P20,idx. | CH\_OFF\_20L | The STA transmits an HT-mixed PPDU (when FORMAT is HT\_MF) or HT-greenfield PPDU (when FORMAT is HT\_GF) of 20 MHz bandwidth. The transmission shall use the primary 20 MHz channel. |
| HT\_MF or  HT\_GF | N/A | HT\_CBW20 and CHANNEL\_WIDTH in PHYCONFIG\_VECTOR = 20 MHz. | CH\_OFF\_20 | The STA transmits an HT-mixed PPDU (when FORMAT is HT\_MF) or HT-greenfield PPDU (when FORMAT is HT\_GF) of 20 MHz bandwidth. |
| HT\_MF or  HT\_GF | N/A | HT\_CBW40 | CH\_OFF\_40 | The STA transmits an HT-mixed PPDU (when FORMAT is HT\_MF) or HT-greenfield PPDU (when FORMAT is HT\_GF) of 40 MHz bandwidth. If the (#6508) BSS bandwidth is wider than 40 MHz, then the transmission shall use the primary 40 MHz channel. |
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**21.2.5.2 Support for NON\_HT format when NON\_HT\_MODULATION is OFDM**

~~In order to transmit a non-HT PPDU, the MAC shall set the CH\_BANDWIDTH(#7404) parameter(Ed) to achieve the required non-HT PPDU format (see Table 21-2 (PPDU format as a function of CH\_BANDWIDTH parameter (11ac)))(#7404).~~

When a PHY-TXSTART.request(TXVECTOR) primitive with the FORMAT parameter equal to NON\_HTand the NON\_HT\_MODULATION parameter equal to OFDM is issued, (…)

**21.2.5.3 Support for HT formats**

When a PHY-TXSTART.request(TXVECTOR) primitive is received with the TXVECTOR parameter FORMAT(Ed) equal to HT\_MF or HT\_GF, the behavior of the PHY is defined by Clause 19 (High Throughput (HT) PHY specification) with additional requirements defined in the following subclauses: — 21.3.9.2 (Transmission of HT PPDUs with more than four transmit chains)

— 21.3.17.1 (Transmit spectrum mask) instead of 19.3.18.1 (Transmit spectrum mask)

— 21.3.17.4.2 (Transmit center frequency leakage) instead of 19.3.18.4 (Transmit center frequency tolerance)

The Clause 21 (Very High Throughput (VHT) PHY specification(11ac)) TXVECTOR parameters in Table 21-1 (TXVECTOR and RXVECTOR parameters (11ac)) are mapped directly to Clause 19 (High Throughput (HT) PHY specification) TXVECTOR parameters in Table 20-1 and the Clause 19 (High Throughput (HT) PHY specification) PHY-TXSTART.request(TXVECTOR) primitive is issued.

(…)

~~In order to transmit an HT PPDU, the MAC shall set the CH\_BANDWIDTH and CH\_OFFSET in the TXVECTOR to achieve the required HT PPDU format (see Table 19-2 (PPDU format as a function of CH\_BANDWIDTH and CH\_OFFSET parameters)); for 20 MHz bandwidth transmissions in a 40 MHz channel, the CH\_OFFSET shall be CH\_OFF\_20U if , or CH\_OFF\_20L otherwise.(#6676) The quantities and are defined in 21.3.7.3 (Channel frequencies).~~

As defined in 21.3.20 (PHY receive procedure), once a PPDU is received and detected as an HT PPDU, the

behavior of the VHT PHY is defined in Clause 19 (High Throughput (HT) PHY specification). The

RXVECTOR parameters in Table 19-1

(..)