IEEE P802.11  
Wireless LANs

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| Changes to D1.0 | | | | |
| Date: 2017-05-04 | | | | |
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Abstract

This submission proposes resolutions for comments of TGax Draft 1.0 with the following CIDs: CID 4905

Revisions:

* Rev 0: Initial version of the document.
* Rev 2: update for 20MHz-only device.
* Rev 3: Added 11b/g
* Rev 4: Minor update on table 28-3

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

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

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L.** | **Comment** | **Proposed Change** | **Resolution** |
| 4905 | Bo Sun | 28.2 | 227.28 | Similar to VHT PHY part, the support to Non-HT, HT and VHT need to be described in the spec | Add a section to describe the support to Non-HT, HT and VHT | Revised –  As proposed change  TGax editor to make the changes shown in 11-17/0233r2 under all headings that include CID 4905. |

**Proposed change: Add clause 28.2.3, 28.2.4, 28.2.5**

Discussion: These clauses are missing in D1.0.

*To the TGax Editor: Add the clauses in D1.0.*

**28.2.3 PHYCONFIG\_VECTOR parameters**

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a VHT 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 a VHT 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 80+80 MHz. The PHY shall set dot11CurrentChannelWidth to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a VHT PHY contains a CENTER\_FREQUENCY\_SEGMENT\_0 parameter, which identifies the center frequency of the channel (or of segment 0 if the CHANNEL\_WIDTH parameter indicates 80+80 MHz) and takes a value between 1 and 200. The PHY shall set dot11CurrentChannelCenterFrequencyIndex0 to the value of this parameter. The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a VHT PHY contains a CENTER\_FREQUENCY\_SEGMENT\_1 parameter, which takes the value 0 if the CHANNEL\_WIDTH parameter does not indicate 80+80 MHz, and otherwise identifies the center frequency of segment 1 and takes a value between 1 and 200. The PHY shall set dot11CurrentChannelCenterFrequencyIndex1 to the value of this parameter.

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

Table 28-2 (Interpretation of FORMAT, NON\_HT Modulation and CH\_BANDWIDTH parameters) shows  
the valid combinations of the FORMAT, NON\_HT MODULATION and CH\_BANDWIDTH parameters  
and the corresponding PPDU format and value of CH\_OFFSET (if applicable). Other combinations are  
reserved.

**Table 28-2 Interpretation of FORMAT, NON\_HT Modulation and CH\_BANDWIDTH parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **FORMAT** | **NON\_HT\_ MODULATION** | **CH\_BANDWIDTH** | **CH\_OFFSET** | **PPDU format** |
| HE | N/A | CBW20 | N/A | The STA transmits a HE PPDU of 20 MHz bandwidth. If the BSS bandwidth is wider than 20 MHz, then the transmission shall use the primary 20 MHz channel. |
| HE | N/A | CBW40 | N/A | The STA transmits a HE PPDU of 40 MHz bandwidth. If the BSS bandwidth is wider than 40 MHz, then the transmission shall use the primary 40 MHz channel. |
| HE | N/A | CBW80 | N/A | The STA transmits a HE PPDU of 80 MHz bandwidth. If the BSS bandwidth is wider than 80 MHz, then the transmission shall use the primary 80 MHz channel. |
| HE | N/A | CBW160 | N/A | The STA transmits a HE PPDU of 160 MHz bandwidth. |
| HE | N/A | CBW80+80 | N/A | The STA transmits a HE PPDU of 80+80 MHz bandwidth. |
| VHT | N/A | CBW20 | N/A | The STA transmits a VHT PPDU (when FORMAT is VHT) of 20 MHz bandwidth. If the BSS bandwidth is wider than 20 MHz, then the transmission shall use the primary 20 MHz channel. |
| VHT | N/A | CBW40 | N/A | The STA transmits a VHT PPDU (when FORMAT is VHT) of 40 MHz bandwidth. If the 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 | 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 | 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 BSS bandwidth is wider than 40 MHz, then the transmission shall use the primary 40 MHz channel. |
| VHT | N/A | CBW80 | N/A | The STA transmits a VHT PPDU of 80 MHz bandwidth. If the BSS bandwidth is 160 MHz or 80+80 MHz, then the transmission shall use the primary 80 MHz channel. |
| VHT | N/A | CBW160 | N/A | The STA transmits a VHT PPDU of 160 MHz bandwidth. |
| VHT | N/A | CBW80+80 | N/A | The STA transmits a VHT PPDU of 80+80 MHz bandwidth. |
| NON\_HT | OFDM/ERP-DSSS/ERP-CCK/ERP-OFDM | CBW20 | N/A | The STA transmits a NON\_HT PPDU using the primary 20 MHz channel. |
| NON\_HT | NON\_HT\_DUP\_OFDM | CBW40 | N/A | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using two adjacent 20 MHz channels as defined in 28.3.13 (Non-HT duplicate transmission). If the BSS bandwidth is wider than 40 MHz, then the transmission shall use the primary 40 MHz channel. |
| NON\_HT | NON\_HT\_DUP\_OFDM | CBW80 | N/A | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using four adjacent 20 MHz channels as defined in 28.3.13 (Non-HT duplicate transmission). If the BSS  BSS bandwidth is 160 MHz or 80+80 MHz, then the transmission shall use the primary 80 MHz channel. |
| NON\_HT | NON\_HT\_DUP\_OFDM | CBW160 | N/A | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using eight adjacent 20 MHz channels as defined in 28.3.13 (Non-HT duplicate transmission). |
| NON\_HT | NON\_HT\_DUP\_OFDM | CBW80+80 | N/A | The STA transmits a NON\_HT PPDU with NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM using two nonadjacent frequency segments, with each frequency segment consisting of four adjacent 20 MHz channels as defined in 28.3.13 (Non-HT duplicate transmission). |

**28.2.5 Support for NON-HT, HT and VHT formats**

**28.2.5.1 General**

A HE 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) and Clause 28 (High Efficiency (HE) PHY specification) PHYs. The MAC interacts with the PHYs via the Clause 28 (High Efficiency (HE) PHY specification) 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) PHY service interfaces and Clause 21 (Very High Throughput (VHT) PHY specification) as shown in Figure 28-1 (PHY interaction on transmit for various PPDU formats), Figure 28-2 (PHY interaction on receive for various PPDU formats), and Figure 28-3 (PHY-CONFIG and CCA interaction with various PPDU formats).



Figure 28-1 PHY interaction on transmit for various PPDU formats.



Figure 28-2 PHY interaction on receive for various PPDU formats.



Figure 28-3 PHY-CONFIG and CCA interaction with various PPDU formats.

**28.2.5.2 Support for NON\_HT format**

When a PHY-TXSTART.request(TXVECTOR) primitive with the FORMAT parameter equal to NON\_HT, the behavior of the HE 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), Clause 18 (Extended Rate PHY (ERP) specification) PHYs respectively depends on the PPDU format. If the NON\_HT\_MODULATION is OFDM, there are additional requirements described in the following subclauses:

— 21.3.9.1 (Transmission of 20 MHz NON\_HT PPDUs with more than one transmit chain)  
— 28.3.20.1 (Transmit spectrum mask) instead of 17.3.9.3 (Transmit spectrum mask)  
— 28.3.20.3 (Transmit center frequency leakage) instead of 17.3.9.7.2 (Transmitter center frequency leakage)

Where the Clause 28 (High Efficiency (HE) PHY specification) TXVECTOR parameters in Table 28-1 (TXVECTOR and RXVECTOR parameters) are mapped to 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) respectively according to Table 28-3 (Mapping of the HE PHY parameters for NON\_HT operation). The HE PHY parameters not listed in the table are not present.

NOTE—When the FORMAT parameter is set to NON\_HT and the NON\_HT\_MODULATION parameter is set to NON\_HT\_DUP\_OFDM in a PHY-TXSTART.request(TXVECTOR) primitive, the behavior of the HE PHY is defined in Clause 28 (High Efficiency (HE) PHY specification).

When the HE PHY receives a Clause 28 (High Efficiency (HE) PHY specification) PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the HE PHY shall behave as if it was a Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications) or Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification) or Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) or Clause 18 (Extended Rate PHY (ERP) specification) PHY that had received a PHYCONFIG.request(PHYCONFIG\_VECTOR) primitive but with the CHANNEL\_WIDTH, CENTER\_FREQUENCY\_SEGMENT\_0, and CENTER\_FREQUENCY\_SEGMENT\_1 parameters discarded from PHYCONFIG\_VECTOR.

As defined in 28.3.22 (PHY receive procedure), once a PPDU is received and detected as a NON\_HT PPDU, the behavior of the HE 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), Clause 18 (Extended Rate PHY (ERP) specification) PHYs respectively depends 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), Clause 18 (Extended Rate PHY (ERP) specification) are mapped to the Clause 28 (High Efficiency (HE) PHY specification) RXVECTOR parameters as defined in Table 28-3 (Mapping of the HE PHY parameters for NON\_HT operation). The HE PHY parameters not listed in the table are not present.

**Table 28-3 Mapping of the HE PHY parameters for NON\_HT operation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **HE PHY Parameter** | **2.4 GHz operation**  **defined by**  **Clause 15 (DSSS**  **PHY specification**  **for the 2.4 GHz**  **band designated**  **for ISM**  **applications)** | **2.4 GHz operation**  **defined by**  **Clause 16 (High**  **rate direct**  **sequence spread**  **spectrum (HR/**  **DSSS) PHY**  **specification)** | **2.4 GHz operation**  **defined by**  **Clause 18**  **(Extended Rate**  **PHY (ERP)**  **specification)** | **5 GHz operation defined by Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification)** | **Parameter List** |
| L\_LENGTH | LENGTH | LENGTH | LENGTH | LENGTH | TXVECTOR/RXVECTOR |
| L\_DATARATE | DATARATE | DATARATE | DATARATE | DATARATE | TXVECTOR/RXVECTOR |
| TXPWR\_LEVEL\_INDEX | TXPWR\_LEVEL\_INDEX | TXPWR\_LEVEL\_INDEX | TXPWR\_LEVEL\_INDEX | TXPWR\_LEVEL\_INDEX | TXVECTOR |
| RSSI | RSSI | RSSI | RSSI | RSSI | RXVECTOR |
| SERVICE | SERVICE | SERVICE | SERVICE | SERVICE | TXVECTOR/RXVECTOR |
| RCPI | RCPI | RCPI | RCPI | RCPI | RXVECTOR |
| CH\_BANDWIDTH\_IN\_NON\_HT | discarded | discarded | CH\_BANDWIDTH\_IN\_NON\_HT | CH\_BANDWIDTH\_IN\_NON\_HT | TXVECTOR/RXVECTOR |
| DYN\_BANDWIDTH\_IN\_NON\_HT | discarded | discarded | DYN\_BANDWIDTH\_IN\_NON\_HT | DYN\_BANDWIDTH\_IN\_NON\_HT | TXVECTOR/RXVECTOR |
| OPERATING\_CHANNEL | discarded | discarded | discarded | OPERATING\_CHANNEL | PHYCONFIG\_VECTOR |

**28.2.5.3 Support for HT format**

When a PHY-TXSTART.request(TXVECTOR) primitive is received with the TXVECTOR parameter FORMAT 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)  
— 28.3.20.1 (Transmit spectrum mask) instead of 19.3.18.1 (Transmit spectrum mask)  
— 28.3.20.3 (Transmit center frequency leakage) instead of 19.3.18.4 (Transmit center frequency tolerance)

Where the Clause 28 (High Efficiency (HE) PHY specification) TXVECTOR parameters in Table 28-1 (TXVECTOR and RXVECTOR parameters) are mapped directly to Clause 19 (High Throughput (HT) PHY specification) TXVECTOR parameters in Table 19-1 (TXVECTOR and RXVECTOR parameters) and the Clause 19 (High Throughput (HT) PHY specification) PHY-TXSTART.request (TXVECTOR) primitive is issued. The HE PHY parameters not listed in Table 19-1 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 28-2 (Interpretation of FORMAT, NON\_HT Modulation and CH\_BANDWIDTH parameters). The 20 MHz-only non-AP HE STA only supports HT transmission on 20 MHz channel width.

When the HE PHY receives a Clause 28 (High Efficiency (HE) PHY specification) PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the HE PHY shall, for the purposes of HT PPDU transmission and reception, behave as if it were a Clause 19 (High Throughput (HT) PHY specification) PHY that had received PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive but with the CHANNEL\_WIDTH, CENTER\_FREQUENCY\_SEGMENT\_0, and CENTER\_FREQUENCY\_SEGMENT\_1 parameters discarded from the PHYCONFIG\_VECTOR and the SECONDARY\_CHANNEL\_OFFSET parameter set to SECONDARY\_CHANNEL\_NONE if dot11CurrentChannelWidth indicates 20 MHz, to SECONDARY\_CHANNEL\_ABOVE if , or to SECONDARY\_CHANNEL\_BELOW otherwise.

As defined in 28.3.22 (PHY receive procedure), once a PPDU is received and detected as an HT PPDU, the  
behavior of the HE PHY is defined in Clause 19 (High Throughput (HT) PHY specification). The  
RXVECTOR parameters in Table 19-1 (TXVECTOR and RXVECTOR parameters) from the Clause 19  
(High Throughput (HT) PHY specification) PHY-RXSTART.indication primitive are mapped directly to the  
RXVECTOR parameters in Table 28-1 (TXVECTOR and RXVECTOR parameters) and a Clause 28 (High Efficiency (HE) PHY specification) PHY-RXSTART.indication primitive is issued. The HE PHY parameters not listed in Table 19-1 are not present. The 20 MHz-only non-AP HE STA only supports HT reception on 20 MHz channel width.

**28.2.5.4 Support for VHT format**

When a PHY-TXSTART.request(TXVECTOR) primitive is received with the TXVECTOR parameter FORMAT equal to VHT, the behavior of the PHY is defined by Clause 21 (Very High Throughput (VHT) PHY specification) with additional requirements defined in the following subclauses:

— 28.3.20.1 (Transmit spectrum mask) instead of 21.3.17.1 (Transmit spectrum mask)  
— 28.3.20.3 (Transmit center frequency leakage) instead of 21.3.17.4.2 (Transmit center frequency tolerance)

Where the Clause 28 (High Efficiency (HE) PHY specification) TXVECTOR parameters in Table 28-1 (TXVECTOR and RXVECTOR parameters) are mapped directly to Clause 21 (Very High Throughput (VHT) PHY specification) TXVECTOR parameters in Table 21-1 (TXVECTOR and RXVECTOR parameters) and the Clause 21 (Very High Throughput (VHT) PHY specification) PHY-TXSTART.request (TXVECTOR) primitive is issued. The HE PHY parameters not listed in Table 21-1 are not present. The 20 MHz-only non-AP HE STA only supports VHT transmission on 20 MHz channel width.

When the HE PHY receives a Clause 28 (High Efficiency (HE) PHY specification) PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive, the HE PHY shall, for the purposes of VHT PPDU transmission and reception, behave as if it were a Clause 21 (Very High Throughput (VHT) PHY specification) PHY that had received PHY-CONFIG.request(PHYCONFIG\_VECTOR) primitive .

As defined in 28.3.22 (PHY receive procedure), once a PPDU is received and detected as an VHT PPDU, the  
behavior of the HE PHY is defined in Clause 21 (Very High Throughput (VHT) PHY specification). The  
RXVECTOR parameters in Table 21-1 (TXVECTOR and RXVECTOR parameters) from the Clause 21  
(High Throughput (HT) PHY specification) PHY-RXSTART.indication primitive are mapped directly to the  
RXVECTOR parameters in Table 28-1 (TXVECTOR and RXVECTOR parameters) and a Clause 28 (High Efficiency (HE) PHY specification) PHY-RXSTART.indication primitive is issued. The HE PHY parameters not listed in Table 21-1 are not present. The 20 MHz-only non-AP HE STA only supports VHT reception on 20 MHz channel width.