IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Inter-band Channel Switch using ECS | | | | | | Date: 2023-07-11 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm Technologies, Inc. |  |  | [youhank@qti.qualcomm.com](mailto:youhank@qti.qualcomm.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following CIDs from LB273:

4343, 4357, 4268, 4203, 4342, 4284, 4318, 4029, 4402, 4403, 4404, 4051, 4052, 4053

NOTE – Set the Track Changes Viewing Option in the MS Word to “All Markup” to clearly see the proposed text edits.

**Revision History:**

R0: Initial version.

R1: Added CIDs 4357, 4203

R2: Added CIDs 4342, 4284

R3: Added CID 4318

R4: Typo fixes

R5: Added CIDs 4029, 4402, 4403, 4404

R6: Added CIDs 4051, 4052, 4053

# CID 4343, 4357

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4343  3.2  (No page/line identified) | CID 1948 on HE/HT/duplicate PPDU wasn't incorporated correctly | Incorporate the following:  REVISED (GEN: 2022-06-15 14:29:50Z) Add the following definition in Clause 3.2:  non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by 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, or not using a TXVECTOR FORMAT parameter equal to HE.  And change non-high-thought (non-HT) physical layer (PHY) protocol data unit (PPDU): non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by 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, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF, VHT. or HE |
| 4357  3.2  (No page/line identified) | Incorporation of the CID 1948 resolution into D2.0 wasn't done correctly:  REVISED (GEN: 2022-06-15 14:29:50Z) Add the following definition in Clause 3.2:  non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by 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, or not using a TXVECTOR FORMAT parameter equal to HE.  And change non-high-thought (non-HT) physical layer (PHY) protocol data unit (PPDU): non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by 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, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF, VHT. or HE | Implement the CID 1948 resolution as directed |

## Discussion

Following was the original related text in REVme 1.0. (Note that there was no definition of non-HE PPDU in REVme D1.0.)

REVme D1.0 P230

|  |
| --- |
| **non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** A PPDU transmitted by a Clause 19 or Clause 21 PHY with the TXVECTOR FORMAT parameter equal to NON\_HT and the CH\_BANDWIDTH parameter equal to NON\_HT\_CBW40, CBW40, CBW80, CBW160, or CBW80+80.  **…**  **non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT. |

As the commenter has pointed out, CID 1948 (LB258) had the following resolution.

|  |
| --- |
| "REVISED (GEN: 2022-06-15 14:29:50Z) Add the following definition in Clause 3.2:  non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by 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, or not using a TXVECTOR FORMAT parameter equal to HE.  And change non-high-thought (non-HT) physical layer (PHY) protocol data unit (PPDU): non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by 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, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF, VHT. or HE" |

Resolution for CID 1948 (LB258) instructed for the following change.

|  |
| --- |
| **non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HE.  **non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** A PPDU transmitted by a Clause 19 or Clause 21 PHY with the TXVECTOR FORMAT parameter equal to NON\_HT and the CH\_BANDWIDTH parameter equal to NON\_HT\_CBW40, CBW40, CBW80, CBW160, or CBW80+80.  **…**  **non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT or HE. |

Unfortunately, the resolution did not clearly indicate the page and line number of the change, hence the REVme editors updated the definition for “non-HT **duplicate** PPDU” instead of “non-HT PPDU”.

Hence, D2.0 became (P221):

|  |
| --- |
| **non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HE.  **…**  **non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** A PPDU transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT or HE.  **…**  **non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT. |

Then, CID 3330 (LB270) further updated the text to (implemented correctly by the editors):

|  |
| --- |
| **non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU):** [non-HE PPDU] A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HE.  **…**  **non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** [non-HT duplicate PPDU] A PPDU transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT or HE.  **…**  **non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** [non-HT PPDU] A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY. |

So, the final status is:

* Non-HE PPDU definition is as instructed by the resolution of CID 1948
  + However, the definition is errorneous. For example, a WUR, S1G or DMG PPDU does not use the “TXVECTOR FORMAT parameter equalt to HE”, hence is a non-HE PPDU by the current definition, which is not technically accurate.
  + However, ‘fixing’ the non-HE PPDU definition is outside the scope of CID 4343 – remember that CID 4343 is stating that CDI 1948 was not implemented correct. But CID 1948 was implemented correctly for the non-HE PPDU. It’s just that the resolution for CID 1948 itself was errorneous.
  + Fortunately, there is another CID (CID 4268) which is asking to update the non-HE PPDU definition, so let’s deal with it in that CID.
* Non-HT duplicate PPDU definition should not have been updated, but was updated errorneously (confusion by editors when implementing CID 1948)
  + This needs to be fixed.
* Non-HT PPDU definition is as instructed by the resolution of CID 3330. This comment we are resolving now (CID 4343) is pointing out that the non-HT PPDU definition does not match the resolution of CID 1948 (LB258), but CID 3330 ovewrote that anyway.
  + Current definition (per CID 3330) is appropriate and adequate; hence no further change is recommended.

## Proposed Resolution: CID 4343, 4357

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 4343 and 4357 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

Note that CIDs 4343 and 4357 have the same resolution and text updates.

**Note to Commenter:**

The proposed text update fixes the definition for non-HT duplicate PPDU. Definition for non-HT PPDU has been superceded by CID 3330 (LB270), hence requires no further change.

## Proposed Text Update: CID 4343, 4357

*Instruction to TGme Editor: Update REVme D3.0 P220L31 as shown below.*

**non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU):** [non-HE PPDU] A PPDU that is transmitted using PPDU formats defined in Clause 15, Clause 16, Clause 17, Clause 18, Clause 19, or Clause 21.

*Instruction to TGme Editor: Update REVme D3.0 P221L21 as shown below.*

**non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** [non-HT duplicate PPDU] A PPDU transmitted with the TXVECTOR FORMAT parameter equal to NON\_HT and the NON\_HT\_MODULATION parameter equal to NON\_HT\_DUP\_OFDM.

**non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** [non-HT PPDU] A PPDU that is transmitted using PPDU formats defined in Clause 15, Clause 16, Clause 17 or Clause 18.

# CID 4268

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4268  3.2  (No page/line identified) | We redefined non-HT PPDU to be in terms of PPDU formats defined by specific clauses -- also need to do this for non-HE PPDU etc. | As it says in the comment [confirm direction] |

## Discussion

See the discussion for CID 4343.

Furthermore, I have reviewed REVme D3.0 P220-221 and did not find any other locations to make definition changes other than the non-HE PPDU.

## Proposed Resolution: CID 4268

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 4268 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

**Note to Commenter:**

The proposed text update changes the definition for non-HE PPDU in the direction suggested by the commenter.

## Proposed Text Update: CID 4268

*Instruction to TGme Editor: Update REVme D3.0 P220L31 as shown below.*

**non-high-efficiency (non-HE) physical layer (PHY) protocol data unit (PPDU):** [non-HE PPDU] A PPDU that is transmitted using PPDU formats defined in Clause 15, Clause 16, Clause 17, Clause 18, Clause 19, or Clause 21.

# CID 4203

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4203  O.5.1  5727.36 | "An HT AP that has dot11FortyMHzOperationActivated equal to true sets its STA Channel Width field of the HT Operation element to a nonzero value. This field signals the current operating mode of the AP, not the BSS. An HT AP might operate a 20/40 MHz BSS while it is operating as a 20 MHz device. " -- this is confusing, because HT Operation is about the BSS not the STA (HT Capabilities is about the STA) | Confirm whether STA Channel Width is really about the transmitting STA not about the BSS, and if it is put a NOTE to that effect, which also describes how the BSS width is signalled [needs discussion] |

## Discussion

Comment is on the last paragraph of Annex O.5.1 (the paragraph highlighted by yellow below.)

REVme D3.0 P5727L36:

|  |
| --- |
| **O.5 20/40 MHz BSS establishment and maintenance**  **O.5.1 Signaling 20/40 MHz BSS capability and operation**  A BSS that occupies 40 MHz of bandwidth and that is administered by an HT AP is called a *20/40 MHz BSS*.  An HT AP that has dot11FortyMHzOperationImplemented equal to true sets the Supported Channel Width Set subfield of the HT Capabilities element to a nonzero value. The AP might also operate a 20/40 MHz BSS. The Supported Channel Width Set subfield of the HT Capabilities element that is transmitted by the AP indicates the possible operating mode of the BSS and of the AP, but the value in this field is not an indication of the current BSS bandwidth of either the AP or the BSS.  An HT AP signals the operating width of the BSS through the Secondary Channel offset field of the HT Operation element. A nonzero value in this field indicates that a secondary channel exists; in other words, the BSS is a 20/40 MHz BSS. A value of 0 in this field indicates that the BSS is operating as a 20 MHz BSS.  An HT AP that has dot11FortyMHzOperationActivated equal to true sets its STA Channel Width field of the HT Operation element to a nonzero value. This field signals the current operating mode of the AP, not the BSS. An HT AP might operate a 20/40 MHz BSS while it is operating as a 20 MHz device. |

Definition and normative text for dot11FortyMHzOperationActivated and “STA Channel Width” field are shown in the following three locations in REVme D3.0.

REVme D3.0 P5320L48:

|  |
| --- |
| Dot11FortyMHzOperationActivated OBJECT-TYPE  SYNTAX TruthValue  MAX-ACCESS read-write  STATUS current  DESCRIPTION  "This is a control variable.  It is written by an external management entity.  Changes take effect as soon as practical in the implementation.  This attribute, when true, indicates that the 40 MHz operation is enabled.  false or not present in a 20 MHz-only non-AP HE STA that is an HT STA.  true in a VHT STA that is not a 20 MHz-only non-AP HE STA."  DEFVAL { false }  ::= { dot11PhyHTEntry 2 } |

REVme D3.0 P1058:

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| --- |
|  |

REVme D3.0 P2539L52:

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| --- |
| An HT AP shall set the STA Channel Width field to 1 in frames in which it has set the Secondary Channel Offset field to SCA or SCB. An HT AP shall set the STA Channel Width field to 0 in frames in which it has set the Secondary Channel Offset field to SCN. |

Based on these, I agree with the commenter that the last paragraph of Annex O.5.1 is erroneous. If an HT BSS is operating in 40 MHz bandwidth mode, then it must set the STA Channel Width field to 1.

Searching through the history, Annex O.5.1 was first introduced in IEEE 802.11-2012 (P2664), where there was an additional sentence (see yellow below) which explained that the green scenario occurs for DLS.

|  |
| --- |
| An HT AP that has dot11FortyMHzOperationActivated equal to true sets its STA Channel Width field of the HT Operation element to a nonzero value. This field signals the current operating mode of the AP, not the BSS. An HT AP may operate a 20/40 MHz BSS while it is operating as a 20 MHz device. Such a situation would support, for example, 40 MHz bandwidth DLS traffic among associated STAs, but only 20 MHz bandwidth traffic between STAs and the AP. |

The above yellow sentence was removed in REVmd D1.0 by CID 59 of CC25 (<https://mentor.ieee.org/802.11/dcn/17/11-17-1518-03-000m-resolution-cids-59-62-remove-dls-stsl.docx>, <https://mentor.ieee.org/802.11/dcn/17/11-17-0914-13-000m-revmd-wg-cc-comments.xls>) which removed DLS from IEEE 802.11. The green sentences should also have been removed together with the DLS removal.

## Proposed Resolution: CID 4203

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 4203 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

**Note to Commenter:**

The proposed text update removes the confusing sentences which should have been deleted as part of the DLS removal in REVmd (CID 59 of CC25).

## Proposed Text Update: CID 4203

*Instruction to TGme Editor: Update REVme D3.0 P5727L39 as shown below.*

An HT AP that has dot11FortyMHzOperationActivated equal to true sets its STA Channel Width field of the HT Operation element to 1.

# CID 4342

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4342  18.4.8.3  3226.26 | "For ERP-DSSS/CCK PPDUs, the adjacent channel rejection shall follow 16.3.8.4" -- should the requirements for ERP-CCK be different (16.3.8.4 only mentions CCK; DSSS is in 15.4.6.4)? | Refer to 16.3.8.4 for ERP-CCK PPDUs and 15.4.6.4 for ERP-DSSS PPDUs [needs discussion] |

## Discussion

The comment is on the yellow sentence below.

REVme D3.0 P3226:

|  |
| --- |
|  |

First some background.

REVme D3.0 P3166:

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| --- |
|  |

REVme D3.0 P3137:

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| --- |
|  |

Note that:

* Both Clause 15 (DSSS) and Clause 16 (HR/DSSS) do not specify the adjacent channel rejection for all modulation levels, but just for the highest modulation level.
* Clause 16 (HR/DSSS) has adjacent channel to be defined as ≥ 25 MHz, while Clause 15 (DSSS) has adjacent channel to be defined as ≥ 30 MHz. And it does not make sense to have different adjacent channel definition for different modulation order. Note that the Clause 16 requirement is more stringent (≥ 25 MHz) than that of Clause 15 (≥ 30 MHz). The first sentence of 18.4.8.3 also specifies that adjacent channel (for ERP) is ≥ 25 MHz.

Hence, it seems sufficient to refer only to the 16.3.8.4 for the adjacent channel rejection requirement for ERP.

## Proposed Resolution: CID 4342

**REJECTED**

Adjacent channel rejection requirement of 16.3.8.4 is more stringent than that of 15.4.6.4, hence 16.3.8.4 alone is sufficient as the requirement for ERP.

# CID 4284

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4284  C.3  5341.49 | dot11VHTBeamformeeNTxSupport is described as:  "This is a capability variable. Its value is determined by device capabilities.  This attribute indicates the maximum number of space-time streams that the STA can receive in a VHT NDP, the maximum value for NSTS, total that can be sent to the STA in a VHT MU PPDU if the STA is MU beamformee capable and the maximum value of Nr that the STA transmits in a VHT Compressed Beamforming frame" but "the maximum value for NSTS, total that can be sent to the STA in a VHT MU PPDU if the STA is MU beamformee capable" is not necessarily the same as "the maximum number of space-time streams that the STA can receive in a VHT NDP" and "the maximum value of Nr that the STA transmits in a VHT Compressed Beamforming frame" (see the Maximum NSTS,total field) | Introduce a new MIB attribute to carry Maximum NSTS,total, and make this supersede dot11VHTBeamformeeNTxSupport for "the maximum value for NSTS, total that can be sent to the STA in a VHT MU PPDU if the STA is MU beamformee capable" [confirm direction] |

## Discussion

Comment is on the last paragraph of Annex O.5.1 (the paragraph highlighted by yellow below.)

REVme D3.0 P5341L49:

|  |
| --- |
| dot11VHTBeamformeeNTxSupport OBJECT-TYPE  SYNTAX Unsigned32 (2..8)  MAX-ACCESS read-only  STATUS current  DESCRIPTION  "This is a capability variable.  Its value is determined by STA capabilities.  This attribute indicates the maximum number of space-time streams that the STA can receive in a VHT NDP, the maximum value for NSTS, total that can be sent to the STA in a VHT MU PPDU if the STA is MU beamformee capable and the maximum value of Nr that the STA transmits in a VHT Compressed Beamforming frame."  ::= { dot11VHTTransmitBeamformingConfigEntry 6 } |

REVme D3.0 P1224:

|  |
| --- |
| … |

REVme D3.0 P1228:

|  |
| --- |
|  |

Commenter is correct that when REVmc D5.0 introduced the “Maximum NSTS,total”, a separate MIB should also have been created.

## Proposed Resolution: CID 4284

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 4284 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

**Note to Commenter:**

The proposed text update adds a new MIB variable.

## Proposed Text Update: CID 4284

*Instruction to TGme Editor: Update REVme D3.0 P3498L40 as shown below.*

**Table 21-27 – VHT PHY MIB attributes**

|  |  |  |
| --- | --- | --- |
| **Managed object** | **Default value/**  **range** | **Operational semantics** |
| … | | |
| dot11VHTBeamformeeNTxSupport | Implementation dependent | Static |
| dot11VHTMaxNstsTotal | Implementation dependent | Static |

*Instruction to TGme Editor: Update REVme D3.0 P4199L32 as shown below.*

**Table 27-53 – HE PHY MIB attributes**

|  |  |  |
| --- | --- | --- |
| **Managed object** | **Default value/**  **range** | **Operational semantics** |
| … | | |
| dot11VHTBeamformeeNTxSupport | Implementation dependent | Static |
| dot11VHTMaxNstsTotal | Implementation dependent | Static |
| **dot11PHYHETable** | | |

*Instruction to TGme Editor: Update REVme D3.0 P5340L50 as shown below.*

Dot11VHTTransmitBeamformingConfigEntry ::=

SEQUENCE {

dot11VHTSUBeamformeeOptionImplemented TruthValue,

dot11VHTSUBeamformerOptionImplemented TruthValue,

dot11VHTMUBeamformeeOptionImplemented TruthValue,

dot11VHTMUBeamformerOptionImplemented TruthValue,

dot11VHTNumberSoundingDimensions Unsigned32,

dot11VHTBeamformeeNTxSupport Unsigned32,

dot11VHTMaxNstsTotal Unsigned32

}

*Instruction to TGme Editor: Update REVme D3.0 P5341L49 as shown below.*

dot11VHTBeamformeeNTxSupport OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by STA capabilities.

This attribute indicates the maximum number of space-time streams that the STA can receive in a VHT NDP and the maximum value of Nr that the STA transmits in a VHT Compressed Beamforming frame."

::= { dot11VHTTransmitBeamformingConfigEntry 6 }

dot11VHTMaxNstsTotal OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by STA capabilities.

This attribute indicates the maximum value for NSTS,total that can be sent to the STA in a VHT MU PPDU if the STA is MU beamformee capable.

The value of this attribute is greater than or equal to dot11VHTBeamformeeNTxSupport if the STA is MU beamformee capable."

::= { dot11VHTTransmitBeamformingConfigEntry 7 }

*Instruction to TGme Editor: Update REVme D3.0 P5457L60 as shown below.*

dot11VHTTransmitBeamformingGroup OBJECT-GROUP

OBJECTS {

dot11VHTSUBeamformeeOptionImplemented,

dot11VHTSUBeamformerOptionImplemented,

dot11VHTMUBeamformeeOptionImplemented,

dot11VHTMUBeamformerOptionImplemented,

dot11VHTNumberSoundingDimensions,

dot11VHTBeamformeeNTxSupport,

dot11VHTVHTMaxNstsTotal }

STATUS current

DESCRIPTION

"Attributes that configure VHT transmit beamforming for IEEE Std 802.11."

::= { dot11Groups 76 }

# CID 4318

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4318  3.2  (No page/line identified) | CID 3772: the improvements to "mask PPDU" definitions should be made for S1G, mass-market PHYs and DMG too | As it says in the comment |

## Discussion

CID 3772 in LB270 was the following.

|  |  |  |  |
| --- | --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 3772  3.2  258.18 | The TVHT "mask" PPDU definitions contain redundancy in the sense that they are defined in terms of the transmit mask bandwidth and then enumerate all possibilities with that mask. | Change the definitions to something like the following: TVHT\_X mask PPDU: A Clause 22 PPDU transmitted using the TVHT\_X transmit spectral mask defined in the same clause." | REVISED (GEN: 2023-03-14 20:47:13Z) - Instruction to TGme Editor: Implement the proposed text updates for CID 3772 in https://mentor.ieee.org/802.11/dcn/23/11-23-0392-00-000m-lb270-phy-misc-comments.docx   Note to Commenter: It is necessary to list out each PPDU allowed to use a certain bandwidth mask. The proposed text update cleans up some redundant language while still keeping an explicit list of PPDUs allowed for each bandwidth mask. |

An example text change made by the CID 3772 was:

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I.e., the “XYZ transmit spectral mask defined in ABC” was moved out of the ‘list’ as the mask was all common.

Commenter is now asking to do similar ‘clean up’ for other mask PPDUs.

REVme D3.0 P197:

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Note that different bullets have different mask they need to conform to, hence we cannot simplify this definition similar to what we did in LB270 CID3772.

Situation is similar for 40 MHz mask PPDU, 80 MHz mask PPDU, 80+80 MHz mask PPDU and 160 MHz mask PPDU.

I have also checked other mask PPDU definitions in Clause 3.2, and either they are

* Not in list format, hence similar clean up is not applicable, or
* Already have moved the common mask definition out of the list (similar to what was done by LB270 CID 3772.

## Proposed Resolution: CID 4318

**REJECTED**

The remaining mask PPDU definitions in Clause 3.2 cannot be further simplified.

# CID 4029

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| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4029  15.3.3.7  3120.52 | I think tere is something wrong with FIG 15-2. The polyniomial is x16+x12+x5 +1. The first tap is at 16, the second tap is at 13, the third at 5. I think that the x4 in the middle block should not be there. | Delete x4 from the middle block |

## Discussion

REVme D3.1 P3125:

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Commenter is saying that there are two x^4 in the figure.

## Proposed Resolution: CID 4029

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 4029 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

**Note to Commenter:**

X^4 in the middle box is removed.

## Proposed Text Update: CID 4029

*Instruction to TGme Editor: Replace the Figure 15-2 at REVme D3.1 P3125L52 with the following.*





# CID 4402, 4403

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| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4402  27.3.10  4060.16 | For 20 MHz HE PPDU, only HE modulated fields tone numerology uses 256 subcarriers, while pre-HE modulated fields uses 64 subcarriers. Please clarify. Same applies to 40/80/160 MHz HE PPDU. | Change to "For a 20 MHz HE PPDU transmission, the 20 MHz is divided into 256 subcarriers for the HE modulated fields." Change the paragraphs for 40/80/160 MHz HE PPDU accordingly. |
| 4403  27.3.10  4060.38 | "For a 160 MHz ..., and the subcarriers on which the signal is transmitted in each 80 MHz bandwidth is identical to an 80 MHz HE PPDU transmission". The subcarriers tone index in each 80 MHz bandwidth is not idential to an 80 MHz HE PPDU since there is a tone shift to lower and upper 80 MHz subchannels. | Change to "the subcarriers on which the signal is transmitted in each 80 MHz bandwidth is identical to those in an 80 MHz HE PPDU transmission with a corresponding subcarrier index shift". |

## Context

REVme D3.0 P4060:

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REVme D3.0 P4062:

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REVme P3.0 P4063:

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REVme D3.0 P4057:

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## Proposed Resolution: CID 4402

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 4402 and 4403 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

**Note to Commenter:**

Change similar to that proposed by the commenter is implemented in multiple places.

## Proposed Resolution: CID 4403

**REVISED**

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 4402 and 4403 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx)

**Note to Commenter:**

The proposed text by the commenter is appropriate for 160 MHz, but not for 80+80 MHz – see Table 27-13.

## Proposed Text Update: CID 4403

**27.3.10 Mathematical description of signals**

*…*

*Instruction to TGme Editor: Update REVme D3.1 P4066L17 as shown below.*

For the HE modulated fields of(#4402) a 20 MHz non-OFDMA HE PPDU transmission, the 20 MHz is divided into 256 subcarriers. The signal is transmitted on all or a subset of subcarriers –122 to –2 and 2 to 122, with 0 being the center subcarrier.

For the HE modulated fields of(#4402) a 20 MHz OFDMA HE PPDU transmission, the 20 MHz is divided into 256 subcarriers. The signal is transmitted on all or a subset of the subcarriers –122 to –4 and 4 to 122, with 0 being the center subcarrier.

For the HE modulated fields of(#4402) a 40 MHz non-OFDMA HE PPDU transmission, the 40 MHz is divided into 512 subcarriers. The signal is transmitted on subcarriers –244 to –3 and 3 to 244, with 0 being the center subcarrier.

For the HE modulated fields of(#4402) a 40 MHz OFDMA HE PPDU transmission, the 40 MHz is divided into 512 subcarriers. The signal is transmitted on all or a subset of subcarriers –244 to –3 and 3 to 244, with 0 being the center subcarrier.

For the HE modulated fields of(#4402) an 80 MHz non-OFDMA HE PPDU transmission, the 80 MHz is divided into 1024 subcarriers. The signal is transmitted on subcarriers –500 to –3 and 3 to 500, with 0 being the center subcarrier.

For the HE modulated fields of(#4402) an 80 MHz OFDMA HE PPDU transmission, the 80 MHz is divided into 1024 subcarriers. The signal is transmitted on all or a subset of the subcarriers –500 to –4 and 4 to 500, with 0 being the center subcarrier.

For for the HE modulated fields of(#4402) a 160 MHz HE PPDU transmission(#4403), each half 80 MHz bandwidth is divided into 1024 subcarriers, and the subcarriers on which the signal is transmitted in each 80 MHz bandwidth is identical to an 80 MHz HE PPDU transmission with a corresponding subcarrier index shift(#4403), depending on non-OFDMA or OFDMA transmission within the corresponding 80 MHz.

For for the HE modulated fields of a noncontiguous 80+80 MHz transmission, each half 80 MHz bandwidth is divided into 1024 subcarriers, and the subcarriers on which the signal is transmitted in each 80 MHz bandwidth is identical to an 80 MHz HE PPDU transmission, depending on non-OFDMA or OFDMA transmission within the corresponding 80 MHz(#4402,4403).

# CID 4404

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| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4404  27.3.11.10  4123.55 | In equations 27-58 and 27-59, wTHE-LTF(t-nTHE-LTF) is wrong, THE-LTF does not include GI portion. It should be wTHE-LTF(t-nTHE-LTF-SYM) | Please correct the equations. |

## Context

REVme D3.1 P4129 (27.3.11.10 HE-LTF field):

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REVme D3.0 P4057:

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## Proposed Resolution: CID 4404

**REVISED**

**Instruction to TGme Editor:**

In Equation (27-58) at REVme D3.1 P4129L54, change “T\_{HE-LTF}” with “T\_{HE-LTF-SYM}” twice.

NOTE – TGme Editor may look at the “Context” section for CID 4404 in [https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273- misc-cids.docx](https://mentor.ieee.org/802.11/dcn/23/11-23-1127-06-000m-lb273-%20misc-cids.docx) which shows the two places where this change needs to be made with red underlines.

# CID 4051

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| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4051  27.3.20.2  4175.36 | In a 5,805 page specification, we should make some effort to cut pointless text and requirements. The requirements in this and the immediately following subclauses are a good place to start. This comment does not argue that we should delete all of them. For example, the requirement of -82 dBm for BPSK rate 1/2 in 20 MHz for PSDU lengths of 4096 octets in an HE SU PPDU, in a wired configuration, is useful. But why is it useful? There is no requirement for PSDU lengths of 537 or 1411 or 2248 octets; why 4096 alone? The point, as I understand it, is that this requirement acts as an indirect way of setting requirements on many parts of the receiver: everything from packet acquisition to the BCC decoder has to work even to meet the (relaxed) requirement of -82 dBm. If -82 dBm is met for PSDU lengths of 4096 octets, we infer that the relevant blocks work well enough, which is what we care about, and we do not need to specify a separate requirement, let alone run a new test, for all other allowable PSDU lengths. But--and here is the point--we have already set almost identical requirements several times already. BPSK rate 1/2 in 20 MHz has already been tested in Clauses, 17, 18, 19, and 21. Do we really have to test it again? OK, HE has a new tone map; let's leave in one requirement for that. But then we should cut the entire rest of the table, apart from the 1024 QAM modes, since it duplicates the Clause 21 table. | (1) Delete all except the last two rows (1024-QAM), the second row, and the second column (with DCM) from Table 27-51, and merge the three cells at top left (Modulation / Without DCM / With DCM) into one (Modulation); (2) Change the first sentence to "The PER shall be less than 10% for a PSDU with the rate-dependent input levels (i) listed for BPSK rate 1/2 in Table 21-25 (Receiver minimum input level sensitivity) for BPSK rate 1/2 without DCM and for QPSK rate 1/2 with DCM, and (ii) listed in Table 27-51."; (3) change "The PSDU length shall be 2048 octets for BPSK modulation with DCM or 4096 octets for all other modulations." to "The PSDU length shall be 4096 octets." |

## Context

Following is the redline version of the change proposed by the commenter.

REVme D3.0 P4175:

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| 27.3.20.2 Receiver minimum input level sensitivity  The PER shall be less than 10% for a PSDU with the rate-dependent input levels (i) listed for BPSK rate 1/2 in Table 21-25 for BPSK rate 1/2 without DCM and for QPSK rate 1/2 with DCM, and (ii) listed in Table 27-51 (Receiver minimum input level sensitivity). The PSDU length shall be 4096 octets.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | * Receiver minimum input level sensitivity(11ax) | | | | | | | |  | | Rate (*R*) | Minimum sensitivity  (20 MHz PPDU)  (dBm) | Minimum sensitivity  (40 MHz PPDU)  (dBm) | Minimum sensitivity  (80 MHz PPDU)  (dBm) | Minimum sensitivity  (160 MHz or  80+80 MHz PPDU) (dBm) | |  | Modulation | |  | BPSK | 1/2 | –82 | –79 | –76 | –73 | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  | N/A | 3/4 | –54 | –51 | –48 | –45 | |  | N/A | 5/6 | –52 | –49 | –46 | –43 | |

FYI, following is Table 21-25 referred to in the new text by the commenter.

REVme D3.0 P3483:

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## Proposed Resolution: CID 4051

**REJECTED**

The exact proposed change by the commenter seems to have some error – e.g., the resulting last two rows have “Modulation” values of “N/A”. Also, 20 MHz HE PPDU using BPSK 1/2 with DCM cannot carry 4096 bytes, and yet the proposed change would require the RX sensitivity to be measured using 4096 bytes.

Details aside, while some portions of the Table 27-51 contain same values as Table 21-25, the proposed language describing how to use the values from Table 21-25 to test modes in Clause 27 is not easy to understand. It is clearer to have the requirement specified in Table 27-51.

Finally, it is understandable that people may have different opinion on whether to test all MCS or just the min/max MCS. The opinion of the commenter (test only the min/max MCS) is duly noted and respected, the opinion of other members who had approved the IEEE 802.11ax amendment cannot be ignored as well.

# CID 4052

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| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4052  27.3.20.3  4176.18 | Deja vu--this entire subclause is a virtual copy of 21.3.18.2. The only differences (as far as I can see) are that the interfering signals are HE rather than VHT, and that DCM is shoehorned in (complete with different blocklength in one case). Are the requirements themselves useful, given that any HE STA is subject to the corresponding requirements in 21.3.18.2? That's not clear. But let's at least cut out the almost entirely surfluous text. | (1) Delete all but the last two rows (1024 QAM), the seocnd column (With DCM) and the second row (N/A BPSK ...) in Table 27-52, and merge the top left three cells into one (Modulation); (2) Replace the entire rest of the text of subclause 27.3.20.3 with "The adjacent channel rejection shall be no less than specified in Table 21-26 and Table 27-52, following the definitions and procedures of 21.3.18.2, except that the interfering signals shall be HE instead of VHT." |

## Discussion

Following is the redline version of the change proposed by the commenter.

REVme D3.0 P4176:

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| 27.3.20.3 Adjacent channel rejection  The adjacent channel rejection shall be no less than specified in Table 21-26 and Table 27-52, following the definitions and procedures of 21.3.18.2, except that the interfering signals shall be HE instead of VHT.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | * Minimum required adjacent and nonadjacent channel rejection levels(11ax) | | | | | | | |  | | Rate (*R*) | Adjacent channel rejection (dB) | | Nonadjacent channel rejection (dB) | | |  | Modulation | 20/40/80/160MHz channel | 80+80 MHz channel | 20/40/80/160MHz channel | 80+80 MHz channel | |  | BPSK | 1/2 | 16 | 13 | 32 | 29 | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  | N/A | 3/4 | –12 | –15 | 4 | 1 | |  | N/A | 5/6 | –14 | –17 | 2 | –1 |   The measurement of adjacent channel rejection for 160 MHz operation in regulatory domain is required only if such a frequency band plan is permitted in the regulatory domain. |

FYI, following is 21.3.18.2 referred to in the new text by the commenter.

REVme D3.0 P3483:

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## Proposed Resolution: CID 4052

**REJECTED**

The exact proposed change by the commenter seems to have some error – e.g., the resulting last two rows have “Modulation” values of “N/A”.

Details aside, while portions of 27.3.20.3 contain similar information as 21.3.18.2, the proposed language describing how to use 21.3.18.2 to test modes in Clause 27 is not straight forward to understand. It is clearer to have the requirement specified in 27.3.20.3.

# CID 4053

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| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 4053  27.3.20.4  4177.36 | It's deja vu all over again. This subcluase is a virtual copy of 21.3.18.3. Why write it all out again? | Change the entire text of the subclause to "The nonadjacent channel rejection shall be no less than specified in Table 21-26 and Table 27-52, follwing the definitions and procedures of 21.3.18.2, except that the interfering signal shall be HE instead of VHT." |

## Discussion

Following is the redline version of the change proposed by the commenter.

REVme D3.0 P4177:

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| 27.3.20.4 Nonadjacent channel rejection  The nonadjacent channel rejection shall be no less than specified in Table 21-26 and Table 27-52, follwing the definitions and procedures of 21.3.18.2, except that the interfering signal shall be HE instead of VHT. |

## Proposed Resolution: CID 4053

**REJECTED**

27.3.20.4 is on nonadjacent channel rejection, while 21.3.18.2 is on adjacent channel rejection. Hence, it is not appropriate to replace the procedures for HE nonadjacent channel rejection testing with the procedures for VHT adjacent channel rejection testing.

If the commenter was referring to 21.3.18.3, then while the procedure is similar to that of 27.3.20.4, there are difference such as the BPSK 1/2 DCM using 2048 bytes. It is also clearer to have the requirement specified in Clause 27 instead of referring to Clause 21.

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