IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | LB258 Misc CIDs | | | | | | Date: 2022-08-29 | | | | | | Author(s): | | | | | | Name | Affiliation | Address | Phone | email | | Youhan Kim | Qualcomm |  |  | [youhank@qti.qualcomm.com](mailto:youhank@qti.qualcomm.com) | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |

Abstract

This submission proposes resolutions for the following comments from comment collection on P802.11-REVme D1.0:

2011, 2060, 1377, 1378, 1372, 1717, 1373, 1370, 2378, 2373,

1053, 1050, 1051, 1048, 1049, 1297, 1064, 1186, 1768, 1647,

1927, 2017, 2044, 2115, 2123, 2154, 1471, 1864

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 1372, 1373, 1370, 2378, 2373, 1053, 1050, 1051, 1048, 1049, 1297, 1064, 1186, 1768, 1647, 1927, 2017, 2044, 2115, 2123, 2154, 1471

R2: Added CID 1864

R3: Added CID 1717

R4: Updated proposed text update for CIDs 2011 and 2060

R5: Updated during July IEEE meeting

R6: Updated during 8/24/2022 TGme ad hoc

R7: Updated resolution to CID 1647.

R8: Fixed typo in proposed text updates for CID 1471 (‘banwdith’ 🡪 ‘bandwidth’)

R9: Updated resolution to CID 1647.

R10: Updated resolution to CIDs 1297 and 1647.

# CID 2011, 2060, 1377, 1378

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2011  N/A  N/A | The RCPI definition is missing for the VHT, TVHT and S1G PHYs | Copy the definition from the HT PHY |
| 2060  N/A  N/A | "The allowed values for the RCPI parameter are in the range 0 to 255, as defined in 9.4.2.37 (RCPI element)."; "The allowed values for the RCPI parameter are in the range 0 to 255, as defined in 17.3.10.7 (Received Channel Power Indicator Measurement)." and whatever 25.3.13 Received channel power indicator (RCPI) measurement ends up saying | The RCPI parameter in the PHY SAP should just be a power in dB with a resolution of 0.5 dB, without any particular encoding |
| 1377  15.2.3.3  3417.63 | "RSSI is intended to be used in a relative manner" -- it's useless to know just that signal A is stronger than signal B, without knowing how strong signal A and signal B are, or even just the difference in power between signal A and signal B | Delete Subclause 15.2.3.3 |
| 1378  15.2.3.3  3417.63 | "RSSI is intended to be used in a relative manner" -- it's useless to know just that signal A is stronger than signal B, without knowing how strong signal A and signal B are, or even just the difference in power between signal A and signal B | Clarify how a unitless RSSI is to be used |

## Discussion

If we want to expand the RCPI to additional PHYs, then we should first fix some issues in the existing RCPI definition.

In some cases, the RCPI is defined to be the received power over the entire PPDU, while in other cases, RCPI is the received power over the ‘preamble’. In practice, it is more practical for receivers to measure the received power at the preamble, hence the proposed resolution unifies the definition of RCPI to be measured over the preamble.

Also, the definition of RCPI has a requirement of measure the power over “channel bandwidth multiplied by 1.1”. For example,

REVme D1.3 P3447:

|  |
| --- |
| RCPI shall equal the received RF power within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver. The received RF power shall be determined assuming a receiver noise equivalent bandwidth equal to the channel bandwidth multiplied by 1.1. |

This means that, for example, we need to measure the received power over 160\*1.1 = 176 MHz when measuring RCPI for 160 MHz PPDUs. This is clearly not practical the additional 16 MHz is well into the adjacent channels. Therefore, the proposed resolution also removes the requirement of measuring over channel bandwidth multiplied by 1.1.

Regarding CID 2060, agree with the commenter that there is no need for the PHY subclause to have the RXVECTOR RCPI in the format of the MAC RCPI field encoding specified in 9.4.2.37. Hence, the proposed resolution removed reference to 9.4.2.37 from PHY clauses.

Finally, regarding CIDs 1377 and 1378, RSSI has been defined since the beginning of 802.11 to be a unitless value. Noting that we are now fixing and expanding the RCPI to additional PHY clauses, there is no need to change the RSSI at this point.

## Proposed Resolution: CID 2011

REVISED

**Note to commenter:**

The instruction to editor below adds the RCPI definition to VHT, TVHT, S1G, HE and WUR PHYs.

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 2011 and 2060 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-01-000m-lb258-misc-cids.docx)

## Proposed Resolution: CID 2060

REVISED

**Note to commenter:**

The instruction to editor below removes the reference to 9.4.2.37 for the encoding of the RXVECTOR parameter RCPI.

**Instruction to Tgme Editor:**

Implement the proposed text updates for CIDs 2011 and 2060 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-01-000m-lb258-misc-cids.docx)

## Proposed Resolution: CIDs 1377, 1378

REJECTED

Whether the information that signal A is stronger than signal B is useful or not, and how it might be used is implementation specific.

## Proposed Text Updates: CIDs 2011, 2060

*Instruction to Tgme Editor: Update REVme D1.3 P3447L39 as shown below.*

**15.4.6.6 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received frame. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the SYNC field of the received PPDU or by other equivalent means that meet the specified accuracy.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Update REVme D1.3 P3476L51 as shown below.*

**16.3.8.6 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received frame. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the SYNC field of the received frame or by other equivalent means that meet the specified accuracy.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Update REVme D1.3 P3480L54 as shown below.*

**17.2.3 RXVECTOR parameters**

**Table 17-2—RXVECTOR parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Associated primitive** | **Value** |
| … | … | … |
| RCPI  (see NOTE) | PHY-RXEND.indication | See 17.3.10.7 |

*Instruction to TGme Editor: Update REVme D1.3 P3515L20 as shown below.*

**17.3.10.7 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received PPDU. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the SYNC field of the received PPDU or by other equivalent means that meet the specified accuracy.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Update REVme D1.3 P3623L10 as shown below.*

**19.3.19.7 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received PPDU. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the HT-STF or HT-LTF field of the received PPDU. The received power shall be the average of the power in all active receive chains.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Update REVme D1.3 P3660L20 as shown below.*

**20.3.10 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received PPDU. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the preamble of the received PPDU.

RCPI shall equal the received RF power in dBm with an accuracy of ± 5 dB with 95% confidence interval within the specified dynamic range of the receiver. The relative error between RF power measurements made within a one second interval should be less than ± 1 dB.

*Instruction to TGme Editor: Add the following at REVme D1.3 P3796L35.*

**21.3.18.7 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received PPDU. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the VHT-STF or VHT-LTF field of the received PPDU. The received power shall be the average of the power in all active receive chains.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Add the following at REVme D1.3 P3869L49.*

**22.3.18.8 Received channel power indicator (RCPI) measurement**

See 21.3.18.7 with “TVHT” replacing “VHT”.

*Instruction to TGme Editor: Add the following at REVme D1.3 P3991L23.*

**23.3.18.7 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received PPDU. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the STF or LTF fields of the received PPDU. If the RCPI is measured over the STF field for an S1G 1 MHz PPDU using MCS 10, then the reported RCPI value shall be 3 dB less than the power measured over the STF field. The received power shall be the average of the power in all active receive chains.

NOTE – The STF field in an S1G 1 MHz PPDU using MCS 10 has 3 dB higher power than the Data field, hence the reported RCPI value is subtracting 3 dB from the measured power.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Update REVme D1.3 P4070L63 as shown below.*

**25.3.13 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received frame. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the STF or the CEF field of the received frame.

RCPI shall equal the received RF power in dBm with an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver. The relative error between RF power measurements made within a one second interval should be less than ± 1 dB.

*Instruction to TGme Editor: Add the following at REVme D1.3 P4482L30.*

**27.3.20.7 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel for a received PPDU. This parameter shall be a measurement by the PHY of the received RF power in the channel measured over the HE-STF or HE-LTF field of the received PPDU. If the RCPI is measured for an HE ER SU PPDU, then the reported RCPI value shall be 3 dB less than the power measured over the HE-STF or HE-LTF field. The received power shall be the average of the power in all active receive chains.

NOTE – The HE-STF and HE-LTF fields in an HE ER SU PPDU has 3 dB higher power than the Data field, hence the reported RCPI value is subtracting 3 dB from the measured power.

RCPI shall equal the received RF power in dBm within an accuracy of ± 5 dB (95% confidence interval) within the specified dynamic range of the receiver.

*Instruction to TGme Editor: Update REVme D1.3 P4621L24 as shown below.*

**28.3.9.2 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power (in dBm) in the selected channel as measured at the DMG antenna output, including the antenna gain that is used to receive the PPDU. This parameter shall be measured by the PHY over the preamble of a received PPDU, that is, L-STF or L-CEF, or both, or, if present, EDMG-STF or EDMG-CEF. The measurement shall be done over the same bandwidth as the PSDU of the PPDU. When multiple RF chains are used to receive the PPDU, RCPI is measured per each RF chain.

The RCPI for each RF chain shall be equal to the received RF power at each RF chain in dBm with an accuracy of ± 5 dB with 95% confidence interval within the specified dynamic range of the receiver. The relative error between RCPI measurements made per RF chain within a one second interval should be less than ± 1 dB.

*Instruction to TGme Editor: Update REVme D1.3 P4921L2 as shown below.*

**30.3.15 WUR receive procedure**

RCPI measurement is made during the reception of the WUR-Sync field as described in 19.3.19.7 (Received channel power indicator (RCPI) measurement).

# CID 1372

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1372  15.2.3.6  3418.11 | Is there supposed to be an RCPI in the clause 15 RXVECTOR? If so, add it to the table, and fix the subclause header of 15.2.3.6. If not, delete 15.2.3.6. | Either: 1) Change the subclause header to "RXVECTOR RCPI" and add a row to Table 15-2 for the RCPI parameter; or 2) Delete subclause 15.2.3.6. |

## Proposed Resolution: CID 1372

REVISED

**Note to commenter:**

The instruction to editor below adds RXVECTOR RCPI to Table 15-2. Note that subclause 15.2.3.6 has already been deleted in REVme D1.3.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1372 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-01-000m-lb258-misc-cids.docx)

## Proposed Text Updates: CID 1372

*Instruction to TGme Editor: Update REVme D1.3 P3426L35 as shown below.*

**15.2.3 RXVECTOR parameters**

**Table 15-2 – RXVECTOR parameters**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| … | … |
| RCPI | See 15.4.6.6. |

# CID 1717

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1717  6.4.8.3.2  858.26 | DataFrameRSSI is not used anywhere in the spec, and it can't be generated because no RSSI in dBm is available except for the BeaconRSSI | Delete the row |

## Background

REVme D1.3 P860

|  |
| --- |
|  |

## Discussion

Commenter is correct that DataFrameRSSI is not used anywhere in the draft. I have also looked for “Data frame RSSI” and “Data RSSI” and could not find any.

## Proposed Resolution: CID 1717

ACCEPTED

# CID 1373

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1373  15.2.3.x  3417.30 | The normative text description for the RX\_START\_OF\_FRAME\_OFFSET is missing. Also, TX\_START\_OF\_FRAME\_OFFSET in 15.2.4. | Add a parallel description for the RX\_START\_OF\_FRAME\_OFFSET parameter to 15.2.3, and the TX parameter in 15.2.4. |

## Proposed Resolution: CID 1373

REVISED

**Note to commenter:**

The instruction to editor below moves the descriptive text for RX\_START\_OF\_FRAME\_OFFSET and TX\_START\_OF\_FRAME\_OFFSET out of Table 15-2 and 15-3 as the commenter has suggested.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1373 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-01-000m-lb258-misc-cids.docx)

## Proposed Text Updates: CID 1373

*Instruction to TGme Editor: Update REVme D1.3 P3426L31 as shown below.*

**15.2.3 RXVECTOR parameters**

**Table 15-2 – RXVECTOR parameters**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| … | … |
| RX\_START\_OF\_FRAME\_OFFSET | 0 to 232– 1. |

*Instruction to TGme Editor: Add the following at REVme D1.3 P3426L59.*

RX\_START\_FRAME\_OFFSET is an estimate of the offset (in 10 ns units) from the point in time at which the start of the preamble of the PPDU arrived at the receive antenna connector to the point in time at which this primitive is issued to the MAC.

*Instruction to TGme Editor: Update REVme D1.3 P3427L17 as shown below.*

**15.2.4 TXSTATUS parameters**

**Table 15-3 – TXSTATUS parameters**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| … | … |
| TX\_START\_OF\_FRAME\_OFFSET | 0 to 232– 1. |

*Instruction to TGme Editor: Add the following at REVme D1.3 P3427L32.*

TX\_START\_OF\_FRAME\_OFFSET is an estimate of the offset (in 10 ns units) from the point in time at which the start of the preamble of the PPDU was transmitted at the transmit antenna connector to the point in time at which this primitive is issued to the MAC.

# CID 1370

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1370  17.2.4.x  3475.42 | The normative text description for the TX\_START\_OF\_FRAME\_OFFSET is missing. Also RX\_ANTENNA and RX\_START\_OF\_FRAME\_OFFSET in 17.2.3. Also, SRAMBLER\_RESET in 17.2.2. | Add a parallel description for the TX\_START\_OF\_FRAME\_OFFSET parameter to 17.2.4, and add descriptions for the missing RX parameters in 17.2.3 and the TX parameters in 17.2.2. |

## Proposed Resolution: CID 1370

REVISED

**Note to commenter:**

The instruction to editor below moves the descriptive text for SCRAMBLER\_RSET, RX\_START\_OF\_FRAME\_OFFSET and TX\_START\_OF\_FRAME\_OFFSET out of Table 17-1, 17-2 and 17-3 as the commenter has suggested.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1370 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-01-000m-lb258-misc-cids.docx)

## Proposed Text Updates: CID 1370

*Instruction to TGme Editor: Update REVme D1.3 P3479L21 as shown below.*

**17.2.2 TXVECTOR parameters**

**Table 17-2 – RXVECTOR parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Associated primitive** | **Value** |
| … | … | … |
| SCRAMBLER\_RESET | PHY-TXSTART.request  (TXVECTOR) | Enumerated Type:  RESET\_SCRAMBLER: The scrambler is reset  NO\_SCRAMBLER\_RESET: The scrambler is not reset. |

*Instruction to TGme Editor: Add the following at REVme D1.3 P3480L18.*

SCRAMBLER\_RESET indicates whether the scrambler is reset before the start of the PPDU.

*Instruction to TGme Editor: Update REVme D1.3 P3481L6 as shown below.*

**17.2.3 RXVECTOR parameters**

**Table 17-2 – RXVECTOR parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Associated primitive** | **Value** |
| … | … | … |
| RX\_START\_OF\_FRAME\_OFFSET | PHY-RXSTART.indication  (RXVECTOR) | 0 to 232– 1. |

*Instruction to TGme Editor: Add the following at REVme D1.3 P3481L46.*

RX\_START\_FRAME\_OFFSET is an estimate of the offset (in 10 ns units) from the point in time at which the start of the preamble of the PPDU arrived at the receive antenna connector to the point in time at which this primitive is issued to the MAC.

*Instruction to TGme Editor: Update REVme D1.3 P3482L34 as shown below.*

**15.2.4 TXSTATUS parameters**

**Table 17-3 – TXSTATUS parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Associated primitive** | **Value** |
| … | … | … |
| TX\_START\_OF\_FRAME\_OFFSET | PHY-TXSTART.confirm | 0 to 232– 1. |

*Instruction to TGme Editor: Add the following at REVme D1.3 P3482L51.*

TX\_START\_OF\_FRAME\_OFFSET is an estimate of the offset (in 10 ns units) from the point in time at which the start of the preamble of the PPDU was transmitted at the transmit antenna connector to the point in time at which this primitive is issued to the MAC.

# CID 2378

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2378  27.2.4  4311.44 | There are unmatched puncturing patterns defind in Table 27-3 and subclause 26.11.7.  At 4249L31,  The CH\_BANDWIDTH parameter value shall be set to CBW160 if there is at least one bit set to 0 in the INACTIVE\_SUBCHANNELS bitmap that corresponds to any 20 MHz subchannel of the secondary 80 MHz in addition to the primary 20MHz is not punctured.  However, at P4313L30, there are different puncuturing patterns defined such as  "the secondary 20 MHz channel or zero, one or both bits corresponding to the secondary 40 MHz channel set to 1. Zero to two bits corresponding to 20 MHz subchannels in the secondary 80 MHz channel set to 1. All other bits set to 0. Not all bits set to 0. If two bits corresponding to 20 MHz subchannels in the secondary 80 MHz channel are set to 1 these correspond to the lower two or higher two 20 MHz subchannels. No more than two bits corresponding to adjacent 20 MHz subchannels set to 1." | INACTIVE SUBCHANNEL should be clarified based on the puncturing patterns defined in HE MU PPDU. |

## Background

REVme D1.0 P4313:

|  |
| --- |
| … |

REVme D1.0 P4349

|  |
| --- |
|  |

## Proposed Resolution: CID 2378

REJECTED

The line for CBW160 in Table 27-4 lists the valid puncturing patterns when transmitting non-HT duplicate PPDUs.

REVme D1.0 P4349L30 is saying that when an HE NDPA carried in a non-HT duplicate PPDU has puncturing in the secondary 80 MHz, then the CH\_BANDWIDTH parameter shall be set to CBW160. This line does not say what puncturing patterns are valid or invalid, and hence is not in conflict with Table 27-4.

# CID 2373, 1053

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2373  27.3.10  4359.33 | For the conditions of "HE modulated fields in an HE TB PPDU" and "otherwise" in Equation (27-5), notation of power normalization factor seems confusing by using the cardinality of the set of modulated subcarriers within Kr especially for HE-LTF field. At P4359L58, in Equations, left and right sides contain the cardinality. | With Equation (36-11) in 11be D1.3 and the description at P542L44, introduction of large Gamma is a good way to go.  For example, large Gamma equals the number of modulated subcarriers within Kr for for the HE-STF and Data fields. For the HE-LTF field, large Gamma\_r is defined as below to ensure per tone power are the same for both HE-LTF and Data fields, regardless of 1x, 2x, or 4x HE-LTF. |
| 1053  27.3.11.10  4420.54 | For HE-LTF, |Kr| is defined by a formula at P4359L57, and oftentimes is not the same as the actual cardinality of the HELTF subcarriers in the r-th RU, yet here Kr^HELTF is described as a cardinality | a) Delete lines 53-55 since the language at L51-52 suffices, and b) use another expression than |KrHELTF| since it is not actually a cardinality. Instead use somehting else (11beD1.3P524L53 uses uppercase Gamma). |

## Proposed Resolution: CIDs 2373, 1053

REVISED

**Note to commenter:**

The instruction to editor below replacies |K\_r^Field| to \Gamma\_r^Field as suggested by the commenter.

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 2373 and 1053 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-01-000m-lb258-misc-cids.docx)

## Proposed Text Updates: CIDs 2373, 1053

*Instruction to TGme Editor: Update REVme D1.3 P4365L44 as shown below.*

**27.3.10 Mathematical description of signals**

…

 is the power normalization factor and is defined in Equation (27-5).

 (27-5)

 is the cardinality of the set of subcarriers *Kr*.

 equals the number of modulated subcarriers within the HE-STF and Data fields. For the HE-LTF field, is defined as below to ensure per tone power are the same for both HE-LTF and Data fields, regardless of  
1×, 2×, or 4× HE-LTF.



*Instruction to TGme Editor: Update Equation (27-39) at REVme D1.3 P4410L24 as shown below.*

**27.3.11.9 HE-STF field**

…

 (27-39)

*Instruction to TGme Editor: Update Equation (27-58) at REVme D1.3 P4425L57 as shown below.*

**27.3.11.10 HE-LTF field**

…

 (27-58)

*Instruction to TGme Editor: Update Equation (27-59) at REVme D1.3 P4426L7 as shown below.*

 (27-59)

*Instruction to TGme Editor: Update REVme D1.3 P4426L51 as shown below.*

 and  are defined after Equation (27-5)

# CID 1050

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1050  27.3.11.8.5  4397.30 | 17.3.5.9 applies to 48 data tones and 4 pilots, but here we have 52 data tones | Find a better xref - e.g. HT pilot insertion for 20MHz |

## Background

REVme D1.3 P3502

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REVme D1.0 P4397

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## Proposed Resolution: CID 1050

REJECTED

The commenter is correct that HE-SIG-B has 52 data subcarriers, while OFDM (Clause 17) has 48 data subcarriers.

However, 17.3.5.9 only talks about the pilot subcarrier location, and does not have any relevance to the number of data subcarriers. While it would also be OK to reference 19.3.11.10 (the pilot subcarriers subclause for HT), note that 19.3.11.10 has other ‘baggage’ to deal with, such as the multiple spatial streams. Hence, if we were to refer to 19.3.11.10, then we have to add additional text clarifying that HE-SIG-B needs to use only the one spatial stream portion of 19.3.11.10.

Since 17.3.5.9 has the same pilot subcarrier location as 19.3.11.10, it seems simpler to keep the current language.

# CID 1051

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1051  27.3.11.8.5  4397.29 | HESIGB can be DCM modulated but no description of this is provided here | Insert suitable cross references for DCM modulation (and a suitable phrase) e.g. "If DCM modulation for HESIGB is employed, see section 27.3.12.9 where N\_SD is defined in section 27.6" |

## Proposed Resolution: CID 1051

REVISED

**Note to commenter:**

The instruction to editor below adds description for DCM modulation for HE-SIG-B. Note that 27.3.12.15 is referenced instead of 27.3.12.9 because 27.3.12.9 deals only with constellation mapping, while 27.3.12.15 includes other operations in the TX modulation such as BCC interleaver.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1051 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0990-05-000m-lb258-misc-cids.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0990-04-000m-lb258-misc-cids.docx)

## Proposed Text Updates: CID 1051

*Instruction to TGme Editor: Update REVme D1.3 P4365L44 as shown below.*

**27.3.11.8.5 Encoding and modulation**

…

The coded bits are interleaved as in 27.3.12.8 (BCC interleavers). The interleaved bits are mapped to constellation points from the HE-SIG-B-MCS field in the HE-SIG-A field following the steps described in 17.3.5.8 (Subcarrier modulation mapping) and 27.3.12.15 (Dual carrier modulation) if the HE-SIG-B DCM field in the HE-SIG-A field is 0 and 1, respectively. *NSD* is 52 and 26 if the HE-SIG-B DCM field in the HE-SIG-A field is 0 and 1, respectively. Pilots are then inserted as described in 17.3.5.9 (Pilot subcarriers).

# CID 1048

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1048  27.3.12.9  4435.7 | Especially for an RU of 2x996, what is "lower half". It sounds like the lower 996 tones, but that is wrong. | Change to "lower half of the data subcarriers generated by the group" and "For the upper half of the subcarriers generated by the group". Ditto, for 16QAM at P4435L19-29 |

## Proposed Resolution: CID 1048

REVISED

**Note to commenter:**

The instruction to editor below implements the changes suggested by the commenter with some editorial updates.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1048 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 1048

*Instruction to TGme Editor: Update REVme D1.3 P4441L7 as shown below.*

**27.3.12.9 Constellation mapping**

…

For BPSK modulation with DCM, the input stream is broken into groups of *NCBPS*/*N80seg,ru* or *NCBPS,u*/*N80seg,ru* bits (). Each bit *Bk* is BPSK modulated to a sample . This generates the samples for the lower half of the data subcarriers generated by the group. For the upper half of the data subcarriers generated by the group, the samples are generated as . The *NSD* here refers to the *NSD* with DCM = 1, which is half the value of *NSD* with DCM = 0.

*Instruction to TGme Editor: Update REVme D1.3 P4441L28 as shown below.*

For 16-QAM modulation with DCM, the input stream is broken into groups of *NCBPS*/*N80seg,ru* or *NCBPS,u*/*N80seg,ru* bits (). A group of 4 bits (*B4k, B4k+1, B4k+2, B4k+3*) is 16-QAM modulated to a sample  as described in 17.3.5.8 (Subcarrier modulation mapping). This is the sample on subcarrier *k* in the lower half of the data subcarriers generated by the group. In the upper half of the data subcarriers generated by the group, the sample  on subcarrier *k + NSD*/*N80seg,ru* is obtained by 16-QAM modulating a permutation of the bits (*B4k, B4k+1, B4k+2, B4k+3*). Specifically,  is obtained by applying the 16-QAM modulation procedure in 17.3.5.8 (Subcarrier modulation mapping) to the bit group (*B4k+1*, *B4k*, *B4k+3*, *B4k+2*). The *NSD* here refers to the *NSD* with DCM = 1, which is half the value of *NSD* with DCM = 0.

# CID 1049

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1049  27.3.12.9  4435.16 | For an RU of 2x996, it is wrong to say lower half of the data subcarriers in the RU". | Change to "lower half of the data subcarriers generated by the group" and "For the upper half of the subcarriers generated by the group". |

## Background

The proposed change by the commenter in redline is (REVme D1.3 P4441L16):

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| --- |
| For QPSK modulation with DCM, the input stream is broken into groups of *NCBPS*/*N80seg,ru* or *NCBPS,u*/*N80seg,ru* bits . Each pair of bits  is QPSK modulated to a symbol . This generates the constellation points for the lower half the data subcarriers generated by the group. For the upper half of the data subcarriers generated by the group, , where *conj*() represents the complex conjugate operation. The *NSD* here refers to the *NSD* with DCM = 1, which is half the value of *NSD* with DCM = 0. |

## Proposed Resolution: CID 1049

ACCEPTED

**Note to TGme Editor:**

Redline version of the change proposed by the commenter, if needed, can be found in the Background section for CID 1049 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

# CID 1297

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1297  27.3.16.2  4455.5 | The quantization bits b\_\phi for the angle \phi is missing | change the text to "with b\_\phi and b\_\psi are the number of quantization bits of the angles \phi(k,u) and \psi(k,u) respectively and are defined by the Codebook Information field of the HE MIMO Control field ... " |

## Background

The proposed change by the commenter in redline is (REVme D1.3 P4461L8):

|  |
| --- |
| The beamforming feedback matrix, *Vk,u*, found by the beamformee *u* for subcarrier *k* in RU *r* shall be compressed in the form of angles using the method described in 19.3.12.3.6 (Compressed beamforming feedback matrix). The angles, *ϕ(k,u)* and *ψ(k,u)*, are quantized according to Table 9-90 (Quantization of angles) with *b*ψ and *bϕ* are the number of quantization bits of the angles *ϕ(k,u)* and *ψ(k,u)* respectively and are defined by the Codebook Information field of the HE MIMO Control field (see 9.4.1.64 (HE MIMO Control field(11ax))). The compressed beamforming feedback matrix as defined in 19.3.12.3.6 (Compressed beamforming feedback matrix) is the only Clause 27 (High-efficiency (HE) PHY specification(11ax)) beamforming feedback matrix defined. |

REVme D1.3 P1103

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## Proposed Resolution: CID 1297

REVISED

**Note to commenter:**

Agree with the commenter that b\_phi is missing. Note that Table 9-90 already specifies that b\_psi and b\_phi are “the number of bits used to quantize” the angles, hence it seems redundant to add that information here again.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1297 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-10-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 1297

*Instruction to TGme Editor: Update REVme D1.3 P4461L8 as shown below.*

**27.3.16.2 Beamforming feedback matrix *V***

…

The beamforming feedback matrix, *Vk,u*, found by the beamformee *u* for subcarrier *k* in RU *r* shall be compressed in the form of angles using the method described in 19.3.12.3.6 (Compressed beamforming feedback matrix). The angles, *ϕ(k,u)* and *ψ(k,u)*, are quantized according to Table 9-90 (Quantization of angles) with *bϕ* and *b*ψ defined by the Codebook Information field of the HE MIMO Control field (see 9.4.1.64 (HE MIMO Control field(11ax))). The compressed beamforming feedback matrix as defined in 19.3.12.3.6 (Compressed beamforming feedback matrix) is the only Clause 27 beamforming feedback matrix defined.

# CID 1064

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1064  27.3.22  4484.26 | Fig 21-63 is incomplete in terms of non-HT detection. For instance, if the LENGTH is so small that the PPDU cannot be a HE PPDU, then the PPDU must be a non-HT PPDU. Since the shortest HE PPDU following LSIG is 4us RLSIG+ 8us HESIGA + 4us HESTF + 4us HELTF + 4us HE Data = 6\*4us, then LSIG LENGTH <= 12B [(16+12\*8+6)/24 = 4.9167] cannot be HE. | In Fig 27-63, change "LENGTH mod 3 = 0" to "LENGTH <= 12 or LENGTH mod 3 = 0" |

## Background

REVme D1.3 4490

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## Proposed Resolution: CID 1064

REJECTED

REVme D1.3 P4490L1 states that Figure 27-63 is a “\*typical\* state machine implementation”. The actual receive state machine is implementation specific. For example, if an implementation has sufficiently low RL-SIG false detection performance, then a too-small-length 11a PPDU will not be mistaken to be an HE PPDU.

If we now add additional requirement that receivers has to check for the minimum length in L-SIG Length field, then for example, some future 802.11 revision could exploit that to define very short PPDUs which need to be ‘spoofed’ to be 11a for HE STAs. However, implementations which followed the current typical state machine in Figure 27-63 will not be spoofed to think such PPDUs to be 11a. Hence, it is better not to change Figure 27-63.

# CID 1186

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1186  B.4.3  4931.6 | HE STA operating in 5 and/or 6 GHz band should be either of CFHE20 or CFHE80, so I think O.8 in the Status for CFHE20 is not appropriate. Also, :M or :O is missing in the Status for CFHE80. | Change the Status description for CFHE20 to "CFIndepSTA AND (CFHE5G OR CFHE6G):O".  Change the Status description for CFHE80 to "(CFHE5G OR CFHE6G) AND (NOT CFHE20):M". |

## Background

The change proposed by the commenter is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | IUT configuration | References | Status | Support |
| … | … | … | … | … |
| \*CFHE20 | HE operation as a 20 MHz-only non-AP HE STA | Clause 27 | CFIndepSTA AND (CFHE5G or CFHE6G):O | Yes o No o |
| \*CFHE80 | HE operation with capability of 80 MHz or wider channel width | Clause 27 | (CFHE5G OR CFHE6G) AND  (NOT CFHE20):M | Yes o No o |

## Proposed Resolution: CID 1186

REVISED

**Note to commenter:**

A STA which is not capable of 40 MHz operation in the 2.4 GHz is also a 20 MHz-only non-AP STA. Hence, changing the CFHE20 to be conditioned on CFHE5G and CFHE6G only is not appropriate.

As for CFHE80, the commenter’s suggestion to include “NOT CFHE20” as a condition to make CFHE80 mandatory is a good idea for the non-AP STA side. However, an AP is required to support CFHE80 when in 5/6 GHz as CFHE20 is not applicable to APs.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1186 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 1186

*Instruction to TGme Editor: Update REVme D1.3 P4937L6 as shown below.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * IUT configuration | | | | |
| Item | IUT configuration | References | Status | Support |
| … | … | … | … | … |
| \*CFHE20 | HE operation as a 20 MHz-only non-AP HE STA | Clause 27 | CFIndepSTA AND CFHE:O | Yes o No o |
| \*CFHE80 | HE operation with capability of 80 MHz or wider channel width | Clause 27 | CFAP AND (CFHE5G OR CFHE6G):M  CFIndepSTA AND (CFHE5G OR CFHE6G) AND (NOT CFHE20):M | Yes o No o |

# CID 1768

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1768  N/A  N/A | There are 6 references to "device under test" (uppercased in 27.3.20.1) but it is not clear what device this is, or exactly what kind of test this is (conformance, compliance, regulatory, certification, ...) | Change  "shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized device under test input ports. Each output port of the transmitting STA shall be connected through a cable to one input port of the device under test."  to  "shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized receiving STA antenna (input) ports. Each output port of the transmitting STA shall be connected through a cable to one input port of the receiving STA."  at 3613.1,  "shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized device under test input ports. Except where otherwise noted, each output port of the transmitting STA shall be connected through a cable to one input port of the device under test."  to  "shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized device receiving STA antenna (input) ports. Except where otherwise noted, each output port of the transmitting STA shall be connected through a cable to one input port of the receiving STA."  in 21.3.18,  "shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized Device Under Test input ports. Each output port of the transmitting STA shall be connected through a cable to one input port of the Device Under Test."  to  "shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized receiving STA antenna (input) ports. Each output port of the transmitting STA shall be connected through a cable to one input port of the receiving STA."  in 27.3.20.1 |

## Proposed Resolution: CID 1768

REVISED

**Note to commenter:**

The underlying text has changed between REVme D1.0 and D1.3. Instruction to editor below implements the suggestion by the commenter on top of D1.3, with an editorial update (“device receiving STA” to “receiving STA”).

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1768 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 1768

*Instruction to TGme Editor: Update REVme D1.3 P3620L2 as shown below.*

**19.3.19 HT PHY receiver specification**

**19.3.19.1 General**

For tests in this subclause, the input levels are measured at the antenna connector and are referenced as the average power per receive antenna. For tests in 19.3.19.2 (Receiver minimum input level sensitivity), 19.3.19.3 (Adjacent channel rejection), and 19.3.19.4 (Nonadjacent channel rejection), the number of spatial streams under test shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized receiving STA antenna (input) ports. Except where otherwise noted, each output port of the transmitting STA shall be connected through a cable to one input port of the receiving STA.

*Instruction to TGme Editor: Update REVme D1.3 P3792L8 as shown below.*

**21.3.18 VHT receiver specification**

For tests in this subclause, the input levels are measured at the antenna connector and are referenced as the average power per receive antenna. For tests in 21.3.18.1 (Receiver minimum input level sensitivity), 21.3.18.2 (Adjacent channel rejection), and 21.3.18.3 (Nonadjacent channel rejection), the number of spatial streams under test shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized receiving STA antenna (input) ports. Except where otherwise noted, each output port of the transmitting STA shall be connected through a cable to one input port of the receiving STA.

*Instruction to TGme Editor: Update REVme D1.3 P4476L13 as shown below.*

**27.3.20 Receiver specification**

**27.3.20.1 General**

For receiver minimum input sensitivity, adjacent channel rejection, nonadjacent channel rejection, receiver maximum input level, and CCA sensitivity requirements described in this subclause, the input levels are measured at the transmit antenna connector and are referenced as the average power per receive antenna. For tests in 27.3.20.2 (Receiver minimum input level sensitivity), 27.3.20.3 (Adjacent channel rejection), and 27.3.20.4 (Nonadjacent channel rejection), the number of spatial streams under test shall be equal to the number of utilized transmitting STA antenna (output) ports and also equal to the number of utilized receiving STA antenna (input) ports. Except where otherwise noted, each output port of the transmitting STA shall be connected through a cable to one input port of the receiving STA.

# CID 1647

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1647  N/A  N/A | The endianness of PHY header fields is not always specified. E.g. for HT there's "All numeric fields are transmitted in unsigned format, LSB first." for HT-MF but apparently nothing for HT-GF; for CDMG there's "All numeric fields are transmitted in unsigned format, LSB first." but this is in 24.3.6 Common preamble so doesn't extend to the PHY header fields | Make a statement in all PHYs that header fields are transmitted LSB first |

## Proposed Resolution: CID 1647

REVISED

**Note to Commenter:**

Unlike MAC which has a common MAC clause (Clause 9), there is no common PHY clause. Hence, we need to review one by one.

In Clause 15, SIGNAL, SERVICE and LENGTH fields clearly specifies that LSB is transmitted first. The CRC field has a clear example stating that “leftmost bit” is transmitted first. Hence, there is no need for further change.

Situation is similar for Clause 16.

Clause 17 has two numeric fields. Rate field has a clear definition for each bit. Length field already states that LSB is transmitted first.

In Clause 19 (HT), HT-MF has a statement that numeric field is transmitted LSB first as the commenter has said. As for HT-GF, the HT-SIG format is the same as that for HT-MF. And since HT-MF already clarified that numeric fields have LSB transmitted first, there is no need to repeat the statement for HT-GF.

In Clause 20 (DMG, D1.3 P3656L15), Clause 21 (VHT, P3743L55), 23 (S1G, P3916L56), 24 (CDMG, P4024L47), 25 (CMMG, P4067L59), 27 (HE, P4374L37, P4390L9) already states that numeric fields are transmitted LSB first.

Clause 30 (WUR) L-SIG has two numeric fields. Rate field refers back to Clause 17 (see above), and LENGTH field is specified to be transmitted LSB first.

The only remaining PHY clause is 28 (EDMG) for the which the preamble definition is written with many tables, and it is not clear if there is a need to explicitly specify that LSB is transmitted first. If needed, commenter should submit a comment with more specific changes to be made at specific locations.

**Instruction to Editor:**

Add the following at D1.3 P4028L35 and P4031L42:

“All numeric fields are transmitted in unsigned format, LSB first.”

# CID 1927

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1927  N/A  N/A | The SCRAMBLER\_INITIAL\_VALUE is not the initial value of the scrambler, it's the value in the SERVICE field after scrambling | Change "SCRAMBLER\_INITIAL\_VALUE" to "SCRAMBLER\_SCRAMBLED\_SERVICE\_VALUE" throughout (I can provide locations) |

## Proposed Resolution: CID 1927

REJECTED

SCRAMBLER\_INITIAL\_VALUE is the initial 7 bits of the scrambler sequence. Hence, the name is appropriate.

Furthermore, the name SCRAMBER\_INITIAL\_VALUE has been used over multiple PHY generations and changing the name now would cause confusion to readers, and does not seem worth it.

# CID 2017

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2017  N/A  N/A | In Clauses 16, 18, 23 there is a reference to a TXSTATUS and/or to TIME\_OF\_DEPARTURE but there is no TXSTATUS parameters subclause (unlike Clauses 15, 17, 19, 20, 21, 24) | Add a TXSTATUS parameters subclause to each PHY clause where it is missing (though arguably Table 16-5--Parameter vectors and Table 18-2--TXSTATUS parameters does it for those two clauses) |

## Background

REVme D1.3 P3464

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REVme D1.3 P3529

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## Proposed Resolution: CID 2017

REVISED

**Note to commenter:**

As the commenter has noted, Clause 16 and 18 already have the TXSTATUS parameter TIME\_OF\_DEPARTURE defined in Table 16-5 and 18-2, respectively. Furthermore, clauses 16 and 18 do not have separate subclause for TXSTATUS, but deliberately uses the Table 16-5 and 18-2 to specify them. Hence, there is no more work needed for clauses 16 and 18.

The instruction to editor below adds the TXSTATUS parameter TIME\_OF\_DEPARTURE to clause 23.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2017 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 2017

*Instruction to TGme Editor: Add the following new subclause at REVme D1.3 P3890L52.*

**23.2.4 TXSTATUS parameters**

The parameters listed in Table 23-X (TXSTATUS parameters) are defined as part of the TXSTATUS parameter list in the PHY-TXSTART.confirm service primitive.

**Table 23-X – TXSTAUTS parameters**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| TIME\_OF\_DEPARTURE | 0 to 232– 1. The locally measured time when the first PPDU energy is sent by the transmitting port, in units equal to 1/TIME\_OF\_DEPARTURE\_ClockRate. This parameter is present only if TIME\_OF\_DEPARTURE\_REQUESTED is true in the  corresponding request. |

# CID 2044

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2044  N/A  N/A | A beamformER needs to support at least 2 sounding dimensions (i.e. Nr must be at least 2 for operation as a BFer). State this for Number of Sounding Dimensions in the subclause VHT Capabilities Information field, the table Subfields of the S1G Capabilities Information field, the table Subfields of the CMMG Capabilities Info field format, C.3 dot11VHTNumberSoundingDimensions OBJECT-TYPE SYNTAX Unsigned32 (1..8) (ditto TVHT, S1G) and also for Beamformee STS Capability in the subclauses VHT Capabilities Information field and S1G Capabilities Information field | In all the referenced locations specify that Nr must be at least 2 |

## Proposed Resolution: CID 2044

REVISED

**Note to commenter:**

Normative statement cannot be put in Clause 9. Hence, the requirement that Nr needs to be at least two is put in Clause 10 instead.

Note that REVme D1.3 P2360L61 (10.36.5) states that “For an S1G STA, the S1G sounding protocol is specified in 10.36.5 (VHT sounding protocol) with “VHT” replaced by “S1G”, except in this sentence”. Hence, there is no need to add an explicit normative statement for S1G – the normative statement for VHT we are putting in 10.36.5 covers S1G as well.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2044 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 2044

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P2353L61.*

**10.34.5 Explicit feedback beamforming for CMMG STAs**

…

A CMMG beamformer shall set the Number of Sounding Dimensions subfield in the CMMG Capabilities element to a value greater than or equal to 1 (2 STS).

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P2360L64.*

**10.36.5 VHT sounding protocol**

**10.36.5.1 General**

…

A VHT beamformer shall set the Number Of Sounding Dimensions subfield in the VHT Capabilities element to a value greater than or equal to 1 (2 STS). A VHT beamformee shall set the Beamformee STS Capability subfield in the VHT Capabilities element to a value greater than or equal to 1 (2 STS).

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P5644L17.*

**C.3 MIB detail**

…

dot11VHTNumberSoundingDimensions OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute indicates the number of antennas used by the beamformer when sending beamformed transmissions."

::= { dot11VHTTransmitBeamformingConfigEntry 5 }

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P5650L29.*

dot11TVHTNumberSoundingDimensions OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute indicates the number of antennas used by the beamformer when sending beamformed transmissions."

::= { dot11TVHTTransmitBeamformingConfigEntry 5 }

dot11VHTBeamformeeNTxSupport OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"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."

::= { dot11VHTTransmitBeamformingConfigEntry 6 }

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P5677L34.*

dot11S1GNumberSoundingDimensions OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute indicates the number of antennas used by the beamformer when sending beamformed transmissions."

::= { dot11S1GTransmitBeamformingConfigEntry 5 }

dot11S1GBeamformeeNTxSupport OBJECT-TYPE

SYNTAX Unsigned32 (2..8)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"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 S1G NDP, the maximum value for NSTS, total that can be sent to the STA in a S1G 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."

::= { dot11S1GTransmitBeamformingConfigEntry 6 }

# CID 2115

|  |  |  |
| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2115  N/A  N/A | The description of the PHYCONFIG\_VECTOR is missing for DSSS, HR/DSSS, ERP, DMG and TVHT | Add a description for those PHYs |

## Proposed Resolution: CID 2115

REVISED

**Note to commenter:**

DMG PHY has PHYCONFIG\_VECTOR description in 20.2.3 (PHYCONFIG\_VECTOR parameters).

Instruction to editor below adds description of the PHYCONFIG\_VECTOR for DSSS, HR/DSSS, ERP and TVHT PHYs.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2115 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 2115

*Instruction to TGme Editor: Add the following new subclause at REVme D1.3 P3427L32.*

**15.2.5 PHYCONFIG\_VECTOR parameters**

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a DSSS PHY contains an OPERATING\_CHANNEL parameter, which identifies the operating channel. The PHY shall set dot11CurrentChannel to the value of this parameter.

*Instruction to TGme Editor: Add the following paragrah at REVme D1.3 P3465L18.*

**16.3.5 Vector description**

…

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an HR/DSSS PHY contains an OPERATING\_CHANNEL parameter, which identifies the operating channel. The PHY shall set dot11CurrentChannel to the value of this parameter.

*Instruction to TGme Editor: Add the following paragrah at REVme D1.3 P3530L21.*

**18.2 PHY-specific service parameter list**

…

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for an ERP PHY contains an OPERATING\_CHANNEL parameter, which identifies the operating channel. The PHY shall set dot11CurrentChannel to the value of this parameter.

*Instruction to TGme Editor: Add the following new subclause at REVme D1.3 P3839L36.*

**22.2.5 PHYCONFIG\_VECTOR parameters**

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a TVHT PHY contains a BASIC\_CHANNEL\_UNIT parameter, which identifies the basic channel unit with possible values being 6 MHz, 7 MHz and 8 MHz.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a TVHT 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 TVHT PHY contains a CHANNEL\_WIDTH parameter, which identifies the operating channel width and takes one of the values TVHT\_W, TVHT\_2W, TVHT\_W+W, TVHT\_4W and TVHT\_2W+2W. The PHY shall set dot11CurrentTVHTChannelWidth to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a TVHT PHY contains a CENTER\_FREQUENCY\_SEGMENT\_0 parameter. The PHY shall set dot11CurrentTVHTChannelCenterFrequencyIndex0 to the value of this parameter.

The PHYCONFIG\_VECTOR carried in a PHY-CONFIG.request primitive for a TVHT PHY contains a CENTER\_FREQUENCY\_SEGMENT\_1 parameter. The PHY shall set dot11CurrentTVHTChannelCenterFrequencyIndex1 to the value of this parameter.

# CID 2123

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2123  N/A  N/A | There are 8 instances of "The static <something> PHY [characteristics], provided through the PLME-CHARACTERISTICS" --- what does the "static" mean?  Also the following sentence is not consistent: "The definitions of these characteristics are in 6.5.4"  v.  "The definitions for these characteristics are given in 6.5"  v.  “The ERP characteristics in Table 18-6 (ERP characteristics) shall be used for the ERP for the purposes of MAC timing calculations"  v.  "The definitions for these characteristics are given in 6.5.4" | Clarify that "static" means "constant for a given PHY instantiation", and make the following sentence in each case consistent |

## Proposed Resolution: CID 2123

REVISED

**Note to commenter:**

The clarification suggested by the commenter on the meaning of ‘static’ introduces yet another undefined terminology – “PHY instantiation”. There are no occurrences of “PHY instantiation” in REVme D1.3, so what does “PHY instantiation” mean? Rather than to try to define “PHY instiation” to define “static”, proposal is to simply delete “static” from “static XYZ PHY characteristics”. This is because there are no “dynamic” PHY characteristics, so there is no ambiguity being introduced by deleting the word “static”.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2123 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 2123

*Instruction to TGme Editor: Update REVme D1.3 P3438L33 as shown below.*

**15.4.3 DSSS PHY**

The DSSS PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 15-5 (DSSS PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P3464L4 as shown below.*

**16.3.3 HR/DSSS PHY**

The HR/DSSS PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 16-4 (HR/DSSS PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P3524L4 as shown below.*

**17.4.4 OFDM PHY**

The OFDM PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 17-21 (OFDM PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P3538L4 as shown below.*

**18.5.4 ERP**

The ERP PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 18-5 (ERP characteristics). The definitions for these characteristics are given in 6.5.4 (PLMECHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P3636L4 as shown below.*

**19.4.4 HT PHY**

The HT PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 19-25 (HT PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P3695L34 as shown below.*

**20.11.4 DMG PHY**

The DMG PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 20-30 (DMG PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm)

*Instruction to TGme Editor: Update REVme D1.3 P3808L56 as shown below.*

**21.4.4 VHT PHY**

The VHT PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 19-25 (HT PHY characteristics) unless otherwise listed in Table 21-28 (VHT PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLMECHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P3870L23 as shown below.*

**22.4.4 TVHT PHY**

The TVHT PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 19-25 (HT PHY characteristics) unless otherwise listed in Table 22-25 (TVHT PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLMECHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P4009L16 as shown below.*

**23.4.4 PHY characteristics**

The S1G PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 23-40 (S1G PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P4043L54 as shown below.*

**24.10.4 PHY characteristics**

The CDMG PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 24-14 (CDMG PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P4123L4 as shown below.*

**25.14.4 PHY characteristics**

The CMMG PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 25-37 (CMMG PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P4504L4 as shown below.*

**27.4.4 HE PHY**

The HE PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 19-25 (HT PHY characteristics) unless otherwise listed in Table 27-54 (HE PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

*Instruction to TGme Editor: Update REVme D1.3 P4856L12 as shown below.*

**28.12.4 EDMG PHY characteristics**

The EDMG PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, are shown in Table 20-30 unless otherwise listed in Table 28-119 (EDMG PHY characteristics). The definitions for these characteristics are given in 6.5.4 (PLME-CHARACTERISTICS.confirm).

# CID 2154

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 2154  N/A  N/A | Various slot issues:  "A STA in which dot11ShortSlotTimeOptionImplemented is true shall set the MAC variable aSlotTime to the short slot value upon transmission or reception of Beacon, Probe Response, Association Response, and Reassociation Response frames from the BSS that the STA has joined or started and that have the Short Slot Time subfield equal to 1." is garbled because transmission (i.e. by an AP) is not "from the BSS"  "A STA in which dot11ShortSlotTimeOptionImplemented is true shall set the MAC variable aSlotTime to the short slot value upon transmission or reception of Beacon, Probe Response, Association Response, and Reassociation Response frames" -- this also needs to depend on dot11ShortSlotTimeOptionActivated  "A STA sets the Short Slot Time subfield to 1 in transmitted Association Request, and Reassociation Request frames when dot11ShortSlotTimeOptionImplemented and dot11ShortSlotTimeOptionActivated are true." -- this doesn't work because dot11ShortSlotTimeOptionActivated is "written by an external management entity" so can't be changed by the AP when a non-short slot STA associates  "If a STA that does not support short slot time associates with an AP that supports Clause 18 (Extended Rate PHY (ERP) specification) operation, and the AP is using short slot time, the AP shall use long slot time beginning at the first Beacon frame subsequent to the association of the long slot time STA." -- also need to update the Short Slot Time field of the Capabilties in Beacons and Probe Responses. Also refer to DENIED\_NO\_SHORT\_SLOT\_TIME\_SUPPORT as an alternative AP response  "The long slot time indicated in Table 18-5 (ERP characteristics) shall be used unless the BSS consists only of STAs that support short slot time. STAs indicate support for short slot time by setting the Short Slot Time subfield to 1 when transmitting Association Request and Reassociation Request frames. If the BSS consists of only ERP STAs that support short slot time, an optional short slot time may be used. APs indicate usage of the short slot time indicated in Table 18-5 (ERP characteristics) by setting the Short Slot Time subfield to 1 in all Beacon, Probe Response, Association Response, and Reassociation Response frame transmissions as described in 9.4.1.4 (Capability Information field)." -- this should be in MAC clauses, not ERP | As it says in the comment |

## Background

REVme D1.3 P1075

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| … |

REVme D1.3 P2658

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| … |

## Proposed Resolution: CID 2154

REVISED

**Note to commenter:**

Instruction to editor below addresses the comment raised by the commenter.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2154 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-06-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 2154

*Instruction to TGme Editor: Update REVme D1.3 P1075L26 as shown below.*

**9.4.1.4 Capability Information field**

…

A non-AP STA sets the Short Slot Time subfield to 1 in transmitted Association Request, and Reassociation Request frames when dot11ShortSlotTimeOptionImplemented and dot11ShortSlotTimeOptionActivated are true. Otherwise, the STA sets the Short Slot Time subfield to 0.

*Instruction to TGme Editor: Update REVme D1.3 P2125L62 as shown below.*

**10.3.2.16 Operation of aSlotTime**

An AP with the MAC variable aSlotTime equal to the long slot time shall set the Short Slot Time subfield in transmitted Beacon, Probe Response, Association Response and Reassociation Response frame to 0. An AP with the MAC variable aSlotTime equal to the short slot time shall set the Short Slot Time subfield in transmitted Beacon, Probe Response, Association Response and Reassociation Response frame to 1.

A non-AP STA in which dot11ShortSlotTimeOptionImplemented and dot11ShortSlotTimeOptionActivated are true shall set the MAC variable aSlotTime to the short slot time upon reception of Beacon, Probe Response, Association Response, and Reassociation Response frames with the Short Slot Time subfield value equal to 1 from the AP that the STA is associated or associating to. A non-AP STA shall set the MAC variable aSlotTime to the long slot time upon reception of Beacon, Probe Response, Association Response, and Reassociation Response frames with the Short Slot Time subfield value equal to 1 from the AP that the STA is associated or associating to.

A STA in which dot11ShortSlotTimeOptionImplemented is false shall set the MAC variable aSlotTime to the long slot time at all times. A STA in which dot11ShortSlotTimeOptionImplemented is not present, or whose PHY supports only a single slot time value shall set the MAC variable aSlotTime to the PHY characteristic aSlotTime.

NOTE—The MAC variable aSlotTime is distinct from the PHY characteristic aSlotTime. Outside this subclause, the MAC uses the MAC variable aSlotTime whenever the value of aSlotTime is required.

*Instruction to TGme Editor: Update REVme D1.3 P2658L60 as shown below.*

**11.1.3.2 Beacon generation in non-DMG infrastructure networks**

…

The AP shall set the Short Slot Time subfield in the Capability Information field in the transmitted Beacon, Probe Response, Association Response and Reassociation Response frames to indicate the currently used slot time value within its BSS (see 10.3.2.16).

An AP that supports Clause 18 operation shall use the long slot time unless the BSS consists only of STAs that support short slot time. STAs indicate support for short slot time by setting the Short Slot Time subfield to 1 when transmitting Association Request and Reassociation Request frames. If the BSS consists of only STAs that support short slot time, short slot time may be used. APs indicate usage of the short slot time by setting the Short Slot Time subfield to 1 in all Beacon, Probe Response, Association Response, and Reassociation Response frame transmissions as described in 9.4.1.4 (Capability Information field).

If a STA that does not support short slot time associates with an AP that supports Clause 18 (Extended Rate PHY (ERP) specification) operation, and the AP is using short slot time, the AP shall use long slot time beginning at the first Beacon frame subsequent to the association of the long slot time STA.

NOTE – An AP that is using short slot time might reject association from a STA that does not support short slot time. See DENIED\_NO\_SHORT\_SLOT\_TIME\_SUPPORT in 9.4.1.9 (Status Code field).

*Instruction to TGme Editor: Delete the last paragraph of 18.5.4 at REVme D1.3 P3538L54 as shown below.*

**18.5.4 ERP**

…

# CID 1471

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1471  N/A  N/A | There are references to "interim transmit [spectrum/spectral] mask", but this term is never defined. What is this? When will it be made permanent? | Change "interim transmit spectrum mask", "interim transmit spectral mask" and "interim spectral mask" to "transmit spectral mask" throughout |

## Background

REVme D1.3 P3784

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## Proposed Resolution: CID 1471

REVISED

**Note to commenter:**

Instruction to editor below clarifies how the interim transmit spectral mask is used to contruct the overall transmit spectral mask.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1471 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0990-08-000m-lb258-misc-cids.docx>

## Proposed Text Updates: CID 1471

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P3784L14.*

**21.3.17 VHT transmit specification**

**21.3.17.1 Transmit spectrum mask**

…

The overall transmit spectral mask is constructed using two components. First, an interim transmit spectral mask is constructed whose mask level is determined relative to the maximum spectral density of the signal. Second, an absolute transmit spectral limit is computed based on the mask bandwidth. The overall transmit spectral mask is then constructed by taking the higher of the interim transmit spectral mask and the absolute transmit spectral limit at each frequency offset.

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P3862L11.*

**22.3.17 TVHT transmit specification**

**22.3.17.1 Transmit spectrum mask**

…

The overall transmit spectral mask is constructed using two components. First, an interim transmit spectral mask is constructed whose mask level is determined relative to the maximum spectral density of the signal. Second, an absolute transmit spectral limit is computed based on the mask bandwidth. The overall transmit spectral mask is then constructed by taking the higher of the interim transmit spectral mask and the absolute transmit spectral limit at each frequency offset.

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P3976L5.*

**23.3.17 S1G transmit specification**

**23.3.17.1 Transmit spectrum mask**

…

The overall transmit spectral mask is constructed using two components. First, an interim transmit spectral mask is constructed whose mask level is determined relative to the maximum spectral density of the signal. Second, an absolute transmit spectral limit is computed based on the mask bandwidth. The overall transmit spectral mask is then constructed by taking the higher of the interim transmit spectral mask and the absolute transmit spectral limit at each frequency offset.

*Instruction to TGme Editor: Add the following paragraph at REVme D1.3 P4463L9.*

**27.3.19 Transmit specification**

**27.3.19.1 Transmit spectrum mask**

…

The overall transmit spectral mask is constructed using two components. First, an interim transmit spectral mask is constructed whose mask level is determined relative to the maximum spectral density of the signal. Second, an absolute transmit spectral limit is computed based on the mask bandwidth. The overall transmit spectral mask is then constructed by taking the higher of the interim transmit spectral mask and the absolute transmit spectral limit at each frequency offset.

# CID 1864

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| --- | --- | --- |
| **CID**  **Clause**  **Page.Line** | **Comment** | **Proposed Change** |
| 1864  3.2  195.31 | Puncturing has broken the definition of "frequency segment: A contiguous block of spectrum used by a transmission" | Append " or a block of spectrum used by a transmission that would be contiguous were it not punctured" |

## Background

The proposed change by the commenter in redline is:

REVme D1.3 P195

|  |
| --- |
| **3. Definitions, acronyms, and abbreviations 3.1 Definitions**  …  **frequency segment:** A contiguous block of spectrum used by a transmission or a block of spectrum used by a transmission that would be contiguous were it not punctured. |

## Proposed Resolution: CID 1864

ACCEPTED

[End of File]