IEEE P802.11  
Wireless LANs

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | LB258 PHY CIDs – Part 1 | | | | | | Date: 2022-04-28 | | | | | | 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:

* 2056 (Already motioned in Motion 54)
* 2260, 1603, 1604, 1312, 2160, 1731, 2375, 1590, 1366, 1367, 1935, 2247, 2371, 1063, 1057, 1070, 2365, 2110, 1247, 2091

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: Removed CID 2365 (needs more work). Added CIDs 2056, 2247, 2371, 1063, 1057, 1070.

R2:

* NOTE - Resolution for CID 2056 (as in R1) has been adopted in April 4 TGme telecon. Motion passed on April 22 (Motion 54).
* Removed CID 1200 (already motioned as part of Motion 54).
* Updated resolution for CID 1070.
* Added CIDs 2365, 2110, 1247, 2091

R3:

* Updated per discussion in TGme Ad Hoc meeting on 4/28/2022 PM2
* CIDs 2260, 1603, 1604, 1312, 2160, 1731, 2375, 1590, 1366, 1367, 1935, 2247, 2371, 1063, 1057 were presented and marked ready for motion

# CID 2056

Resolution for CID 2056 (as in R1) adopted in April 4 TGme telecon. Motion passed on April 22 (Motion 54).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2056 | 3.2 |  | There are about a dozen "data stream"s, but this term is not defined | Add a definition "data stream: A physical layer (PHY) service data unit (PSDU)." |

**Discussion**

There are 16 locations in REVme D1.1 using the term “data stream(s)”.

REVme D1.1 P199L61

|  |
| --- |
| **3. Definitions, acronyms, and abbreviations 3.1 Definitions**  **multi-user multiple input, multiple output (MU-MIMO):** A technique by which multiple stations (STAs), each with one or more antennas, either simultaneously transmit to a single STA or simultaneously receive from a single STA independent data streams over the same subcarriers. |

“Data stream” here is equivalent to PSDU.

REVme D1.1 P200L54

|  |
| --- |
| **3. Definitions, acronyms, and abbreviations 3.1 Definitions**  **orthogonal frequency division multiple access (OFDMA):** An orthogonal frequency division multiplexing (OFDM)-based multiple access technique by which multiple stations (STAs) either simultaneously transmit to a single STA or simultaneously receive from a single STA independent data streams over different groups of subcarriers. |

“Data stream” here is equivalent to PSDU.

REVme D1.1 P204L25

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| --- |
| **3. Definitions, acronyms, and abbreviations 3.1 Definitions**  **spatial multiplexing (SM):** A transmission technique in which data streams are transmitted on multiple spatial channels that are provided through the use of multiple antennas at the transmitter and the receiver. |

“Data stream” here means “spatial streams”. Hence, it is not appropriate to change it to PSDU.

REVme D1.1 P521L30

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| **6.3.27.6 MLME-DELBA.request**  **6.3.27.6.2 Semantics of the service primitive**   |  |  |  |  | | --- | --- | --- | --- | | **Name** | **Type** | **Valid range** | **Description** | | PeerSTAAddress | MAC address | N/A | Specifies the address of the peer MAC entity with which to perform the block ack deletion. | | Direction | Enumeration | Originator, Recipient | Specifies if the MAC entity initiating the MLME DELBA.request primitive is the originator or the recipient of the data stream that uses the block ack agreement. | |

REVme D1.1 P522L30

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| **6.3.27.7 MLME-DELBA.indication**  **6.3.27.7.2 Semantics of the service primitive**   |  |  |  |  | | --- | --- | --- | --- | | **Name** | **Type** | **Valid range** | **Description** | | PeerSTAAddress | MAC address | N/A | Specifies the address of the peer MAC entity with which to perform the block ack deletion. | | Direction | Enumeration | Originator, Recipient | Specifies if the MAC entity initiating the MLME DELBA.request primitive is the originator or the recipient of the data stream that uses block ack. | |

For the above two locations Mark Rison suggested:

|  |
| --- |
| MSDU stream (or change "of the data stream that uses the block ack agreement" to "of the block ack agreement") |

And feedback from Mark Hamilton was:

|  |
| --- |
| If we go with option 2, I would change the changes marked in yellow below (the “MAC” ones), to:  Change “data stream” to “MSDUs” (and change “uses” to “use”) at REVme D1.1  P521L30  P522L30    The context here is that this is the description of the Direction parameter to the DELBA primitives.  The current text says (highlighting the replacement spot):  Specifies if the MAC entity initiating the MLMEDELBA.  request primitive is the originator or the recipient of the data stream that uses the block ack agreement.    I do not want to introduce a new concept/term, “MSDU stream” as suggested below (which will be comment-bait for asking for a definition of this term).  I think in this context simply saying the originator or recipient of the MSDUs that use the block ack agreement is sufficient and clear. |

REVme D1.1 P3099L37

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| --- |
| **12.3.2.4.2 WEP encryption algorithm** A WEP implementation shall use the ARC4 stream cipher from RSA Security, Inc., as its encryption and decryption algorithm. ARC4 uses a pseudorandom number generator (PRNG) to generate a key stream that it exclusive-ORs (XORs) with a plaintext data stream to produce cipher text or to recover plaintext from a cipher text. |

Mark Rison suggested not to make any changes here as WEP has been deprecated.

REVme D1.1 P3585L14

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| --- |
| **19.3.11.7.6 LDPC parser** The succession of LDPC codewords that result from the encoding process of 19.3.11.7.5 (LDPC PPDU encoding process) shall be converted into a bitstream in sequential fashion. Within each codeword, bit *i*0 is ordered first. The parsing of this encoded data stream into spatial streams shall follow exactly the parsing rules defined for the BCC encoder, as defined in 19.3.11.8.1 (Overview). However, the frequency interleaver of 19.3.11.8.3 (Frequency interleaver) is bypassed. |

“Data stream” is not PSDU here. Rather, this is the LDPC encoder output. Hence, no change.

REVme D1.1 P3514L54

|  |
| --- |
| **17.3.12 Receive PHY**  After a PHY-CCA.indication primitive is issued, the PHY entity shall begin receiving the training symbols and searching for the SIGNAL in order to set the length of the data stream, the demodulation type, and the decoding rate. |

“Data stream” is equivalent to PSDU here. This is because the Length field in L-SIG indicates the length of the PSDU in octets.

REVme D1.1 P3553L58

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| --- |
| **19.3.4 Overview of the PPDU encoding process**   1. If BCC encoding is to be used, encode the extended, scrambled data string with a rate ½ convolutional encoder (see 17.3.5.6 (Convolutional encoder)). Omit (puncture) some of the encoder output string (chosen according to puncturing pattern) to reach the coding rate, *R*, corresponding to the TXVECTOR parameters MCS or L\_DATARATE. Refer to 19.3.11.6 (BCC coding and puncturing) for details. If LDPC encoding is to be used, encode the scrambled data stream according to 19.3.11.7.5 (LDPC PPDU encoding process) |

“Data stream” is not PSDU here. Rather, this corresponds to PSDU + PHY padding. Hence, no change.

REVme D1.1 P3624L2

|  |
| --- |
| **19.3.21 PHY receive procedure**  After the PHY-CCA.indication(BUSY, channel-list) primitive is issued, the PHY entity shall begin receiving the training symbols and searching for SIGNAL and HT-SIG in order to set the length of the data stream, the demodulation type, code type, and the decoding rate. |

“Data stream” is equivalent to PSDU here. This is because the HT Length field in HT-SIG indicates the length of the PSDU in octets.

REVme D1.1 P3677L5

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| --- |
| **20.6.2.3 Data field**  **20.6.2.3.3 Encoding**  **20.6.2.3.3.1 General**   1. The Reed Solomon encoded data stream is further encoded using the block code(N,8) asdescribed in 20.6.2.3.3.3 ((N,8) Block-coding) 2. The coded bit stream is concatenated with zeros. They are scrambled with the continuation of the scrambler sequence that scrambled the PSDU input bits. |

“Data stream” is not PSDU here. Rather, this is the RS encoder output.

Mark Rison suggested changing the “data stream” to

|  |
| --- |
| bit stream (to match surrounding text) |

REVme D1.1 P3713 L16 and L20

|  |
| --- |
|  |

The “Single Data Stream” at L16 is not PSDU. Rather, this corresponds to PSDU + PHY padding.

The “NES Data Streams” at L20 is not PSDU. Rather, this is the BCC encoder input and/or output, where there are NES parallel BCC encoders.

Also, prior to BCC encoder, PHY has added PHY padding on top of PSDU.

Hence, no change.

REVme D1.1 P3794L59

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| --- |
| **21.3.20 PHY receive procedure**  After the PHY-CCA.indication(BUSY, channel-list) primitive is issued, the PHY entity shall begin receiving the training symbols and searching for L-SIG in order to set the maximum duration of the data stream. |

In case of VHT PPDUs, there is no explicit indication of PSDU length in the preamble (e.g. L-SIG, VHT-SIG-A). Rather, the Length field in the L-SIG indicates the duration (in time) of the PPDU.

Also, there is only “one PPDU”, and thus one PPDU duration. Hence, it is not necessary to talk about a ‘maximum’ duration of a PPDU.

Therefore, suggestion is to change

“maximum duration of the data stream”

to

“duration of the PPDU”.

REVme D1.1 P3992L60

|  |
| --- |
| **23.3.20 PHY receive procedure**  After the PHY-CCA.indication(BUSY, channel-list) is issued, the PHY entity shall begin receiving the training symbols and searching for SIG or SIG-A in order to set the maximum duration of the data stream and get other PHY parameters such as the demodulation type, code type, and the decoding rate. |

I am not that familiar with S1G.

Dave Goodall was fine with changing “data stream” to “PPDU”.

Mark Rison further suggested to change

“maximum duration of the data stream”

to

“duration of the PPDU”.

I presume this is fine as I do not believe S1G has ‘multiple PPDUs’ being transmitted/received at the same time.

REVme D1.1 P4487L43

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| --- |
| **27.3.22 HE receive procedure**  *Instruction to TGme Editor: Update REVme D1.1 P4487L43 as shown below.*  Otherwise, for detecting the HE preamble, the PHY entity shall search for L-SIG and RL-SIG fields in order to set the maximum duration of the data stream. |

In case of HE PPDUs, there is no explicit indication of PSDU length in the preamble (e.g. L-SIG, HE-SIG-A). Rather, the Length field in the L-SIG indicates the duration (in time) of the PPDU.

Also, there is only “one” PPDU duration.

* HE SU and HE ER SU PPDU are “SU”, hence only one PPDU, and thus one PPDU duration.
* DL OFDMA/MU-MIMO (HE MU PPDU) is also one PPDU transmitted by an AP, and thus one PPDU duration.
* UL OFDMA/MU-MIMO (HE TB PPDU) consists of multiple PPDUs, one PPDU transmitted by each non-AP STA. However, all the non-AP STAs are required to send the exactly same PPDU duration. Hence, there is only one PPDU duration.

Hence, it is not necessary to talk about a ‘maximum’ duration of a PPDU.

Therefore, suggestion is to change

“maximum duration of the data stream”

to

“duration of the PPDU”.

**Proposed Resolution: CID 2056**

REVISED

**Note to commenter:**

The proposed text updates below updates some of the “data stream(s)” to more appropriate terms when applicable. See the discussion section for CID 2056 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-01-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx) for further details.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2056 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-01-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 2056**

**3. Definitions, acronyms, and abbreviations  
3.1 Definitions**

*Instruction to TGme Editor: Update REVme D1.1 P199L61 as shown below.*

**multi-user multiple input, multiple output (MU-MIMO):** A technique by which multiple stations (STAs), each with one or more antennas, either simultaneously transmit to a single STA or simultaneously receive from a single STA independent PSDUs over the same subcarriers.

*Instruction to TGme Editor: Update REVme D1.1 P200L54 as shown below.*

**orthogonal frequency division multiple access (OFDMA):** An orthogonal frequency division multiplexing (OFDM)-based multiple access technique by which multiple stations (STAs) either simultaneously transmit to a single STA or simultaneously receive from a single STA independent PSDUs over different groups of subcarriers.

**6.3.27.6 MLME-DELBA.request**

**6.3.27.6.2 Semantics of the service primitive**

*Instruction to TGme Editor: Update REVme D1.1 P521L30 as shown below.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerSTAAddress | MAC address | N/A | Specifies the address of the peer MAC entity with which to perform the block ack deletion. |
| Direction | Enumeration | Originator, Recipient | Specifies if the MAC entity initiating the MLME DELBA.request primitive is the originator or the recipient of the MSDUs that use the block ack agreement. |

**6.3.27.7 MLME-DELBA.indication**

**6.3.27.7.2 Semantics of the service primitive**

*Instruction to TGme Editor: Update REVme D1.1 P522L30 as shown below.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerSTAAddress | MAC address | N/A | Specifies the address of the peer MAC entity with which to perform the block ack deletion. |
| Direction | Enumeration | Originator, Recipient | Specifies if the MAC entity initiating the MLME DELBA.request primitive is the originator or the recipient of the MSDUs that use block ack. |

**s**

**17.3.12 Receive PHY**

*Instruction to TGme Editor: Update REVme D1.1 P3514L54 as shown below.*

After a PHY-CCA.indication primitive is issued, the PHY entity shall begin receiving the training symbols and searching for the SIGNAL in order to set the length of the PSDU, the demodulation type, and the decoding rate.

**19.3.21 PHY receive procedure**

*Instruction to TGme Editor: Update REVme D1.1 P3624L2 as shown below.*

After the PHY-CCA.indication(BUSY, channel-list) primitive is issued, the PHY entity shall begin receiving the training symbols and searching for SIGNAL and HT-SIG in order to set the length of the PSDU, the demodulation type, code type, and the decoding rate.

**20.6.2.3 Data field**

**20.6.2.3.3 Encoding**

**20.6.2.3.3.1 General**

*Instruction to TGme Editor: Update REVme D1.1 P3677L5 as shown below.*

1. The Reed Solomon encoded bit stream is further encoded using the block code(N,8) asdescribed in 20.6.2.3.3.3 ((N,8) Block-coding)

**21.3.20 PHY receive procedure**

*Instruction to TGme Editor: Update REVme D1.1 P3794L59 as shown below.*

After the PHY-CCA.indication(BUSY, channel-list) primitive is issued, the PHY entity shall begin receiving the training symbols and searching for L-SIG in order to set the duration of the PPDU.

**23.3.20 PHY receive procedure**

*Instruction to TGme Editor: Update REVme D1.1 P3992L60 as shown below.*

After the PHY-CCA.indication(BUSY, channel-list) is issued, the PHY entity shall begin receiving the training symbols and searching for SIG or SIG-A in order to set the duration of the PPDU and get other PHY parameters such as the demodulation type, code type, and the decoding rate.

**27.3.22 HE receive procedure**

*Instruction to TGme Editor: Update REVme D1.1 P4487L43 as shown below.*

Otherwise, for detecting the HE preamble, the PHY entity shall search for L-SIG and RL-SIG fields in order to set the duration of the PPDU.

# CID 2260

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| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2260 | 15.3.2 | 3419.44 | In clause 15 all occurrences of MPDU have been replaced with PSDU in the text, but not in Figure 15-1. | Please replace MPDU in Figure 15-1 with PSDU. Please apply the same correction to Figure 15-6 on P3423L44, Figure 15-7 on P3425L9, L37, Figure 15-8 on P3246L9 Figure 15-9 on P3428L25, L30, L41, Figure 16-7 on P3452L25, L29, L38, Figure 23-49 on P3989L49 |

**Discussion**

I have checked the PHY clauses, and confirm that the use of the term MPDU is limited to cases where they intentionally refer to “MPDU”.

E.g. REVme D1.1 P3443L48

|  |
| --- |
| The MAC uses the PHY service, so each MPDU corresponds to a PSDU that is carried in a PPDU |

**Proposed Resolution: CID 2260**

REVISED

**Note to commenter:**

The proposed text updates below essentially implement all the changes suggested by the commenter. The resolution is not marked as “ACCEPTED” because (1) one of the cited locations is incorrect (P3246L9 should have been P3426L9) and (b) we need to provide the updated Visio files to the Editor.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2260 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 2260**

*Instruction to TGme Editor: Update Figure 15-1 on REVme D1.1 P3421 as shown below.*

Chart, diagram, line chart

Description automatically generated





*Instruction to TGme Editor: Update Figure 15-6 on REVme D1.1 P3425 as shown below.*

Diagram

Description automatically generated with low confidence





*Instruction to TGme Editor: Update Figure 15-7 on REVme D1.1 P3427 as shown below.*

Diagram

Description automatically generated





*Instruction to TGme Editor: Update Figure 15-8 on REVme D1.1 P3428 as shown below.*

Chart, line chart

Description automatically generated





*Instruction to TGme Editor: Update Figure 15-9 on REVme D1.1 P3430 as shown below.*

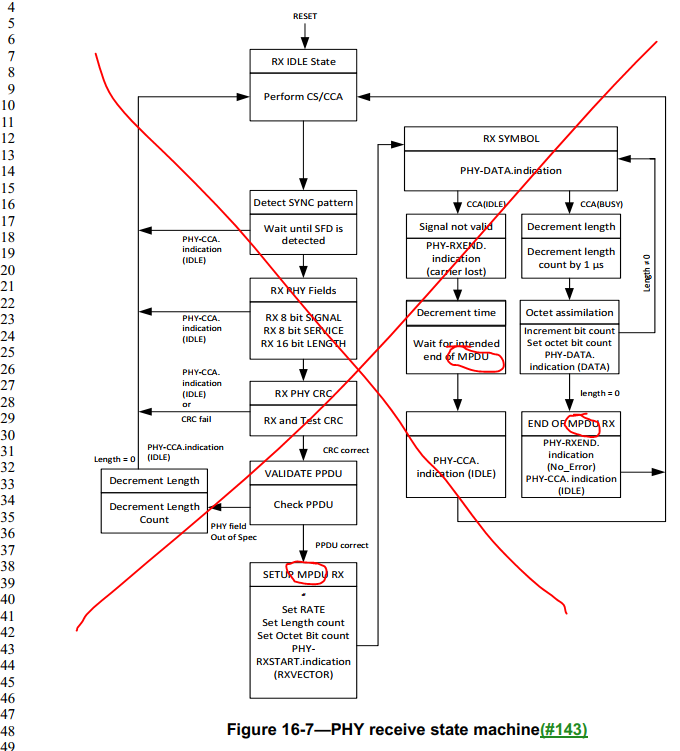
Diagram, schematic

Description automatically generated





*Instruction to TGme Editor: Update Figure 16-7 on REVme D1.1 P3454 as shown below.*







*Instruction to TGme Editor: Update Figure 23-49 on REVme D1.1 P3991 as shown below.*

Diagram, schematic

Description automatically generated





# CID 1603, 1604

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| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1603 | 15.4.42 | 3431.29 | "The DSSS PHY shall operate in the frequency range of 2.4 GHz to 2.4835 GHz as allocated by regulatory bodies in (#296)China, the United States and its territories, and Europe" is missing Japan (cf. 16.3.6.2). Anyway, it's also allocated in lots of other places | Change to "The DSSS PHY shall operate in the frequency range of 2.4 GHz to 2.5 GHz as allocated by regulatory bodies" |
| 1604 | 16.3.6.2 | 3457.43 | "The HR/DSSS PHY shall operate in the 2.4-2.4835 GHz frequency range, as allocated by regulatory bodies in (#296)China, the United States and its territories, Europe, and Japan, or in the 2.471-2.497 GHz frequency range, as allocated by regulatory authority in Japan". It's also allocated in lots of other places | Change to "The HR/DSSS PHY shall operate in the frequency range of 2.4 GHz to 2.5 GHz as allocated by regulatory bodies" |

**Discussion**

REVme D1.0 P3431

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REVme D1.0 P3457

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The commenter is incorrect in CID 1603 that Japan is missing. However, the suggested text by to commenter seems fine, so propose to accept.

**Proposed Resolution: CIDs 1603, 1604**

ACCEPTED

# CID 1312

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1312 | 17.3.2.2 | 3477.46 | Figure 17-4 is not an illustration of the transmitted PPDU, it is only showing the traninging fields. | We already said at the start of 17.3.2.1 that Figure 17-1 shows the format of the PPDU. Perhaps just delete the cited sentence? Or, if something is needed to reference Figure 17-4, then the wording needs to be aligned to the content of the figure. |

**Discussion**

REVme D1.1 P3479L46 is the sentence under question.

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| … |

And Figure 14-4 is at REVme D1.1 P3484:

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So, Figure 17-4 is part of a different section (17.3.3), and there is no clear need for the 17.3.2.2 (Overview of the PPDU encoding process) to refer to Figure 17-4. Hence, suggest to delete the cited sentence.

**Proposed Resolution: CID 1312**

REVISED

**Note to commenter:**

Agree that the cited sentence is not needed.

**Instruction to TGme Editor:**

Delete the sentence spanning D1.1 P3479L46-47 (“An illustration of … (SYNC))).”).

# CID 2160

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| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2160 | 17.3.5.5 | 3489.9 | "NOTE 3--The receiving PHY cannot determine whether the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT was present, but it does not matter since descrambling the DATA field is the same either way." -- first half duplicates previous NOTE | Change to "NOTE 3--Descrambling the DATA field is the same irrespective of whether the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT was present." |

**Discussion**

REVme D1.1 P3491

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| --- |
| … |

Commenter is saying that the beginning portion of NOTE 5 duplicates that of NOTE 4, which is true.

The change suggested by the commenter in redline is

|  |
| --- |
| NOTE 4—The receiving PHY in an HE STA cannot determine whether the CH\_BANDWIDTH\_IN\_NON\_HT, DYN\_BANDWIDTH\_IN\_NON\_HT or SCRAMBLER\_INITIAL\_VALUE parameters were present in the TXVECTOR of the transmitting PHY; therefore, the receiving PHY in an HE STA always includes values for the CH\_BANDWIDTH\_IN\_NON\_HT, DYN\_BANDWIDTH\_IN\_NON\_HT, and SCRAMBLER\_INITIAL\_VALUE parameters in the RXVECTOR if the PPDU is a non-HT PPDU. It is the responsibility of the MAC to determine the validity of the RXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT, DYN\_BANDWIDTH\_IN\_NON\_HT, and SCRAMBLER\_INITIAL\_VALUE.  NOTE 5—Descrambling the DATA field is the same irrespective of whether the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT was present. |

The general direction seems fine, but the commenter is missing the TXVECTOR parameters DYN\_BANDWIDTH\_IN\_NON\_HT and SCRAMBLER\_INITIAL\_VALUE.

**Proposed Resolution: CID 2160**

REVISED

**Note to commenter:**

The proposed text updates below extends the suggestion by the commenter by including the TXVECTOR parameters DYN\_BANDWIDTH\_IN\_NON\_HT and SCRAMBLER\_INITIAL\_VALUE.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2160 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 2160**

*Instruction to TGme Editor: Update REVme D1.1 P3491L9 as as shown below.*

NOTE 5—Descrambling the DATA field is the same irrespective of whether any of the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT, DYN\_BANDWIDTH\_IN\_NON\_HT or SCRAMBLER\_INITIAL\_VALUE were present.

# CID 1731

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1731 | 18.4.8.2 | 3528.2 | "The PER of the ERP-DSSS modes shall be as specified in 16.3.8.2 (Receiver minimum input level sensitivity)." -- 16.3.8.2 is CCK, and in any case "the ERP-DSSS modes" is not clear | Delete the cited sentence |

**Discussion**

Comment is on the following yellow sentence.

REVme D1.0 P3527-3528

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Commenter is correct that 16.3.8.2 is CCK.

REVme D1.1 P3468

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However, the comment that “ERP-DSSS modes” is not clear is not accurate because it is defined in Clause 3.2 (Definitions specific to IEEE Std 802.11).

REVme D1.1 P221

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Given these, it seems appropriate to change “ERP-DSSS” to “ERP-CCK”.

**Proposed Resolution: CID 1731**

REVISED

**Note to commenter:**

ERP-DSSS and ERP-CCK are defined terms in Clause 3.2. Commenter is correct that the reference 16.3.8.2 is on CCK, not DSSS. Hence, the proposed text updates below changes ERP-DSSS to ERP-CCK.

**Instruction to TGme Editor:**

At REVme D1.1 P3530L2, change “The PER of the ERP-DSSS modes shall be” to “The PER for ERP-CCK shall be”.

# CID 2375

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2375 | 19.3.12.3.6 | 3601.54 | There is a typo in D1 matrix in Equation (19-83). O should be deleted from D1. | its value should be non-zero. |

**Discussion**

19.3.12.3.6 is on compressed beamforming feedback matrix.

The commenter is pointing out that the “O” marked with a red circle in Equation (19-83) below is an editing error.

REVme D1.1 P3603:

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The corresponding equation in IEEE 802.11n-2009 was

IEEE 802.11n-2009 P310:

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Hence the commenter is correct on the editing error.

However, Equation (19-83) has more error than that upon further review – even in the original Equation (20-83) in IEEE 802.11n-2009.

Note that Equation (19-83) is  as written in REVme D1.1 P3603L47. And the matrices *G* and *V* are supposed to be  square matrices:

REVme D1.1 P3602:

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However, *G* is a 4x4 matrix in Equation (19-83), and the size of *D* is unclear.

Furthermore, Equation (19-84) also has the same issue of incorrect *G* matrix dimension, and unclear size of the *D* matrix.

REVme D1.1 P3604:

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**Proposed Resolution: CID 2375**

REVISED

**Note to commenter:**

The proposed text updates fix the issue pointed out by the commenter on Equation (19-83), as well as fix the incorrect dimension of matrices in equations (19-83) and (19-84).

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2375 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 2375**

19.3.12.3.6 Compressed beamforming feedback matrix

*Instruction to TGme Editor: Update Equation (19-83) at REVme D1.1 P3603L52 as as shown below.  
(NOTE to TGme Editor: Changes relative to the existing equation is marked in RED color to help the Editor identify the required changes. Also, note that the 4th matrix of new Equation (19-83) has a “diagonal three-dots” which might be a bit hard to see, but that needs to be ‘edited’ into the REVme draft.)*

 (19-83)

*Instruction to TGme Editor: Update Equation (19-84) at REVme D1.1 P3604L9 as as shown below.  
(NOTE to TGme Editor: Changes relative to the existing equation is marked in RED color to help the Editor identify the required changes.)*

 (19-84)

# CID 1590

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1590 | 19.3.21 | 3621.19 | Figure 19-27--PHY receive state machine has a "test Parity" but no action based on this test. Also in Figure 17-20--PHY receive state machine the "p" is lowercase even though it's I think referring to the field name. Also in Figure 27-63--PHY receive state machine if midambles are not present the downward arrow after the parity check is not labelled | Label the arrow down as "Parity check passes" and add an arrow going left labelled "Parity check fails". In Figure 17-20 change "test parity" to "test Parity". In Figure 27-63--PHY receive state machine if midambles are not present label the downward arrow out of RX L-SIG "Parity and RATE checks pass" |

**Proposed Resolution: CID 1590**

REVISED

**Note to commenter:**

All the necessary information needed to demodulate an HT-mixed format PPDU is contained within the HT-SIG. Hence, it is not necessary to have received the L-SIG correctly (e.g. L-SIG parity passes) in order to demodulate an HT-mixed format PPDU. Therefore, it is not appropriate to add in Figure 19-27 that the receiver should continue with the next steps of the demodulation only if the Parity check has passed. Instead, we decided to delete the text “RX and test Parity”.

As for the comments on Figure 17-20 and Figure 27-63, the corresponding changes are made in the text changes below.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1590 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0520-03-000m-lb258-phy-cides-part-1.docx>

**Proposed Text Updates: CID 1590**

*Instruction to TGme Editor: Update REVme Figure 19-27 at D1.0 P3621 as as shown below.*

Delete “RX and test Parity” in the RX L-SIG box. The reviewer will send a Visio file for this to the Editor offline.

*Instruction to TGme Editor: Update REVme Figure 17-20 at D1.1 P3514 as as shown below.*

Diagram

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*Instruction to TGme Editor: Update REVme Figure 27-63 at D1.1 P4484 as as shown below.*

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated



# CID 1366

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1366 | 21.2.4 | 366.58 | It's an "HT-mixed format PPDU" (not "HT-mixed PPDU") | Replace "HT-mixed PPDU" with "HT-mixed format PPDU"). Same thing at P3700.8, P3700.16, and P3700.22. |

**Proposed Resolution: CID 1366**

ACCEPTED

# CID 1367

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1367 | 21.2.4 | 366.59 | It's an "HT-greenfield format PPDU" (not "HT-greenfield PPDU") | Replace "HT-greenfield PPDU" with "HT-greenfield format PPDU"). Same thing at P3700.10, P3700.17, P3700.23, P5050.59, and P5050.62. |

**Proposed Resolution: CID 1367**

REVISED

**Note to commenter:**

Agree that it should be “HT-mixed format PPDU”. There are one more location which needs similar change, hence the resolution is a “REVISED”.

**Instruction to TGme Editor:**

Change “HT-greenfield PPDU” to “HT- greenfield format PPDU” at REVme D1.1

P3701L59

P3702L10

P3702L18

P3702L23

P5056L49

Change “HT- greenfield PPDUs” to “HT- greenfield format PPDUs” at REVme D1.1

P5053L9

P5053L11

# CID 1935

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1935 | 21.3.18 | 3785.3 | "For tests in this subclause" is not clear as to whether it includes child subclauses | Change to "For tests in this subclause and its subsubclauses" |

**Background**

REVme D1.0 P3785~3789

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**Proposed Resolution: CID 1935**

REJECTED

21.3.18 (VHT receiver specification) consists of six subclauses (21.3.18.1 – 21.3.18.6). All the tests are within those child clauses, and there are no tests at the 21.3.18 level itself. Hence there is no confusion that the statement “For tests in this subclause” refers to the tests in the child clauses of this subclause.

# CID 2247, 2371

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2247 | 27.3.4 | 4334.12 | In the legend for the figure there is no distinction between Rus that require 40MHz pre-HE modulated transmission, and Rus that require 80MHz pre-HE modulated transmissions | Preferably use the dotted format used within the figure itself for the legend |
| 2371 | 27.3.4 | 4334.24 | The 'color' for 40 MHz preamble is not clear.  Hence, it is not clear which RU26 in an 80 MHz HE PPDU needs to use the 40 MHz preamble vs. the 80 MHz preamble. | Change the 'color' for the 40 MHz preamble. |

**Background**

REVme D1.0 P4334

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**Proposed Resolution: CID 2247, 2371**

REVISED

**Note to commenter:**

Figure has been updated to make the RU coloring clearer.

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 2247, 2371 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

(Same resolution for CIDs 2247 and 2371.)

**Proposed Text Updates: CID 2247, 2371**

*Instruction to TGme Editor: Update Figure 27-12 at REVme D1.1 P4334 as as shown below.*

Diagram

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# CID 1063

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1063 | 21.3.20 | 3794.18 | Fig 21-37 is incomplete in terms of non-HT detection. For instance, if the RATE is not 6 Mbps or the LENGTH is so small that the PPDU cannot be a HT/VHT PPDU, then the PPDU must be a non-HT PPDU. | In Fig 21-37, from "RX L-SIG" add a "NON-HT" output arrow connected to a circle |

**Background**

REVme D1.1 P3793

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REVme D1.0 P3794

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**Proposed Resolution: CID 1063**

REJECTED

21.3.20 (PHY receive procedure) does not have a normative requirement that a receiver shall classify a PPDU which is not long enough to be a potentially HT/VHT PPDU to be classified as a non-HT PPDU. Please note that 21.3.20 is a ‘typical’ PHY receive procedure, and does not prohibit an implementation from doing what the commenter has suggested, but such behavior is not mandatory either.

# CID 1057

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1057 | 27.2.6.2 | 4316.17 | Table 27-5 and P4365L40 refer to an HE TX/RXVECTOR parameter L\_DATARATE but L\_DATARATE is not present in Table 27-1 | Add L\_DATARATE to TX/RXVECTOR |

**Proposed Resolution: CID 1057**

REVISED

**Note to commenter:**

The proposed text updates add L\_DATARATE to TX/RXVECTOR.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1057 in <https://mentor.ieee.org/802.11/dcn/22/11-22-0520-03-000m-lb258-phy-cides-part-1.docx>

**Proposed Text Updates: CID 1057**

*Instruction to TGme Editor: Update Table 27-1 at REVme D1.1 P4295L10 as as shown below.*

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| --- | --- | --- | --- | --- |
| Parameter | Condition | Value | TXVECTOR | RXVECTOR |
| FORMAT |  | Determines the format of the PPDU.  Enumerated type:  NON\_HT indicates Clause 15, Clause 16, Clause 17, Clause 18, or non-HT duplicate PPDU format. In this case, the modulation is determined by the NON\_HT\_MODULATION parameter.  HT\_MF indicates HT-mixed format.  HT\_GF indicates HT-greenfield format.  VHT indicates VHT format.  HE\_SU indicates HE SU PPDU format.  HE\_MU indicates HE MU PPDU format.  HE\_ER\_SU indicates HE ER SU PPDU format.  HE\_TB indicates HE TB PPDU format. | Y | Y |
| NON\_HT\_MODULATION | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters). | | | |
| L\_DATARATE | FORMAT is NON\_HT | Indicates the rate used to transmit the PSDU in megabits per second.  Allowed values depend on the value of the NON\_HT\_MODULATION  parameter as follows:  ERP-DSSS: 1 and 2  ERP-CCK: 5.5 and 11  ERP-OFDM, NON\_HT\_DUP\_OFDM:  6, 9, 12, 18, 24, 36, 48, and 54  OFDM: 6, 9, 12, 18, 24, 36, 48, and 54 | Y | Y |
| Otherwise | Not present | | |
| L\_LENGTH | FORMAT is HE\_SU,  HE\_MU, or HE\_ER\_SU | Not present  NOTE—The LENGTH field of the L-SIG field for HE PPDU is defined in Equation (27-11) using the TXTIME value defined in 27.4.3 (TXTIME and PSDU\_LENGTH calculation), which in turn depends on other parameters including the TXVECTOR parameter APEP\_LENGTH. | N | N |
| FORMAT is HE\_TB | Indicates the value in the LENGTH field of the L-SIG field in the range of 1 to 4095. The value is obtained from the triggering frame to which the HE TB PPDU is a response. | Y | N |
| Otherwise | See corresponding entry in Table 19-1 (TXVECTOR and RXVECTOR parameters) or Table 21-1 (TXVECTOR and RXVECTOR parameters). | | |

# CID 1070

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1070 | 27.2.3 | 4309.6 | RXVECTOR and TRIGVECTOR are incomplete since they lacks a parameter for ppm offset or CFO (or similar). Timing information from the existing PHY-RXSTART, PHY-TXSTART and PLME-CHARACTERISTICS.confirm primitives probably suffice. | Add new RELATIVE\_TX\_RX\_FREQ\_OFFSET parameter to RXVECTOR and TRIGVECTOR |

**Proposed Resolution: CID 1070**

REVISED

**Note to commenter:**

TRIGVECTOR is used to configure an AP to receive an HE TB PPDU, and the AP does not know the frequency difference between AP and non-AP STA. Hence, TRIGVECTOR does not need a RELATIVE\_TX\_RX\_FREQ\_OFFSET parameter.

While passing the frequency error to MAC is one way, please note that the TB PPDU is the PPDU transmitted immediately after receiving the triggering PPDU. Hence, it seems simpler to remind the readers that the frequency error to be compensated for an HE TB PPDU transmission was measures in the PPDU last received prior to the HE TB PPDU transmission. Whether or how the information is passed to MAC or not is an implementation detail.

The proposed text udpates below adds a NOTE indicating that the triggering PPDU from which the frequency error was measured for an HE TB PPDU transmission is the last received PPDU.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1070 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 1070**

**27.3.15.3 Pre-correction accuracy requirements**

*Instruction to TGme Editor: Update REVme D1.1 P4455L39 as as shown below.*

A STA compensates for carrier frequency offset (CFO) error and symbol clock error with respect to the corresponding triggering PPDU when transmitting the following types of PPDUs:

— HE TB PPDU

— Non-HT or non-HT duplicate PPDU with the TXVECTOR parameter TRIGGER\_RESPONDING set to true

NOTE 1—The MU-RTS Trigger frame solicits transmission of a non-HT or non-HT duplicate PPDU and not an HE TB  
PPDU. The non-HT or non-HT duplicate PPDU transmitted as a response to an MU-RTS Trigger frame carries a CTS  
frame.

NOTE 2 – The PHY can correctly compensate the HE TB PPDU autonomously of the MAC by applying frequency error measurement from the last PPDU received prior to the transmission of the HE TB PPDU, since that is the corresponding triggering PPDU.

# CID 2365, 2110

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| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2365 | 17.3.10.6 | 3507.34 | 17.3.10.6 has information for CCA for both operating classes requiring CCA-ED behavior and operating classes not requiring CCA-ED behavior. This makes it hard to distinguish which applies to operating classes requiring CCA-ED, and which applies to operating classes not requiring CCA-ED.  Note that HT, VHT and HE clauses avoid such confusion by having a separate subclause specific to operating classes requiring CCA-ED behavior - see 19.3.19.5.2, 21.3.18.5.2, 27.3.20.6.2. | Create a new subclause 17.3.10.6 (CCA requirements for operating classes requiring CCA-ED).  Move the paragraphs starting at the following locations to this new subclause 17.3.10.6: P3507L35 P3507L54 P3507L60 |
| 2110 |  |  | "CCA-ED" just confuses everyone, because everyone thinks it means CCA using ED, when in fact it means some wacko mode of operation in wacky regulatory domains/bands | Change "CCA-ED" to "regulatory-only CCA-ED" throughout |

**Discussion**

CCA-ED is not the generic Energy Detection at -62 dBm, but a specific behavior applicable to operating classes with behavior limit of CCA-EDBehavior.

REVme D1.0 P5789

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REVme D1.0 P5796

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REVme D1.0 P5804

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And as seen above, CCA-ED is currently applicable to operating classes in the 3 GHz band.

The commenter of CID 2365 is pointing out that the current way 17.3.10.6 (CCA requirements) is written is hard to distinguish what requirements apply to ‘general’ operating classes, while what requirements apply only to the CCA-ED applicable operating classes. Specifically, only the paragraphes/sentences marked with red below are relevant to CCA-ED.

REVme D1.0 P3507-3508

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Hence, the commenter suggests separating out the subclause for CCA requirements for operating classes requiring CCA-ED. Note that Clause 19 (HT), 21 (VHT) and 27 (HE) all have separate subclause specific to CCA-ED as well.

REVme D1.0 P3614

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REVme D1.0 P3787

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REVme D1.0 P4473

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Thus, the proposed resolution in this document implements splitting out 17.3.10.6 (CCA requirements) so that CCA requirements for operating classes requiring and not requiring the CCA-ED is clearly distinguished from each other.

CID 2110 is pointing out that the name CCA-ED is confusing, and thus can often be misunderstood to mean the “generic” ED at -62 dBm. Hence, the commenter is suggesting to change the name “CCA-ED” to something else – “regulatory-only CCA-ED” is the name suggested by the commenter.

Given that the CCA-ED behavior is tied to operating classes, the proposed resolution in this document changes “CCE-ED” to “CCA-Operating Class Specific ED (CCA-OCSED)”.

While implementing the changes outlined above for CIDs 2365 and 2110, this reviewer noticed that TVHT (Clause 22) and S1G (Clause 23) have sections related to CCA-ED. But note that TVHT operates only in the TVWS, and S1G operates in frequency bands below 1 GHz.

REVme D1.2 P386L16:

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REVme D1.0 P280:

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Since the only operating classes requiring CCA-ED are in the 3 GHz band, this means that CCA-ED is not relevant to TVHT and S1G STAs. Therefore, the relevant subclauses (22.3.18.6.2 and 23.3.18.5.3) are deleted.

Finally, the following MIB variable names are updated to more explicitly reflect that these are related to CCA-ED (now renamed to CCA-OSCED).

* dot11OFDMCCAEDImplemented 🡪 dot11OFDMCCAOCSEDImplemented
* dot11OFDMCCAEDRequired 🡪 dot11ODFMCCAOCSEDRequired
* dot11OFDMEDThreshold 🡪 dot11OFDMCCAOCSEDThreshold

**Proposed Resolution: CID 2365, 2110**

REVISED

**Note to commenter:**

The proposed text updates below separate out the CCA requirements for operating classes requiring CCA-ED into a separate subclause, and renames CCA-ED to CCA-OCSED (Operating Class Specific ED).

**Instruction to TGme Editor:**

Implement the proposed text updates for CIDs 2365 and 2110 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 2365, 2110**

*Instruction to TGme Editor: Update REVme D1.2 P3510L29 as as shown below.*

**17.3.10.6 CCA requirements**

**17.3.10.6.1 General**

The PHY shall indicate a medium busy condition by issuing a PHY-CCA.indication primitive when the carrier sense/clear channel assessment (CS/CCA) mechanism detects a channel busy condition.

The start of an OFDM transmission at a receive level greater than or equal to the minimum modulation and coding rate sensitivity (–82 dBm for 20 MHz channel spacing, –85 dBm for 10 MHz channel spacing, and –88 dBm for 5 MHz channel spacing) shall cause CS/CCA to detect a channel busy condition with a probability > 90% within 4 μs for 20 MHz channel spacing, 8 μs for 10 MHz channel spacing, and 16 μs for 5 MHz channel spacing.

NOTE 1—CS/CCA detect time is based on finding the short sequences in the preamble, so when *TSYM* doubles, so does CS/CCA detect time.

Additionally, the CS/CCA mechanism shall detect a medium busy condition within 4 μs of any signal with a received energy that is 20 dB above the minimum modulation and coding rate sensitivity (minimum modulation and coding rate sensitivity + 20 dB resulting in –62 dBm for 20 MHz channel spacing, –65 dBm for 10 MHz channel spacing, and –68 dBm for 5 MHz channel spacing).

NOTE 2—The requirement to detect a channel busy condition for any signal 20 dB above the minimum modulation and coding rate sensitivity (minimum modulation and coding rate sensitivity + 20 dB resulting in –62 dBm for 20 MHz channel spacing, –65 dBm for 10 MHz channel spacing, and –68 dBm for 5 MHz channel spacing) is a mandatory energy detect requirement on all Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) receivers.

**17.3.10.6.2 CCA requirements for operating classes requiring CCA-OCSED**

For improved spectrum sharing, CCA-Operating Class Specific Energy Detect (CCA-OCSED) is required in some bands. The behavior class indicating CCA-OCSED is given in Table D-2 (Behavior limits). The operating classes requiring the corresponding CCA-OCSED behavior class are given in E.1 (Country information and operating classes). The PHY of a STA that is operating within an operating class that requires CCA-OCSED shall operate with CCA-OCSED.

For the operating classes requiring CCA-OCSED, the PHY shall also indicate a medium busy condition when CCA-OCSED detects a channel busy condition. CCA-OCSED shall detect a channel busy condition when the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold. The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

*Instruction to TGme Editor: Update REVme D1.2 P3617L45 as as shown below.*

**19.3.19.5 CCA sensitivity**

19.3.19.5.2 CCA-Operating Class Specific Energy Detect (CCA-OCSED)

For the operating classes requiring CCA-Operating Class Specific Energy Detect (CCA-OCSED), the PHY shall also indicate a medium busy condition when CCA-OCSED detects a channel busy condition.

For improved spectrum sharing, CCA-OCSED is required in some bands. The behavior class indicating CCA-OCSED is given in Table D-2 (Behavior limits). The operating classes requiring the corresponding CCA-OCSED behavior class are given in E.1 (Country information and operating classes). The PHY of a STA that is operating within an operating class that requires CCA-OCSED shall operate with CCA-OCSED.

CCA-OCSED shall detect a channel busy condition when the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold for the primary channel and dot11OFDMCCAOCSEDThreshold for the secondary channel (if present). The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

NOTE—The requirement to detect a channel busy condition as stated in 19.3.19.5.3 (CCA sensitivity for non-HT PPDUs), 19.3.19.5.4 (CCA sensitivity in 20 MHz), and 19.3.19.5.5 (CCA sensitivity in 40 MHz) is a mandatory energy detection requirement on all Clause 19 (High-throughput (HT) PHY specification) receivers. Support for CCA-OCSED is an additional requirement that relates specifically to the sensitivities described in D.2.5 (CCA-OCSED threshold).

*Instruction to TGme Editor: Update REVme D1.2 P3790L55 as as shown below.*

21.3.18.5 CCA sensitivity

21.3.18.5.2 CCA sensitivity for operating classes requiring CCA-OCSED

For the operating classes requiring CCA-Operating Class Specific Energy Detect (CCA-OCSED), the PHY shall also indicate a medium busy condition when CCA-OCSED detects a channel busy condition.

For improved spectrum sharing, CCA-OCSED is required in some bands. The behavior class indicating CCA-OCSED is given in Table D-2 (Behavior limits). The operating classes requiring the corresponding CCA-OCSED behavior class are given in E.1 (Country information and operating classes). The PHY of a STA that is operating within an operating class that requires CCA-OCSED shall operate with CCA-OCSED.

CCA-OCSED shall detect a channel busy condition when the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold for the primary 20 MHz channel, dot11OFDMCCAOCSEDThreshold for the secondary 20 MHz channel (if present), dot11OFDMCCAOCSEDThreshold + 3 dB for the secondary 40 MHz channel (if present), and dot11OFDMCCAOCSEDThreshold + 6 dB for the secondary 80 MHz channel (if present). The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

NOTE—The requirement to detect a channel busy condition as stated in 21.3.18.5.3 (CCA sensitivity for signals occupying the primary 20 MHz channel) and 21.3.18.5.4 (CCA sensitivity for signals not occupying the primary 20 MHz channel) is a mandatory energy detect requirement on all Clause 21 (Very high throughput (VHT) PHY specification) receivers. Support for CCA-OCSED is an additional requirement that relates specifically to the sensitivities described in D.2.5 (CCA-OCSED threshold).

**22.3.18.6 CCA sensitivity**

*Instruction to TGme Editor: Delete subclause 22.3.18.6.2 (REVme D1.2 P3864L34) as as shown below.*

**23.3.18.5 CCA sensitivity**

*Instruction to TGme Editor: Delete subclause 23.3.18.5.3 (REVme D1.2 P3982L47) as as shown below.*

23.3.18.5.4 CCA sensitivity for signals occupying the primary 2 MHz and/or primary 1 MHz channel

23.3.18.5.4.1 General

*Instruction to TGme Editor: Update REVme D1.2 P3983L38 as as shown below.*

The device shall not issue a PHY-CCA.indication(BUSY, {primary2}), PHY-CCA.indication(BUSY, {secondary2}), PHY-CCA.indication(BUSY, {secondary4}), or PHY-CCA.indication(BUSY, {secondary8}) until the end of the duration indicated by the PPDU or until all conditions above are  no longer satisfied. Additionally, for both type 1 and type 2 channels, the device shall issue a PHY‑CCA.indication(BUSY, {primary1}) if any received signal in the primary 1 MHz channel exceeds –75 dBm within a period aCCATime.

*Instruction to TGme Editor: Update REVme D1.2 P3985L6 as as shown below.*

The device shall not issue a PHY-CCA.indication(BUSY, {secondary2}), PHY-CCA.indication(BUSY, {secondary4}), or PHY-CCA.indication(BUSY, {secondary8}) until the end of the duration indicated by the PPDU or until all conditions above are no longer satisfied. Additionally, for both type 1 and type 2 channels, the device shall issue a PHY-CCA.indication(BUSY, {primary2}) if any received signal in the primary 2 MHz channel exceeds –72 dBm within a period aCCATime.

23.3.18.5.4.2 CCA sensitivity for devices in type 2 channels implementing intended 8 or 16 MHz transmit channel width channel access procedure

*Instruction to TGme Editor: Update REVme D1.2 P3985L36 as as shown below.*

The device shall not issue a PHY-CCA.indication(BUSY, {primary2}), PHY-CCA.indication(BUSY, {secondary2}), PHY-CCA.indication(BUSY, {secondary4}), or PHY-CCA.indication(BUSY, {secondary8}) until the end of the duration indicated by the PPDU or until all conditions above are no longer satisfied. Additionally, the device shall issue a PHY-CCA.indication(BUSY, {primary1}) if any received signal in the primary 1 MHz channel exceeds –75 dBm within a period aCCATime.

*Instruction to TGme Editor: Update REVme D1.2 P3985L64 as as shown below.*

The device shall not issue a PHY-CCA.indication(BUSY, {secondary2}), PHY-CCA.indication(BUSY, {secondary4}), or PHY-CCA.indication(BUSY, {secondary8}) until the end of the duration indicated by the packet or until all conditions above are no longer satisfied. Additionally, for both type 1 and type 2 channels, the device shall issue a PHY-CCA.indication(BUSY, {primary2}) if any received signal in the primary 2 MHz channel exceeds –72 dBm within a period of aCCATime.

**26.5.2.5 UL MU CS mechanism**

*Instruction to TGme Editor: Update REVme D1.2 P4174L29 as as shown below.*

If the CS Required subfield in a Trigger frame is 1, then the non-AP STA shall consider the status of the CCA [using energy detect defined in 27.3.20.6 (CCA sensitivity) and the virtual carrier sense (NAV)] during the SIFS between the Trigger frame and the PPDU sent in response to the Trigger frame.

*Instruction to TGme Editor: Update REVme D1.2 P4475L25 as as shown below.*

27.3.20.6.2 CCA sensitivity for operating classes requiring CCA-OCSED

For the operating classes requiring CCA-Operating Class Specific Energy Detect (CCA-OCSED), the PHY shall indicate a medium busy condition if CCA-OCSED detects a channel busy condition. For improved spectrum sharing, CCA-OCSED is required in some bands. The behavior class indicating CCA-OCSED is given in Table D-2 (Behavior limits). The operating classes requiring the corresponding CCA-OCSED behavior class are given in E.1 (Country information and operating classes). The PHY of a STA that is operating within an operating class that requires CCA-OCSED shall operate with CCA-OCSED.

CCA-OCSED for a STA that is attempting a non-preamble puncturing transmission shall detect a channel busy condition if the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold for the primary 20 MHz channel, dot11OFDMCCAOCSEDThreshold for the secondary 20 MHz channel (if present), dot11OFDMCCAOCSEDThreshold + 3 dB for the secondary 40 MHz channel (if present), and dot11OFDMCCAOCSEDThreshold + 6 dB for the secondary 80 MHz channel (if present). The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

CCA-OCSED for a STA that is attempting a preamble puncturing transmission shall detect a channel busy condition if the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold for the primary 20 MHz channel and dot11OFDMCCAOCSEDThreshold for each nonprimary 20 MHz subchannel. The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

For the HE TB PPDU transmission, for each of 20 MHz sub-channels that require CCA, CCA-OCSED shall detect a channel busy condition if the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold. The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

For transmissions that carry a frame that includes a BQR Control subfield (see 9.2.4.7 (Control subfield variants of an A-Control subfield)), CCA-OCSED shall detect a channel busy condition if the received signal strength exceeds the CCA-OCSED threshold as given by dot11OFDMCCAOCSEDThreshold for primary 20 MHz channel and dot11OFDMCCAOCSEDThreshold for each nonprimary 20 MHz channel (if present). The CCA-OCSED thresholds for the operating classes requiring CCA-OCSED are subject to the criteria in D.2.5 (CCA-OCSED threshold).

NOTE—The requirement to detect a channel busy condition as stated in 27.3.20.6.3 (CCA sensitivity for the primary 20 MHz channel) and 27.3.20.6.4 (CCA sensitivity for signals not occupying the primary 20 MHz channel) is a mandatory energy detect requirement on all Clause 27 (High-efficiency (HE) PHY specification) receivers. Support for CCA-OCSED is an additional requirement that relates specifically to the sensitivities described in D.2.5 (CCA-OCSED threshold).

**B.4.6 OFDM PHY functions**

*Instruction to TGme Editor: Update REVme D1.2 P4991L36 as as shown below.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OF2.19 | CCA |  |  |  |
| OF2.19.1 | CCA: RSSI | 17.3.6 (CCA) | M | Yes o No o |
| OF2.19.2 | CCA: indication to MAC sublayer | 17.3.6 (CCA) | M | Yes o No o |
| \*OF2.19.3 | CCA-OCSED functionality | 17.3.10.6.2 (CCA requirements for operating classes requiring CCA-OCSED) | CF3G6:M | Yes o No o N/A o |
| OF2.19.3.1 | CCA-OCSED energy above dot11OFDMCCAOCSEDThreshold | 17.3.10.6.2 (CCA requirements for operating classes requiring CCA-OCSED) | OF2.19.3:M | Yes o No o N/A o |

C.3 MIB detail

*Instruction to TGme Editor: Update REVme D1.2 P5612L10 as as shown below.*

Dot11PhyOFDMEntry ::=

SEQUENCE {

dot11CurrentFrequency Unsigned32,

dot11TIThreshold Integer32,

dot11FrequencyBandsImplemented Unsigned32,

dot11ChannelStartingFactor Unsigned32,

dot11FiveMHzOperationImplemented TruthValue,

dot11TenMHzOperationImplemented TruthValue,

dot11TwentyMHzOperationImplemented TruthValue,

dot11PhyOFDMChannelWidth INTEGER,

dot11OFDMCCAOCSEDImplemented TruthValue,

dot11OFDMCCAOCSEDRequired TruthValue,

dot11OFDMCCAOCSEDThreshold Unsigned32,

dot11STATransmitPowerClass INTEGER,

dot11ACRType INTEGER }

*Instruction to TGme Editor: Update REVme D1.2 P5613L61 as as shown below.*

dot11OFDMCCAOCSEDImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute indicates that the OFDM PHY is capable of CCA-Operating Class Specific Energy Detect."

::= { dot11PhyOFDMEntry 9 }

dot11OFDMCCAOCSEDRequired OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME when the device is initialized for operation in a band defined by an Operating Class.

This attribute indicates that the PHY CCA-Operating Class Specific Energy Detect functionality is enabled."

::= { dot11PhyOFDMEntry 10 }

dot11OFDMCCAOCSEDThreshold OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written the SME when the device is initialized for operation in a band defined by an Operating Class, or written by an external management entity.

Changes take effect as soon as practical in the implementation.

The current CCA-Operating Class Specific Energy Detect Threshold being used by the OFDM PHY."

::= { dot11PhyOFDMEntry 11 }

*Instruction to TGme Editor: Update REVme D1.2 P5738L31 as as shown below.*

dot11PhyOFDMComplianceGroup3 OBJECT-GROUP

OBJECTS {

dot11CurrentFrequency,

dot11FrequencyBandsImplemented,

dot11ChannelStartingFactor,

dot11FiveMHzOperationImplemented,

dot11TenMHzOperationImplemented,

dot11TwentyMHzOperationImplemented,

dot11PhyOFDMChannelWidth,

dot11OFDMCCAOCSEDImplemented,

dot11OFDMCCAOCSEDRequired,

dot11OFDMCCAOCSEDThreshold,

dot11STATransmitPowerClass,

dot11ACRType }

STATUS current

DESCRIPTION

"Attributes that configure the OFDM PHY for IEEE Std 802.11."

::= { dot11Groups 42}

**D.1 External regulatory references**

*Instruction to TGme Editor: Update REVme D1.2 P5794L19 as as shown below.*

|  |  |
| --- | --- |
| Table D-2 - Behavior limits | |
| Behavior limit | Description |
| … | … |
| CCA-OCSEDBehaviorb | The PHY shall also indicate a medium busy condition when CCA-Operating Class Specific Energy Detect detects a channel busy condition. |

*Instruction to TGme Editor: Update REVme D1.2 P5799L5 as as shown below.*

D.2.5 CCA-OCSED threshold

CCA-OCSED thresholds for operation in specific bands are given in E.2 (Band-specific operating requirements).

E.1 Country information and operating classes

*Instruction to TGme Editor: Update REVme D1.2 P5801L52 as as shown below.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table E-1 - Operating classes in the United States and its territories | | | | | | |
| Operating class | Global operating class (see Table E-4 (Global operating classes)) | Channel starting frequency (GHz) | Channel spacing (MHz) | Channel set | Channel center frequency index | Behavior limits set |
| … | | | | | | |
| 13 | 94 | 3.000 | 20 | 133, 137 | — | CCA-OCSEDBehavior |
| 14 | 95 | 3.000 | 10 | 132, 134, 136, 138 | — | CCA-OCSEDBehavior |
| 15 | 96 | 3.0025 | 5 | 131, 132, 133, 134, 135, 136, 137, 138 | — | CCA-OCSEDBehavior |

*Instruction to TGme Editor: Update REVme D1.2 P5809L9 as as shown below.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table E-4 - Global operating classes | | | | | | |
| Operating class | Nonglobal operating class(es) (see NOTE 3) | Channel starting frequency (GHz) | Channel spacing (MHz) | Channel set | Channel center frequency index | Behavior limits set |
| … | | | | | | |
| 94 | E-1-13 | 3 | 20 | 133, 137 | — | CCA-OCSEDBehavior |
| 95 | E-1-14 | 3 | 10 | 132, 134, 136, 138 | — | CCA-OCSEDBehavior |
| 96 | E-1-15 | 3.0025 | 5 | 131, 132, 133, 134, 135, 136, 137, 138 | — | CCA-OCSEDBehavior |

E.2 Band-specific operating requirements

E.2.2 3650–3700 MHz band in the United States and its territories

*Instruction to TGme Editor: Update REVme D1.2 P5818L18 as as shown below.*

A STA shall use the following:

* CCA-OCSED
* CS/CCA
* TPC
* DFS

For OFDM PHY operation in this specific band, the CCA-OCSED thresholds shall be less than or equal to –72 dBm for 20 MHz channel widths, –75 dBm for 10 MHz channel widths, and –78 dBm for 5 MHz channel widths (minimum sensitivity for BPSK, R=1/2 + 10 dB in Table 17-18 (Receiver performance requirements)).

# CID 1247

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 1247 | 21.3.16 | 3776.59 | The reference for transmit and receive port impedance is poorly phrased, awkwardly worded, and not really correct, as clause 17.3.8.7 only defines the connector impedance for "exposed" connectors. | Replace: "Transmit and receive antenna connector impedance for each transmit and receive antenna is defined in 17.3.8.7 (Transmit and receive impedance at the antenna connector)." With: "The impedance of exposed transmit and receive antenna connectors are defined in 17.3.8.7 (Transmit and receive impedance at the antenna connector)." Note this same correction should also be made at 3855.4 (2 locations in all). |

**Discussion**

The comment is on the following two locations:

REVme D1.0 P3776:

|  |
| --- |
|  |

REVme D1.0 P3855

|  |
| --- |
|  |

Both locations are referring to 17.3.8.7, which is

REVme D1.2 P3503:

|  |
| --- |
|  |

As the commenter has pointed out, 17.3.8.7 deals only with the case in which the connecter is ‘exposed’. Hence, it makes sense to restrict 21.3.16 and 22.3.16 to the case in which the connector is ‘exposed’ as well – as the commenter has suggested.

Note that there are other locatiosn which talk about antenna impedance as well.

REVme D1.2 P3436

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| --- |
|  |

REVme D1.2 P3465

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| --- |
|  |

REVme D1.2 P3609

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| --- |
|  |

REVme D1.2 P3971

|  |
| --- |
|  |

Of these, 19.3.17 and 23.3.16 should also have the same fix.

**Proposed Resolution: CID 1247**

REVISED

**Note to commenter:**

The proposed text update below clarifies that 17.3.8.7 on deals with the case in which the antenna connecter is exposed as the commenter has suggested. Furthermore, similar change is made to 19.3.17 and 23.3.16 as well.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 1247 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 1247**

*Instruction to TGme Editor: Update REVme D1.2 P3609L21 as as shown below.*

**19.3.17 Transmit and receive impedance at the antenna connector**

The impedance of exposed transmit and receive antenna connectors are defined in 17.3.8.7 (Transmit and receive impedance at the antenna connector).

*Instruction to TGme Editor: Update REVme D1.2 P3779L59 as as shown below.*

**21.3.16 Transmit and receive port impedance**

The impedance of exposed transmit and receive antenna connectors are defined in 17.3.8.7 (Transmit and receive impedance at the antenna connector).

*Instruction to TGme Editor: Update REVme D1.2 P3858L3 as as shown below.*

**22.3.16 Transmit and receive port impedance**

The impedance of exposed transmit and receive antenna connectors are defined in 17.3.8.7 (Transmit and receive impedance at the antenna connector).

*Instruction to TGme Editor: Update REVme D1.2 P3971L51 as as shown below.*

**23.3.16 Transmit and receive port impedance**

The impedance of exposed transmit and receive antenna connectors are defined in 17.3.8.7 (Transmit and receive impedance at the antenna connector).

# CID 2091

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page.Line** | **Comment** | **Proposed Change** |
| 2091 |  |  | CID 98 follow-up: changes need to be applied to the other instances of "Each output port" | As it says in the comment |

**Discussion**

Following was CID98 in CC35 on REVme D0.0:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number** | **Page.Line** | **Comment** | **Proposed Change** | **Resolution** |
| 98 | John Coffey | 21.3.18 | 2304.57 | This introductory subclause establishes that "tests in this subclause" are carried out in a conducted configuration. This makes sense for many requirements, in particular for minimum receiver sensitivity, but not for energy detect, cf. 3208.20 (21.3.18.5.4), where the receiver should defer whenever a power level of -62 dBm is encountered over the air. | At a minimum, add the qualifier "Except where otherwise noted," before "Each output port". At 3208.20, change "any signal" to "any signal, however received,", and add at end of paragraph "The requirements of this paragraph apply for all received signals; in particular, they are not limited to configurations in which each output port of a transmitting STA are connected through a cable to each input port of the receiving STA." | REVISED (PHY: 2021-10-18 15:06:29Z)  At 3204.53, replace the paragraph with: “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 Subclauses 21.3.18.1, 21.3.18.2, and 21.3.18.3, 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 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.” |

Change made by CID98 was:

|  |
| --- |
| **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 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. |

It is not very clear what CID 2091 is suggesting, but I am took the literal reading of the comment and searched for “each output port” in REVme D1.2, and reviewed whether it makes sense to change to “except where otherwise noted, each output port”.

REVme D1.2 P3613:

|  |
| --- |
| **19.3.18.7.3 Transmitter constellation error**  The relative constellation PPDU-averaged RMS error, calculated first by averaging over subcarriers, spatial streams, and OFDM symbols, shall not exceed a data-rate-dependent value according to Table 19-22 (Allowed relative constellation error versus constellation size and coding rate). 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 testing instrumentation input ports. In the test, with EQM MCSs shall be used and no beamforming steering matrix shall be used. Each output port of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The same requirement applies both to 20 MHz channels and 40 MHz channels. |

Here, “Each output port” is specific to this particular subclause on Transmitter Constellation Error. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P3784:

|  |
| --- |
| **21.3.17.2 Spectral flatness**  …  For the spectral flatness test, the transmitting STA shall be configured to use a spatial mapping matrix *Qk* (see 21.3.10.11 (OFDM modulation)) with flat frequency response. Each output port under test of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements apply to 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous transmissions as well as 80+80 MHz transmissions. |

Here, “Each output port” is specific to this particular subclause on spectral flatness. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P3785:

|  |
| --- |
| **21.3.17.4.3 Transmitter constellation error**  The relative constellation RMS error, calculated by first averaging over subcarriers, frequency segments, VHT PPDUs, and spatial streams [see Equation (19-89)] shall not exceed a data-rate dependent value according to Table 21-24 (Allowed relative constellation error versus constellation size and coding rate). 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 testing instrumentation input ports. In the test, *NSS = NSTS* (no STBC) shall be used and no beamforming steering matrix shall be used. Each output port of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements apply to 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous transmissions as well as 80+80 MHz noncontiguous transmissions. |

Here, “Each output port” is specific to this particular subclause on Transmitter Constellation Error. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P3788:

|  |
| --- |
| **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 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. |

This is what was updated by CC35 CID98. So, no further change is needed.

REVme D1.2 P3860:

|  |
| --- |
| **22.3.17.2 Spectral flatness**  **…**  For the spectral flatness test, the transmitting STA shall be configured to use a spatial mapping matrix Qk (see 22.3.10.11 (OFDM modulation transmission in VHT format)) with flat frequency response. Each output port under test of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. |

Here, “Each output port” is specific to this particular subclause on spectral flatness. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P3975

|  |
| --- |
| **23.3.17.2 Spectral flatness**  **…** For the spectral flatness test, the transmitting STA shall be configured to use a spatial mapping matrix with flat frequency response. Each output port under test of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements apply to 1 MHz, 2 MHz, 4 MHz, 8 MHz, and 16 MHz normal mode transmissions and transmissions based on 1 and 2 MHz duplicated segments. |

Here, “Each output port” is specific to this particular subclause on spectral flatness. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P3977

|  |
| --- |
| **23.3.17.4.3 Transmitter constellation error**  The relative constellation RMS error, calculated by first averaging over subcarriers, OFDM PPDUs and spatial streams [see Equation (19-89)] shall not exceed a data-rate dependent value according to Table 23-33 (Allowed relative constellation error versus constellation size and coding rate). 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 testing instrumentation input ports. In the test, *NSS*=*NSTS* (no STBC) shall be used. Each output port of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements apply to 1 MHz, 2 MHz, 4 MHz, 8 MHz, and 16 MHz transmissions. |

Here, “Each output port” is specific to this particular subclause on Transmitter Constellation Error. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P4463

|  |
| --- |
| **27.3.19.2 Spectral flatness**  **…**  For the spectral flatness test, the transmitting STA shall be configured to use a spatial mapping matrix *Qk* (see 27.3.12.14 (OFDM modulation)) with flat frequency response. Each output port under test of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements shall apply to 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous transmissions as well as 80+80 MHz transmissions. |

Here, “Each output port” is specific to this particular subclause on spectral flatness. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P4465

|  |
| --- |
| **27.3.19.4.3 Transmitter constellation error**  The relative constellation RMS error in the test, calculated by first averaging over subcarriers, frequency segments, HE PPDUs, and spatial streams [see Equation (27-127)] as described in 27.3.19.4.4 (Transmitter modulation accuracy (EVM) test) shall not exceed a data-rate-dependent value according to Table 27-49 (Allowed relative constellation error versus constellation size and coding rate(11ax)). 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 testing instrumentation input ports. In the test, *NSS* = *NSTS* (no STBC), and no beamforming steering matrix shall be used. Each output port of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. The requirements shall apply to 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous transmissions as well as 80+80 MHz noncontiguous transmissions. |

Here, “Each output port” is specific to this particular subclause on Transmitter Constellation Error. Hence, there is no need to add “except where otherwise noted.”

REVme D1.2 P4622

|  |
| --- |
| **28.3.9.9 Spectral flatness test for the EDMG OFDM mode**  **…**  For the spectral flatness test, the transmitting STA shall be configured to use a spatial mapping matrix *Qk* (see 28.6.10 (PPDU transmission)) with flat frequency response. Each output port under test of the transmitting STA shall be connected through a cable to one input port of the testing instrumentation. |

Here, “Each output port” is specific to this particular subclause on spectral flatness. Hence, there is no need to add “except where otherwise noted.”

The remaining two places of “each output port” are being updated to “except where otherwise noted, each output port” in the proposed resolution below.

**Proposed Resolution: CID 2091**

REVISED

**Note to commenter:**

There are 12 instances of “each output port” in REVme D1.2, and most of them should not be changed to “except where otherwise noted, each output port”. The proposed text update below updates two locations of “each output port”.

**Instruction to TGme Editor:**

Implement the proposed text updates for CID 2091 in [https://mentor.ieee.org/802.11/dcn/22/11-22-0520-02-000m-lb258-phy-cides-part-1.docx](https://mentor.ieee.org/802.11/dcn/22/11-22-0520-00-000m-lb258-phy-cides-part-1.docx)

**Proposed Text Updates: CID 2091**

*Instruction to TGme Editor: Update REVme D1.2 P3615L58 as as shown below.*

**19.3.19 HT PHY 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 19.3.19.1 (Receiver minimum input level sensitivity), 19.3.19.2 (Adjacent channel rejection), and 19.3.19.3 (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 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.

**19.3.19.1 Receiver minimum input level sensitivity**

The PER shall be less than 10% for a PSDU length of 4096 octets with the rate-dependent input levels listed in Table 19-23 (Receiver minimum input level sensitivity) or less. The test in this subclause and the minimum sensitivity levels specified in Table 19-23 (Receiver minimum input level sensitivity) apply only to non-STBC modes, MCSs 0–31, 800 ns GI, and BCC.

*Instruction to TGme Editor: Update REVme D1.2 P4472L9 as 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 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.

[End of File]