IEEE P802.11
Wireless LANs

|  |
| --- |
| Resolution of Multirate Support related CIDs |
| Date: 2018-02-25 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Oren Kedem | Intel |  |  | oren.kedem@intel.com |
| Carlos Cordeiro  | Intel  |  |  | carlos.cordeiro@intel.com  |
| Solomon Trainin | Qualcomm |  |  | strainin@qti.qualcomm.com |
|  |  |  |  |  |

Abstract

This submission proposes resolutions to 2125, 2255, 2261, 1078, 1080, 1214, 1964, 2257, 2126, 2127,1079, 1566, 1567, 1852, 1853, 1854, 1965, 2176, 1965 CIDs.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1078 | 10.7.7.2 | "Rules for Channel Width selection of ..." Why do channel and width need to start in upper case? | Change to "Rules for channel width selection of ..." | Accepted |
| 2176 | 10.7.7.2 | "for EDMG STA" is not correct. | either change to "For a EDMG STA" or change to "For EDMG STAs" | Accepted |

**Revised text**

Rules for channel width selection of control frames for an EDMG STA are specified in 10.7.7.6.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1080 | 10.7.7.6 | "... the transmitting STA shall set the TXVECTOR parameter CH\_BANDWIDTH to the desired bandwidth". It is not clear what "desired bandwdith" really means. Who desires that bandwidth? Clarify. | As in comment. | Revised Was replaced with specific rules defined in section 10.22.2.12 |
| 1214 | 10.7.7.6 | "to the desired bandwidth" - STAs don't have desires. Do we just invent a random bandwidth? | Replace with a specification of where the knowledge of the bandwidth is created or communicated. |

**D1.0 text**

If an EDMG STA transmits to another EDMG STA a Control frame that is not an RTS frame, DMG CTS
frame, or DMG DTS frame, and if that Control frame elicits a control response frame, the transmitting STA
shall set the TXVECTOR parameter CH\_BANDWIDTH to the desired bandwidth.

**Revised text**

~~If an EDMG STA transmits to another EDMG STA a Control frame that is not an RTS frame, DMG CTS
frame, or DMG DTS frame, and if that Control frame elicits a control response frame, the transmitting STA
shall set the TXVECTOR parameter CH\_BANDWIDTH to the desired bandwidth.~~

**Below rule was added to 10.22.2.12**

An EDMG STA that initiates a PPDU transmission to another peer EDMG STA shall not set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to the channels in which the CCA were not idle according to Table 8.5a and shall set the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING to a value that provides bandwidth information to the peer STA.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1964 | 10.7.7.6 | The TXOP holder should set the TXVECTOR parameter CH\_BANDWIDTH of a CF-End frame to the maximum bandwidth allowed by the rules in 10.22.2.7. Rule or/and reference are wrong | Propose to replace by "The TXOP holder should set the TXVECTOR parameter CH\_BANDWIDTH of a CF-End frame equal to the RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_EDMG of the last received DMG CTS frame or equal to the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_EDMG of the RTS frame if no DMG CTS frame is received. | Revised CF-End rule was moved to the 10.3.2.14 EDMG RTS procedure |

**Revied Text in EDMG RTS procedure**

A CF-End frame sent to truncate a TXOP initiated by RTS frame carried in non-EDMG duplicate format shall be sent using a non-EDMG duplicate format. The TXVECTOR parameters CH\_BANDWIDTH and CH\_BANDWIDTH SIGNALING of the CF-End frame shall be set to the same values as indicated by the RXVECTOR parameters of the DMG CTS frame if received or to the same values as indicated by the TXVECTOR parameters of the RTS frame otherwise.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2257 | 10.7.7.6 | There is no BW rule for EDMG PPDU in response to another EDMG PPDU | add the responding EDMG PPDU shall have the same CH\_BANDWIDTH as the eliciting EDMG PPDU | Revised:Section 10.7.7.6 and 10.7.7.8 were revised to accommodate |

**Revised Text**

**Below rule was adopted in the 10.7.7.6 Channel Width selection for Control frames transmitted by EDMG STAs**

An EDMG STA that sends a Control frame in response to a frame carried in an EDMG PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to indicate the same channels as indicated by the RXVECTOR parameter CH\_BANDWIDTH of the frame eliciting the response.

**Below rule was adopted in the 10.7.7.8 Channel Width selection for individually addressed Data and Management frames transmitted by EDMG STAs**

A TXOP responder that transmits a PPDU as a result of reverse direction grant shall set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to the same value of the received EDMG PPDU addressed to the TXOP responder and that granted the reverse direction.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2261 | 10.7.7.6 | "If a Control frame is transmitted in a non-EDMG PPDU (channel width equal to 2.16 GHz) and with the DMG Control modulation class, the transmitting DMG STA may set the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_EDMG equal to the CH\_BANDWIDTH parameter."Can CH\_BANDWIDTH\_IN\_NON\_EDMG be set to something else? | change to "the transmitting DMG STA may set the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_EDMG equal to the CH\_BANDWIDTH parameter or CH\_BANDWIDTH\_IN\_NON\_EDMG is not present" | Revised:Rule was removed as it related to Control frames which are not RTS/CTS/DTS and there is no BW signalling for those control frames. |
| 2126 | 10.7.7.6 | "An EDMG STA that sends a Control frame in response to a frame carried in a non-EDMG duplicate PPDUthat does not provide channel width information- Should set the TXVECTOR parameter CH\_BANDWIDTH to the same value as the RXVECTOR parameter CH\_BANDWIDTH for the frame eliciting the response."These two sentences seem to contradics with each other. If there is not channel width provided in the frame that elicits the response, then how would the EDMG STA should be able to set the sme CH\_BANDWIDTH parameters ? | Clarify | Revised:Rule was changed to the following:An EDMG STA that sends a control frame in response to a frame carried in a non-EDMG duplicate PPDU, it shall set the TXVECTOR parameter CH\_BANDWIDTH to the same value of the TXVECTOR parameter CH\_BANDWIDTH for the last EDMG PPDU or non-EDMG duplicate PPDU frame successfully transmitted by the STA in the current sequence |
| 2127 | 10.7.7.6 | "An EDMG STA that sends a Control frame in response to a non-EDMG duplicate format frame with the DMG Control modulation class and that is not a DMG CTS frame or DMG DTS frame shall set the channelwidth indicated by the TXVECTOR parameter CH\_BANDWIDTH to the same value as the channel width indicated by the RXVECTOR parameter CH\_BANDWIDTH for the frame eliciting the response". | change to "An EDMG STA that sends a Control frame in response to a non-EDMG duplicate format frame with the DMG Control modulation class and that is not a DMG CTS frame or DMG DTS frame shall set the TXVECTOR parameter CH\_BANDWIDTH to the same value as the RXVECTOR parameter CH\_BANDWIDTH for the frame eliciting the response". | Rule was revised but not as commented since CH\_BANDWIDTH is not provided in case of non-EDMG duplicate format frame. |

**Discussion**

Proposed a new text that addresses

**Revised text**

An EDMG STA that sends a Control frame in response to a frame carried in an EDMG PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to indicate the same channels as indicated by the RXVECTOR parameter CH\_BANDWIDTH of the frame eliciting the response.

An EDMG STA that sends a Control frame in response to a frame carried in a non-EDMG duplicate PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to the first rule that is met within below rules:

* To be equivalent to the received PPDU’s RXVECTOR parameter CH\_BANDWIDTH\_SIGNALING value if provided.
* Equal to the CH\_BANDWIDTH parameter value of the last successfully received EDMG PPDU addressed to the STA in the current exchange sequence.
* Equal to the same value of the TXVECTOR parameter CH\_BANDWIDTH of the last EDMG PPDU or non-EDMG duplicate PPDU frame transmitted by the STA in the current exchange sequence.
* To the RXVECTOR CH\_BANDWIDTH parameter estimated value.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2255 | 10.7.7.2 | A bullet should be added to allow Ack/BA transmission in MCS0. Otherwise the mechanism descriibed in 10.39.4 cannot be utilized | Add a bullet to allow MCS0 if CT is appended to BA or Ack | Revised:Below rule was added  |

**Revised Text**

* In case an Ack frame or a BlockAck frame is appended with a control trailer that provides spatial stream feedback, it shall be sent using non-EDMG duplicate mode and shall follow the rules defined in 10.39.4.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 2125 | 10.7.7.2 | "Use MCS1 when the Ack or BlockAck frame is sent within a non-EDMG duplicate PPDU (4.32 GHz, 6.48 GHz or 8.64 GHz channel)". Why mandating MCS1 ? Why MCS0 is disallowed? | Clarify | Revisd: |
| 2256 | 10.7.7.2 | Ack to duplicate non-EDMG control modulation class should be MCS0 | Add a bullet to allow MCS0 if eliciting frame is sent in MCS0 |

**Discussion**

Ack in Response to PPDU sent in MCS0 should be in MCS0 and it discussed in DMG rules. The rule here should discuss only on Ack/BACK in response to SC/OFDM modulation (control modulation was removed from rule).

Ack sent in CP modulation shall be sent in response to MPDU sent in CP modulation only per existing DMG rules as indicated below

**Rule in section 10.7.7.6**

An EDMG STA transmitting an Ack frame or a BlockAck frame in response to an EDMG frame sent using the
EDMG SC modulation class or EDMG OFDM modulation class shall:

**Below rule is indicated in 802.11 2016 version in section 10.7.7.2 Rate selection rules for Control frames transmitted by DMG STAs**

A STA transmitting an Ack or a BlockAck frame that is a response to a frame sent using the DMG Control
modulation class shall use the DMG Control modulation class.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1079 | 10.7.7.5 | "If an EDMG BRP packet is sent during a BRP transaction ..., the EDMG BRP packet should be transmitted with MCS 0." Is this sentence meaningful? Doesn't it end the same with "may be transmitted with any MCS"? | Change to ".. may be transmitted with any MCS." | Rejected:This rule give recommendation with regard to which MCS should be used in the respective usecase. The final outcome between the suggested and the existed text is the same, BRP frame can be sent with any MCS  |
| 1566 | 10.7.7.5 | An EDMG BRP packet is a concept of PHY | Change "EDMG BRP packet " to " EDMG BRP frame" | Revised  |
| 1567 | 10.7.7.5 | EDMG BRP frame is included in the single channel case as well as EDMG BRP packet | insert "2.16GHz" between "over a" and "4.32 GHz, 6.48 GHz, 8.64 GHz, 2.16 + 2.16 GHz or 4.32 + 4.32 GHz channel" | Revised  |
| 1565 | 10.7.7.5 | Lack of definition of "a BRP transaction". According to 11ad, " A beam refinement transaction is a set of BRP frames composed of request and responses." | Define " BRP Transaction" or Change" a BRP transaction" to "a beam refinement transaction" | RejectedBRP is a short for Beam Refinment hence no need to include it in text  |

**Revised text**

**10.7.7.5 Rate selection for BRP packets***Change the following subclause as follow*EDMG BRP packet sent during a BRP transaction to perform beamforming training over a 2.16 GHz, 4.32GHz, 6.48 GHz, 8.64 GHz, 2.16 + 2.16 GHz or 4.32 + 4.32 GHz channel should be transmitted with MCS0.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1852 | 10.7.7.7 | Grammatical error in TXVECTOR parameter restrictions | Change "NUM\_USERS is set" to "NUM\_USERS set" | Accepted   |
| 1853 | 10.7.7.7 | Grammatical error in TXVECTOR parameter restrictions | Change "NUM\_MOD is set" to "NUM\_MOD set" | Accepted  |
| 1854 | 10.7.7.7 | Grammatical error in TXVECTOR parameter restrictions | Change "set LONG" to "set to LONG" | Accepted  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Comment** | **Proposed change** |
| 1965 | 10.7.7.9 | Lack of relevant modulation class selection in the table 10-6 | Append "IsSC field of L-Header is set to 1" to the second column, second row, and "IsSC field of L-Header is set to 0" to the second column, third row. | Revised  |

**Proposed text**

**10.7.7.2 Rate selection rules for Control frames transmitted by DMG STAs**

*Change the following paragraph after the sixth paragraph*An EDMG STA transmitting an Ack frame or a BlockAck frame in response to an EDMG frame sent using the
EDMG SC modulation class or EDMG OFDM modulation class shall:

* Use the rules applicable to an DMG STA rules when the number of bits set to 1 in the CH\_BANDWIDTH parameter in the RXVECTOR of the received EDMG PPDU is equal to 1 (i.e. one 2.16GHz channel)
* Use MCS1 when the Ack or BlockAck frame is sent with a non-EDMG duplicate PPDU and the number of bits set in the CH\_BANDWIDTH parameter is greater than 1.
* Use one of MCS 1 through MCS 4 from the mandatory MCS set of the EDMG SC modulation
class when the ACK or BlockAck frame is sent within an EDMG PPDU as long as (a) the selected
MCS has a Data Rate that does not exceed the Data Rate of the frame that elicited the response, and
(b) no other MCS satisfying condition (a) results in a shorter frame transmission time.
* In case an Ack frame or a BlockAck frame is appended with a control trailer that provides spatial stream feedback, it shall be sent using non-EDMG duplicate mode and shall follow the rules defined in 10.39.4.

Rules for channel width selection of control frames for an EDMG STA are specified in 10.7.7.6.

**10.7.7.5 Rate selection for BRP packets***Change the following subclause as follow*EDMG BRP packet sent during a BRP transaction to perform beamforming training over a 2.16 GHz, 4.32GHz, 6.48 GHz, 8.64 GHz, 2.16 + 2.16 GHz or 4.32 + 4.32 GHz channel should be transmitted with MCS0.

*Change section as below*

**10.7.7.6 Channel Width selection for Control frames transmitted by EDMG STAs**

The rules in this subclause, combined with the rules in 10.7.7.2, determine the format of control frames which are not RTS, DMG CTS, DMG DTS or CF\_End frames.

Channel width selection rules for RTS and CF-End frames are specified in 10.3.2.14.

Channel width selection rules for DMG CTS and DMG DTS frames are specified in 10.3.2.7.

An EDMG STA that sends a Control frame in response to a frame carried in an EDMG PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to indicate the same bits as indicated by the RXVECTOR parameter CH\_BANDWIDTH of the frame eliciting the response.

An EDMG STA that sends a Control frame in response to a frame carried in a non-EDMG duplicate PPDU shall set the TXVECTOR parameter CH\_BANDWIDTH to the first rule that is met within below rules:

* To be equivalent to the received PPDU’s RXVECTOR parameter CH\_BANDWIDTH\_SIGNALING value if provided.
* Equal to the CH\_BANDWIDTH parameter value of the last successfully received EDMG PPDU addressed to the STA in the current exchange sequence.
* Equal to the same value of the TXVECTOR parameter CH\_BANDWIDTH of the last EDMG PPDU or non-EDMG duplicate PPDU frame transmitted by the STA in the current exchange sequence.
* To the RXVECTOR CH\_BANDWIDTH parameter estimated value.

*Editor note: section 10.26 need to be verified in relation to completeness of the means provided be EDMG Protection.*

*Change section as below*

**10.7.7.7 Control frame TXVECTOR parameter restrictions**

A STA shall not transmit a Control frame with the TXVECTOR parameter GI\_LENGTH set to a value
that is not equal to NormalGI.
A STA shall not transmit a Control frame with the TXVECTOR parameter EDMG\_MODULATION set to
EDMG\_OFDM\_MODE.
A STA shall not transmit a Control frame with the TXVECTOR parameter NUM\_STS set to a value
greater than one.
A STA shall not transmit a Control frame with the TXVECTOR parameter NUM\_USERS set to a value
greater than one.
A STA shall not transmit a Control frame with the TXVECTOR parameter LDPC\_CW\_TYPE set to LONG.

A STA shall not transmit a Control frame with the TXVECTOR parameter NUC\_MOD set to
NUCApplied.

*Add new section*

**10.7.7.8 Channel Width selection for individually addressed Data and Management frames transmitted by EDMG STAs**
A TXOP holder that transmits a PPDU during a TXOP that was established using the bandwidth negotiation procedure specified in 10.3.2.14 and 10.3.2.7 shall set the TXVECTOR parameter CH\_BANDWIDTH according to the following rules:

* CH\_BANDWIDTH shall be set to channels that were indicated in the RXVECTOR parameter CH\_BANDWIDTH SIGNALING of the TXOP responder’s CTS frame.
* CH\_BANDWIDTH may indicate subset of the channels that were indicated as used in the previous PPDU that was sent in same TXOP, only if the transmitted PPDU is an EDMG PPDU.
* CH\_BANDWIDTH shall not indicate channels that were not used by all previous PPDUs sent in same TXOP.

A TXOP responder that transmits a PPDU as a result of reverse direction grant shall set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to the same value of the received EDMG PPDU addressed to the TXOP responder and that granted the reverse direction.

**10.7.9 Modulation classes***Change table 10-6 as follows*

*Insert the following rows in table 10-6*

|  |  |  |  |
| --- | --- | --- | --- |
| EDMG Control  | Clause 30 transmission FORMAT is EDMG and EDMG\_MODULATION isEDMG\_C\_MODE | N/A  | N/A |
| EDMG SC  | Clause 30 transmission, FORMAT is EDMG, EDMG\_MODULATION is EDMG\_SC | N/A  | N/A |
| EDMG OFDM  | Clause 30 transmission FORMAT is EDMG, EDMG\_MODULATION is EDMG\_OFDM\_MODE | N/A  | N/A |

*Change first paragraph of below section as follows:*

**10.36.11.2 Channel access over multiple channels
10.36.11.2.1 Channel access rules**

The following apply to transmissions performed in an EDMG BSS:

* Transmissions shall not occupy a bandwidth that exceeds the equivalent of four 2.16 GHz channels.
* Transmissions shall be confined to the channel number indicated by the primary channel, the channels indicated in the EDMG Operation and EDMG Capabilities elements.

**10.22.2.12 EDCA channel access in an EDMG BSS***Modify the last paragraph as follow:*

An EDMG STA that initiates a PPDU transmission to another peer EDMG STA shall not set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to the channels in which the CCA were not idle according to Table 8.5a and shall set the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING to a value that provides bandwidth information to the peer STA.

**SP/M:** Do you accept the resolutions given in this document