IEEE P802.11
Wireless LANs

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|  CIDs related to TXVECTOR |
| Date: 2019-3-11 |
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Abstract

This submission proposes resolution of comments on clause 29 received from LB# 239 (TGay Draft 3.0).

5 CIDs: 4157, 4190, 4191, 4194, 4464

Revision history:

r0 initial

r1 edited during the presentation

|  |  |  |  |  |  |
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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 4157 | 29.2.2 | 389.01 | "RX\_TRN\_PER\_TX\_TRN": add a note in the value that this has to divide evenly into the EDMG\_TRN\_LEN parameter (i.e. if the EDMG TRN\_LEN is 16, this can take the value 2,4,8) | as in comment | **Revised** |

**Discussion**

**Agreed in principle. The description of the VECTOR parameter should specify possible range or enumerates of the value. The values for RX\_TRN\_PER\_TX\_TRN are divisors of the value of the EDMG\_TRN\_LEN.**

The text at P584L34 in 29.9.2.2.3 EDMG BRP packet header fields specifies that:

“A value of 1 in the Packet Type field, a value of 0 in the Beam Tracking Request field, a value greater than 0 in the RX TRN-Units per Each TX TRN-Unit field, and a value greater than 0 in the EDMG TRN Length field indicate an EDMG BRP-RX/TX packet.” **Thus,** the value of **RX\_TRN\_PER\_TX\_TRN (=**the RX TRN-Units per Each TX TRN-Unit field + 1) shall be equal to or greater than 2.

On the other hands, we don’t see any text in D3.0 to prohibit the **RX\_TRN\_PER\_TX\_TRN parameter being equal to EDMG\_TRN\_LEN, so the maximum value of** the **RX\_TRN\_PER\_TX\_TRN parameter can be 255.**

**Proposed changes to D3.0**

29.2.2 TXVECTOR and RXVECTOR parameters

***Editor: Change the description of RX\_TRN\_PER\_TX\_TRN parameter in Table 46 (TXVECTOR and RXVECTOR parameters)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RX\_TRN\_PER\_TX\_TRN | FORMAT is EDMG, EDMG\_PACKET\_TYPE is EDMG-TRN-R/T-PACKET, EDMG\_TRN\_LEN > 0 | Indicates the number of consecutive TRN-Units in which the same AWV is used in the transmission of the last EDMG\_TRN\_M TRN subfields of each TRN-Unit. Values are in the range 2–255, and divisors of the value of the EDMG\_TRN\_LEN, including EDMG\_TRN\_LEN but excluding 1.  | Y | Y |

|  |  |  |  |  |  |
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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 4190 | 29.2.2 | 392.00 | It is not unclear how the PHY at the receiver can detect the CT\_TYPE from received packets. The PHY needs to report the CT\_TYPE parameter and related parameters in the received control tralier (e.g. NUM\_SECTORS\_MSB) as part of the RXVECTOR. | Add control trailer type field as the first field of the Control tralier format defined in 29.3.7 (P449-P452). Propose to have 4 bits for it as the current formats have enough reserve bits. | **Revised** |

**Proposed changes to D3.0**

29.3.7 Control trailer

***Editor: Change the third paragraph in 29.3.7 as follows (P448L16 of D3.0):***

The format of the control trailer depends on the value of the TXVECTOR parameter CT\_TYPE. The format is indicated by the CT format type field that is the first field in each of the control trailer formats. Table TT defined the value of the CT format type field. Table 80 defines the control trailer format when the CT\_TYPE parameter is equal to CTS\_DTS. Table 81 defines the control trailer format when the CT\_TYPE parameter is equal to GRANT\_RTS\_CTS2self. Table 82 defines the control trailer format when the CT\_TYPE parameter is equal to SPR. Table 83 defines the control trailer format when the CT\_TYPE parameter is equal to SSW\_FEEDBACK, BLOCK\_ACK or ACK.

***Editor: Insert the following table after the third paragraph in 29.3.7 (P448L20+ of D3.0)***

**Table TT ---CT format type**

|  |  |
| --- | --- |
| **CT format type field** | **CT\_TYPE** |
| 0 | CTS\_DTS |
| 1 | GRANT\_RTS\_CTS2self |
| 2 | SPR |
| 3 | SSW\_FEEDBACK, BLOCK\_ACK or ACK |
| 4-15 | Reserved |

***Editor: Add CT format type field to Table 80, Table 81, Table 82 and Table 83 respectively.***

**Table 80 ---Control Trailer definition when CT\_TYPE is CTS\_DTS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| CT format type | 4 | 0 | Indicated the format of the control trailer. Set to 0 to indicate that the CT\_TYPE is CTS\_DTS. |
| Channel Aggregation | 1 | 4 | See Table 57 |
| BW | 8 | 5 | See Table 57 |
| Primary Channel Number | 3 | 13 | See Table 57 |
| SISO/MIMO | 1 | 16 | Corresponds to the TXVECTOR parameter NEXT\_TX\_SISO. Set to 0 to indicate that the following transmission from this STA is performed with a single antenna. Set to 1 to indicate that the following transmission from this STA is performed with multiple antennas.  |
| SU/MU MIMO | 1 | 17 | Corresponds to the TXVECTOR parameter MU\_MIMO\_NEXT. Set to 0 to indicate SU-MIMO, and set to 1 to indicate MU-MIMO. Reserved when the SISO/MIMO field is set to 0. |
| EDMG Group ID | 8 | 18 | Corresponds to the TXVECTOR parameter EDMG\_GROUP\_ID. This field indicates the group of STAs that will be involved in the following MU-MIMO transmission. Reserved when the SU/MU MIMO field is set to 0. |
| TX Sector Combination Index | 6 | 26 | Indicates the TX sector combination (as defined in 9.4.2.253) and the corresponding RX AWVs to be used in the SU-MIMO transmission from the EDMG STA transmitting the CTS to the EDMG STA that transmitted the RTS. Reserved if the SISO/MIMO field is set to 0, if the SU/MU MIMO field is set to 1 or if the control trailer is sent with a DMG DTS frame. |
| HBF | 1 | 32 | Corresponds to the TXVECTOR parameter HBF\_TRAINING. Set to 0 to indicate that the following transmission from this STA is not hybrid beamforming training. Set to 1 to indicate that the following transmission from this STA is hybrid beamforming training. Reserved when the SISO/MIMO field is 0. |
| Reserved | 95 | 33 | Set to 0 by the transmitter and ignored by the receiver. |
| CTCS | 16 | 128 | Control Trailer Check Sequence (CTCS) is a CRC-16 computed over the content of the control trailer. The CRC-16 is computed as defined in section 20.3.7. |

**Table 81 ---Control Trailer definition when CT\_TYPE is GRANT\_RTS\_CTS2self**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| CT format type | 4 | 0 | Indicated the format of the control trailer. Set to 1 to indicate that the CT\_TYPE is GRANT\_RTS\_CTS2self. |
| Channel Aggregation | 1 | 4 | See Table 57 |
| BW | 8 | 5 | See Table 57 |
| Primary Channel Number | 3 | 13 | See Table 57 |
| SISO/MIMO | 1 | 16 | See Table 80 |
| SU/MU MIMO | 1 | 17 | See Table 80 |
| TX Sector Combination Index | 6 | 18 | Indicates the TX sector combination (as defined in 9.4.2.253) and the corresponding RX AWVs to be used in the following SU-MIMO transmission. Reserved if the SISO/MIMO field is 0 or the SU/MU MIMO field is 1. |
| EDMG Group ID | 8 | 24 | See Table 80 |
| MU-MIMO Transmission Configuration Type  | 1 | 32 | Corresponds to the TXVECTOR parameter MU\_MIMO\_TX\_CONFIG\_TYPE. Set to 1 to indicate that the MU-MIMO transmission configuration was obtained from the reciprocal MU-MIMO BF training; set to 0 to indicate that the MU-MIMO transmission configuration was obtained from the non-reciprocal MU-MIMO BF training. Reserved if the SISO/MIMO field is 0 or the SU/MU MIMO field is 0. |
| MU-MIMO Transmission Configuration Index  | 3 | 33 | Corresponds to the TXVECTOR parameter MU\_MIMO\_TX\_CONFIG\_INDEX. Indicates the MU-MIMO transmission configuration (as defined in 9.4.2.261) to be used in the following MU-MIMO transmission. Reserved if the SISO/MIMO field is 0 or the SU/MU MIMO field is 0. |
| Total Number of Sectors MSB  | 4 | 36 | This field is prepended to the Total Number of Sectors subfield in the BF Control field to form a single 11 bits field indicating the total number of sectors the initiator or the responder uses during an SLS. This field is reserved and set to 0 when the PPDU does not carry a Grant or Grant Ack frame with the Beamforming Training field equal to 1. |
| Number of RX DMG Antennas MSB  | 1 | 40 | This field is prepended to the Number of RX DMG Antennas subfield in the BF Control field to form a single 3 bits field indicating the total number of repetitions of the TXSS that the initiator or the responder uses during the SLS. This field is reserved and set to 0 when the PPDU does not carry a Grant or Grant Ack frame with the Beamforming Training field equal to 1. |
| HBF | 1 | 41 | See Table 80. |
| Reserved | 86 | 42 | Set to 0 by the transmitter and ignored by the receiver. |
| CTCS | 16 | 128 | Control Trailer Check Sequence (CTCS) is a CRC-16 computed over the content of the control trailer. The CRC-16 is computed as defined in section 20.3.7. |

**Table 82 ---Control Trailer definition when CT\_TYPE is SPR**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| CT format type | 4 | 0 | Indicated the format of the control trailer. Set to 2 to indicate that the CT\_TYPE is SPR. |
| Channel Aggregation | 1 | 4 | See Table 57 |
| BW | 8 | 5 | See Table 57 |
| Primary Channel Number | 3 | 13 | See Table 57 |
| Is Channel Number | 1 | 16 | Corresponds to the TXVECTOR parameter IS\_CHANNEL\_NUMBER. Indicates whether the value in the BW subfield represents a channel width or a channel number (see 11.4.13.3). |
| Total Number of Sectors | 11 | 17 | Corresponds to the TXVECTOR parameter NUM\_SECTORS. This field indicates the total number of sectors the initiator or the unsolicited RSS responder uses during an SLS. This field is reserved and set to 0 when the PPDU does not carry an SPR frame with the Beamforming Training field equal to 1. |
| Number of RX DMG Antennas | 3 | 28 | Corresponds to the TXVECTOR parameter NUM\_ANT. This field indicates the total number of repetitions of the TXSS that the responder uses during the SLS. This field is reserved and set to 0 when the PPDU does not carry an SPR frame with the Beamforming Training field equal to 1. |
| Reserved | 97 | 31 | Set to 0 by the transmitter and ignored by the receiver. |
| CTCS | 16 | 128 | Control Trailer Check Sequence (CTCS) is a CRC-16 computed over the content of the control trailer. The CRC-16 is computed as defined in section 20.3.7. |

**Table 83 ---Control Trailer definition when CT\_TYPE is SSW\_FEEDBACK, BLOCK\_ACK or ACK**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| CT format type | 4 | 0 | Indicated the format of the control trailer. Set to 3 to indicate that the CT\_TYPE is SSW\_FEEDBACK, BLOCK\_ACK or ACK. |
| Number of reported Streams  | 3 | 4 | Indicates the total number of reported streams minus one. This value should match the Number of SS field in the PHY header of the PPDU to which this control frame is responding. |
| Stream 1 SNR | 4 | 7 | Range 0 to 30 dB in 2 dB steps |
| Stream 1 RSSI  | 3 | 11 | Range -70 dBm to -42 dBm in 4 dB steps |
| Stream 2 SNR | 4 | 14 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 2 RSSI  | 3 | 18 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Stream 3 SNR | 4 | 21 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 3 RSSI  | 3 | 25 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Stream 4 SNR | 4 | 28 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 4 RSSI  | 3 | 32 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Stream 5 SNR | 4 | 35 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 5 RSSI  | 3 | 39 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Stream 6 SNR | 4 | 42 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 6 RSSI  | 3 | 46 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Stream 7 SNR | 4 | 49 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 7 RSSI  | 3 | 53 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Stream 8 SNR | 4 | 56 | Range 0 to 30 dB in 2 dB steps. If unused, these bits are reserved. |
| Stream 8 RSSI  | 3 | 60 | Range -70 dBm to -42 dBm in 4 dB steps. If unused, these bits are reserved. |
| Reserved | 65 | 63 | Set to 0 by the transmitter and ignored by the receiver. |
| CTCS | 16 | 128 | Contains the CRC-16 computed over the content of the control trailer. This field is computed as defined in section 20.3.7 |

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 4191 | 29.2.2 | 394.01 | The "Condition" of TIME\_OF\_DEPARTURE\_REQUESTED is "FORMAT is EDMG", while P381L17 says "The parameter TIME\_OF\_DEPARTURE\_REQUESTED is common for both NON\_EDMG and EDMG formats." | Remove the "Condition (FORMAT is EDMG)" for TIME\_OF\_DEPARTURE\_REQUESTED. | **Accepted** |

**Discussion**

Agreed with the commenter. There is a description at P381L17-19 in 29.2.2(TXVECTOR and RXVECTOR parameters) of D3.0:

**“””**

The parameter TIME\_OF\_DEPARTURE\_REQUESTED is common for both NON\_EDMG and EDMG formats. The parameter RX\_START\_OF\_FRAME\_OFFSET is common for both NON\_EDMG and EDMG formats.

**“””**

**and** RX\_START\_OF\_FRAME\_OFFSET doesn’t have Condition. The following is the excerpt from D3.0.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RX\_START\_OF\_FRAME\_OFFSET |  | 0 to 232–1. An estimate of the offset (in 0.1 nanosecond units) from the point in time at which the start of the preamble corresponding to the incoming frame arrived at the receive antenna connector to the point in time at which this primitive is issued to the MAC. | N | See NOTE 3 |

**Proposed changes to D3.0**

29.2.2 TXVECTOR and RXVECTOR parameters

***Editor: Remove the Condition of*** *TIME\_OF\_DEPARTURE\_REQUESTED parameter* ***(P394 of D3.0):***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TIME\_OF\_DEPARTURE\_REQUESTED |  | Enumerated type:True indicates that the MAC entity requests that the PHY entity measures and reports time of departure parameters corresponding to the time when the first frame energy is sent by the transmitting port. False indicates that the MAC entity requests that the PHY entity neither measures nor reports time of departure parameters. | O | N |

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 4194 | 29.2.2 | 398.00 | "Condition" that indicates SSSW packet is needed for the following parameters: SSSW\_DIR, SSSW\_ADD\_MODE, SSSW\_SOURCE\_AID, SSSW\_DESTINATION\_AID, SSSW\_CDOWN, SSSW\_RF\_CHAIN\_ID, SSSW\_BSSID, SSSW\_UNASSOCIATED, SSSW\_SISO\_FEEDBACK\_DURATION and SSSW\_FEEDBACK | Add the following to the "Condition" field of all the parameters mentioned in the comment:FORMAT is NON\_EDMG,NON\_EDMG\_MODULATION is DMG\_C\_MODE, NON\_EDMG\_DUP\_C\_MODE,L\_LENGTH is 6 | **Revised** |

**Discussion**

Complete Conditions are proposed as follows.

**Proposed changes to D3.0**

29.2.2 TXVECTOR and RXVECTOR parameters

***Editor: Change the Condition for the SSSW-related parameters in Table 46(TXVECTOR and RXVECTOR parameters) as follows: (P398-P400 of D3.0):***

***Editor: Fix a typo in the description of SSSW\_DIR (Inidicates -> Indicates); and in the description of NEXT\_TX\_SISO – though the latter is out of scope of this comment, there is the same typo.***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NEXT\_TX\_SISO | SCRAMBLER\_INIT\_SETTING is CONTROL\_TRAILER | Indicates whether the following transmission from this STA is performed with a single DMG antenna or multiple DMG antennas.Enumerated type:NextTxSingleAntennaNextTxMultiAntenna | Y | Y |
| SSSW\_DIR  | FORMAT is NON\_EDMG,NON\_EDMG\_MODULATION is DMG\_C\_MODE, NON\_EDMG\_DUP\_C\_MODE,L\_LENGTH is 6 | Indicates the direction of the transmission of a Short SSW packet. Enumerated type: Initiator: indicates the frame is transmitted by the initiator Responder: indicates the frame is transmitted by the responder  | Y | Y |
| SSSW\_ADD\_MODE  | SSSW\_DIR is Initiator | Indicates the interpretation of the destination AID. Enumerated type: IndividualAddr: The destination AID field contains an individual address. GroupAddr: The destination AID field contains a group address  | Y | Y |
| SSSW\_SOURCE\_AID  | FORMAT is NON\_EDMG,NON\_EDMG\_MODULATION is DMG\_C\_MODE, NON\_EDMG\_DUP\_C\_MODE,L\_LENGTH is 6 | When the SSSW\_DIR is set to Initiator, contains the AID of the STA that transmits the Short SSW packet, except if the transmitting STA is a PCP or an AP in which case this field contains the BSS AID or the transmitting STA is not associated to intended recipient in which case this field contains a random value in the range of 0 to 255. When the SSSW\_DIR is set to Responder, contains the AID of the STA that transmits the Short SSW packet, except if the transmitting STA is a PCP or an AP in which case this field contains the BSS AID or the transmitting STA is not associated to the intended recipient in which case this field contains the value contained in the Source AID field in the received Short SSW packet during the preceding ISS  | Y | Y |
| SSSW\_DESTINATION\_AID  | FORMAT is NON\_EDMG,NON\_EDMG\_MODULATION is DMG\_C\_MODE, NON\_EDMG\_DUP\_C\_MODE,L\_LENGTH is 6 | When the SSSW\_DIR is set to Initiator, contains the AID of the STA addressed by the Short SSW packet, except if the addressed STA is a PCP or an AP in which case this field contains the BSS AID or the transmitting STA is not associated to the intended recipient in which case this field contains a random value in the range of 0 to 255. When the SSSW\_DIR is set to Responder, contains the AID of the STA that transmits the Short SSW packet, except if the transmitting STA is a PCP or an AP in which case this field contains the BSS AID or the transmitting STA is not associated to the intended recipient in which case this field contains the value contained in the Destination AID field in the received Short SSW packet during the preceding ISS.  | Y | Y |
| SSSW\_CDOWN  | FORMAT is NON\_EDMG,NON\_EDMG\_MODULATION is DMG\_C\_MODE, NON\_EDMG\_DUP\_C\_MODE,L\_LENGTH is 6 | A down-counter indicating the number of remaining Short SSW packet transmissions and LBIFSs to the end of the TXSS/RXSS across all DMG antennas. This parameter is set to 0 in the last Short SSW packet transmission.  | Y | Y |
| SSSW\_RF\_CHAIN\_ID  | FORMAT is NON\_EDMG,NON\_EDMG\_MODULATION is DMG\_C\_MODE, NON\_EDMG\_DUP\_C\_MODE,L\_LENGTH is 6 | Identifies the transmit chain currently being used for the transmission. Can take the values in the range 1 through 8.  | Y | Y |
| SSSW\_BSSID  | SSSW\_DIR is Initiator,SSSW\_ADD\_MODE is IndividualAddr | Contains the BSSID of the BSS  | Y | Y |
| SSSW\_UNASSOCIATED  | SSSW\_DIR is Initiator,SSSW\_ADD\_MODE is IndividualAddr | Indicates whether the transmitting STA is associated to the intended recipient. Enumerated type: Associated: if the transmitting STA is associated to the intended recipient. Unassociated: if the transmitting STA is not associated to the intended recipient  | Y | Y |
| SSSW\_SISO\_FEEDBACK\_DURATION  | SSSW\_DIR is GroupAddr | Specifies the duration, in microseconds, of the SISO Feedback subphase that starts following the Short SSW packet transmission with CDOWN field equal to 0.  | Y | Y |
| SSSW\_FEEDBACK  | SSSW\_DIR is Responder | Contains the value of the CDOWN field of the Short SSW packet that was received with best quality in the immediately preceding sector sweep. The determination of which packet was received with best quality is implementation dependent.  | Y | Y |

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 4464 | 29.2.2 | 381.09 | N\_CB is determined by CH\_BANDWIDTH parameters defined in Table 66-68 and CHANNEL\_AGGREGATION parameters. The CH\_BANDWIDTH parameters shown in L9-16 are some example CH\_BANDWIDTH values. More general description on CH\_BANDWIDTH parameter is expected. | Line 9: If the CH\_BANDWIDTH parameter is set to having single "1" (for example "01000000") or two non-contiguous "1s" (for example "01001000"), then NCB is set to 1. L10-16 should also be updated accordingly. | **Accepted** |

**Proposed changes to D3.0**

29.2.2 TXVECTOR and RXVECTOR parameters

***Editor: Change the second paragraph in 29.2.2 as follows: (P381L5 of D3.0):***

The value of the CH\_BANDWIDTH and CHANNEL\_AGGREGATION parameters in the TXVECTOR and RXVECTOR define the value of the *NCB* parameter in the EDMG PHY definition throughout this clause. The *NCB* parameter represents the number of contiguous (i.e., bonded) 2.16 GHz channels used for a transmission.

* If the CH\_BANDWIDTH parameter is set to having a single bit equal to “1” (for example “01000000”) or two non-contiguous bits equal to “1”s (for example “01001000”), then *NCB* is set to 1.
* If the CH\_BANDWIDTH parameter is set to have two contiguous “1”s (for example “01100000”) and the CHANNEL\_AGGREGATION parameter is set to AGGREGATE, then *NCB* is set to 1. Otherwise if the CHANNEL\_AGGREGATION parameter is set to NOT\_AGGREGATE, then *NCB* is set to 2.
* If the CH\_BANDWIDTH parameter is set to have three contiguous “1”s (for example “00111000”), then *NCB* is set to 3.
* If the CH\_BANDWIDTH parameter is set to have four contiguous “1”s (for example “01111000”) and the CHANNEL\_AGGREGATION parameter is set to AGGREGATE, then *NCB* is set to 2. Otherwise if CHANNEL\_AGGREGATION parameter is set to NOT\_AGGREGATE, then *NCB* is set to 4.

**Straw Poll:**

* **Do you agree to accept the comment resolution for CIDs** 4157, 4190, 4191, 4194, 4464 **in 19/0353r1?**

**References**

[1] Draft P802.11ay D3.0