IEEE P802.11
Wireless LANs

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| Resolution to CID related to DMG Link Margin element |
| Date: 2018-October-09 |
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Abstract

This submission proposes resolution to CID 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3000, 3042, 3075 and 3591

The resolutions are in reference to Draft IEEE P802.11ay/D2.1 and IEEE 802.11-2016.

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| CID | Clause | Comment | Proposed change |
| 3043 | 9.4.2.142.4 | Averaging method for RCPI (in DMG Link Margin element) | Add text to specify how the averaging is performed and that only PPDUs with MCS>0 are counted. |

**Proposed resolution 3043:** Revised.

**Discussion:**

Clarification of the values in a table improves clarity, hence change is accepted with revised text.

Averaging of the RCPI measured values should be performed in power units

***TGay Editor: Add at the end of section 29.3.9.2 (P407L36)***

The RCPI per received PPDU is averaged in power units before being converted to dBm for reporting.

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| CID | Clause | Comment | Proposed change |
| 3044 | 9.4.2.142.5 | Averaging method for SNR (in DMG Link Margin element) | Add text to specify how the averaging is performed and that only PPDUs with MCS>0 are counted. |

**Proposed resolution 3044:** Revised.

**Discussion:**

Clarification of the values in a table improves clarity, hence change is accepted with revised text.

Averaging of the SNR measured values should be performed in power units

***TGay Editor: Add at the end of paragraph in lines 12-16 in section 9.4.2.142.5 (P100L16):***

The SNR per received frame is averaged in power units before being converted to dB.

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| CID | Clause | Comment | Proposed change |
| 3045 | 9.4.2.142.1 | Field "Link Margin" in "DMG Link Margin element" is not defined well. | The "Link Margin" field cannot support any MIMO and it should be backward compatible with DMG. Hence it is suggested to set it to value -128 when the field "Indication for Parameters Across PPDUs" is 1. |

**Proposed resolution 3045:** Reject.

**Discussion:**

The "Link Margin" in "DMG Link Margin element" (as defined in 802.11-2016) and in 802.11ay backward compatible part is designed for a single stream. Hence when EDMG extension is used, this field should not be used.

In Draft 2.1 P099L13-16 it is stated:

The Number of Space-Time Streams Reported (NSTS) subfield indicates the number of space-time streams being reported. Each entry, i, corresponds to a space-time stream. If the value of this field is greater than 0, the MCS, Link Margin and SNR fields in the DMG Link Margin element are reserved. For a non-EDMG STA, this field is set to 1.

Hence there is no need for additional text.

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| CID | Clause | Comment | Proposed change |
| 3046 | 9.4.2.142.1 | Field "MCS" in "DMG Link Margin element" is not defined well. | The "MCS" field cannot support any MIMO and it should be backward compatible with DMG. Hence it is suggested to set it to value 255 when the field "Indication for Parameters Across PPDUs" is 1.AND add text to section "9.4.2.142.1 General" which indicates that value 255 is an NA value |

**Proposed resolution 3046:** Reject.

**Discussion:**

The "MCS" in "DMG Link Margin element" (as defined in 802.11-2016) and in 802.11ay backward compatible part is designed for a single stream. Hence when EDMG extension is used, this field should not be used.

In Draft 2.1 P099L13-16 it is stated:

The Number of Space-Time Streams Reported (NSTS) subfield indicates the number of space-time streams being reported. Each entry, i, corresponds to a space-time stream. If the value of this field is greater than 0, the MCS, Link Margin and SNR fields in the DMG Link Margin element are reserved. For a non-EDMG STA, this field is set to 1.

Hence there is no need for additional text.

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| CID | Clause | Comment | Proposed change |
| 3047 | 9.4.2.142.1 | Field "SNR" in "DMG Link Margin element" is not defined well. | The "SNR" field cannot support any MIMO and it should be backward compatible with DMG. Hence it is suggested to set it to value 0 when the field "Indication for Parameters Across PPDUs" is 1. |

**Proposed resolution 3047:** Reject.

**Discussion:**

The "SNR" in "DMG Link Margin element" (as defined in 802.11-2016) and in 802.11ay backward compatible part is designed for a single stream. Hence when EDMG extension is used, this field should not be used.

In Draft 2.1 P099L13-16 it is stated:

The Number of Space-Time Streams Reported (NSTS) subfield indicates the number of space-time streams being reported. Each entry, i, corresponds to a space-time stream. If the value of this field is greater than 0, the MCS, Link Margin and SNR fields in the DMG Link Margin element are reserved. For a non-EDMG STA, this field is set to 1.

Hence there is no need for additional text.

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| CID | Clause | Comment | Proposed change |
| 3048 | 9.4.2.142 | The 11ay spec has no text to extend the "9.4.2.142.2 Activity field" when values 1-3 and maybe others. E.g. how is transmit power changed in MIMO and MU-MIMO. | A lot of technical details are missing.Will provide submission to the missing parts. |
| 3049 | 9.4.2.142.1 | Field "Activity field" in "DMG Link Margin element" is has 3 options: Change MCS, Power up and Power down. However these commands have no associated value to do. These actions are used when the RECEIVER is controlling the MCS and Tx power which the receiver uses. For fast and accurate control (of the receiver) there is a need to facilitate the action request to include a value (for each). | Three new actions to be added to the Action list for codes 1-3 where the "Link Margin" field is reused to inform the recepient station exactly how to change the MCS or the Tx Power. |
| 3050 | 9.4.2.142.8 | The "EDMG TPC" includes only files "Activity" and "Link margin". The "Activity" filed is has 3 options: Change MCS, Power up and Power down. However these commands have no associated value to do. These actions are used when the RECEIVER is controlling the MCS and Tx power which the receiver uses. For fast and accurate control (of the receiver) there is a need to facilitate the action request to include a value (for each). | Three new actions to be added to the Action list for codes 1-3 where the "Link Margin" field is reused to inform the recepient station exactly how to change the MCS or the Tx Power |

**Proposed resolution 3048-3050:** Revised.

**Discussion:**

The Activity field has *Decrease(d) transmit power* and *Increase(d) transmit power*. However, there is no definition how to increase/decreas the power. This deficit applies to DMG as well, but we will not change it at this time.

We suggest reusing the Link Margin field (for these cases) to specify the amount of increase/decreas power value.

The Activity field has *Change(d) MCS*. However, there is no definition how to change the MCS. This deficit applies to DMG as well, but we will not change it at this time.

We suggest reusing the Link Margin field (for these cases) to specify the required new MCS.

***TGay Editor: Add at the end of 9.4.2.142.8 section (P102L11):***

When Activity field is 1, the Link Margin field contains the new requested MCS.

When Activity field is 2 or 3, the Link Margin field contains the amount of transmit power change in 2’s complement format and in steps of 0.25 dB.

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| CID | Clause | Comment | Proposed change |
| 3000 | 9.4.2.142.5 | SNR is called out in .25dB steps and -8 dB to 55.75 dB. The represents 8-bits or - 1 octet. This should call out 1 Octet or reference Figure 33. | 14 add sentence" The SNR subfields values are 1 Octet each as shown in Figure 33" |

**Proposed resolution:** Revise.

**Discussion:**

Accept the suggested additional clarification, with revised text.

***TGay Editor: Modify at the end of the 1st paragraph after Figure 33 (P100L12):***

Each SNR Per STSi subfield, 1 ≤ i ≤ NSTS, where NSTS is the value of the Number of Space-Time 10 Streams Reported subfield within the Rate Adaptation Control field, contains the SNR of the space-time 11 stream. The SNR subfield levels are 8 bit unsigned integers referenced to a level of –8 dB. Each step is 0.25 dB. 12 SNR values less than or equal to –8 dB are represented as 0. SNR values greater than or equal to 55.75 dB 13 are represented as 255.

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| CID | Clause | Comment | Proposed change |
| 3042 | 9.6.6.4 | The "Radio Measurement" is extended to support statistics/averaging within some period. Meaning that multiple measurements are done and reported as "one" value and not a list. However the "Radio Measurement" as defined in 802.11-2016 and used in 11ay is for single measurement or multiple when each value is reported. | Suggested to add additional values to "Table 9-306--Radio Measurement Action field values" where the new values indicate measurements averaging.In addition text is missing to explain how the periodic reports work, as well as parameters to configure the periodic reports. |

**Proposed resolution:** Revise.

**Discussion of Parameters Across RX Chains field:**

The Parameters Across RX Chains field includes only RCPI.

The resolution of CID 3043 (above) already solves this issue, hence no additional change needed.

**Discussion of Parameters Across PPDUs field:**

The Parameters Across PPDUs field include SNR per STS, MCS per STS and Link Margin Per STS.

**Discussion of Parameters Across PPDUs field, SNR per STS subfield:**

The resolution of CID 3044 (above) already solves this issue, hence no additional change needed.

**Discussion of Parameters Across PPDUs field, MCS per STS subfield:**

The averaging is performed only if the MCS is unchanged, hence no averaging is needed.

**Discussion of Parameters Across PPDUs field, Link Margin per STS subfield:**

The text in the amendment in section 9.4.2.142.5, page 100, lines 22-26 states that the value is in decibel units and that “The method used to measure link margin is beyond the scope of this standard”.
Hence the averaging method is also beyond the scope of this standard.

***TGay Editor: Modify the lastst paragraph of section 9.4.2.142.5 (P100L22):***

Each Link Margin Per STSi subfield, 1≤ i ≤ NSTS, where NSTS is the value of the Number of Space-Time Streams Reported subfield within the Rate Adaptation Control field, contains the measured link margin of Data frames of space-time stream i and is coded as a 2s complement signed integer in units of decibels. A value of –128 indicates that no link margin is provided. The method used to measure link margin is beyond the scope of this standard. The averaging method of the link margin for multiple PPDUs is beyond the scope of this standard.

**Discussion of Parameters Across LDPC Codewords field:**

The Parameters Across PPDUs field include: Average Iterations per STS, Max Iteration per STS and Nonzero Syndromes Per STS.

**Discussion of Parameters Across LDPC Codewords field, Average Iterations per STS subfield:**

There is a need to specify that the average is performed linearly.

***TGay Editor: Modify the second paragraph of section 9.4.2.142.6 (P101L01):***

Each Average Iterations subfield, 0 ≤ i ≤ NSTS, where NSTS is the value of the Number of Space-Time Streams Reported subfield within the Rate Adaptation Control field, indicates the average number of iterations used by the LDPC decoder on PSDUs received with an MCS different than MCS 0. One iteration includes processing of all rows. Values are from 0.0 to +25.5 in 0.1 steps. This statistic is reset when the reset condition defined below in this subclause is met. The averaging method of the average iterations for multiple LDPC codewords is linear across codewords in each PPDU and across multiple PPDUs.

**Discussion of Parameters Across LDPC Codewords field, Max Iterations per STS subfield:**

There is a need to specify the method.

***TGay Editor: Modify the third paragraph of section 9.4.2.142.6 (P101L06):***

Each Max Iteration subfield, 0 ≤ i ≤ NSTS, where NSTS is the value of the Number of Space-Time Streams Reported subfield within the Rate Adaptation Control field, indicates the maximum number of iterations used by the LDPC decoder on PSDUs received with an MCS different than MCS 0. One iteration includes processing of all rows. This statistic is reset when the reset condition defined below in this subclause is met. The maximum value is across codewords in each PPDU and across multiple PPDUs.

**Discussion of Parameters Across LDPC Codewords field, Nonzero Syndromes per STS subfield:**

There is a need to specify the method.

***TGay Editor: Modify the fourth paragraph of section 9.4.2.142.6 (P101L11):***

Each Nonzero Syndromes subfield, 0 ≤ i ≤ NSTS, where NSTS is the value of the Number of Space-Time Streams Reported subfield within the Rate Adaptation Control field, indicates the number of LDPC codewords within the PSDU received with an MCS different than MCS 0 and that have nonzero syndrome. This statistic is reset when the reset condition defined below in this subclause is met. The value is a count of the nonzero syndrome LDPC codewords in each PPDU and multiple PPDUs.

**Discussion of Parameters Across SC Blocks or OFDM Symbols field:**

The Parameters Across SC Blocks or OFDM Symbols field includes EVM per STS.

**Discussion of Parameters Across SC Blocks or OFDM Symbols field, EVM per STS subfield:**

There is a need to specify that the average is performed over the decibel units.

***TGay Editor: Modify the second paragraph of section 9.4.2.142.7 (P101L29):***

Each EVMi subfield, 0 ≤ i ≤ NSTS, where NSTS is the value of the Number of Space-Time Streams Reported subfield within the Rate Adaptation Control field, indicates the average EVM in dB of the SC data symbols or OFDM data subcarriers averaged across all PPDUs and SC blocks or OFDM symbols, having same modulation and MCS. Values are from –5.0 dB to +46.0 dB in 0.2 dB steps. This statistic is reset when the reset condition defined in 9.4.2.142.6 is met. The averaging method across PPDUs is also in dB units.

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| CID | Clause | Comment | Proposed change |
| 3075 | 9.6.6.4 | The Measurement Method FIELD has been changed to a Measurement Method SUBFIELD in this paragraph, but other mentions of the Measurement Method FIELD (e.g. in subclause 9.4.2.20.16, or in subclause 9.4.2.21.15). This must either be a FIELD or a SUBFIELD, but it should be the same in all clauses. | Decide whether this is a field or a subfield. |

**Proposed resolution:** Reject.

**Discussion:**

The naming rules are clear, and Measurement Method is a subfield, hence the name is ok.

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| CID | Clause | Comment | Proposed change |
| 3591 | 9.4.2.142.3 | Grammar, wrong reference | Change "The Number of PPDUs subfield contains the number of PPDUs used over which the RCPI and SNR measurements were taken (see 9.4.2.142.5 and 9.4.2.142.6)" to "The Number of PPDUs subfield contains the number of PPDUs over which the RCPI and SNR measurements were taken (see 9.4.2.142.4 and 9.4.2.142.5)" |

**Proposed resolution:** Accept.

**Discussion:**

Correct

***TGay Editor: Change the following paragraph of subclause 9.4.2.142.3 in Draft 2.1 (P99L28)***

The Number of PPDUs subfield contains the number of PPDUs ~~used~~ over which the RCPI and SNR measurements were taken (see 9.4.2.142.~~5~~4 and 9.4.2.142.~~6~~5).