IEEE P802.11
Wireless LANs

|  |
| --- |
| Resolution to CID 3245 and 3652 |
| Date: 2018-09-10 |
| Author(s): |
| Name | Company | Address | Phone | email |
| Cheng Chen | Intel |  |  | cheng.chen@intel.com |
| Carlos Cordeiro | Intel |  |  | carlos.cordeiro@intel.com |
| Payam Torab | Facebook |  |  | ptorab@fb.com |
| Solomon Trainin | Qualcomm |  |  | strainin@qti.qualcomm.com |
| Nikolas Olaziregi | Nokia |  |  | nikolas.olaziregi@nokia.com |

Abstract

This submission proposes resolution to CID 3245 and 3652.

The resolutions are in reference to Draft IEEE P802.11ay/D2.0 and IEEE 802.11-2016.

|  |  |  |  |
| --- | --- | --- | --- |
| CID | Clause | Comment | Proposed change |
| 3245 | 10.44 | Current DMG link adaptation protocol requires solicited link measurement report. That is, whenever the initiating STA requests link measurement, it has to perform a paired Link Measurement Request and Link Measurement Report frame with the responding STA. However, in some scenarios, the initiating STA would like to get periodic link measurement reports from the responder STA. As a result, the protocol needs to be modified in order to support such use case. | Modify the DMG link adaptation protocol so that periodic link measurement report can be supported. |
| 3652 | 10.44.5 | As it is defined in the current text the measurement starts at PLME-MINPAYLOADSTAT.request primitive to request the PHY to initiate measurement of signal power of received PPDUs and to compute the receiver statistics. So there is no need for the Link measurement request frame to initiate the measurement. The Link Measurement Report frame transmission may be periodical w/o the Link Measurement Request frame to trigger the response. Elimination of the Link Measurement Request frame saves time and increase robustness specifically in the cases when the link quality deteriorates. | The change shall eliminate need of the Link Measurement Request per each Link Measurement Report. |

**Proposed resolution:** Revised.

See the proposed spec change as follows.

**9.6.7.4 Link Measurement Request frame format**

***Change Figure 9-503 as follows:***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category | Radio Measurement Action | Dialog Token | Transmit Power Used | Max Transmit Power | Periodic Report Request Control | Periodic Report Request |
| Octets | 1 | 1 | 6 | 1 | 8 | 1 | 8 |

Figure 9-651---Link Measurement Request frame Action field format

***Insert the following paragraph at the end of the subclause:***

The Periodic Report Request Control field contains indications of whether the Link Measurement Request frame includes optional fields used for periodic link measurement, and is shown in Figure 9-xxx0.

The Periodic Report Request field is optionally present. If present, it specifies the start time, interval and duration for periodic link measurement reports, and is shown in Figure 9-xxx1.

|  |  |  |
| --- | --- | --- |
|  | Indication for Periodic Report Request | Reserved |
| Bits | 1 | 7 |

Figure 9-xxx0---Periodic Report Request Control field format

The Indication for Periodic Report Request subfield is set to 1 if the Link Measurement Request frame contains the Periodic Report Request field. It is set to 0 otherwise.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Reporting Start Time | Reporting Interval  | Reporting Count |
| Octets | 4 | 2 | 2 |

Figure 9-xxx1---Periodic Report Request field format

The Reporting Start Time subfield indicates the lower 4 octets of the TSF timer at the start of the first reporting interval.

The Reporting Interval subfield indicates the interval of time, in microseconds, at which the responding STA needs to take measurements and send an unsolicited Link Measurement Report frame to the requesting STA. The value 0 is reserved.

The Reporting Count subfield indicates the number of reporting intervals, during which time the responding STA needs to send unsolicited Link Measurement Report frames periodically to the requesting STA for every reporting interval. The value 0 is reserved.

**9.6.7.5 Link Measurement Report frame format**

***Change Figure 9-534 as follows:***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Category | Radio Measurement Action | Dialog Token | TPC Report element | Receive Antenna ID | Transmit Antenna ID | RCPI | RSNI | DMG Link Margin | DMG Link Adaptation Acknowledgement | Periodic Report Control | Report Interval Start Time | Statistics Reset Time Offset |
| Octets | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | variable | variable | 1 | 4 | 2 |

Figure 9-534---DMG Link Margin element format

***Insert the following paragraph before the 2nd to last paragraph of this subclause***

The Periodic Report Control field contains indications of whether the responding STA accepts or rejects the periodic link measurement request, and whether the Link Measurement Report frame includes optional fields used for periodic link measurement reports. The field and is shown in Figure 9-xxx2.

The Report Interval Start Time field is optionally present. If present, it indicates the lower 4 octets of the TSF timer at the start of the report interval of the corresponding Link Measurement Report frame.

The Statistics Reset Time Offset field is optionally present. If present, it indicates the relative time offset, in microseconds, of the last event when the reset condition (see 9.4.2.142.6) is met since the start of the corresponding reporting interval.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Accept/Reject Periodic Report | Indication for Report Interval Start Time | Indication for Statistics Reset Time Offset | Reserved |
| Bits | 1 | 1 | 1 | 5 |

Figure 9-xxx2---Periodic Report Control field format

The Accept/Reject Periodic Report subfield is set to 1 if the responding STA accepts periodic report, and is set to 0 if the responding STA rejects periodic report.

The Indication for Report Interval Start Time subfield is set to 1 if the Link Measurement Report frame contains the Report Interval Start time field. It is set to 0 otherwise.

The Indication for Statistics Reset Time Offset subfield is set to 1 if the Link Measurement Report frame contains the Statistics Reset Time Offset field. It is set to 0 otherwise.

***Modify the following paragraphs of this subclause***

The Dialog Token field is set to the value of the Dialog Token field in the last received corresponding Link Measurement Request frame.

The Receive Antenna ID field contains the identifying number for the antenna(s) used to receive the corresponding Link Measurement Request frame or the last received frame from the requesting STA within the corresponding report interval. Antenna ID is defined in 9.4.2.40.

The Transmit Antenna ID field contains the identifying number for the antenna(s) used to transmit this Link Measurement Report frame. Antenna ID is defined in 9.4.2.40.

RCPI indicates the received channel power of the corresponding Link Measurement Request frame or the last received frame from the requesting STA within the corresponding report interval, which is a logarithmic function of the received signal power, as defined in 9.4.2.38.

RSNI indicates the received signal-to-noise indication for the corresponding Link Measurement Request frame or the last received frame from the requesting STA within the corresponding report interval, as described in 9.4.2.41.

***Change the following subclause as follows:***

**9.4.2.142.1 General**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Activity | MCS | Link Margin | SNR | Reference Timestamp |
| Octets | 1 | 1 | 1 | 1 | 1 | 1 | 4 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Rate Adaptation Control | Parameters Across Rx Chains | Parameters Across PPDUs | Parameters Across LDPC Codewords | Parameters Across SC Blocks Or OFDM Symbols |
| Octets | 2 | 0 or NRX | 0 or 3\*NSTS | 0 or 8\*NSTS | 0 or 4\*NSTS |

**9.4.2.142.5 Parameters Across PPDUs field**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | SNR Per $STS\_{0}$ | $$MCS\_{0}$$ | Link Margin Per $STS\_{0}$  | … | SNR Per $STS\_{NSTS}$ | $$MCS\_{NSTS}$$ | Link Margin Per $STS\_{NSTS}$  |
| Octets | 1 | 1 | 1 |  | 1 | 1 | 1 |

The Link Margin subfield contains the measured link margin of Data frames of the space-time stream and is coded as a 2s complement signed nteger in units of decibels. A value of –128 indicates that no link margin is provided. The method used to measure the link margin is beyond the scope of this standard.

***Change the following subclause as follows:***

**10.39 DMG link adaptation**

**10.39.1 General**

***Change the 1st paragraph as follows:***

A STA may transmit a Link Measurement Request frame to request a STA indicated in the RA field of the frame to respond with a Link Measurement Report frame, or periodic Link Measurement Report frames (9.6.6.5 (Link Measurement Report frame format)). If the Link Measurement Request frame is sent within a PPDU defined in Clause 20 (Directional multi-gigabit (DMG) PHY specification) or Clause 29, the Link Measurement Report frame shall contain the DMG Link Margin element. ~~If the TDD Link Maintenance Statistics subfield within the DMG Capabilities element of the STA transmitting the Link Measurement Report frame is nonzero, the DMG Link Margin element contains extra fields related to parameters used for TDD link maintenance (see 10.44.5). The requesting STA may use values of the MCS, of the SNR and of the Link Margin to transmit frames to the STA indicated in the RA field of the Link Measurement Request frame.~~ If the DMG Link Margin element does not include the Parameters Across PPDUs field, the requesting STA may use values of the MCS, SNR and Link Margin fields in the received DMG Link Margin element to transmit frames to the STA indicated in the RA field of the Link Measurement Request frame. Otherwise, the requesting STA may use values of the MCS, SNR and Link Margin field(s) in the received Parameters Across PPDUs field to transmit frames to the STA indicated in the RA field of the Link Measurement Request frame.

***Add the following paragraph before the 3rd paragraph:***

To initiate periodic link measurement, the requesting STA shall transmit a Link Measurement Request frame that includes the Periodic Report Request field (see 9.6.7.4), the requesting STA should transmit at least one management or data frame (e.g., a QoS Null frame), preferably requiring acknowledgement, every interval of time indicated by the value of the Reporting Interval field within the Periodic Report Request field, to keep the statistics reported in the periodic Link Measurement Report frames updated.

***Change the 3rd paragraph as follows:***

If the Dialog Token field in the Link Measurement Request frame is equal to a nonzero value, the responding STA shall perform the measurement on the next frame received from the requesting STA and shall send back a Link Measurement Report frame corresponding to the received frame. If the Link Measurement Request frame includes the Periodic Report Request field and the responding STA accepts periodic link measurement request, at the time indicated by the value of the Reporting Start Time subfield, the responding STA shall start sending Link Measurement Report frames periodically to the requesting STA for each report interval. Transmission of the unsolicited Link Measurement Report frame should be as close as possible to the start of each consecutive report interval subject to channel access rules. The total number of report intervals shall be equal to the value of the Reporting Count subfield in the Link Measurement Request frame. If the Link Measurement Request frame includes the Periodic Report Request field and the responding STA rejects periodic link measurement request, the responding STA shall transmit a Link Measurement Response frame and set the Accept/Reject Periodic Report subfield within the Periodic Report Control field to 0.

***Change the 5th paragraph as follows:***

The DMG STA whose MAC address equals the value of the Link Measurement Request frame RA field shall transmit ~~a~~ one or more Link Measurement Report frames addressed to the requesting STA. The RA field of the Link Measurement Report frame shall be equal to the TA field of the Link Measurement Request frame.

***Change the 6th paragraph as follows:***

If the Dialog Token field in the Link Measurement Report frame is equal to the nonzero Dialog Token field of the Link Measurement Request frame, then the MCS, SNR, and Link Margin fields of the Link

Measurement Report frame shall be computed using the measurements of the PPDU that is the next frame received from the requesting STA, or the last received frame from the requesting STA within the corresponding report interval.

NOTE -- The MCS, SNR, and Link Margin values can be carried in either the three similarly named fields in the Link Measurement Report frame, or as part of the Parameters Across PPDUs field in the same frame.

**Straw Poll:**

* **Do you agree to accept comment resolutions as proposed in doc 11-18/1539r3?**