IEEE P802.11
Wireless LANs

|  |
| --- |
| Comments to 11-20-0859-00-00ay |
| Date: 2020-06-21 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Solomon Trainin | Qualcomm |  |  | strainin@qti.qualcomm.com |
| Alecsander Eitan | Qualcomm |  |  | eitana@qti.qualcomm.com |
| Assaf Kasher | Qualcomm |  |  | akasher@qti.qualcomm.com |
|  |  |  |  |  |
|  |  |  |  |  |

This submission provides comments to the document

11-20-0859-00-00ay-coex-frame-draft0.01

IEEE P802.11
Wireless LANs

IEEE P802.11
Wireless LANs

|  |
| --- |
| DMG Directional Transmit Activity Report |
| Date: 2020-06-21 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Payam Torab | Facebook | 1 Hacker WayMenlo Park, CA 94025USA |  | torab@ieee.org |
| Djordje Tujkovic |  | djordjet@fb.com |
| Krishna Gomadam |  | kgomadam@fb.com |
|  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

This submission defines a new Public Action frame to report parameters related to transmit activity of a DMG STA in a given spatial direction (transmit antenna pattern). Using the frame contents, including receive training fields, the receiving STAs can both protect themselves and the frame transmitter through measures such as changing transmit and receive beams, changing transmit power level, better planning of transmit periods, vacating the operating channel, or operating at reduced bandwidth.

This submission is provided to resolve CID 6232. Proposed edits are based on 11ay Draft 5.0 and REVmd Draft 3.2.

|  |  |  |  |
| --- | --- | --- | --- |
| **CID** | **Comment** | **Proposed change** | **Resolution** |
| 6232 | DMG devices with mostly fixed directions of transmission, regardless of channel access they use, should send a DMG frame to help other DMG STAs (those not in BSS, although usage is not limited to this case) identify the possible interference and perform inference mitigation. This is a different flow from discovery (beacons), which can use different MCS and different beams. | Define a public frame to describe the transmit power and channel usage information in the direction of transmit activity. Refer to https://mentor.ieee.org/802.11/dcn/19/11-19-1514-00-00ay-dmg-sta-directional-transmit-activity-report-frame.pptx for details. | Revised  |

**Discussion:**

The need for an informational frame to mitigate interference from devices that operate inside a DMG Service Period with fixed (or near fixed) beams has been discussed in the following contribution,

<https://mentor.ieee.org/802.11/dcn/19/11-19-1514-00-00ay-dmg-sta-directional-transmit-activity-report-frame.pptx>

This contribution defines the frame contents and transmit procedure.

**3.5.10 Elements**

**3.5.10.1 General**

*Insert the following rows in Table 9-94 (Element IDs), renumbering as appropriate*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EDMG Capabilities (see 9.4.2.263) | 255 | 61 | Yes | No |
| EDMG Operation (see 9.4.2.264) | 255 | 62 | Yes | No |
| EDMG Extended Schedule (see 9.4.2.265) | 255 | 63 | Yes | No |
| EDMG Channel Measurement Feedback (see 9.4.2.266) | 255 | 64 | Yes | No |
| EDMG Group ID Set (see 9.4.2.267) | 255 | 65 | Yes | No |
| EDMG BRP Request (see 9.4.2.268) | 255 | 66 | Yes | No |
| EDMG Training Field Schedule (see 9.4.2.269) | 255 | 67 | Yes | No |
| EDMG Partial Sector Level Sweep (see 9.4.2.270) | 255 | 68 | Yes | No |
| MIMO Setup Control (see 9.4.2.271) | 255 | 69 | Yes | No |
| MIMO Poll Control (see 9.4.2.272) | 255 | 70 | Yes | No |
| MIMO Feedback Control (see 9.4.2.273) | 255 | 71 | Yes | No |
| MIMO Selection Control (see 9.4.2.274) | 255 | 72 | Yes | No |
| EDMG Flow Control Extension Configuration (see 9.4.2.275) | 255 | 73 | Yes | No |
| QoS Triggered Unscheduled (see 9.4.2.276) | 255 | 74 | Yes | No |
| Unsolicited Block Ack Extension (see 9.4.2.277) | 255 | 75 | Yes | No |
| SAR Configuration (see 9.4.2.278) | 255 | 76 | Yes | No |
| TDD Slot Structure (see 9.4.2.279) | 255 | 77 | Yes | No |
| TDD Slot Schedule (see 9.4.2.280) | 255 | 78 | Yes | No |
| TDD Route (see 9.4.2.281) | 255 | 79 | Yes | No |
| Digital BF Feedback (see 9.4.2.282) | 255 | 80 | Yes | No |
| TDD Bandwidth Request (see 9.4.2.283) | 255 | 81 | Yes | No |
| TDD Synchronization (see 9.4.2.284) | 255 | 82 | Yes | No |
| EDMG Wide Bandwidth Channel Switch (see 9.4.2.285) | 255 | 83 | Yes | No |
| DMG Discovery Assistance (see 9.4.2.286) | 255 | 84 | Yes | No |
| Extended Link Measurement (see 9.4.2.287) | 255 | 85 | Yes | No |
| DMG STA Directional Transmit Activity Report (see 9.4.2.288) | 255 | 86 | Yes | No |

***Editor: Change Section 9.3.4.2 as follows; also left justify the second column in the table***

9.3.4.2 DMG Beacon

*Insert the following rows before the last row in Table 9-47 (DMG Beacon frame body)*

|  |  |  |
| --- | --- | --- |
| 56 | TDD Slot Structure | This element is optionally present if dot11TDDOptionImplemented is true.  |
| 57 | TDD Slot Schedule | This element is optionally present if dot11TDDOptionImplemented is true.  |
| 58 | EDMG Capabilities | This element is optionally present if dot11EDMGOptionImplemented is true |
| 59 | EDMG Operation | This element is optionally present if dot11EDMGOptionImplemented is true |
| 60 | EDMG Extended Schedule | This element is optionally present if dot11EDMGOptionImplemented is true |
| 61 | EDMG Group ID Set | This element is optionally present if dot11EDMGOptionImplemented is true |
| 62 | EDMG Training Field Schedule | This element is optionally present if dot11EDMGOptionImplemented is true |
| 63 | Time Advertisement | This element is optionally present if dot11UTCTSFOffsetActivated is true |
|  |  |  |

9.4.2.127.2 DMG STA Capability Information field

***Editor: Change Figure 9-550 (DMG STA Capability Information field format) as follows***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 B5 | B6 | B7 B13 |
|  | Reverse Direction | Higher Layer Timer Synchronization | TPC | SPSH and Interference Mitigation | Number of RX DMG Antennas | Fast Link Adaptation | Total Number of Sectors |
| Bits: | 1 | 1 | 1 | 1 | 2 | 1 | 7 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B14 B19 | B20 | B21 B26 | B27 | B28 B51 | B52 | B53 |
|  | RXSS Length | DMG Antenna Reciprocity | A-MPDU Parameters | BA with Flow Control | Supported MCS Set | Directional Transmit Activity Report  | A-PPDU Supported |
| Bits: | 6 | 1 | 6 | 1 | 24 | 1 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B54 | B55 | B56 | B57 B59 | B60 | B61 | B62 | B63 |
|  | Heartbeat | Supports Other\_AID | Antenna Pattern Reciprocity | Heartbeat Elapsed Indication | Grant Ack Supported | RXSSTxRate Supported | EPD | Extended TPC Rx Supported ~~Reserved~~ |
| Bits: | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 |

 ***Editor: Insert the following text before the “A-PPDU Supported” field definition (P1297L38 in REVmd Draft 3.2)***

The Directional Transmit Activity Report subfield is set to 1 if dot11DMGSTATxActivityReportImplemented is true and indicates that the STA is capable of transmitting DMG STA Directional Transmit Activity Report frames as described in Section 11.31.5. This subfield is set to 0 otherwise.

***Editor: Replace Section 9.4.2.288 DMG STA Transceiver Parameters element with the following text***

**9.4.2.288 DMG STA Directional Transmit Activity Report element**

The format of the DMG STA Directional Transmit Activity Report element is shown in Figure 9-X1.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Control | TransmitBeam Information | ObservationPeriod Start Time | ObservationPeriod Duration |
| Octets: | 1 | 1 | 1 | 1 | 2 | 4 | 4 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | OperatingClass | Primary Channel | OperatingChannels | OperatingChannel Width | Optional Subelements |
| Octets: | 1 | 1 | 1 | 1 | Variable |

**Figure 9-X1**—**DMG STA Directional Transmit Activity Report element format**

The Element ID, Length, and Element ID Extension fields are defined in 9.4.2.1.

The Control field is shown in Figure 9-X2.

|  |  |  |
| --- | --- | --- |
|  | B0 | B1 B7 |
|  | Expect TRN-R | Reserved |
| Bits: | 1 | 7 |

**Figure 9-X2—Directional Transmit MAC Activity subelement Data field format**

The Expect TRN-R subfield is set to 1 to indicate that future PPDUs transmitted by the STA and containing this element can be expected to include TRN-R subfields within their TRN fields, and is set to 0 otherwise.

NOTE—Even if the transmitting STA is capable of including TRN-R subfileds in transmitted PPDUs, some PPDUs may not include TRN-R subfields for various reasons including making the PPDU shorter to fit in a given transmit opportunity.

The Transmit Beam Information field, shown in Figure 9-X3, provides additional information for the antenna pattern used to transmit the frame.

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B13 | B14 | B15 |
|  | Transmit Beam ID | Receive Activity  | Reciprocal |
| Bits: | 3 | 11 | 1 |

**Figure 9-X3** —**Transmit Beam Information field format**

The Transmit Beam ID subfield indicates a locally unique identifier for the antenna pattern used to transmit the frame.

NOTE—Transmit Beam ID helps the receiving STAs differentiate between DMG STA Directional Transmit Activity Report frames transmitted using different antenna patterns. One way to create a locally unique identifier is to concatenate the values of the DMG Antenna ID (3 bits) and Sector ID (11 bits) used to transmit the frame.

The Receive Activity subfield is set to 1 to indicate that the transmitting STA is using or intends to use the same antenna pattern to receive from other STAs, and set to 0 otherwise.

When the Receive Activity subfield is 1, the Reciprocal subfield is set to 1 if the transmitting STA is DMG antenna reciprocal and antenna pattern reciprocal, and set to 0 otherwise. The Reciprocal subfield is reserved when the Receive Activity subfield is 0.

The Observation Period Start Time field is set to the lower 4 octets of the measuring STA’s TSF timer at the beginning of the observation period.

The Observation Period Duration field is set to the duration of the observation period that all reported metrics apply to, in µs.

The Operating Class field indicates an operating class value as defined in Annex E. The operating class is interpreted in the context of the country specified in the Country element included in the frame.

The Primary Channel field indicates the 2.16 GHz primary channel of the BSS the transmitting STA is associated with.

The Operating Channels field indicates all 2.16 GHz channels occupied by PPDUs transmitted during the observation period or after (including future PPDUs), using the same DMG antenna and antenna pattern as the transmitted DMG STA Directional Transmit Activity Report frame. The Operating Channels field has the same format as the BSS Operating Channels field in the EDMG Operation element (see 9.4.2.264 (EDMG Operation element)).

The Operating Channels Width field indicates all bandwidths occupied by PPDUs transmitted during the observation period or after (including future PPDUs), using the same DMG antenna and antenna pattern as the transmitted DMG STA Directional Transmit Activity Report frame. The Operating Channels Width field has the same format as the Operating Channels Width field in the EDMG Operation element (see 9.4.2.264 (EDMG Operation element)).

The Optional Subelements field contains two or more subelements. The subelement format and ordering of subelements are defined in 9.4.3 (Subelements).

The Subelement ID field values for the defined subelements are listed in Table 9-X4.

**Table 9-X4—Optional subelement IDs for the**

**DMG STA Directional Transmit Activity Report element**

|  |  |  |
| --- | --- | --- |
| **Subelement ID** | **Name** | **Extensible** |
| 0 | Directional Medium Access Activity | Yes |
| 1 | Directional Transmit Power Activity | Yes |
| 2-255 | Reserved |  |

The Directional Transmit MAC Activity subelement is shown in Figure 9-X5.

|  |  |  |  |
| --- | --- | --- | --- |
|  | TransmitLoad | MaximumTransmit Time | MaximumQuiet Time |
| Octets: | 1 | 4 | 1 |

**Figure 9-X5—Directional Transmit MAC Activity subelement Data field format**

In the following, the 2.16 GHz channel that the PPDU containing the DMG STA Directional Transmit Activity Report element is transmitted on is referred to as reported channel.

For a given antenna pattern and reported channel, the Transmit Load subfield contains an upper bound on the percentage of time that the local DMG PHY entity was in transmit state during the observation period and using the given antenna pattern and reported channel. The subfield is encoded as an 8-bit unsigned integer, linearly scaled, with values of 0 and 255 representing 0% and 100%, respectively.

For a given antenna pattern and reported channel, the Maximum Transmit Time subfield contains an upper bound, in µs, on continuous transmission time during the observation period and using the given antenna pattern and reported channel. For the purpose of calculating this metric, a continuous transmission time is a period during which the local DMG PHY is not in any state other than transmit state for any interval longer than SIFS.

For a given antenna pattern and reported channel, the Maximum Quiet Time subfield contains a lower bound, in µs, on maximum quiet time during the observation period and using the given antenna pattern and reported channel. For the purpose of calculating this metric, a quiet time is a period during which the local DMG PHY is in any state other than transmit state.

Figure 9-X6 illustrates two examples of Maximum Transmit Time and Maximum Quiet Time calculation.

(a)

(b)

**Figure 9-X6—Examples of Maximum Transmit Time and Maximum Quiet Time;**

**(a) operation during a TDD SP, (b) operation during other DMG allocations**

The Directional Transmit Power Activity subelement is shown in Figure 9-X7.

|  |  |  |
| --- | --- | --- |
|  | TRP | Additional Sensitivity |
| Octets: | 1 | 1 |

**Figure 9-X7—Directional Transmit PHY Activity subelement Data field format**

The TRP subfield indicates the total radiated power used to transmit the PPDU that contains the element, rounded up to the nearest multiple of 0.25 dBm. It is encoded as an 8-bit unsigned integer with values 0 through 255 representing 0 dBm through 63.75 dBm in 0.25 dBm steps.

NOTE—The value of the TRP subfield is independent of how often or how long the STA transmits during an observation period.

The Additional Sensitivity subfield indicates the extra receiver sensitivity of the STA, calculated as following and rounded to the nearest integer,

*Additional Sensitivity[dB]* = *Pmin\_sensitivity* – *Psensitivity*

where

*Pmin\_sensitivity* is the receiver sensitivity, in dBm, for MCS 0 defined in Table 20-3

*Psensitivity* is the actual receiver sensitivity, in dBm, measured using the same method as specified for *Pmin\_sensitivity*

The subfield is encoded as an 8-bit signed integer in the range -32 to 31. Values outside this range are reserved., with the value of this field is rounded to nearest integer in the range -16 to 15. This enables reduced sensitivity to interference.

NOTE—STAs receiving the DMG STA Directional Transmit Activity Report frame (activity report frame for short) can use the TRP and Additional Sensitivity subfields in the frame to reduce the interference they cause to the frame transmitter. To illustrate, consider STA1 receiving an activity report frame transmitted by STA2. Assume the following definitions,

 STA1 receive antenna gain in the direction 𝜙 towards STA2 when it received the activity report frame; if needed, STA1 can estimate 𝜙 using the TRN fields of the PPDU that contains the activity report frame.

 STA1 transmit antenna gain in the direction 𝜙 towards STA2 for a given transmission, possibly using a different DMG antenna configuration from what STA1 was using when it received the activity report frame

 STA2 receive antenna gain in the direction 𝜃 towards STA1, when STA2 uses the same DMG antenna configuration it was using when it transmitted the activity report frame

 STA2 transmit antenna gain in the direction 𝜃 towards STA1

 STA1 total radiated power

 STA2 total radiated power, as indicated by the value of the TRP field

 STA2 actual receiver sensitivity, calculated using the value of the Additional Sensitivity subfield

*Loss* Path loss between STA1 and STA2

Note the antenna gains are not necessarily the peak gains that STA1 and STA2 can achieve along and directions towards each other. The receive power at STA1 is . The receive power at STA2, if using the same DMG antenna configuration STA2 used to transmit the activity report frame, is . Assuming DMG antenna pattern reciprocity for STA2, and substituting , it is easy to see that STA1 can keep the receive power at STA2 below STA2 receiver sensitivity by limiting its total radiated power as , where all parameters on the right-hand side of the inequality are known to STA1.

In the special case that STA1 also transmits using the same DMG antenna configuration it was using when it received the activity report frame, and assuming antenna pattern reciprocity for STA1, STA1 can mitigate its interference to STA2 by limiting its total radiated power to , without having to know the direction 𝜙 towards STA2.

***Editor: Add a new entry to Table 9-363 (Public Action field values).***

**9.6.7.1 Public Action frames**

*…*

**Table 9-363—Public Action field values**

|  |  |
| --- | --- |
| **Public Action field value** | **Description** |
| … | … |
| <To be assigned> | DMG STA Directional Transmit Activity Report |
| … | … |

***Editor: Add a new frame definition under 9.6.7***

**9.6.7.xx DMG STA Directional Transmit Activity Report frame format**

The DMG STA Directional Transmit Activity Report frame is transmitted by a DMG STA to describe the transmit activity of the STA for a given antenna pattern and over a given observation period. The information included in the frame can help a receiving STA take actions to eliminate or mitigate both the interference caused by the STA transmitting the frame, and the interference caused by the receiving STA to the transmitting STA. The format of the DMG STA Directional Transmit Activity Report frame Action field is shown in Figure 9-Y1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Category | PublicAction | Timestamp | Countryelement | DMG STADirectional TransmitActivity Report element |
| Octets: | 1 | 1 | 8 | Variable | Variable |

**Figure 9-Y1—DMG STA Directional Transmit Activity Report frame Action field format**

The Category field is defined in 9.4.1.11 (Action field).

The Public Action field is defined in 9.6.7.1 (Public Action frames).

The Timestamp field is defined in 9.4.1.10 (Timestamp field).

The Country element is defined in 9.4.2.8 (Country element).

The DMG STA Directional Transmit Activity Report element is defined in 9.4.2.288 (DMG STA Directional Transmit Activity Report element).

***Editor: Change Section 9.6.10 as follows***

**9.6.10 Protected Dual of Public Action frames**

**Table 9-403—Public Action field values defined for Protected Dual**

**of Public Action frames**

|  |  |  |
| --- | --- | --- |
| **Public Action field value** | **Description** | **Defined in** |
| … |  | … |
| <To be assigned any of the reserved values 0, 3, 7, 14 or 15> | Protected DMG STA Directional Transmit Activity Report | 9.6.7.xx |
| … |  |  |

***Editor: Change Section 10.6.7.3 as follows***

10.6.7.3 Rate selection for group addressed Data and Management frames transmitted by DMG STAs

***Editor: Change the first paragraph (P220L33) as follows***

This subclause describes the rate selection rules for group addressed Data and Management frames transmitted by DMG STAs. These rate selection rules apply only to MCSs defined in Clause 20 and Clause 28.

***Editor: Add the following to end of the text in 11ay Draft 5.0 (P220L35)***

*Delete (correct thing to do and my preference) or change the third paragraph, and insert a new paragraph as follows*

If the antenna pattern used to transmit a single group addressed frame is expected to covers only one receiving STA in the same BSS, the frame may be transmitted following the rate selection rules of individually addressed frames as described in 10.6.7.4 (Rate selection for individually addressed Data and Management frames transmitted by DMG STAs).

Group addressed DMG STA Directional Transmit Activity Report frames shall be transmitted using DMG MCS 1.

***Editor: Modify Section 10.6.7.4 as follows***

10.6.7.4 Rate selection for individually addressed Data and Management frames transmitted by DMG STAs

***Editor: Change the first paragraph (P221L4) as follows***

This subclause describes the rate selection rules for individually addressed Data and Management frames as transmitted by DMG STAs. The rate selection rules apply only to MCSs defined in Clause 20 and Clause 28.

***Editor: Add the following to end of the text in 11ay Draft 5.0 (P221L28)***

*Change the fourth paragraph as follows*

TPA Request and TPA Response frames shall be transmitted using DMG MCS 1.

***Editor: Modify Section 11.1.3.3.4 as follows***

11.1.3.3.4 Beacon generation under TDD channel access

When a TDD SP occupies the entire beacon interval, the DMG Beacon frame fields shall be set as follows:

* Next A-BFT subfield set to a nonzero value
* Duration field bits 0-13 set to 0, and bit 14 and bit 15 set to 1

***Editor: Add a new section as follows***

**11.31.5** **Directional transmit activity report**

DMG STAs for which dot11DMGSTATxActivityReportImplemented is true are capable of transmitting DMG STA Directional Transmit Activity Report frames (9.6.7.xx), which for a given antenna pattern and 2.16 GHz channel, include information that helps receiving STAs unintentionally affected by the radiation pattern (more precisely, STAs that receive energy when the transmitting STA uses the given antenna pattern to communicate with its intended targets) to mitigate the interference caused by the transmitting STA, as well as the interreference these receiving STAs cause to the transmitting STA.

chan

STAs with both dot11DMGSTATxActivityReportImplemented and dot11DMGSTATxActivityReportActivated equal to true regularly transmit DMG STA Directional Transmit Activity Report frames (activity report frames for short) as follows.

For each antenna pattern and each 2.16 GHz channel that the STA is using to communicate with other STAs, the STA monitors its transmit activity in terms of number of *active* time units, contiguous or non-contiguous, during a sliding observation period. An active time unit is a period during which the STA has been in transmit mode for at least 10% of the time unit duration, excluding any time spent towards transmitting a DMG Beacon frame or a PPDU that contains only activity report frames, using the reference antenna pattern and using the reference 2.16 GHz channel or a wider channel that includes the reference channel. The time unit duration, in microseconds, is dot11DMGSTATxActivityReportTimeUnit.

As long as the STA has observed at least dot11DMGSTATxActivityReportMinActiveTimeUnits active time units over the last dot11DMGSTATxActivityReportActiveMonitoringTime time units, it shall transmit a PPDU containing at least one activity report frame, using the reference antenna pattern, and on the 2.16 GHz reference channel, at least once during every dot11DMGSTATxActivityReportInterval time units, provided that the STA has a transmit opportunity longer than SIFS plus the duration of a PPDU that only includes one activity report frame and no training subfields.

NOTE—For example, the following settings require a capable DMG STA to transmit a DMG STA Directional Transmit Activity Report frame at least once during every 15-second interval, as long as the STA has had at least 10 active seconds of transmission using a given antenna pattern over the last 60 seconds: dot11DMGSTATxActivityReportActivated = true, dot11DMGSTATxActivityReportTimeUnit = 1000000, dot11DMGSTATxActivityReportMinActiveTimeUnits = 10, dot11DMGSTATxActivityReportActiveMonitoringTime = 60, and dot11DMGSTATxActivityReportInterval = 15.

All transmitted activity report frames shall include the Country (9.4.2.8) and DMG STA Directional Transmit Activity Report (9.4.2.288) elements. The DMG STA Directional Transmit Activity Report element shall include the Directional Medium Access Activity and Directional Transmit Power Activity subelements.

The PPDUs containing an activity report frame should use the average effective TRP that the transmitting STA expects to apply when it communicates with other STAs using the reference antenna pattern and occupying channels that are the same as, or include the reference channel.

NOTE—For example, when the STA is communicating over a 4.32 GHz channel, it should transmit the PPDUs that contain a transmit activity report frame at half the power on each of the two 2.16 GHz channels in the 4.32 GHz channel.

A PPDU containing an activity report frame should include TRN-R subfields within its TRN field to enable receive training (with the goal of mitigating the interference) by receiving DMG STAs. Specifically, the STA transmitting such PPDU may set the TRN-LEN parameter of the TXVECTOR of the PPDU to a value greater than 0 if the PACKET-TYPE parameter of the TXVECTOR is set to TRN-R-PACKET. The PACKET-TYPE parameter of the TXVECTOR of such PPDU shall not be set to TRN-T-PACKET. The transmitting STA sets the Expect TRN-R subfield in the DMG STA Directional Transmit Activity Report element to 1 to indicate that it generally includes TRN-R subfields in transmitted PPDUs containing the element, and sets it to 0 otherwise.

NOTE—Even if the transmitting STA is capable of including TRN-R subfileds in PPDUs containing an activity report frame, some PPDUs may not include TRN-R subfields for various reasons, including shortening the PPDU to fit in a given transmit opportunity. The Expect TRN-R subfield in the DMG STA Directional Transmit Activity Report element indicates STA willingness to include TRN-R subfields in such PPDUs, except when external conditions such as duration of the transmit opportunities the STA is provided with (possibly decided by other STAs or a network management entity), prohibit including those subfields.

A STA may transmit individually addressed activity report frames to a target STA in the same BSS or otherwise. When transmitting the activity report frame to a target STA in the same BSS, and when management frame protection is negotiated, the transmitting STA shall use individually addressed Protected Dual of Public Action frames instead of Public Action frames.

***Editor: Add new MIBs in Annex C as follows***

**Annex C**

**C.3 MIB detail**

***Editor: P762L51 － Change the Dot11DMGSTAConfigEntry table as follows***

Dot11DMGSTAConfigEntry ::=

SEQUENCE {

dot11DMGOptionImplemented TruthValue,

dot11RelayActivated TruthValue,

dot11REDSActivated TruthValue,

dot11RDSActivated TruthValue,

dot11MultipleMACActivated TruthValue,

dot11ClusteringActivated TruthValue,

dot11DiscoveryAssistanceActivated TruthValue,

dot11DMGTDDLocalClockModeActivated TruthValue,

dot11DMGTimeAdvertisementBeaconInterval Unsigned32,

dot11ExtendedTPCActivated INTEGER,

dot11TDDOptionImplemented TruthValue,

dot11SAROptionImplemented TruthValue,

dot11UnsolicitedBAActivated TruthValue,

dot11ProtectedAnnounceImplemented TruthValue,

dot11DMGSTATxActivityReportImplemented TruthValue,

dot11DMGSTATxActivityReportActivated TruthValue

}

***Editor: P763L14 － Change dot11DMGSTAConfig to dot11DMGSTAConfigEntry; change Table to table***

***Editor: P765L26 － Insert the following MIB variables at the end of dot11DMGSTAConfigEntry table***

dot11DMGSTATxActivityReportImplemented OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME or an external management entity.

Changes take effect as soon as practical in the implementation.

This attribute, when true, indicates that the STA supports transmitting DMG STA Directional Transmit Activity Report frames."

DEFVAL { false }

::= { dot11DMGSTAConfigEntry 15 }

dot11DMGSTATxActivityReportActivated OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME or an external management entity.

Changes take effect as soon as practical in the implementation.

This attribute, when true, indicates that the STA transmits DMG STA Directional Transmit Activity Report frames using each antenna pattern and 2.16 GHz channel that is actively being used for data communication, as long as the STA supports this feature."

DEFVAL { false }

::= { dot11DMGSTAConfigEntry 16 }

***Editor: P775L42 － Change the Dot11DMGOperationEntry table as follows***

Dot11DMGOperationEntry ::=

SEQUENCE {

dot11MaxLostBeacons Unsigned32,

dot11MinBHIDuration Unsigned32,

dot11PSRequestSuspensionInterval Unsigned32,

dot11BroadcastSTAInfoDuration Unsigned32,

dot11NbrOfChangeBeacons Unsigned32,

dot11ImplicitHandoverLostBeacons Unsigned32,

dot11MinPPDuration Unsigned32,

dot11SPIdleTimeout Unsigned32,

dot11QABTimeout Unsigned32,

dot11ClusterEnableTime Unsigned32,

dot11PNWarningThresholdLow Unsigned32,

dot11PNWarningThresholdHigh INTEGER,

dot11BeaconSPDuration Unsigned32,

dot11PNExhaustionThresholdLow Unsigned32,

dot11PNExhaustionThresholdHigh INTEGER,

dot11MaxNumberOfClusteringMonitoringPeriods Unsigned32,

dot11DMGEcssPolicyDetailUpdateDurationMax Unsigned32,

dot11DMGEcssClusterReportDurationMin Unsigned32,

dot11DMGNavSync Unsigned32,

dot11DMGChannelAccessScheme INTEGER,

dot11DMGSTATxActivityReportTimeUnit Unsigned32,

dot11DMGSTATxActivityReportMinActiveTimeUnits Unsigned32,

dot11DMGSTATxActivityReportActiveMonitoringTime Unsigned32,

dot11DMGSTATxActivityReportInterval Unsigned32

}

***Editor: P776L9 － Change dot11DMGOperation to dot11DMGOperationEntry; change Table to table***

***Editor: P776L26 － Insert the following MIB variables at the end of dot11DMGOperationEntry table***

dot11DMGSTATxActivityReportTimeUnit OBJECT-TYPE

SYNTAX Unsigned32 (1..3600000000)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME or an external management entity.

Changes take effect as soon as practical in the implementation.

This attribute specifies the duration of the time unit, in microseconds, which is used to monitor the transmit activity of the STA for different antenna patterns and 2.16 GHz channels. The same time unit is also used to specify how often the STA needs to transmit DMG STA Directional Transmit Activity frames once the STA transmit activity exceeds a given threshold (specified by other MIB variables).

 "

DEFVAL { 1000000 }

::= { dot11DMGOperationEntry 21 }

dot11DMGSTATxActivityReportMinActiveTimeUnits OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME or an external management entity.

Changes take effect as soon as practical in the implementation.

For a given antenna pattern and 2.16 GHz channel, this attribute specifies the minimum number of active contiguous or non-contiguous time units (specified by another MIB variable) inside a sliding window of a given duration (specified by another MIB variable) that would require the STA to transmit DMG STA Directional Transmit Activity Report frames using that antenna pattern and 2.16 GHz channel.

An active time unit is an interval of a given duration during which the STA has been in transmit mode to transmit at least one PPDU other than a PPDU that contains only DMG STA Directional Transmit Activity Report frames."

DEFVAL { 10 }

::= { dot11DMGOperationEntry 22 }

dot11DMGSTATxActivityReportActiveMonitoringTime OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME or an external management entity.

Changes take effect as soon as practical in the implementation.

For a given antenna pattern and 2.16 GHz channel, this attribute specifies the duration of a sliding time window, as a multiple of a given time unit (specified by another MIB variable), during which the transmit activity of the STA is monitored to determine a minimum level of transmit activity (specified by another MIB variable) that would require the STA to transmit DMG STA Directional Transmit Activity Report frames using that antenna pattern and 2.16 GHz channel."

DEFVAL { 60 }

::= { dot11DMGOperationEntry 23 }

dot11DMGSTATxActivityReportInterval OBJECT-TYPE

SYNTAX Unsigned32 (1..4294967295)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a control variable.

It is written by the SME or an external management entity.

Changes take effect as soon as practical in the implementation.

For a given antenna pattern and 2.16 GHz channel, this attribute specifies the duration of a time interval, as a multiple of a given time unit (specified by another MIB variable), during which the STA must transmit at least one DMG STA Directional Transmit Activity Report frame using that antenna pattern and 2.16 GHz channel, provided that the STA has been actively transmitting data using that antenna pattern and 2.16 GHz channel, where the threshold for active transmission is specified by other MIB variables."

DEFVAL { 15 }

::= { dot11DMGOperationEntry 24 }

***Editor: P777L31 － Change the definition of “dot11DMGComplianceGroup” and “dot11DMGOperationsComplianceGroup” as follows***

dot11DMGComplianceGroup OBJECT-GROUP

OBJECTS {

dot11MultibandImplemented, dot11DMGOptionImplemented, dot11RelayActivated, dot11REDSActivated, dot11RDSActivated, dot11RSNAProtectedManagementFramesActivated, dot11MultipleMACActivated,

dot11ClusteringActivated, dot11LowPowerSCPHYImplemented, dot11LowPowerSCPHYActivated, dot11DiscoveryAssistanceActivated,

dot11DMGTDDLocalClockModeActivated,

dot11DMGTimeAdvertisementBeaconInterval,

dot11ExtendedTPCActivated,

dot11TDDOptionImplemented,

dot11SAROptionImplemented,

dot11UnsolicitedBAActivated,

dot11DMGSTATxActivityReportImplemented,

dot11DMGSTATxActivityReportActivated

}

STATUS current

DESCRIPTION

"Attributes that configure the DMG Group for IEEE Std 802.11."

::= { dot11Groups 64 }

dot11DMGOperationsComplianceGroup OBJECT-GROUP

OBJECTS {dot11MaxLostBeacons, dot11MinBHIDuration,

dot11PSRequestSuspensionInterval,

dot11BroadcastSTAInfoDuration, dot11NbrOfChangeBeacons,

dot11ImplicitHandoverLostBeacons, dot11MinPPDuration,

dot11SPIdleTimeout, dot11QABTimeout, dot11ClusterEnableTime,

dot11PNWarningThresholdLow, dot11PNWarningThresholdHigh,

dot11BeaconSPDuration,

dot11PNExhaustionThresholdLow, dot11PNExhaustionThresholdHigh,

dot11MaxNumberOfClusteringMonitoringPeriods,

dot11DMGEcssPolicyDetailUpdateDurationMax,

dot11DMGEcssClusterReportDurationMin,

dot11DMGNavSync,

dot11DMGChannelAccessScheme,

dot11DMGSTATxActivityReportTimeUnit,

dot11DMGSTATxActivityReportMinActiveTimeUnits,

dot11DMGSTATxActivityReportActiveMonitoringTime,

dot11DMGSTATxActivityReportInterval

}

STATUS current

DESCRIPTION

"Attributes that configure the DMG Operation for IEEE Std 802.11."

::= { dot11Groups 65 }