IEEE P802.11  
Wireless LANs

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| --- | --- | --- | --- | --- |
| [Draft text for Protocol and Frames for TDD Link Maintenance] | | | | |
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Abstract

[This document proposes draft changes to include protocol and frames for TDD link maintenance as described in 18/0470r1.]

***Insert the following subclauses***

**6.5.7 PLME-MINPAYLOADSTAT.request**

**6.5.7.1 Function**

This primitive is a request for the PHY to start measuring the signal power of received PPDUs and compute metrics such as EVM, SNR and LDPC over iterations of PPDUs that exceed the prescribed PSDU length (see 10.39.4).

**6.5.7.2 Semantics of the service primitive**

This primitive provides the following parameter:

PLME-MINPAYLOADSTAT.request(

PSDU\_MIN\_LENGTH

)

The PSDU\_MIN\_LENGTH parameter represents the smallest PSDU length, in octets, that PPDUs are required to have for the PHY to compute the required metrics.

**6.5.7.3 When generated**

This primitive is issued by the SME to the PHY entity to require the PHY to proceed with parameters measurement of received PPDUs that have a PSDU length no less than PSDU\_MIN\_LENGTH. The SME also issues the primitive to change the value of PSDU\_MIN\_LENGTH.

**6.5.7.4 Effect of receipt**

The effect of receipt of this primitive by the PHY entity is to start measuring signal power and to compute the metrics measured over PPDUs with a PSDU length no less than PSDU\_MIN\_LENGTH.

**6.5.8 PLME-MINPAYLOADSTAT.confirm**

**6.5.8.1 Function**

This primitive indicates that the PHY is ready to proceed with the measurement over received PPDUs and that the threshold has been set to PSDU\_MIN\_LENGTH.

**6.5.8.2 Semantics of the service primitive**

This primitive provides the following parameter:

PLME-MINPAYLOADSTAT.confirm(

PSDU\_MIN\_LENGTH

)

The PSDU\_MIN\_LENGTH parameter represents the smallest PSDU length, in octets, that PPDUs are required to have for the PHY to compute the required metrics.

**6.5.8.3 When generated**

This primitive is issued by the local PHY entity in response to a PLME-MINPAYLOADSTAT.request primitive.

**6.5.8.4 Effect of receipt**

The receipt of this primitive indicates to the SME that the PHY is ready to proceed with the measurement over received PPDUs that have a PSDU length no less than PSDU\_MIN\_LENGTH.

**6.5.9 PLME- MINPAYLOADSTATRESET.request**

**6.5.9.1 Function**

This primitive is a request by the SME to reset the PHY counters corresponding to the PLME**-**MINPAYLOADSTAT primitive. No other PHY functionality is impacted by the primitive.

**6.5.9.2 Semantics of the service primitive**

This primitive has no parameters.

**6.5.9.3 When generated**

This primitive is generated to reset the PHY measurements initiated by the PLME-MINPAYLOADSTAT.

**6.5.9.4 Effect of receipt**

Receipt of this primitive by the PHY causes it to reset the PHY counters of associated received PPDUs.

**6.5.10 PLME- MINPAYLOADSTATSTOP.request**

**6.5.10.1 Function**

This primitive is a request by the SME for the PHY to stop all measurements corresponding to the PLME**-**MINPAYLOADSTAT primitive. No other PHY functionality is impacted by the primitive.

**6.5.10.2 Semantics of the service primitive**

This primitive has no parameters.

**6.5.10.3 When generated**

This primitive is generated to stop the PHY measurements initiated by the PLME-MINPAYLOADSTAT.

**6.5.10.4 Effect of receipt**

Receipt of this primitive by the PHY causes it to stop the PHY measurements associated received PPDUs.

9.3.3.6 Association Request frame format

***Insert the following rows in Table 9-29***

|  |  |  |
| --- | --- | --- |
| <Last –1> | TDD Slot Schedule | The TDD Slot Schedule element is optionally present if dot11DMGOptionImplemented is true. |

* + - 1. Association Response frame format

***Insert the following rows in Table 9-30***

|  |  |  |
| --- | --- | --- |
| <Last –1> | TDD Slot Schedule | The TDD Slot Schedule element is optionally present if dot11DMGOptionImplemented is true. |

* + - 1. Reassociation Request frame format

***Insert the following rows in Table 9-31***

|  |  |  |
| --- | --- | --- |
| <Last –1> | TDD Slot Schedule | The TDD Slot Schedule element is optionally present if dot11DMGOptionImplemented is true. |

* + - 1. Reassociation Response frame format

***Insert the following rows in Table 9-32***

|  |  |  |
| --- | --- | --- |
| <Last –1> | TDD Slot Schedule | The TDD Slot Schedule element is optionally present if dot11DMGOptionImplemented is true. |

**9.4.2.128 DMG Capabilities element**

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | STA Address | AID | DMG STA Capability Information | DMG AP or PCP Capability Information | DMG STA Beam Tracking TimeLimit | Extended SC MCS Capabilities | Maximum Number of Basic A-MSDU Subframes in A-MSDU | Maximum Number Of Short A-MSDU Subframes in A-MSDU | TDD Capability Information |
| Octets | 1 | 1 | 6 | 1 | 8 | 2 | 2 | 1 | 1 | 1 | 2 |

Figure 9-503---DMG Capabilities element format

***Insert the following subclause***

**9.4.2.128.xx TDD Capability Information field**

The TDD Capability Information field, shown in Figure 9-xxx0, indicates the transmitting STA capabilities in TDD SPs.

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 | B1 B4 | B5 B15 |
|  | TDD Channel Access Supported | TDD Link Maintenance Statistics | Reserved |
| Bit | 1 | 4 | 11 |

Figure 9-xxx0---TDD Capabilities subfield format

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

The TDD Link Maintenance Statistics subfield indicates the capabilities of reporting TDD rate adaptation statistics, and is shown in Figure 9-xxx1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B3 | B64 | B65 | B66 |
|  | Parameters Across Rx Chains Supported | Parameters Across PPDUs Supported | Parameters Across LDPC Codewords Supported | Parameters Across SC Blocks Or OFDM Symbols Supported |
| Bit | 1 | 1 | 1 | 1 |

Figure 9-xxx1---TDD Link Maintenance Statistics subfield format

The Parameters Across Rx Chains Supported subfield is set to 1 to indicate the STA supports reporting the parameters across Rx Chains in the DMG Link Margin element (see 9.4.2.142). Otherwise, this field is set to 0.

The Parameters Across PPDUs Supported subfield is set to 1 to indicate the STA supports reporting the parameters across PPDUs in the DMG Link Margin element (see 9.4.2.142). Otherwise, this field is set to 0.

The Parameters Across LDPC Codewords Supported subfield is set to 1 to indicate the STA supports reporting the parameters across LDPC codewords in the DMG Link Margin element (see 9.4.2.142). Otherwise, this field is set to 0.

The Parameters Across SC Blocks Or OFDM Symbols Supported subfield is set to 1 to indicate the STA supports reporting the parameters across SC blocks or OFDM symbols in the DMG Link Margin element (see 9.4.2.142). Otherwise, this field is set to 0.

***Change the following subclauses as follows:***

**9.4.2.142 DMG Link Margin element**

**9.4.2.142.1 General**

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 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 2\*NSTS | 0 or 8\*NSTS | 0 or 4\*NSTS |

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

***Insert the following paragraphs at the end of the subclause***

The Rate Adaptation Control field contains the number of space-time streams reported (NSTS) and indications of whether the element includes optional fields used for rate adaptation. The Rate Adaptation Control field is defined in 9.4.2.142.3.

The Parameters Across Rx Chains field is optionally present. If present, it contains the subfields of parameters across Rx chains. The Parameters Across Rx chains field is defined in 9.4.2.142.4.

The Parameters Across PPDUs field is optionally present. If present, it contains the subfields of parameters across PPDUs. The Parameters Across PPDUs field is defined in 9.4.2.142.5.

The Parameters Across LDPC Codewords field is optionally present. If present, it contains the subfields of parameters across LDPC Codewords. The Parameters Across LDPC Codewords field is defined in 9.4.2.142.6.

The Parameters Across SC Blocks Or OFDM Symbols field is optionally present. If present, it contains the subfields of parameters across SC blocks or OFDM symbols. The Parameters Across SC Blocks Or OFDM Symbols field is defined in 9.4.2.142.7.

***Insert the following subclauses:***

**9.4.2.142.3 Rate Adaptation Control field**

The Rate Adaptation field is defined in Figure 9-xxx2.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Number of Rx chains Reported (NRX) | Number of Space-Time Streams Reported (NSTS) | | Indication for Parameters Across PPDUs | Indication for Parameters Across LDPC Codewords | Indication for Parameters Across SC Blocks or OFDM Symbols | IsEDMG | IsSC | Number of PPDUs | Reserved |
| Bits | 3 | 3 | 1 | | 1 | 1 | 1 | 1 | 16 | 13 |

**Figure 9-xxx2---Rate Adaptation Control field format**

The Number of Rx Chains Reported (NRX) subfield indicates the number of Rx chain entries being reported. Each entry, *i*, corresponds to an Rx chain *i*. 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.

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.

Note: For DMG STA NSTS is set to 1.

The Indication for Parameters Across PPDUs subfield is set to 1 if the DMG Link Margin element contains the Parameters across Rx chains and Parameters Across PPDUs field. It is set to 0 otherwise.

The Indication for Parameters Across LDPC Codewords subfield is set to 1 if the DMG Link Margin element contains the Parameters Across LDPC Codewords field. It is set to 0 otherwise.

The Indication for Parameters Across SC Blocks or OFDM Symbols subfield is set to 1 if the DMG Link Margin element contains the Parameters Across SC Blocks or OFDM Symbols field. It is set to 0 otherwise.

The IsEDMG subfield is used to indicate whether the value in the MCS field corresponds to the DMG PHY or the EDMG PHY. It is set to 1 for the EDMG PHY and to 0 for the DMG PHY.

The IsSC subfield is used to indicate whether the value in the MCS field corresponds to SC modulation or OFDM modulation. It is set to 1 for SC and to 0 for OFDM.

The Number of PPDUs subfield contains the number of PPDUs used over which the RCPI and SNR measurements were taken. (see 9.4.2.142.4 and 9.4.2.142.5)

**9.4.2.142.4 Parameters Across Rx chains field**

The Parameters Across Rx chains field is defined in Figure 9-xxx3.

|  |  |
| --- | --- |
|  | RCPI |
| Bits | 8 |

**Figure 9-xxx3---** **Parameters Across Rx chains field format**

The RCPI subfield contains the RCPI for each RF chain. The RCPI calculation is defined in 30.3.9.

**9.4.2.142.5 Parameters Across PPDUs field**

The Parameters Across PPDUs field is defined in Figure 9-xxx4.

|  |  |  |
| --- | --- | --- |
|  | SNR Per STS | MCS |
| Bits | 8 | 8 |

**Figure 9-xxx4---** **Parameters Across PPDUs field format**

The SNR Per STS subfield contains the SNR of the space time stream. The SNR subfield levels are unsigned integers referenced to a level of –8 dB. Each step is 0.25 dB. SNR values less than or equal to –8 dB are represented as 0. SNR values greater than or equal to 55.75 dB are represented as 0xFF.

The MCS subfield contains the MCS of the space time stream and is used to indicate the MCS which was used to collect the values in the Parameters Across LDPC Codewords or Parameters Across SC Blocks or OFDM Symbols subfields. If the Number of PPDUs subfield is 0, the MCS subfield is set to 0xFF.

**9.4.2.142.6 Parameters Across LDPC Codewords field**

The Parameters Across LDPC Codewords field is defined in Figure 9-xxx5.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Average Iterations | Max Iterations | Nonzero Syndromes | Number of LDPC Codewords |
| Bits | 8 | 8 | 24 | 24 |

**Figure 9-xxx5---** **Parameters Across LDPC Codewords field format**

The Average Iterations subfield indicates the average number of iterations used by the LDPC decoder on the PSDU for PPDUs not using MCS 0. One iteration includes processing of all rows. Values are from 0.0 to +25.5 in 0.1 steps. The collection is reset when the reset condition is met.

The Max Iteration subfield indicates the maximum number of iterations used by the LDPC decoder on the PSDU for PPDUs not using MCS 0. One iteration includes processing of all rows. The collection is reset when the reset condition is met.

The Nonzero Syndromes subfield indicates the number of LDPC codewords within the PSDU using an MCS different than MCS 0 and that have nonzero syndrome. The collection is reset when the reset condition is met.

The Number of LDPC Codewords subfield indicates the number of processed LDPC codewords using an MCS different than MCS 0 and included in the Average Iterations, Max Iterations and Nonzero Syndromes subfield statistics. The collection is reset when the reset condition is met. The value is saturated to 224-1 if it overflows.

The reset condition is defined as follows:

* Any change of: modulation (SC/OFDM), MCS, constellation, LDPC mode, GI/CP mode, number of space-time streams, MIMO type; or
* End of reporting period

**9.4.2.142.7** **Parameters Across SC Blocks or OFDM Symbols field**

The Parameters Across SC Blocks or OFDM Symbols field is defined in Figure 9-xxx6.

|  |  |  |
| --- | --- | --- |
|  | EVM | Number of SC Blocks or OFDM Symbols |
| Bits | 8 | 24 |

**Figure 9-xxx6---** **Parameters Across SC Blocks or OFDM Symbols field format**

The EVM subfield 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. The collection is reset when the reset condition is met (see 9.4.2.142.6).

The Number of SC Blocks or OFDM Symbols subfield indicates the count of the SC blocks or OFDM symbols included in the average EVM value. The value is saturated to 224-1 if it overflows.

The collection is reset when the reset condition is met (see 9.4.2.142.6).

***Insert the following subclause:***

**9.4.2.xxx1 TDD Bandwidth Request element**

The TDD Bandwidth Request element contains the information needed for bandwidth reservation request during TDD SPs. The format of the TDD Bandwidth Request element is shown in Figure 9-xxx7.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Transmit MCS | Requested Tx Percentage | Number of Queue Parameters | Reserved | Queue Parameter 1 | … | Queue Parameter N |
| Bits | 8 | 8 | 8 | 8 | 14 | 5 | 5 | 72 | … | 72 |

**Figure 9-xxx7---** **TDD Bandwidth Request element format**

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

The Transmit MCS field indicates the recommended MCS value to be used for the upcoming STA to AP transmission(s).

The Requested Tx Percentage field indicates the requested transmit percentage of airtime from the STA to the AP. The value is in units of 0.01 percent.

The Number of Queue Parameters field defines the integer number, N, of subsequent Queue Parameter fields followed.

Each Queue Parameter field is defined as shown in Figure 9-xxx8.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TID | Reserved | Queue Size | Traffic Arrival Rate |
| Bits | 5 | 3 | 32 | 32 |

**Figure 9-xxx8---** **Queue Parameter field format**

For values from 0 to 15, the TID subfield indicates the TID corresponding to the queue. A value of 31 indicates that this field is not applicable. Other values are reserved.

The Queue Size subfield indicates the amount of queued traffic at the transmitter, in unit of bytes, corresponding to the TID indicated by the TID subfield.

The Traffic Arrival Rate subfield indicates the arrival rate of the traffic since the last reporting event, in units of 1 Kbps. The method for computing the arrival rate is implementation dependent.

**9.4.2.xxx2 TDD Synchronization element**

The TDD Synchronization element contains the information needed for clock synchronization during TDD SPs. The format of the element is shown in Figure 9-xxx9.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Clock Quality |
| Bits | 8 | 8 | 8 | 32 |

**Figure 9-xxx9---** **TDD Synchronization element format**

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

The Clock Quality field indicates the accuracy of the local clock available to the STA that transmits the element. It is set to the value of the 32-bit ClockQuality structure defined in IEEE Std 802.1AS.

NOTE – DMG STAs that support TDD channel access can use external timing sources such as GNSS for accurate synchronization. For example, for a STA with access to a clock that is synchronized to a primary reference time source such as GNSS (i.e., clockClass of 0x06), and has a precision of ±500 ps (i.e., clockAccuracy 0f 0x23) and has a clock variance of 1.497e-22 s2 (i.e., offsetScaledLogVariance 0x3780) the value of the Clock Quality field is 0x06233780. Refer to IEEE Std 802.1AS for details.

NOTE – DMG STAs that support TDD channel access can use different protocols for time synchronization. The TDD Synchronization element is used to indicate the quality of the clock available to a STA to its peers. Protocols that could use this information are outside the scope of this standard.

***Add the following two rows in Table 9-416***

**Table 9-416 Announce frame Action field format**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| <Last - 3> | DMG Link Margin element | The DMG Link Margin element is defined in 9.4.2.142. The DMG Link Margin element is optionally present. If present, the DMG Link Margin element specifies the parameters needed for DMG link maintenance. |
| <Last – 2> | TDD Bandwidth Request element | The TDD Bandwidth Request element is defined in 9.4.2.xxx1. The TDD Bandwidth Request element is optionally present. If present, the TDD Bandwidth Request element specifies the parameters needed for bandwidth reservation during TDD SPs. |
| <Last – 1> | TDD Synchronization element | The TDD Synchronization element is defined in 9.4.2.xxx2. The TDD Synchronization element is optionally present. If present, the TDD Synchronization element specifies the information needed for clock synchronization during TDD SPs. |

***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 (9.6.7.5). If the Link Measurement Request frame is sent within a PPDU defined in Clause 20 or clause 30, the Link Measurement Report frame shall contain the DMG Link Margin element. If the TDD Link Maintenance Statistics subfield within the DMG STA Capability Information field of the STA indicated in the RA field is not set to 0, the DMG Link Margin element contains extra fields related to parameters used for TDD link maintenance (see 9.4.2.142.1), 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.

***Insert the following subclause***

**10.39.4 TDD link maintenance**

A STA indicates support for TDD link maintenance by setting the TDD Link Maintenance Statistics field within the STA’s DMG Capabilities element to a nonzero value. A STA that supports TDD link maintenance shall not initiate TDD link maintenance, as specified below, with a peer STA that does not support TDD link maintenance.

The SME of the STA that supports TDD link maintenance shall use the PLME-MINPAYLOADSTAT.request primitive to request the PHY to initiate measurement of signal power of received PPDUs and to compute the RX parameters as described below. Upon receiving a PLME-MINPAYLOADSTAT.request primitive, the PHY shall use the parameter PSDU\_MIN\_LENGTH of the primitive to start the measurements and shall respond to the MAC with a PLME-MINPAYLOADSTAT.confirm primitive.

A STA that supports TDD link maintenance and that receives a Link Measurement Request frame shall include a DMG Link Margin element in a transmitted Link Measurement Report frame. The STA shall perform the link statistics measurements according to the following rules:

* In the Parameters Across Rx Chains field, the RCPI shall be measured during the reception of the L-STF or EDMG-STF field of the PPDU. The measurement shall be performed on the same bandwidth as the PSDU (see 9.4.2.142.4).
* The value of the Parameters Across PPDUs field is computed as follows
  + For a SC mode PPDU, the SNR per stream is found by computing the SNR of the DMG or EDMG preambles. If EDMG preambles are present, it shall be used to compute the SNR. The measurement shall be on the same bandwidth as the PSDU.
  + For an OFDM mode PPDU, the average SNR per stream is found by computing the SNR per subcarrier in decibels for all the pilot and data subcarriers, and then computing the arithmetic mean of those values. Each SNR value per subcarrier in stream *i* (before being averaged) corresponds to the SNR of one of the pilot or data subcarrier. The SNR value per subcarrier per stream shall be based on measurement of EDMG-STF and/or EDMG-CEF using the same bandwidth as the PSDU (see 9.4.2.142.5).
* To compute the value of the Parameters Across LDPC Codewords field, the PPDUs used for computing the Average Iterations, Max Iteration, Nonzero Syndromes and Number of LDPC Codewords subfields are those PPDUs that have the payload length greater or equal to PSDU\_MIN\_LENGTH. All reported LDPC statistics shall be measured over the PSDU of a PPDU.
* To compute the value of the Parameters Across SC Blocks or OFDM Symbols field, the PPDUs used for computing the Average EVM and Number of SC Blocks or OFDM Symbols subfields are those PPDUs that have the payload length greater or equal to PSDU\_MIN\_LENGTH (see 9.4.2.142.6). The EVM is computed by averaging, in power units, the estimated EVM of SC data symbols or OFDM data subcarriers across PSDUs of PPDUs transmitted with an MCS different than MCS 0. The average is performed per space-time stream. The EVM estimation per SC symbol or OFDM carrier should be as close as possible to the value computed when the estimator has full knowledge of the transmitted signal (see 9.4.2.142.7).

To cause the PHY to stop performing measurement over received PPDUs, the SME shall invoke the PLME-MINPAYLOADSTATSTOP.request primitive.

***Insert the following subclause***

**30.3.9 Received channel power indicator (RCPI) measurement**

The RCPI is a measure of the received RF power in the selected channel as measured at the DMG antenna output, including the antenna gain that is used to receive the PPDU. This parameter shall be measured by the PHY over the preamble of a received PPDU, that is, L-STF or L-CEF, or both, and, if present, EDMG-STF or EDMG-CEF, or both. The measurement shall be done over the same bandwidth as the PSDU of the PPDU. When multiple RF chains are used to receive the PPDU, RCPI is measured per each RF chain.

The RCPI encoding is defined in 9.4.2.38.

RCPI shall equal the received RF power at each RF chain with an accuracy of ± 5 dB with 95% confidence interval within the specified dynamic range of the receiver. The received RF power at each RF chain shall be determined assuming a receiver noise equivalent bandwidth equal to the channel width multiplied by 1.1. The relative error between RCPI measurements made per RF chain within a 1 second interval should be less than ± 1 dB.

***Change Table 17 in 11ay D1.1 as follows:***

|  |  |  |
| --- | --- | --- |
| **Binary encoding** | **Operation between AP or PCP DMG STA and non-AP and PCP DMG STA during TDD slot** | |
| **Behavior of AP and PCP STA** | **Behavior of Non-AP and non-PCP STA** |
| **00** | **N/A; TDD slot unassigned** | |
| **01** | **TX** | **RX** |
| **10** | **RX** | **TX** |
| **11** | **~~Reserved~~ Unavailable** | |

***Add the following paragraphs after P165L3-L11 in 10.37.6.2.2 of 11ay D1.1 and change the paragraph at P165L12-L23 as follows:***

A non-AP and non-PCP DMG STA may transmit a TDD Slot Schedule element in an Announce frame or Association Request frame to a DMG AP or DMG PCP. In this case, the Bitmap and Access Type Schedule field in the element is set from the viewpoint of the AP or PCP, and indicates the availability of the STA, which can be used as input to the AP or PCP scheduling.

A TDD slot can be a simplex TDD slot, an unavailable TDD slot, or an unassigned TDD slot. No transmissions shall occur in an unassigned TDD slot or an unavailable TDD slot. RX and TX operations during a simplex TDD slot depend on the STA behavior indicated in the Bitmap and Access Type Schedule field defined in Table 17 as follows:

-A STA shall not transmit in a simplex TDD slot if the Bitmap and Access Type Schedule field indicates a value different than TX for the STA for the TDD slot.

-In a simplex TDD slot that has the Bitmap and Access Type Schedule field for the STA equal to TX, the STA should initiate transmissions addressed to the peer STA assigned to the TDD slot at the start of the TDD slot.

-In a simplex TDD slot that has the Bitmap and Access Type Schedule field for the STA equal to RX, the STA shall be beamformed towards the peer STA assigned to the TDD slot and shall remain in the receive state for the duration of the TDD slot in order to receive transmissions from peer STA.

When an AP or PCP receives a TDD Slot Schedule element from a STA that indicates a TDD slot is an unavailable TDD slot for that STA, the AP or PCP shall not schedule any transmission or reception in this TDD slot for that STA.

**11.4.13 DMG allocation formats**

**11.4.13.1 General**

***Change this subclause as follows:***

A DMG STA manages allocations and TSs as described in 11.4.1 to 11.4.14. Using the DMG TSPEC, a

DMG STA can indicate two types of allocation scheduling: isochronous and asynchronous. Using the Announce frame that includes the TDD Bandwidth Request element, a DMG STA can request TDD slot allocation scheduling within a TDD SP. It should establish an isochronous allocation if it needs periodic access to the channel and does not expect to change the amount of time allocated frequently. It should establish an asynchronous allocation if it expects to make requests for channel time and wishes to reserve a minimum amount of channel time to satisfy for those requests when they occur. It should establish TDD slot allocations within a TDD SP if it supports TDD channel access and wishes to reserve an amount of time to satisfy the bandwidth request contained in the TDD Bandwidth element.

***Add the following subclause as follows:***

**11.4.13.1 TDD slot allocations**

A DMG STA transmits an Announce frame to its AP or PCP and that includes a TDD Bandwidth Request element to request channel time during a TDD SP allocation.

For each TID, a DMG STA can indicate the corresponding queue parameters and request the amount of transmit percentage that needs to be allocated (see 9.4.2.xxx1).

**Straw Poll:**

* **Do you agree to include the text changes proposed in (11-18-0786-03-00ay-** **Draft text for Protocols and Frames for TDD Link Maintenance) to the spec draft?**

References:

1. 11-18-0130-01-00ay-link-maintenance-in- distribution-networks.pptx
2. 11-18-0470-01-00ay-protocol-and-frames-for-tdd-link-maintenance.pptx
3. 802.11ay D1.1