IEEE P802.11
Wireless LANs

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| Resolutions for some comments on 11md/D0.1 (CC25) |
| Date: 2017-11-09 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Mark RISON | Samsung Cambridge Solution Centre | SJH, CB4 0DS, U.K. | +44 1223 434600 | at samsung (a global commercial entity) I'm the letter emme then dot rison |

Abstract

This submission proposes resolutions for CIDs 146, 186, 187, 191, 205, 206, 207, 209, 243, 261, 264, 291, 299, 322 on 11md/D0.1. Green indicates material agreed to in the group, yellow material to be discussed, red material rejected by the group and cyan material not to be overlooked. The “Final” view should be selected in Word.

r1: for discussion at 2017-08-18 teleconf. Added CID 243. Updated CID 146.

r2: as discussed at 2017-08-25 teleconf and updated after. Added CID 261. Updated CIDs 146, 243 and 264.

r3: as discussed at 2017-10-13 teleconf and updated later. Updated CIDs 146, 191, 206, 207, 261.

r4: for discussion at 2017-11-09 F2F. Added CIDs 197, 198, 323. Updated CIDs 191, 264, 322.

r5: after discussion at 2017-11-09 F2F. Updated CIDs 191, 197, 198, 261.

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| Identifiers | Comment | Proposed change |
| CID 191Mark RISON10.161477.19 | There are several instances of wording of the form "A STA shall not transmit a frame with the TXVECTOR parameter blah set to foo unless the RA of the frame is of type baz": 1341.23, 1341.29, 1341.35, 1341.41, 1342.7, 1342.18, 1342.29, 1342.40, 1342.51, 1343.23 in 802.11mc/D6.0. These are broken because the first "frame" means PPDU and the second one means "MPDU". There is also an issue if the RA is a group address | Reword these instances to the form "A STA shall not transmit a PPDU with the TXVECTOR parameter blah set to foo unless the RA of the frame(s) it contains are of type baz (where this condition applies to all addressed STAs if the RA is a group address)" . See 16/0839r3 |

Discussion:

As it says in the comment, an MPDU does not have a TXVECTOR. The TXVECTOR is associated with the PPDU. Additionally, for group-addressed frames the requirements need to apply w.r.t. all the targeted recipients.

Note, however, that it is considered acceptable to refer to PPDUs as “frames”:

**physical layer (PHY) frame**: The unit of data exchanged between PHY entities. Syn: **PPDU**.

NOTE 14—In contexts in which the PHY is clearly the subject, “frame” is an implicit reference to a PHY frame.

So the problem is restricted to cases where “frame” is being used for both MPDUs and PPDUs (typically because one part of the wording refers to the RA or to a frame type and another refers to the TXVECTOR).

Proposed changes:

All references are to D0.3.

Change “Frames” to “PPDUs” at 770.32 in 9.2.5.2.

Change 1605.39 in 10.3.2.9.1 as follows:

The STA indicates truncation of the TXOP by transmitting a CF-End frame in a PPDU with TXVECTOR parameter restrictions as specified in 10.7.6.3 (Rate selection for CF-End frames).

Change 1595.54 in 10.3.2.4 as follows:

An S1G STA that receives a PS-Poll frame in a PPDU with ~~the~~ RXVECTOR parameter RESPONSE\_INDICATION equal to NDP Response shall update its NAV using a duration value equal to NDPTxTime (10.3.2.5.2 (RID update)) plus one SIFS, but only when the new NAV value is greater than the current NAV value and the RA is not equal to the MAC address of the S1G STA. The NDPTxTime is calculated according to additional RXVECTOR parameters as described in 10.3.2.5.2 (RID update).

Change 1644.37 in 10.7.5.7 as follows:

— A STA shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not supported by the receiver STA, as reported in any HT Capabilities element, VHT Capabilities element, or S1G Capabilities element received from the intended receiver (if there is more than one intended receiver, then this requirement applies to each intended receiver).

— An HT STA that is a member of a BSS and that is not a VHT STA shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not permitted for use in the BSS, as reported in the most recently received HT Operation element, with the exception of transmissions on a TDLS off-channel link, which follow the rules described in 11.23.6.2 (General behavior on the off-channel) and 11.23.6.3 (Setting up a 40 MHz direct link).

— A VHT STA that is a member of a BSS shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not permitted for use in the BSS, as reported in the most recently received VHT Operation element with the following exceptions:

— Transmissions on a TDLS off-channel link follow the rules described in 11.23.6.2 (General behavior on the off-channel) and 11.23.6.3 (Setting up a 40 MHz direct link).

— Transmissions by a VHT STA on a TDLS link follow the rules described in 11.23.1 (General) and 11.23.6.5 (Setting up a wide bandwidth off-channel direct link).

[…]

— If at least one Operating Mode field with the Rx NSS Type subfield equal to 0 was received from the receiver STA (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— A STA shall not transmit a frame using a value for the TXVECTOR parameter CH\_BANDWIDTH that is not supported by the receiver STA as reported in the most recently received Operating Mode field with the Rx NSS Type subfield equal to 0 from the receiver STA.

Change 1647.47 in 10.7.6.3 as follows:

A STA that transmits a CF-End frame at the end of a TXOP that was obtained by a non-AP STA through the use of the dual CTS mechanism shall transmit the CF-End frame in a PPDU with the same value for the TXVECTOR parameter STBC, TXVECTOR parameter MCS (if present), and TXVECTOR parameter RATE as was used for the transmission of the PPDU containing the matching Control frame at the beginning of the TXOP.

Change 1647.62 in 10.7.6.3 as follows:

A STA that transmits a CF-End frame at the end of a TXOP that was obtained by an AP through the use of the dual CTS mechanism shall transmit the CF-End frame in a PPDU with the same value for the TXVECTOR parameter STBC, TXVECTOR parameter MCS (if present), and TXVECTOR parameter RATE as was used for the transmission of the PPDU containing the matching Control frame at the beginning of the TXOP.

Change 1650.25 in 10.7.6.5.2 as follows:

The modulation class of the PPDU containing the control response frame shall be selected according to the following rules:

— If the PPDU containing the received frame is of a modulation class other than HT, VHT, or S1G and the control response frame is carried in a non-HT PPDU, the control response frame shall be transmitted in a PPDU using the same modulation class as the PPDU containing the received frame. In addition, the control response frame shall be sent in a PPDU using the same value for the TXVECTOR parameter PREAMBLE\_TYPE as the PPDU containing the received frame.

Change 1654.52 in 10.7.6.5.7 as follows:

A STA shall not transmit a control response frame in a PPDU with TXVECTOR parameter GI\_TYPE set to SHORT\_GI unless it is in response to a reception of a frame in a PPDU with ~~the~~ RXVECTOR parameter GI\_TYPE equal to SHORT\_GI.

A STA shall not transmit a control response frame in a PPDU with TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless it is in response to a reception of a frame in a PPDU with ~~the~~ RXVECTOR parameter FEC\_CODING equal to LDPC\_CODING.

A STA shall not transmit a control response frame in a PPDU with ~~the~~ TXVECTOR parameter FORMAT set to HT\_GF.

Change 1657.3 in 10.7.6.7 as follows:

A STA shall not transmit a Control frame that initiates a TXOP in a PPDU with ~~the~~ TXVECTOR parameter GI\_TYPE set to a value of SHORT\_GI.

A STA shall not transmit a Control frame that initiates a TXOP in a PPDU with ~~the~~ TXVECTOR parameter FEC\_CODING set to a value of LDPC\_CODING.

Delete “the” in “An S1G STA shall not transmit an S1G Control frame or an NDP CMAC frame with the TXVECTOR parameter S1G\_DUP\_1M to another S1G STA” at 1662.6 in 10.7.11. Change 1661.59 in 10.7.11 as follows:

NOTE—A CTS frame, even though it does not have a TA field, can also be transmitted in a PPDU with ~~the~~ TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT present.

Delete the “’s” in “TXVECTOR’s parameter” at 1662.3, 1930.18, 1930.20, 1930.24.

Change 1676.15 in 10.16 as follows:

An HT STA shall not transmit a frame in a PPDU with ~~the~~ TXVECTOR parameter FORMAT set to HT\_MF or HT\_GF and ~~the~~ TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless the RA of the frame corresponds to an HT STA for which the LDPC Coding Capability subfield of the HT Capabilities element received from that STA contained a value of 1 and dot11LDPCCodingOptionActivated is true (if there is more than one intended receiver, then this requirement applies to each intended receiver).

A VHT STA shall not transmit a frame in a PPDU with ~~the~~ TXVECTOR parameter FORMAT set to VHT and ~~the~~ TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless the RA of the frame corresponds to a VHT STA for which the Rx LDPC subfield of the VHT Capabilities element received from that STA contained a value of 1 and dot11VHTLDPCCodingOptionActivated is true (if there is more than one intended receiver, then this requirement applies to each intended receiver).

An S1G STA shall not transmit a frame in a PPDU with ~~the~~ TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless the RA of the frame corresponds to a STA for which the Rx LDPC subfield of the S1G Capabilities element from that STA contained a value of 1 and dot11S1GLDPCCodingOptionActivated is true (if there is more than one intended receiver, then this requirement applies to each intended receiver).

***~~Editor’s Note: Is the following paragraph duplicate of the second paragraph of this subclause?~~***

~~A VHT STA shall not transmit a frame with the TXVECTOR parameter FORMAT set to VHT and the TXVECTOR parameter FEC\_CODING set to LDPC\_CODING unless the RA of the frame corresponds to a VHT STA for which the Rx LDPC subfield of the VHT Capabilities element received from that STA contained a value of 1 and dot11VHTLDPCCodingOptionActivated is true.~~

A STA should not transmit a frame in a PPDU with ~~the~~ TXVECTOR parameter FORMAT set to HT\_MF, HT\_GF or VHT and ~~the~~ TXVECTOR parameter FEC\_CODING set to LDPC\_CODING if the RA of the frame corresponds to a STA from which it has received a frame containing an Operating Mode field and the most recent Operating Mode field it has received from that STA had the No LDPC subfield equal to 1 (if there is more than one intended receiver, then this requirement applies to each intended receiver).

Change 1677.16 in 10.18 as follows:

A STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW20 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The STA is an HT STA.

— The TXVECTOR parameter FORMAT is equal to HT\_MF, HT\_GF, or VHT.

— The RA of the frame corresponds to a STA for which the Short GI for 20 MHz subfield of the HT Capabilities element contained a value of 1.

— dot11ShortGIOptionInTwentyActivated is present and is true.

A STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW40 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The STA is an HT STA.

— The TXVECTOR parameter FORMAT is equal to HT\_MF, HT\_GF, or VHT.

— The RA of the frame corresponds to a STA for which the Short GI for 40 MHz subfield of the HT Capabilities element contained a value of 1.

— dot11ShortGIOptionInFortyActivated is present and is true.

A STA shall not transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW80 and GI\_TYPE set to SHORT\_GI unless all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The STA is a VHT STA.

— The TXVECTOR parameter FORMAT is equal to VHT.

— The RA of the frame corresponds to a STA for which the Short GI for 80 MHz/TVHT\_MODE\_4C subfield of the VHT Capabilities element contained a value of 1.

— dot11VHTShortGIOptionIn80Activated is present and is true.

A STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW160 or CBW80+80 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The STA is a VHT STA.

— The TXVECTOR parameter FORMAT is equal to VHT.

— The RA of the frame corresponds to a STA for which the Short GI for 160 and 80+80 MHz subfield of the VHT Capabilities element contained a value of 1.

— dot11VHTShortGIOptionIn160and80p80Activated is present and is true.

A STA may transmit a frame in a PPDU with TXVECTOR parameters FORMAT set to VHT, NUM\_USERS set to greater than 1, and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met:

— The STA is a VHT STA.

— The TXVECTOR parameter FORMAT is equal to VHT.

— The RAs of all MPDUs in the VHT MU PPDU correspond to STAs for which the Short GI subfield of the following conditions are satisfied:

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW20, the Short GI for 20 MHz subfields of the HT Capabilities element contained a value of 1, and dot11ShortGIOptionInTwentyActivated is present and is true.

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW40, the Short GI for 40 MHz subfields of the HT Capabilities element contained a value of 1, and dot11ShortGIOptionInFortyActivated is present and is true.

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW80, the Short GI for 80 MHz/ TVHT\_MODE\_4C subfields of the VHT Capabilities element contained a value of 1, and dot11VHTShortGIOptionIn80Activated is present and is true.

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW160 or CBW80+80, the Short GI for 160 MHz and 80+80 MHz subfields of the VHT Capabilities element contained a value of 1, and dot11VHTShortGIOptionIn160and80p80Activated is present and is true.

An S1G STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW1 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The RA of the frame corresponds to a STA for which the Short GI for 1 MHz subfield of the S1G Capabilities element is 1.

— dot11ShortGIOptionIn1MActivated is present and is true.

An S1G STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW2 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The RA of the frame corresponds to a STA for which the Short GI for 2 MHz subfield of the S1G Capabilities element is 1.

— dot11ShortGIOptionIn2MActivated is present and is true.

An S1G STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW4 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The RA of the frame corresponds to a STA for which the Short GI for 4 MHz subfield of the S1G Capabilities element is 1.

— dot11ShortGIOptionIn4MActivated is present and is true.

An S1G STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW8 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The RA of the frame corresponds to a STA for which the Short GI for 8 MHz subfield of the S1G Capabilities element is 1.

— dot11ShortGIOptionIn8MActivated is present and is true.

An S1G STA may transmit a frame in a PPDU with TXVECTOR parameters CH\_BANDWIDTH set to CBW16 and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met (if there is more than one intended receiver, then this requirement applies to each intended receiver):

— The RA of the frame corresponds to a STA for which the Short GI for 16 MHz subfield of the S1G Capabilities element is 1.

— dot11ShortGIOptionIn16MActivated is present and is true.

An S1G STA may transmit a frame in a PPDU with TXVECTOR parameters NUM\_USERS set to greater than 1, and GI\_TYPE set to SHORT\_GI only if all of the following conditions are met:

— The RAs of all MPDUs in the S1G MU PPDU correspond to STAs for which the Short GI subfield

of the following conditions are satisfied:

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW2, the Short GI for 2 MHz

subfield of the S1G Capabilities element is equal to 1, and dot11ShortGIOptionIn2MActivated

is present and is true.

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW4, the Short GI for 4 MHz

subfield of the S1G Capabilities element is equal to 1, and dot11ShortGIOptionIn4MActivated

is present and is true.

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW8, the Short GI for 8 MHz

subfield of the S1G Capabilities element is equal to 1, and dot11ShortGIOptionIn8MActivated

is present and is true.

— If the TXVECTOR parameter CH\_BANDWIDTH is set to CBW16, the Short GI for 16 MHz

subfield of the S1G Capabilities element is equal to 1, and dot11ShortGIOptionIn16MActivated

is present and is true.

An HT STA shall not transmit a frame with ~~the~~ TXVECTOR parameter FORMAT set to HT\_GF and the GI\_TYPE parameter set to SHORT\_GI when the MCS parameter indicates a single spatial stream.

Change 1679.27 in 10.19 as follows:

An HT STA shall not transmit a frame in a PPDU with ~~the~~ TXVECTOR parameter FORMAT set to HT\_GF unless the RA of the frame corresponds to a STA for which the HT-Greenfield subfield of the HT Capabilities element contained a value of 1 and dot11HTGreenfieldOptionActivated is true (if there is more than one intended receiver, then this requirement applies to each intended receiver).

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 191 in <this document>, which address the issue raised.

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| Identifiers | Comment | Proposed change |
| CID 209Mark RISON | dot11QAPMissingAckRetryLimit's description doesn't make it clear the "or after" bit is about U-APSD | Make the changes shown in 16/0839r3 under CID 8067 |
| CID 299Mark RISONC.3 | dot11QAPMissingAckRetryLimit's description suggests it's only used for PS-Poll contexts but the use is also in U-APSD contexts (see 1585.24). The description is confusing, too (how does the condition after "or after" relate to the one before (subset? Duplication?) | Change the last para of the description |

Discussion:

Context for PS-Poll (1728.23):

If the AP does not receive an acknowledgment to an individually addressed MPDU containing all or part of a BU sent to a STA in PS mode following receipt of a PS-Poll frame from that STA, it may retransmit the frame for at most the lesser of the maximum retry limit and dot11QAPMissingAckRetryLimit times before the next Beacon frame, but it shall retransmit that frame at least once before the next Beacon frame, time permitting and subject to its appropriate lifetime limit.

Context for U-APSD (1728.31):

If the AP does not receive an acknowledgment in response to a non-A-MPDU frame that is an

individually addressed Data frame that is sent with the EOSP subfield equal to 1, and that requires

acknowledgment, it shall retransmit that frame at least once within the same SP, subject to

applicable retry or lifetime limits. If the AP does not receive a Block Ack frame in response to an A-

MPDU that contains one or more individually addressed Data frames that are sent with the EOSP

subfield equal to 1, and that require acknowledgment, it shall retransmit at least one of those frames

at least once within the same SP, subject to applicable retry or lifetime limits. The maximum number

of retransmissions within the same SP is the lesser of the maximum retry limit and

dot11QAPMissingAckRetryLimit.

Context for dot11QAPMissingAckRetryLimit’s description (3377.33):

This attribute indicates the number of times the AP may retry a frame for which it does not receive an Ack frame for a STA in power save mode after receiving a PS-Poll frame and sending an individually addressed response or after the AP does not receive an Ack frame to an individually addressed MPDU sent with the EOSP subfield equal to 1.

Actually the problem is the wording, which doesn’t make it clear the “or after” bit is about U-APSD (though the “EOSP” bit gives the game away). Oh, and it assumes it’s an Ack frame, but it might be a BlockAck frame.

Proposed changes:

Change 3377.33 as follows:

This attribute indicates the number of times the AP may retry a frame for which it does not receive an ~~Ack frame~~acknowledgement for a STA in power save mode after receiving a PS-Poll frame and sending an individually addressed response or after receiving a U-APSD trigger frame and sending an individually addressed response ~~the AP does not receive an Ack frame to an individually addressed MPDU sent~~ with the EOSP subfield equal to 1.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CIDs 209 and 299 in <this document>, which make the description of the MIB variable clearer.

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| Identifiers | Comment | Proposed change |
| CID 186Mark RISON10.3.2.3.11409.20 | In Figure 10-4 there are two "AIFS[i]"s but they have different properties. This is mathematically impossible | Replace one with "[AC]" and the other with "[AC$prime]", where $prime is the glyph for a prime |
| CID 187Mark RISON10.3.2.3.11409.20 | In Figure 10-4 there are two "AIFS[i]"s but they have different properties. This is mathematically impossible | Delete the top one (i.e. lines 1-4ish) |

Discussion:

Apparently the proposed change was not clear enough when this came up in TGmc.

Proposed changes:

Change Figure 10-4 from:



to:



or to:



Proposed resolution for CID 186:

REVISED

Make the proposed change and also change e) below it to read:

e) AIFS[AC] arbitration interframe space (for the AC used by the QoS facility)

Proposed resolution for CID 187:

REJECTED

The intention of showing two AIFSs is to get across the concept that AIFS generally takes on different values for each AC.

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| Identifiers | Comment | Proposed change |
| CID 207Mark RISON | aSTFTwoLength and aLTFTwoLength are stated to be integers. However, for TVHT they aren't, because of the way TVHT is derived from VHT | Make the changes shown in 16/0839r3 under CID 8316 |

Discussion:

The table in 6.5.4.2 claims that the type of aPreambleLength and aPHYHeaderLength is “integer”.

However 22.4.4 says:

The static TVHT PHY characteristics, provided through the PLME-CHARACTERISTICS service primitive, shall be as shown in Table 19-25 (HT PHY characteristics) except parameters listed in Table 22-25 (TVHT PHY characteristics) and aPreambleLength, aSTFOneLength, aSTFTwoLength, aLTFOneLength, aLTFTwoLength, aPHYHeaderLength, and aPHYSigTwoLength, which are multiplied by 7.5 for 6 MHz and 7 MHz unit channels and by 5.625 for 8 MHz unit channels. The definitions for these characteristics are given in 6.5 (PLME SAP interface).

The values for aPreambleLength and aPHYHeaderLength in Table 19-25 are 16 µs and 4 µs respectively. The result of multiplying the latter by 5.625 is not an integer.

Actually, this might also be true of a[SL]TF{One,Two}Length and aPHYSigTwoLength. Time for a table:

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| Characteristic | × 1 | × 7.5 | × 5.625 |
| aPreambleLength | 16 µs | 120 µs | 90 µs |
| aSTFOneLength | 8 µs | 60 µs | 45 µs |
| aSTFTwoLength | 4 µs | 30 µs | 22.5 µs |
| aLTFOneLength | 8 µs | 60 µs | 45 µs |
| aLTFTwoLength | 4 µs | 30 µs | 22.5 µs |
| aPHYHeaderLength | 4 µs | 30 µs | 22.5 µs |
| aPHYSigTwoLength | 8 µs | 60 µs | 45 µs |

So the non-integers appear only for a[SL]TFTwoLength and aPHYHeaderLength. But for the latter 648.19 already says “If the actual value of the length of the modulated header is not an integer number of microseconds, the value is rounded up to the next higher value.”

So the problem is only for a[SL]TFTwoLength.

Proposed resolution:

REVISED

At 648.12½ add “. If the actual value of the length of the HT-STF is not an integer number of microseconds, the value is rounded up to the next higher value.” to the end of the rightmost cell.

At 648.15½ add “. If the actual value of the length of the Additional HT-LTFs is not an integer number of microseconds, the value is rounded up to the next higher value.” to the end of the rightmost cell.

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| Identifiers | Comment | Proposed change |
| CID 206Mark RISON | It says "corresponds to a VHT-MCS and NSS for which support is indicated by the combination of theTx VHT-MCS Map subfield in the VHT Operation parameter of the MLME-(RE)ASSOCIATE.request primitive, if present, and the AP's operational VHT-MCS and NSSset, if defined, and the VHT Capabilities Information field, at a bandwidth and guard intervalsupported by the non-AP STA on transmission and permitted in the BSS." -- this is very hard to parse ("the combination of X, if present, and Y, if defined, and Z, at A and B and C") and the precedence is unclear | Make the changes shown in 16/0839r3 under CID 8320 |

Discussion:

We need more structure.

Proposed changes:

Change 2066.58 as follows:

The value of the Minimum PHY Rate in a TSPEC shall satisfy the following constraints:

a) for an uplink TS, it

— is included in dot11SupportedDataRatesTxTable and in the AP’s operational rate set, or

— corresponds to an HT MCS included in dot11HTSupportedMCSTxTable, if present, and in the AP’s operational HT MCS set, if defined, at a bandwidth and guard interval supported by the non-AP STA on transmission and permitted in the BSS, or

— corresponds to a VHT-MCS and NSS for which support is indicated by the combination of: ***<para break and indent>***

— the Tx VHT-MCS Map subfield in the VHT Operation parameter of the MLME-(RE)ASSOCIATE.request primitive, if present, and

— the AP’s operational VHT-MCS and NSS set, if defined, and

— the VHT Capabilities Information field~~,~~

at a bandwidth and guard interval supported by the non-AP STA on transmission and permitted in the BSS.

b) for a downlink TS, it

— is included in the OperationalRateSet parameter of the MLME-JOIN.request primitive and supported by the AP on transmission, or

— corresponds to an HT MCS included in dot11HTSupportedMCSRxTable, if present, and supported by the AP on transmission, at a bandwidth and guard interval supported by the non-AP STA on reception and permitted in the BSS, or

— corresponds to a VHT-MCS and NSS for which support is indicated by the combination of: ***<para break and indent>***

— the Rx VHT-MCS Map subfield in the VHT Operation parameter of the MLME-(RE)ASSOCIATE.request primitive, if present, and

— the Tx VHT-MCS Map subfield of the VHT Operation element advertised by the AP, if present, and

— the VHT Capabilities Information field~~,~~

at a bandwidth and guard interval supported by the non-AP STA on reception and permitted in the BSS.

c) for a bidirectional TS, it satisfies both a) and b) above.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 206 in <this document>, which clarify the structure of the criteria.

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| Identifiers | Comment | Proposed change |
| CID 205Mark RISON | Does the "PHY header" include the SERVICE field for all PHYs (e.g. Figure 17-1---PPDU format for OFDM)? If so, then its length is dependent on the datarate of the PHY payload, which is awkward for things like aPHYHeaderLength | Make the changes indicated in 16/0839r3 under CID 8088 |

Discussion:

aPHYHeaderLength is defined at 648.16 as “The current PHY’s header length (in microseconds), excluding aPHYSigTwoLength if present.”

For things like DSSS and HR/DSSS it’s all fine (Figures 15-1 and 16-2 respectively): the SERVICE field is sent at a known PHY rate and so the duration of the PHY header is fixed.

However for things like OFDM, HT and VHT it’s more problematic (Figures 17-1, 19-1 and 21-4 respectively), because the PHY header includes a SERVICE field that is in the Data field and hence has a non-fixed duration, although Figures 19-1 and 21-4 don’t explicitly indicate what the “PHY header” consists of.

Proposed resolution:

REVISED

At 648.17, after “excluding aPHYSigTwoLength if present” add “and the SERVICE field if it is in the Data field of the PPDU”.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 264Mark RISON | Things like"The MPDUs resulting from the fragmentation of an MSDU or MMPDU are sent as independent transmissions, each of which is separately acknowledged.""If additional fragments of an individually addressed MSDU or MMPDU are received after its dot11MaxReceiveLifetime is exceeded, those fragments shall be acknowledged and discarded.""However, an acknowledgment shall be sent in response to a duplicate fragment of an individually addressed MSDU or MMPDU."are a statement of the general case but do not apply to the (esoteric) case of QoSNoAck/No Ack | Ensure that all references to acknowledgement have a suitable exception for frames transmitted with No Ack ack policy |

Discussion:

The likelihood of finding all the references to acknowledgement is low, and the likelihood of any such solution not rotting is zero.

Proposed changes:

Change from the second para of 10.3.2.9 as follows:

A STA shall not transmit an Ack or BlockAck frame in response to a QoS Data frame whose ack policy is No Ack. A STA shall not transmit an Ack frame in response to a Management frame of subtype Action No Ack. A non-AP STA shall not transmit an Ack or BlockAck frame in response to a group addressed frame. An MPDU that does not require acknowledgment is implicitly considered acknowledged, as if an explicit acknowledgment had been sent.

NOTE—Group addressed MSDUs are sent to an AP in individually addressed frames.

Change the last sentence of 10.6 as follows:

However, ~~an acknowledgment shall be sent in response to~~ a duplicate fragment of an individually addressed MSDU or MMPDU shall be acknowledged.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 264 in <this document>, which make it clear that No Ack QoS Data frames and Action No Ack frames are never acked.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 322Mark RISON | When is PHY-TXBUSY.indication(IDLE) issued? The spec only discusses PHY-TXBUSY.indication(BUSY) | Add a statement that it is issued when the conditions for the BUSY are no longer met |

Discussion:

Actually, PHY-TXBUSY.indication(IDLE) is covered, albeit not that explicitly, by the following in 8.3.5.17.3:

This primitive is generated within aTxPHYDelay of the occurrence of a change in the state of the PHY transmit state machine to the RX state. In this case, the STATE of the primitive is set to IDLE.

However, the previous para is suspect:

The primitive is generated when the PHY issues a PHY-TXSTART.confirm primitive to one of the MAC entities coordinated by an MM-SME, and it is generated to all coordinated MAC entities except to the one to which it responds with the PHY-TXSTART.confirm primitive. The STATE of the primitive is set to BUSY.

What if there is no MM-SME? When is PHY-TXBUSY.indication(BUSY) sent in that case? Maybe the answer is “never”, so maybe the wording should be:

The primitive is only generated if an MM-SME is present, as follows:

PHY-TXBUSY (BUSY) is generated when the PHY issues a PHY-TXSTART.confirm primitive to one of the MAC entities coordinated by an MM-SME, and it is generated to all coordinated MAC entities except to the one to which it responds with the PHY-TXSTART.confirm primitive. ~~The STATE of the primitive is set to BUSY.~~

~~This primitive~~ PHY-TXBUSY (IDLE) is generated to all coordinated MAC entities within aTxPHYDelay of the occurrence of a change in the state of the PHY transmit state machine to the RX state. ~~In this case, the STATE of the primitive is set to IDLE.~~

However, this does not seem to match the use of the primitive (10.24.2.2):

The backoff procedure shall be invoked by an EDCAF when any of the following events occurs:

[…]

e) The transmission attempt of a STA coordinated by an MM-SME collides internally with another STA coordinated by the same MM-SME (see 11.34 (MMSL cluster operation)), which is indicated to the first MAC entity with a PHY-TXBUSY.indication(BUSY) primitive as response to the PHY-TXSTART.request primitive.

Here it seems that all that matters is whether you get a PHY-TXBUSY(.indication (BUSY)) or a PHY-TXSTART.confirm in response to a PHY-TXSTART,request.

Proposed resolution:

REJECTED

The conditions under which PHY-TXBUSY.indication(IDLE) is sent are described in 8.3.5.17.3: “within aTxPHYDelay of the occurrence of a change in the state of the PHY transmit state machine to the RX state”.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 291Mark RISON20.4.3.2.1 | "Used to initialize the differential encoding." -- how? There is no specification of "differential encoding" (20.4.3.3.4 does not specify anything) | Make a reference to this field wherever differential encoding initialisation is specified |

Discussion:

Assaf KASHER (Intel) has provided the following input:

The differential encoding is described in 20.4.3.3.4.

The purpose of this fake bit described as the differential encoder initialization is to provide time for a reference waveform (which is the spreading sequence multiplied by either 1 or -1. We could have added a bit outside the header to do that, but chose to have a waveform corresponding to number of bits which is a multiple of 8.

I hope it clarifies the issue. May be inserting the word “dummy” into the description can make it clearer, but I am not sure.

[…]

This [differential encoder initialization] bit and the scrambler initialization bits are not scrambled.

[…]

A receiver may perform non-differential detection and recover d(0) directly. Using the information that d(-1) is 1, it may recover s(0) and therefore c(0). However, the assumption is that the receiver performs differential decoding. It recovers s(1) by looking at the product of d(1)xd(0). The product is calculated directly on the signals – after correlating the r\_DATA(n) with the Ga(32) sequence, the receivers multiplies the peak (or a set of peaks) in adjacent symbols to recover d(n). This cannot be done for d(0). This is what mean by saying that from the receiver point of view d(0) does not exist.

Proposed changes:

In the first non-header row of Table 20-11, change “Differential encoder initialization” to “Differential Encoder Initialization” and after “Used to initialize the differential encoding” append “; *c(0)* in 20.4.3.3.4. May be set to any value”.

Change 20.4.3.3.4 as follows:

**20.4.3.3.4 Modulation**

The scrambled and coded bit stream *c(k)*, *k* = 0, 1, 2, …, is converted into a stream of complex constellation points *d(k)* using differential binary phase shift keying (DBPSK) as follows.

*c(k)* ~~The encoded bit stream [~~*~~c~~~~0~~~~, c~~~~1~~~~, c~~~~2~~~~, c~~~~3~~~~, c~~~~4~~~~, …~~*~~]~~ is converted to the nondifferential stream *s(k) = 2c(k)~~k~~ – 1*. Th~~e~~is is converted to the differential ~~sequence~~stream ~~is created by setting~~ *d(k) = s(k) × d(k – 1)*, where ~~. For the differential encoding purposes~~ *d(–1)* is defined to be 1. *~~s(0)~~* ~~is the first bit of the encoded header bits.~~ *c(0)* is the Differential Encoder Initialization field of the DMG control mode header.

NOTE—The scrambling and coding process does not affect the Differential Encoder Initialization field of the DMG control mode header. However, a typical receiver implementation does not recover *d(0)* and hence does not recover the value of this field.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 291 in <this document>, which clarify that the Differential Encoder Initialization field is c(0) for the differential encoding process described in 20.4.3.3.4, but that this field is not recovered by a typical receiver implementation.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 146Mark RISON9.2.4.5.4687.1 | The way the ack policy is referred to is confusing/inconsistent. Do you refer to the options indicated by the bit pattern (e.g. "Normal Ack or Implicit Block Ack Request") or do you refer to only the type of ack being requested in the context being requested (e.g. just "Implicit Block Ack Request" in the case of an A-MPDU)? | Throughout the draft, in the cases where the bit pattern is being referenced, use the full field name and full type description, e.g. "the Ack Policy subfield in the QoS Control field set to Normal Ack or Implicit Block Ack Request"; in the cases where the specific context is intended do not refer to the full field name, e.g. not "One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request" but "One or more QoS Data frames with the ack policy indicating Implicit Block Ack Request" |

Discussion:

The four possible Ack Policy field settings have more than four meanings, disambiguated by context:

|  |  |  |
| --- | --- | --- |
| b5 | b6 | Meaning(s) |
| 0 | 0 | Normal Ackor Implicit Block Ack Request |
| 1 | 0 | No Ack |
| 0 | 1 | No explicit acknowledgmentor PSMP Ack[or HTP Ack in P802.11ax] |
| 1 | 1 | Block Ack |

The question arises: when we refer to this, are we focusing on the bit pattern, or are we focusing on the meaning? If we are focusing on the bit pattern, we should either use that explicitly or refer to all the possible meanings of that pattern (the latter might be preferable because no-one will be able to remember what each two-bit value refers to; but it might lead to spec rot when a new meaning gets added for a particular bit pattern). But if we are focusing on the meaning, it only makes sense to refer to the meaning that applies in that context (e.g. in the non-S-MPDU A-MPDU context then 00 only refers to Implicit Block Ack Request; no spec rot then).

Some of the 242 instances of “ack policy”:

* the MSDU is transmitted using one or more QoS Data frame(s) with the Ack Policy subfield in the QoS Control field set to Normal Ack or Implicit Block Ack Request, PSMP Ack *[note: no reference to No explicit acknowledgement]*, or Block Ack
* if the frame is a QoS Data frame with the Ack Policy subfield in the QoS Control field equal to either Normal Ack *[note: no reference to Implicit BAR]* or Block Ack
* In Management frames, non-QoS Data frames (i.e., with bit 7 of the Frame Control field equal to 0), and individually addressed *[missing “QoS”]* Data frames with the Ack Policy subfield equal to Normal Ack only *[note: no reference to Implicit BAR]*, the Duration/ID field is set to
* All QoS Data frames within an A-MPDU that have a TID for which an HT-immediate block ack agreement exists have the same value for the Ack Policy subfield of the QoS Control field *[splendid!]*
* One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request *[this is in an A-MPDU context so fine not to refer to Normal Ack]*
* These MPDUs all have the Ack Policy field equal to the same value, which is either Implicit Block Ack Request or Block Ack. *[ditto]*
* Acknowledgment in response to data received with the Ack Policy field equal to PSMP Ack *[note: no reference to No explicit acknowledgement]*
* A QoS Data frame with a TID matching an existing block ack agreement may be transmitted outside an A-MPDU with its Ack Policy subfield set to Normal Ack *[this is in a non-A-MPDU context so fine not to refer to Implicit BAR]*
* For MSDUs or A-MSDUs belonging to the service class of QoSAck when the receiver is a QoS STA, *[missing reference to ack policy]* set to Normal Ack or Implicit Block Ack Request, PSMP Ack *[note: no reference to No explicit acknowledgement]*, or Block Ack.
* A STA shall support the reception of an A-MSDU, where the A-MSDU is carried in a QoS Data frame with Ack Policy equal to Normal Ack in the following cases: *[this is in a non-A-MPDU context so fine not to refer to Implicit BAR]*
* A Data frame cannot indicate an Ack Policy of “Implicit Block Ack” [..] A Data frame could indicate an Ack Policy of “Normal Ack” *[note: unusual quoting]*
* In both CFP and CP, a STA shall respond to QoS Data frames having the Ack Policy subfield in the QoS Control field equal to Normal Ack with an Ack frame *[note: this one really has to be where it’s about Normal Ack and not about Implicit BAR!]*
* For the case of an MPDU transmitted with Normal Ack policy *[note: no reference to “ack policy”]*
* Split transmission of Data frames sent under block ack policy *[note: not clear – is this referring to ack policy Block Ack?]* across multiple TXOPs or SPs
* Under a block ack agreement, the Normal Ack policy *[note: no reference to “ack policy”]* may be used in order to improve efficiency. A STA shall respond with an Ack frame to the reception of frames that are covered by a block ack agreement, but that are not part of an A-MPDU and that are received with their Ack Policy subfield in the QoS Control field equal to Normal Ack *[this is in a non-A-MPDU context so fine not to refer to Implicit BAR]*
* The reception of QoS Data frames using Normal Ack policy *[note: no reference to “ack policy”; the intent here is probably to specifically refer to ack policy Normal Ack only, i.e. not non-S-MPDU A-MPDU]* shall not be used by the recipient as an indication to reset the timer employed in detecting a block ack timeout
* A STA that receives an A-MPDU that contains one or more MPDUs in which the Address 1 field matches its MAC address with the Ack Policy field equal to Normal Ack (i.e., implicit block ack request) *[note: wacky way to refer to ack policy Implicit BAR!]* during either full-state operation or partial-state operation shall transmit a PPDU containing a BlockAck frame that is separated on the WM by a SIFS from the PPDU that elicited the BlockAck frame as a response.
* A STA may send a block of data in a single A-MPDU where each Data frame has its Ack Policy field set to Normal Ack *[note: missing Implicit BAR]*
* when a Data frame that was previously transmitted within an A-MPDU that had the Ack Policy field equal to Normal Ack *[ditto]* is discarded due to exhausted MSDU lifetime
* An originator that is a DMG STA shall not start a new TXOP or SP with an MPDU or A-MPDU that has an Ack policy *[note: odd capitalisation]* other than Normal Ack *[note: not clear whether deliberately excluding Implicit BAR here; also A-MPDUs do not have an Ack policy]*
* A QoS Data frame with the Ack Policy field equal to any value except PSMP Ack (i.e., including Implicit Block Ack Request) *[note: but excluding No explicit acknowledgment?]*
* An RD responder that is a non-DMG STA may transmit a +CF-Ack non-A-MPDU frame or +CF-Ack VHT single MPDU in response to a QoS Data +HTC non-A-MPDU frame or VHT single MPDU that has the Ack Policy field equal to Normal Ack *[this is in a non-A-MPDU context so fine not to refer to Implicit BAR]* and the RDG/More PPDU subfield equal to 1.
* — An Ack Policy of Block Ack, Normal Ack, or Implicit Block Ack Request *[note: the last two are the same bitfield]* results in the behavior defined in 9.2.4.5.4 (Ack Policy subfield).

— An Ack Policy of PSMP Ack *[note: what about No explicit acknowledgement?]* causes the AP to record the received Data frame and results in the transmission of a Multi-TID BlockAck frame in the next PSMP-DTT allocated to the STA.

* A non-AP STA shall transmit a Multi-TID BlockAck frame during its PSMP-UTT for data received with the Ack Policy field set to PSMP Ack *[this is in a PSMP context so fine not to refer to No explicit acknowledgement]*
* The Ack Policy field of a QoS Data frame transmitted during a PSMP sequence shall not be set to either Normal Ack or Implicit Block Ack *[note: this is a bit wacky because these are the same Ack Policy field setting]*
* The exception might occur if the non-AP STA transmits one or more BlockAckReq frames or QoS Data frames with Ack Policy set to Implicit Block Ack *[note: what about Normal Ack?]* outside the PSMP mechanism.
* It shall be a QoS Null frame with the Ack Policy field set to Normal Ack *[this is in a non-A-MPDU context so fine not to refer to Implicit BAR]*
* the Ack Policy subfield in the QoS Control field of that MPDU header is Block Ack or Implicit Block Ack Request *[this is in an A-MPDU context so fine not to refer to Normal Ack]*
* *implicit-bar* QoS Data frame in an A-MPDU with Normal Ack policy. *[note: wacky not to refer to Implicit BAR as an ack policy setting]*
* *normal-ack* QoS Data frame with the Ack Policy subfield equal to Normal Ack. *[note: needs to be in a non-A-MPDU]*
* *psmp-ack* Ack Policy field of QoS Data frame is equal to PSMP Ack. *[note: where is No explicit acknowledgement covered?]*
* Data frames sent under the PSMP Ack Ack Policy *[note: looks odd]*
* acknowledgment mechanisms other than Normal Ack *[note: is this actually about the ack policy?]*
* BUs for a TID without a schedule are sent using Normal Ack *[ditto]*

We should use our usual convention and say “Ack Policy field” for the field and just “ack policy” for the looser general concept. E.g. say “if the ack policy is Block Ack”.

A discussion in TGax has indicated that some people think referring to just one meaning of the Ack Policy field implies all the context necessary for that interpretation to apply. So e.g. “ack policy [note case] is Normal Ack” would mean (paraphrasing) “Ack Policy subfield is 00 and in non-A-MPDU or in A-MPDU with EOF=1” and “ack policy is Implicit BAR” would mean “Ack Policy subfield is 00 and in A-MPDU with (if not HT PPDU) EOF=0”. We could define this, i.e. define and then use the expression “the ack policy is Normal Ack[/Implicit Block Ack Request/PSMP Ack/No Explicit Acknowlegment/HTP Ack]”. Should we do this?

Graham suggestion: table with ack policy, Ack Policy subfield value, additional conditions, and meaning

In the rest of this set of proposed changes, “$noun” is to be understood as “BLAH”, excluding the double quotes.

In Table 9-6 change “Ack Policy” to “Ack $Noun” throughout.

* Ack ~~Policy~~$noun subfield

The Ack ~~Policy~~$noun subfield is 2 bits in length and, together with other information, as shown in Table 9-9, identifies the ack~~nowledgment~~ policy, i.e. the behavior ~~that is~~ followed upon the delivery of the MPDU. ~~The interpretation of these 2 bits is given in Table 9-9 (Ack Policy subfield in QoS Control field of QoS Data frames).~~

|  |  |  |
| --- | --- | --- |
|  |  | * Ack policy~~Policy subfield in QoS Control field of QoS Data frames~~
 |
| Ack policy | Bits in QoS Control field | Other conditions | Meaning |
|  | Bit 5 | Bit 6 |  |
| Normal Ack | 0 | 0 | MPDU is in a non-A-MPDU, or in an A-MPDU where the MPDU delimiter has an EOF subfield and the EOF subfield is equal to 1 | ~~Normal Ack or Implicit Block Ack Request.~~ ~~In a frame that is a non-A-MPDU frame or VHT single MPDU:~~The addressed recipient returns an Ack or QoS +CF-Ack frame after a short interframe space (SIFS) period, according to the procedures defined in 10.3.2.9 (Acknowledgment procedure) and 10.22.3.5 (HCCA transfer rules). A non-DMG STA uses this ack policy ~~sets the Ack Policy subfield~~ for individually addressed QoS Null (no data) frames ~~to this value~~.~~Otherwise:~~~~The addressed recipient returns a BlockAck frame, either individually or as part of an A-MPDU starting a SIFS after the PPDU carrying the frame, according to the procedures defined in 10.3.2.9 (Acknowledgment procedure), 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA), 10.24.8.3 (Operation of HT-delayed block ack), 10.28.3 (Rules for RD initiator), 10.28.4 (Rules for RD responder), and 10.32.3 (Explicit feedback beamforming).~~ |
| Implicit BAR | 0 | 0 | MPDU is in an A-MPDU where the MPDU delimiter does not have an EOF subfield or where the EOF subfield is equal to 0 | The addressed recipient returns a BlockAck frame, either individually or as part of an A-MPDU starting a SIFS after the PPDU carrying the frame, according to the procedures defined in 10.3.2.9 (Acknowledgment procedure), 10.24.7.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA), 10.24.8.3 (Operation of HT-delayed block ack), 10.28.3 (Rules for RD initiator), 10.28.4 (Rules for RD responder), and 10.32.3 (Explicit feedback beamforming). |
| No Ack | 1 | 0 | None | ~~No Ack~~The addressed recipient takes no action upon receipt of the frame. More details are provided in 10.25 (No Acknowledgment (No Ack)).This ack policy is used ~~The Ack Policy subfield is set to this value~~ in all individually addressed frames in which the sender does not require acknowledgment. It is also used ~~The Ack Policy subfield is also set to this value~~ in all group addressed frames that use the QoS frame format except QoS Data frames with a TID for which a block ack agreement exists.It ~~This value of the Ack Policy subfield~~ is not used for QoS Data frames with a TID for which a block ack agreement exists.~~The Ack Policy subfield for group addressed QoS Null (no data) frames is set to this value.~~ |
| No Explicit Acknowledgment | 0 | 1 | Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is equal to 1 | ~~No explicit acknowledgment or PSMP Ack.~~~~When bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is set to 1:~~There might be a response frame to the frame that is received, but it is neither the Ack frame nor any Data frame of subtype +CF-Ack.The Ack Policy subfield for QoS CF-Poll and QoS CF-Ack +CF-Poll Data frames is set to this value.~~When bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is set to 0:~~ ~~The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP downlink transmission time (PSMP-DTT) is to be received in a later PSMP uplink transmission time (PSMP-UTT).~~~~The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP-UTT is to be received in a later PSMP-DTT.~~NOTE—Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) indicates the absence of a ~~data~~ Frame Body field in a QoS Data frame. When equal to 1, the QoS Data frame contains no Frame Body field, and any response is generated in response to a QoS CF-Poll or QoS CF-Ack +CF-Poll frame, but does not signify an acknowledgment of data. ~~When set to 0, the QoS Data frame contains a Frame Body field, which is acknowledged as described in 10.29.2.7 (PSMP acknowledgment rules).~~ |
| PSMP Ack. | 0 | 1 | Bit 6 of the Frame Control field (see 9.2.4.1.3 (Type and Subtype subfields)) is equal to 0 | The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP downlink transmission time (PSMP-DTT) is to be received in a later PSMP uplink transmission time (PSMP-UTT).The acknowledgment for a frame indicating PSMP Ack when it appears in a PSMP-UTT is to be received in a later PSMP-DTT.See 10.29.2.7 (PSMP acknowledgment rules). |
| Block Ack | 1 | 1 | None | ~~Block Ack~~The addressed recipient takes no action upon the receipt of the frame except for recording the state. The recipient can expect a BlockAckReq frame or implicit block ack request in the future to which it responds using the procedure described in 10.24 (Block acknowledgment (block ack)). |

In 10.22.2.7 “a frame transmitted with an acknowledgment policy that does not require immediate acknowledgment” and “an individually addressed frame transmitted with an acknowledgment policy that requires immediate acknowledgment”; 11.4.1 “allows other parameters to be specified that are associated with the TS, such as a traffic classifier and acknowledgment policy”; 11.5.4 “regardless of the acknowledgment policy used in that frame”; K.4.1 “(within the constraints of the minimum PHY rate, acknowledgment policy, and so forth)” change “acknowledgment policy” to “ack policy”.

In B.4.12 “Decode of no-acknowledgment policy in QoS Data frames” change “no-acknowledgment policy” to “No Ack ack policy”.

Then make changes like:

In 5.1.1.4 make the following changes:

When an MSDU is received from the MAC SAP with one of the following service class indications, and the recipient STA is a QoS STA:

— QoSAck, the MSDU is transmitted using one or more QoS Data frame(s) with an ack policy other than No Ack~~the Ack Policy subfield in the QoS Control field set to Normal Ack or Implicit Block Ack Request, PSMP Ack, or Block Ack~~.

— QoSNoAck, the MSDU is transmitted using one or more QoS Data frame(s) with an ack policy of ~~the Ack Policy subfield in the QoS Control field set to~~ No Ack.

When a QoS Data frame is received from another STA, the service class parameter in the MA-UNITDATA.indication primitive is set to

— QoSAck, if the frame is a QoS Data frame with an ack policy other than No Ack~~the Ack Policy subfield in the QoS Control field equal to either Normal Ack or Block Ack~~.

— QoSAck, if the frame was delivered via the DMS or the GCR block ack retransmission policy.

— QoSNoAck, if the frame is a QoS Data frame with an ack policy of~~the Ack Policy subfield in the QoS Control field equal to~~ No Ack. This service class is also used when the DA parameter is a group address unless the frame was delivered via DMS or the GCR block ack retransmission policy.

In 9.2.5.2 make the following changes:

5) In Management frames, non-QoS Data frames (i.e., with bit 7 of the Frame Control field equal to 0), and individually addressed Data frames with an ack policy other than No Ack or Block Ack~~the Ack Policy subfield equal to Normal Ack only~~, the Duration/ID field is set to one of the following:

[…]

6) In individually addressed QoS Data frames with an ack policy of~~the Ack Policy subfield equal to~~ No Ack or Block Ack, for Action No Ack frames, and for group addressed frames, the Duration/ID field is set to one of the following:

In Table 9-443 change:

 These have an ack policy of ~~the Ack Policy field equal to~~ Block Ack.

Of these, at most one of the following

is present in a non-DMG BSS:

— One or more QoS Data frames

with an ack policy of Implicit BAR

~~the Ack Policy field equal to~~

~~Implicit Block Ack Request~~

— A BlockAckReq frame

Of these, at most one of the following

is present in a DMG BSS:

— One or more QoS Data frames

with an ack policy of Implicit BAR

~~the Ack Policy field equal to~~

~~Implicit Block Ack Request~~

— A QoS Null MPDU with an ack policy of ~~Ack Policy~~

~~set to~~ No Ack

— A BlockAckReq frame with an

optional QoS Null MPDU with

an ack policy of ~~Ack Policy set to~~ No Ack

QoS Null MPDUs with an ack policy of ~~Ack Policy set to~~ No Ack

In a DMG BSS, QoS Null MPDUs with an ack policy of ~~Ack Policy set to~~ No Ack.

NOTE—These MPDUs all have the same ack policy~~Ack Policy field equal to the same value~~, which is either Implicit BAR~~Block Ack Request~~ or Block Ack.

In 10.2.7 make the following changes:

A QoS Data frame with a TID matching an existing block ack agreement may be transmitted outside an A-MPDU with an ack policy of ~~its Ack Policy subfield set to~~ Normal Ack.

If the No-Fragmentation field in the ADDBA Extension element within the ADDBA Response frame is 0, the originator may send fragmented nonaggregated MSDUs under a block ack agreement with an ack policy of Normal Ack ~~policy under block ack agreement~~.

We should be consistent for capitalisation, so “No explicit acknowledgement” should become “No Explicit Acknowledgement”.

Usual inconsistency about whether it’s a field or a subfield.

Note to self: ack policy not blockackpolicy not "bar ack policy" not "ba ack policy" not "info ack policy" not "immediate block ack policy" not "delayed block ack policy" not "block ack policy subfield"

Proposed changes:

In 5.1.1.4 make the following changes:

When an MSDU is received from the MAC SAP with one of the following service class indications, and the recipient STA is a QoS STA:

— QoSAck, the MSDU is transmitted using one or more QoS Data frame(s) with the Ack Policy subfield in the QoS Control field not set to No Ack~~Normal Ack or Implicit Block Ack Request, PSMP Ack, or Block Ack~~.

— QoSNoAck, the MSDU is transmitted using one or more QoS Data frame(s) with the Ack Policy subfield in the QoS Control field set to No Ack.

When a QoS Data frame is received from another STA, the service class parameter in the MA-UNITDATA.indication primitive is set to

— QoSAck, if the frame is a QoS Data frame with the Ack Policy subfield in the QoS Control field not equal to either No Ack~~Normal Ack or Block Ack~~.

— QoSAck, if the frame was delivered via the DMS or the GCR block ack retransmission policy.

— QoSNoAck, if the frame is a QoS Data frame with the Ack Policy subfield in the QoS Control field equal to No Ack. This service class is also used when the DA parameter is a group address unless the frame was delivered via DMS or the GCR block ack retransmission policy.

In Table 9-9 change “No explicit acknowledgment” to “No Explicit Acknowledgment”.

In 9.2.5.2 make the following changes:

5) In Management frames, non-QoS Data frames (i.e., with bit 7 of the Frame Control field equal to 0), and individually addressed Data frames with the Ack Policy subfield not equal to ~~Normal Ack only~~ No Ack or Block Ack, the Duration/ID field is set to one of the following:

[…]

6) In individually addressed QoS Data frames with the Ack Policy subfield equal to No Ack or Block Ack, for Action No Ack frames, and for group addressed frames, the Duration/ID field is set to one of the following:

In Table 9-443 change:

 These have the Ack Policy subfield ~~equal~~set to Block Ack.

Of these, at most one of the following

is present in a non-DMG BSS:

— One or more QoS Data frames

with the Ack Policy subfield ~~equal~~set to

Normal Ack or Implicit Block Ack Request

— A BlockAckReq frame

Of these, at most one of the following

is present in a DMG BSS:

— One or more QoS Data frames

with the Ack Policy subfield ~~equal~~set to

Normal Ack or Implicit Block Ack Request

— A QoS Null MPDU with the Ack Policy subfield

set to No Ack

— A BlockAckReq frame with an

optional QoS Null MPDU with

the Ack Policy subfield set to No Ack

No Ack QoS Null MPDUs ~~with Ack Policy set to No Ack~~

In a DMG BSS, QoS Null MPDUs with the Ack Policy subfield set to No Ack.

NOTE—These MPDUs all have the Ack Policy subfield ~~equal~~set to the same value, which is either Normal Ack or Implicit Block Ack Request, or Block Ack.

In 10.2.7 make the following changes:

A QoS Data frame with a TID matching an existing block ack agreement may be transmitted outside an A-MPDU with its Ack Policy subfield set to Normal Ack or Implicit Block Ack Request.

If the No-Fragmentation field in the ADDBA Extension element within the ADDBA Response frame is 0, the originator may send fragmented nonaggregated MSDUs under a block ack agreement with the Ack Policy subfield in the MPDUs set to Normal Ack or Implicit Block Ack Request ~~policy under block ack agreement~~.

In 10.12 make the following changes:

A STA shall support the reception of an A-MSDU, where the A-MSDU is carried in a QoS Data frame with the Ack Policy subfield equal to Normal Ack or Implicit Block Ack Request in the following cases:

In 10.13.8 make the following changes:

~~— A Data frame cannot indicate an Ack Policy of “Implicit Block Ack”, and does not generate a BlockAck frame response (see 9.2.4.5.4 (Ack Policy subfield)).~~

— A Data frame could indicate an ~~A~~ack ~~P~~policy of ~~“~~Normal Ack or Implicit Block Ack Request~~”~~, which solicits an Ack frame immediate response. No block ack agreement is needed in this case (see 9.2.4.5.4 (Ack Policy subfield)).

In 10.22.3.2.4 make the following changes:

The recipient of the final frame, with the Ack Policy subfield equal to Normal Ack or Implicit Block Ack Request

the QoS STA shall retransmit the frame or transmit a QoS Null frame, with the Ack Policy subfield set to Normal Ack or Implicit Block Ack Request

In 10.22.3.5.1 make the following changes:

In both CFP and CP, a STA shall respond to QoS Data frames having the Ack Policy subfield in the QoS Control field equal to Normal Ack or Implicit Block Ack Request with an Ack frame

In 10.22.4.2.3 make the following changes:

For the case of an unaggregated MPDU ~~transmitted~~ with the Ack Policy subfield set to Normal Ack or Implicit Block Ack Request ~~policy~~ and without RTS/CTS protection, this equals the time required to transmit the MPDU plus the time required to transmit the expected response frame plus one SIFS.

In 10.24.3 make the following changes:

— Split transmission of Data frames sent under a block ack agreement ~~policy~~ across multiple TXOPs or SPs

Under a block ack agreement, ~~the Normal Ack policy~~ Ack frames may be used in order to improve efficiency. A STA shall respond with an Ack frame to the reception of frames that are covered by a block ack agreement, but that are not part of an A-MPDU or that are an S-MPDU, and that are received with their Ack Policy subfield in the QoS Control field equal to Normal Ack or Implicit Block Ack Request.

The reception of QoS Data frames that are not part of an A-MPDU or that are an S-MPDU ~~using Normal Ack policy~~ shall not be used by the recipient as an indication to reset the timer employed in detecting a block ack timeout (see 11.5 (Block ack operation)). The block ack timeout allows the recipient to delete the block ack if the originator does not switch back to using block ack.

In 10.24.5 make the following changes:

The block ack agreement may be torn down if there are no BlockAck, BlockAckReq, or QoS Data frames (sent under a block ack agreement~~policy~~) for the block ack’s TID received from the peer

In 10.24.7.5 make the following changes:

A STA that receives an A-MPDU that contains one or more QoS Data frames~~MPDUs~~ in which the Address 1 field matches its MAC address with the Ack Policy subfield equal to Normal Ack or Implicit Block Ack Request ~~(i.e., implicit block ack request)~~ during either full-state ~~operation~~ or partial-state operation shall transmit a PPDU containing a BlockAck frame

When responding with a BlockAck frame to either a received BlockAckReq frame or a received A-MPDU containing one or more QoS Data frames with the Ack Policy subfield equal to Normal Ack or Implicit Block Ack Request ~~(i.e., implicit block ack request)~~ during either full-state ~~operation~~ or partial-state operation,

When responding with a BlockAck frame to either a received BlockAckReq frame or a received A-MPDU containing one or more QoS Data frames with the Ack Policy subfield equal to Normal Ack or Implicit Block Ack Request ~~(i.e., implicit block ack request)~~ during either full-state or partial-state operation,

When responding with a BlockAck frame to either a received BlockAckReq frame or a received A-MPDU containing one or more QoS Data frames with the Ack Policy subfield equal to Normal Ack or Implicit Block Ack Request ~~(i.e., implicit block ack request)~~ during either full-state or partial-state operation,

Finally, change any remaining instances of “Ack Policy field” to “Ack Policy subfield”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID in <this document>, which

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| Identifiers | Comment | Proposed change |
| CID 243Mark RISON | "is shown in" (Figure, Table, etc.) or similar wooly statements ("is illustrated in") should be "is defined in" (at least in Clause 9 and the cases where the figure/table is the thing that normatively defines the structure/valid values) | As it says in the comment |

Discussion:

“is shown in” is arguably strong enough. But “is illustrated in” is too weak, seeming just to be a “serving suggestion”, and should only be used for examples.

Proposed changes:

Change “illustrated” to “shown” at the following locations in D0.2: 674.31, 674.48, 683.17, 684.29 (and add “in” after “described” on the previous line), 707.21, 767.55, 768.19, 768.33, 772.4, 772.20, 772.42, 776.2, 776.22, 781.6, 783.44, 783.56, 784.6, 784.46, 785.4, 786.45, 786.62, 787.17, 787.35, 788.28, 788.54, 800.1, 805.50, 806.6, 947.29, 957.22, 957.33, 958.1, 972.48, 1126.38, 1135.23, 1140.15, 1192.22, 1192.50, 2456.1, 2463.61, 2620.65, 2621.2.

Change “given” to “shown” at the following locations in D0.2: 995.7, 1082.24, 1339.43.

Change “described” to “shown” at the following locations in D0.2: 1041.5, 1119.45, 1159.46.

Change “provided” to “shown” at the following locations in D0.2: 1090.21, 1118.7, 1120.26, 1120.47, 1213.52, 1214.18, 1215.42, 1217.46, 1218.1, 1219.51, 1123.53, 1224.12, 1224.37, 1224.62, 1225.37, 1225.60, 1226.16 (and add “ANQP-element” after “TDLS Capability” on the same line), 1230.54, 1278.9, 1280.17.

Change “indicated” to “shown” at the following locations in D0.2: 1204.50.

Change “depicted” to “shown” at the following locations in D0.2: 2414.26, 2650.40, 2651.11, 2652.3, 2652.49.

Change “as” to “shown” at the following locations in D0.2: 978.36.

Change “format in” to “format shown in” at 2163.7.

Delete “illustrated” at the following locations in D0.2: 980.38.

After the first para of Subclause 1.4 insert a new para as follows:

Where normative text references a figure, table or equation using “shown in” or “defined in”, the referenced figure, table or equation is normative, unless the word “example” is used. Where normative text references a figure or subclause using “illustrated in”, the referenced figure or subclause is informative.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 243 in <this document>, which cause the participle “shown” to be used rather than “illustrated”, “provided”, “depicted”, etc. when the figure is normative.

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| Identifiers | Comment | Proposed change |
| CID 261Mark RISON | "intended for" is a bit vague | Change to "addressed to" throughout |

Discussion:

This should not be done globally, as it would then cause things like “transmitting a VHT NDP addressed to multiple recipients”; “the MCCAOP request has been addressed to group addressed transmissions”; “These OBSS procedures are addressed to stationary and portable APs” to be changed incorrectly (an NDP has no addresses; an MCCAOP is intended for a certain class of transmissions, not addressed to it; OBSS procedures are intended for certain APs, not addressed to them).

Note, however, that it is fine to refer to something being addressed to a STA even if that addressing can take the form of a group address.

In D0.4 relevant instances of “intended for” are:

4.5.2.1: If the MSDU had been intended for a STA that was a member of the same BSS as the sending STA, then the “input” and “output” APs for the MAC service tuple would have been the same.

10.60: The S1G STA shall not schedule a transmission of a PPDU carrying an individually addressed MPDU intended for the EL STA, or cause the EL STA to transmit an individually addressed PPDU until the ELRecoveryTimer has reached 0.

11.2.3.19: The STA receives a frame intended for it with the More Data subfield equal to 0

21.3.11.1: With SU-MIMO beamforming all space-time streams in the transmitted signal are intended for reception at a single STA. With DL-MU-MIMO beamforming, disjoint subsets of the space-time streams are intended for reception at different STAs.

21.3.11.4: A STA is also able to identify the space-time streams intended for other STAs that act as interference. VHT-LTF symbols in the VHT MU PPDU are used to measure the channel for the space-time streams intended for the STA and can also be used to measure the channel for the interfering space-time streams. To successfully demodulate the space-time streams intended for the STA, the STA may use the channel state information for all space-time streams to reduce the effect of interfering space-time streams.

21.3.20/23.3.19: The PHY has also been configured with group information (i.e., group membership and position in group) so that it can receive data intended for the STA.

Suggest not changing the ones about STSs “intended for” STAs, since these are only indirectly addressed (via GID).

Proposed resolution:

REVISED

Change “intended for” to “addressed to” in Subclauses 4.5.2.1 and 11.2.3.19.

In 10.60 in D0.4 change “The S1G STA shall not schedule a transmission of a PPDU carrying an individually addressed MPDU intended for the EL STA, or cause the EL STA to transmit an individually addressed PPDU until the ELRecoveryTimer has reached 0.” to “The S1G STA shall not schedule a transmission of an MPDU individually addressed to the EL STA, or cause the EL STA to transmit an individually addressed MPDU, until the ELRecoveryTimer has reached 0.” (note also added comma and change from PPDU to MPDU).

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| Identifiers | Comment | Proposed change |
| CID 197Mark RISON11.9.31818.1 | Quiet Channel does not work in an IBSS because it's set by the BSS starter and replicated forever after. See further discussion under CID 7271 in 16/0276 | Delete or deprecate use of Quiet Channel elements in IBSSen |
| CID 198Mark RISON11.9.31818.1 | Quiet Channel does not work in an IBSS and probably doesn't work in an MBSS either. See further discussion under CID 7271 in 16/0276 | Delete or deprecate use of Quiet Channel elements in MBSSen |

Discussion:

[The CID reference is incorrect: it should have been to CID 7212.]

11.9.3 states (my emphasis):

An IBSS STA may schedule quiet intervals only if it is the DFS owner. In order to set a quiet interval schedule, the STA transmits one or more Quiet elements in the first Beacon frame establishing the IBSS. **All IBSS STAs shall continue these quiet interval schedules** by including appropriate Quiet elements in any transmitted Beacon frames or Probe Response frames.

So the only way you can quieten the channel using the Quiet element is to make a decision to permanently quieten it, which does not seem useful. If the IBSS starter didn’t include a Quiet element then the channel can’t subsequently be quietened in that IBSS using a Quiet element, and if the IBSS starter did include a Quiet element then its parameters apply for the lifetime of the IBSS.

Note, however, that this text is about use of the Quiet element, not the Quiet Channel element. Similarly, only use of the Quiet element is described in an MBSS. But Quiet Channel elements can be used to quieten S80, which might be desirable in an MBSS. Also, there is no requirement to keep propagating the same quiet schedules forever.

Also note that per the resolution of CID 7271,

"mode set Quiet Channel elements" (i.e. Quiet Channel elements with the AP Quiet Mode field equal to 1) only apply to infrastructure BSSs.

Proposed changes:

Change 11.9.3 as follows:

An AP may schedule quiet intervals by transmitting one or more mode set Quiet Channel elements (VHT AP only) and/or one or more Quiet elements in Beacon frames and Probe Response frames.

A mesh STA may schedule quiet intervals by transmitting one or more Quiet elements in Beacon frames and Probe Response frames. A mesh STA shall not transmit mode set Quiet Channel elements.

[…]

An AP may stop scheduling quiet intervals, or may transmit Quiet elements with changes in the Quiet Period, Quiet Duration and Quiet Offset fields, or may (VHT AP only) transmit ~~mode set~~ Quiet Channel elements (with changes in the Quiet Period, Quiet Duration and Quiet Offset fields in the case of mode set Quiet Channel elements). A mesh STA may stop scheduling quiet intervals, or may transmit Quiet elements with changes in the Quiet Period, Quiet Duration and Quiet Offset fields, or may transmit (VHT mesh STA only) Quiet Channel elements that are not mode set Quiet Channel elements. Only the most recently received Beacon frame or Probe Response frame defines all future quiet intervals; therefore, all schedules for quiet intervals based on older Beacon frames or Probe Response frames shall be discarded.

[…]

An IBSS STA may schedule quiet intervals only if it is the DFS owner. In order to set a quiet interval schedule, the STA transmits one or more Quiet elements in the first Beacon frame establishing the IBSS. All IBSS STAs shall continue these quiet interval schedules by including appropriate Quiet elements in any transmitted Beacon frames or Probe Response frames. An IBSS STA shall not transmit Quiet Channel elements.

NOTE—This means the quiet interval schedules, if any, are defined by the IBSS STA that starts the IBSS. They cannot subsequently be changed, or initiated, by any STA in the IBSS (including the STA that started the BSS and the DFS owner).

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CIDs 197 and 198 in <this document>, which disallow use of Quiet Channel elements for IBSS STAs, indicate quietening is basically broken for IBSS STAs, and clarify the quietening behaviour for MBSS STAs.

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| Identifiers | Comment | Proposed change |
| CID 323Mark RISON | In the PHYs, there are statements that "PHY-TXSTART shall be disabled. What does this mean? How can the name of a (class of) primitive be disabled? | Change to say that the PPDU transmission initiated by a PHY-TXSTART shall be terminated |

Discussion:

The PHYs have wording of the form (this is the HT wording):

The PHY proceeds with PSDU transmission through a series of data octet transfers from the MAC. The SERVICE field and PSDU are encoded by the encoder selected by the FEC\_CODING, CH\_BANDWIDTH, and MCS parameters of the TXVECTOR as described in 19.3.3 (Transmitter block diagram). Transmission can be prematurely terminated by the MAC through the primitive PHY-TXEND.request primitive. PHY-TXSTART shall be disabled by receiving a PHY-TXEND.request primitive. Normal termination occurs after the transmission of the final bit of the last PSDU octet, according to the number supplied in the LENGTH field.

The packet transmission shall be completed, and the PHY entity shall enter the receive state (i.e., PHY-TXSTART shall be disabled). Each PHY-TXEND.request primitive is acknowledged with a PHY-TXEND.confirm primitive from the PHY. If the length of the coded PSDU is not an integer multiple of the OFDM symbol length, bits shall be stuffed to make the coded PSDU length an integer multiple of the OFDM symbol length.

As the commenter says, a class of primitives is not something that can be disabled, only some behaviour can be. The preceding sentences already make the behaviour clear.

Proposed resolution:

REVISED

Delete “PHY-TXSTART shall be disabled by the issuance of the PHY-TXEND.request primitive.” in 15.3.6, 16.2.5, 17.3.11.

Delete “PHY-TXSTART shall be disabled by receiving a PHY-TXEND.request primitive.” in 19.3.20, 20.8.

Delete “(i.e., PHY-TXSTART shall be disabled)” in 15.3.6, 16.2.5, 17.3.11, 19.3.20, 20.8.

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| Identifiers | Comment | Proposed change |
| CID Mark RISON |  |  |

Discussion:

Proposed changes:

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID in <this document>, which

**References:**

802.11md/D0.1 except where otherwise specified