IEEE P802.11  
Wireless LANs

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| Resolutions for some comments on 11md/D1.0 (LB232) | | | | |
| Date: 2018-09-06 | | | | |
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Abstract

This submission proposes resolutions for CIDs 1375, 1379, 1387, 1388, 1415, 1435, 1447, 1452, 1453, 1455, 1456, 1465, 1480, 1507, 1524, 1525, 1526 on 11md/D1.0. 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.

***R04 of this document updates the resolution to CID 1465 based on Menzo Wentink and Michael Montemurro review of the proposed resolution.***

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| Identifiers | Comment | Proposed change |
| CID 1456  Mark RISON | 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 and 17/1243r6 |
| CID 1524  Mark RISON  1.4 | Sometimes MPDUs are said to be transmitted with a certain TXVECTOR, but the TXVECTOR is associated with the PPDU not the MPDU | Add "References to an MPDU being transmitted with a certain TXVECTOR parameter are to be understood as referring to the TXVECTOR parameter used for the PPDU containing the MPDU." in 1.4 |

Discussion:

There is some confusion in the standard regarding what a TXVECTOR pertains to, or at least what words should be used to describe what a TXVECTOR pertains to (ditto RXVECTOR).

There are four possibilities:

1. it pertains to an MPDU
2. it pertains to an MPDU or A-MPDU, whichever is what is passed to the PHY
3. it pertains to a PSDU
4. it pertains to a PPDU

The standard is often written in a way which suggests 4), though formally it's actually 3), which is very similar to 2). 1) is not precise enough, at least without extra words.

In support of this, note that (6.5.5.2 and) 8.3.5.5.2, which is where the TXVECTOR's purpose is defined, says:

The TXVECTOR represents a list of parameters that the MAC sublayer provides to the local PHY entity in order to transmit a PSDU.

However, here are some places that suggest the TXVECTOR pertains to a PPDU:

20 MHz mask physical layer (PHY) protocol data unit (PPDU):

[…]

c) A high-throughput (HT) PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to HT\_CBW20 and the CH\_OFFSET parameter equal to CH\_OFF\_20

space-time block coding (STBC) frame: A frame that is transmitted in a physical layer (PHY) protocol data unit (PPDU) that has a nonzero value of the TXVECTOR STBC parameter

Indicates short GI support

for the reception of

PPDUs transmitted

with TXVECTOR parameter

CH\_BANDWIDTH equal

to HT\_CBW20

When an HT STA transmits a PPDU using a RIFS and with the TXVECTOR parameter FORMAT equal to NON\_HT with the NON\_HT\_MODULATION parameter equal to one of ERP-OFDM and

NON\_HT\_DUP\_OFDM

And some places that suggest the TXVECTOR pertains to an MPDU:

The +HTC subfield is 1 bit in length. The setting of the subfield is as follows:

— It is set to 1 in a QoS Data or Management frame transmitted with a value of HT\_GF, HT\_MF, VHT or S1G for the FORMAT parameter of the TXVECTOR

When transmitting a response frame immediately following a SIFS, a DMG STA shall set the TXVECTOR parameter LAST\_RSSI of the response frame to the power that was measured on the received PPDU

Something should be added to cover these wordings that associate a TXVECTOR with an MPDU or PPDU.

Additionally, as it says in the comment, for group-addressed frames the requirements need to apply w.r.t. all the targeted recipients (but this is not needed in subclauses that are explicitly about individually-addressed frames only). A discussion in TGmc suggested this needed to be verbose, and e.g. just adding “(s)” was not sufficient.

Proposed changes:

At the end of 8.3.5.5.2 add:

References to an (A-)MPDU being transmitted or received with a certain TXVECTOR or RXVECTOR parameter, respectively, are to be understood as referring to the TXVECTOR or RXVECTOR parameter, respectively, corresponding to the PSDU containing the (A-)MPDU.

References to a PPDU being transmitted or received with a certain TXVECTOR or RXVECTOR parameter, respectively, are to be understood as referring to the TXVECTOR or RXVECTOR parameter, respectively, corresponding to the PSDU contained in the PPDU.

***[Editor: having made this addition, do not make the changes highlighted in yellow in this set of proposed changes.]***

Change “Frames” to “PPDUs” in the last bullet of the first list in 9.2.5.2:

— ~~Frames~~PPDUs transmitted by an S1G STA with the TXVECTOR parameter RESPONSE INDICATION equal to Long Response

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 10.6.5.7 as follows:

— A STA shall not transmit a frame using a rate or MCS that is not supported by the receiver STA ~~or STAs~~, as reported in any Supported Rates and BSS Membership Selectors element, Extended Supported Rates and BSS Membership Selectors element, or Supported MCS Set field in Management frames transmitted by the receiver STA.

— A STA shall not transmit a frame using a <VHT-MCS, NSS> tuple that is not supported by the receiver STA, as reported in any Supported VHT-MCS and NSS Set field in Management frames transmitted by the receiver STA.

— A STA shall not transmit a frame using a <S1G-MCS, NSS> tuple that is not supported by the receiver STA, as reported in any Supported S1G-MCS and NSS Set field in Management frames transmitted by the receiver STA.

— If at least one Operating Mode field with the Rx NSS Type subfield equal to 0 was received from the receiver STA:

— A STA shall not transmit a frame with the number of spatial streams greater than that indicated in the Rx NSS subfield in the most recently received Operating Mode field with the Rx NSS Type subfield equal to 0 from the receiver STA.

— If at least one Operating Mode field with the Rx NSS Type subfield equal to 1 was received from the receiver STA:

— A STA shall not transmit an SU PPDU frame using a beamforming steering matrix with the number of spatial streams greater than that indicated in the Rx NSS subfield in the most recently received Operating Mode field with the Rx NSS Type subfield equal to 1 from the receiver STA if the beamforming steering matrix was derived from a VHT Compressed Beamforming report with Feedback Type subfield indicating MU in the VHT Compressed Beamforming frame(s).

— 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.

— 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).

— An S1G 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 S1G Operation element with the following exceptions:

— Transmissions on a TDLS off-channel link follow the rules described in 11.21.6.2 (General behavior on the off-channel) and 11.21.6.3 (Setting up a 40 MHz direct link).

— Transmissions by an S1G STA on a TDLS link follow the rules described in 11.21.1 (General) and 11.21.6.5 (Setting up a wide bandwidth off-channel direct link).

Additionally, the value of the CH\_BANDWIDTH parameter for a transmission by an S1G STA that is operating as an SST STA is limited by the Maximum permitted PPDU bandwidth as indicated in the Maximum Transmission Width field of the most recently received SST element or RPS element (see 10.53 (Subchannel selective transmission (SST)) and 10.24.5 (Restricted access window (RAW) operation).

— If at least one Operating Mode field with the Rx NSS Type subfield equal to 0 was received from the receiver STA:

— 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 10.6.6.5.2 as follows:

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

— If the PSDU 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 PSDU using the same modulation class as the PSDU containing the received frame. In addition, the control response frame shall be sent in a PSDU using the same value for the TXVECTOR parameter PREAMBLE\_TYPE as the PSDU containing the received frame.

— If the PSDU containing the received frame is of the modulation class HT or VHT and the control response frame is carried in a non-HT PPDU, the control response frame shall be transmitted in a PSDU using one of the ERP-OFDM or OFDM modulation classes.

Change 10.6.8.4 as follows:

— A STA shall not transmit a frame using a rate or MCS that is not supported by the receiver STA ~~or STAs~~, as reported in any Supported Rates and BSS Membership Selectors element, Extended Supported Rates and BSS Membership Selectors element, or Supported MCS Set field in the Management frames transmitted by the receiver STA.

— A STA shall not transmit a frame using a <CMMG MCS, NSS> tuple that is not supported by the receiver STA, as reported in any Supported CMMG MCS and NSS Set field in the Management frames transmitted by the receiver STA.

— If at least one Operating Mode field with the Rx NSS Type subfield equal to 0 was received from the receiver STA:

— A STA shall not transmit a frame with the number of spatial streams greater than that indicated in the Rx NSS subfield in the most recently received Operating Mode field with the Rx NSS Type subfield equal to 0 from the receiver STA.

— 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 CMMG Capabilities element ~~or CMMG Capabilities~~ element received from the intended receiver.**<para break>**

~~— A STA that is a member of a BSS and that is not a CMMG 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 CMMG Operation element with the exception transmissions on a TDLS off-channel link, which follow the rules described in 11.21 (Tunneled direct-link setup).~~

— A ~~CMMG~~ 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 CMMG Operation element with the following exceptions:

— Transmissions on a TDLS off-channel link follow the rules described in 11.21 (Tunneled direct-link setup).

— Transmissions by a CMMG STA on a TDLS link follow the rules described in 11.21 (Tunneled direct-link setup).

— If at least one Operating Mode field with the Rx NSS Type subfield equal to 0 was received from the receiver STA:

— 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.

~~— A STA shall not initiate transmission of a frame at a data rate higher than the greatest rate in the OperationalRateSet, or using an MCS that is not in the CMMG OperationalMCSset, or using a <CMMG MCS, NSS> tuple that is not in the OperationalCMMGMCS\_NSSSet, which are parameters of the MLME-JOIN.request primitive.~~

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.

Change 10.16 as follows:

An HT STA shall not transmit a frame in a PSDU 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 for each intended receiver).

A VHT STA shall not transmit a frame in a PSDU 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 for each intended receiver).

An S1G STA shall not transmit a frame in a PSDU 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 for each intended receiver).

A STA should not transmit a frame in a PSDU 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 for each intended receiver).

Change 10.17 as follows:

A STA shall not send an HT PPDU with the TXVECTOR parameter STBC set to a nonzero value to a recipient STA unless the recipient STA has indicated in the Rx STBC field of its HT Capabilities element that it supports the reception of PPDUs using STBC with a number of spatial streams greater than or equal to the number of spatial streams in the HT PPDU (if there is more than one intended receiver, then this requirement applies for each intended receiver). A STA shall not send a VHT PPDU with the TXVECTOR parameter STBC set to a nonzero value to a recipient STA unless the recipient STA has indicated in the Rx STBC field of its VHT Capabilities element that it supports the reception of PPDUs using STBC with a number of spatial streams greater than or equal to the number of spatial streams in the VHT PPDU (if there is more than one intended receiver, then this requirement applies for each intended receiver). A STA shall not send an S1G PPDU with the TXVECTOR parameter STBC set to a nonzero value to a recipient STA unless the recipient STA has indicated in the Rx STBC field of its S1G Capabilities element that it supports the reception of PPDUs using STBC with a number of spatial streams greater than or equal to the number of spatial streams in the S1G PPDU (if there is more than one intended receiver, then this requirement applies for each intended receiver).

[…]

A STA shall not send a CMMG PPDU with the TXVECTOR parameter STBC set to a nonzero value to

a recipient STA unless the recipient STA has indicated in the Rx STBC field of its CMMG Capabilities element that it supports the reception of PPDUs using STBC with a number of spatial streams equal to or greater than the number of spatial streams in the CMMG PPDU (if there is more than one intended receiver, then this requirement applies for each intended receiver).

Change 10.18 as follows:

A STA may transmit a frame in a PSDU 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 for 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 PSDU 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 for 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 PSDU 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 for 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 PSDU 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 for 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 PSDU 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 PSDU 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 for 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 PSDU 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 for 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 PSDU 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 for 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 PSDU 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 for 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 PSDU 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 for 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 PSDU 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 10.19 as follows:

An HT STA shall not transmit a frame in a PSDU 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 for each intended receiver).

Change 10.57 as follows:

An S1G STA shall not transmit a frame with TXVECTOR parameter TRAVELING\_PILOTS equal to 1 to an S1G STA unless the Traveling Pilot Support field of the S1G Capabilities element received from that STA contained a value of 1 or 3 and dot11S1GTravelingPilotOptionActivated is true (if there is more than one intended receiver, then this requirement applies for each intended receiver).

In Table 9-307 change “Extended Supported Rates element” to “Extended Supported Rates and BSS Membership Selectors element”.

Delete the “’s” in “XVECTOR’s parameter” in Table 10-3, Table 10-7, 10.6.12, 10.51.2 (3x).

Proposed resolution for CID 1456:

REVISED

Make the changes shown under “Proposed changes” for CID 1456 in <this document>, which address the issues raised.

Proposed resolution for CID 1524:

REVISED

Make the changes shown under “Proposed changes” for CID 1524 in <this document>, which clarify that although the TXVECTOR is formally associated with the PSDU, it can loosely be referred to in the context of an (A-)MPDU or a PPDU, and also that in the case of group-addressed frames the constraints of all intended receivers need to be taken account of.

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| Identifiers | Comment | Proposed change |
| CID 1375  Mark RISON  11.22.16.2  2189.9 | It should be possible to cancel multiple DMS streams | Allow a list of DMSIDs in DMS cancellation, i.e. the length is not necessarily set to 1. The STA should be able to send the cancellation with multiple DMSIDs |

Discussion:

11.22.16.2 specifies:

The DMS recipient may request removal of one or more accepted DMS traffic flows by sending a DMS Request frame or Reassociation Request frame that includes a DMS Request element containing one or more DMS Descriptors with the Request Type set to “Remove” and the DMSID field set to that the DMSID of the accepted DMS traffic flow to be removed. The DMS Length field in this DMS Descriptor is set to 1. The TLCAS Elements, TCLAS Processing Element TSPEC Element and Optional Subelements fields shall not be included in the DMS Descriptor if the Request Type is set to “Remove.” The DMS provider shall terminate individually addressed frame delivery for the requested group addressed frames identified by the DMSID for the requesting DMS recipient upon receipt of a DMS Request frame or Reassociation Request frame with the Request Type field equal to “Remove.” The DMS provider shall respond to the termination request by sending a DMS Response frame including the corresponding DMSID and a Response Type value of “Terminate” in the Response Type field of the corresponding DMS Status field. The DMS Length field in this DMS Status field is set to 3. The TLCAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelement fields shall not be included in the DMS Status field if the Response Type field is set to “Terminate.”

The first sentence allows for removal of multiple DMS streams, but the second half suggests only one DMS stream can be removed.

Proposed changes:

Change 11.22.16.2 as follows:

In this subclause, the following terms are used:

— *DMS provider*: An AP, PCP, or DMG STA associated with a PCP that provides DMS.

— *DMS recipient*: A non-AP STA that uses DMS.

In an infrastructure BSS, d~~D~~irected multicast service (DMS) is a service that may be provided by an AP ~~DMS provider~~ to ~~its~~ associated STAs~~DMS recipients~~ that support DMS, where the AP~~DMS provider~~ transmits group addressed MSDUs as individually addressed A-MSDUs.

In a PBSS, DMS is a service that may be provided by any STA to other STAs ~~associated~~ in the same PBSS that support DMS, where the STA transmits group addressed MSDUs as individually addressed A-MSDUs. […]

A DMS recipient ~~that supports DMS~~ may request use of DMS […]

Upon receipt of a DMS Request frame or Reassociation Request frame from a DMS recipient, a~~the~~ DMS provider shall respond with a corresponding DMS Response frame or Reassociation Response frame. […]

If a~~the~~ DMS provider accepts a DMS request identified by a DMS Descriptor, the Response Type field of the corresponding DMS Status field in the DMS Response element shall be set to “Accept” and a nonzero DMSID ~~is~~shall be assigned. ~~A Response Type value of “Deny” shall be set in the corresponding Response Type field of the DMS Status field in the DMS Response element when~~ If a~~the~~ DMS provider denies a DMS request identified by a DMS Descriptor, the Response Type field of the corresponding DMS Status field in the DMS Response element shall be set to “Denied” and the DMSID shall be set to 0. […] When one or more STAs send a DMS request to a~~n~~ DMS provider, containing a DMS descriptor with a set of TCLAS element and TCLAS Processing elements that are identical irrespective of ordering to another successfully received DMS request that is not yet terminated, the DMS provider shall assign the same DMSID as was assigned to the previous DMS request.

~~When the~~If a DMS provider denies the DMS Request, it may suggest an alternative TCLAS-based classifier by including one or more TCLAS elements and an optional TCLAS Processing element. […]

If the requested DMS is accepted by the DMS provider, the DMS provider shall send subsequent group addressed MSDUs that match the frame classifier specified in the DMS Descriptors to the ~~requesting STA~~DMS recipient as A-MSDU subframes […]

A DMS recipient may request modification of the traffic characteristics or attributes of one or more accepted DMS traffic flows by sending a DMS Request frame or Reassociation Request frame that includes a DMS Request element that contains~~ing~~ one or more DMS Descriptors each with the Request Type field set to “Change” and the DMSID field set to that of the DMSID of ~~with the DMSIDs that identify~~ the accepted DMS traffic flow~~s~~ to be modified. ~~If the Request Type field of a DMS Descriptor is set to “Change,” then t~~The values of at least one of the TSPEC Element and Optional Subelement fields shall be different from those of the accepted DMS traffic flow ~~corresponding to the DMSID~~.

If a~~the~~ DMS provider accepts a DMS change request identified by a DMS Descriptor, the Response Type field of the corresponding DMS Status field in the DMS Response element shall be set to “Accept” and the DMSID shall be set to that of the DMS Descriptor. If a~~the~~ DMS provider denies a DMS change request identified by a DMS Descriptor, the Response Type field of the corresponding DMS Status field in the DMS Response element shall be set to “Den~~y~~ied” and the DMSID shall be set to that of the DMS Descriptor. ~~When the~~If a DMS provider denies a DMS change request identified by a DMS Descriptor, the existing DMS traffic flow of the corresponding DMSID shall remain unchanged.

~~The~~A DMS recipient may request removal of one or more accepted DMS traffic flows by sending a DMS Request frame or Reassociation Request frame that includes a DMS Request element containing one or more DMS Descriptors each with the Request Type field set to “Remove” and the DMSID field set to that of the DMSID of the accepted DMS traffic flow to be removed. The DMS Length field ~~in this DMS Descriptor is~~shall be set to 1. The T~~L~~CLAS Elements, TCLAS Processing Element TSPEC Element and Optional Subelements fields shall not be included. ~~in the DMS Descriptor if the Request Type is set to “Remove~~.~~”~~ ***<insert para break>***

~~The~~A DMS provider shall terminate one or more accepted DMS traffic flows~~individually addressed frame delivery for the requested group addressed frames identified by the DMSID for the requesting DMS recipient~~ upon receipt of a DMS Request frame or Reassociation Request frame that includes a DMS Request element containing one or more DMS Descriptors each with the Request Type field equal to “Remove.” and the DMSID field set to that of the DMSID of an accepted DMS traffic flow. The DMS provider shall respond to the termination request by sending a DMS Response frame containing one or more DMS Status fields each including the corresponding DMSID and a ~~Response Type~~ value of “Terminate” in the Response Type field ~~of the corresponding DMS Status field~~. The DMS Length field ~~in this DMS Status field is~~shall be set to 3. The T~~L~~CLAS Elements, TCLAS Processing Element, TSPEC Element and Optional Subelement fields shall not be included. ~~in the DMS Status field if the Response Type field is set to “Terminate.”~~

~~The~~A DMS provider may send an unsolicited DMS Response frame at any time to ~~cancel~~terminate an ~~granted~~accepted DMS traffic flow~~identified by the DMSID~~ by including the DMSID and a ~~Response Type~~ value of “Terminate” in the Response Type field in the DMS Status field in a DMS Response element. ~~The~~A DMS provider may reject a new DMS traffic flow or ~~cancel~~terminate a granted DMS traffic flow at any time based on network conditions, for example the number of associated STAs and channel load.

~~The~~A DMS recipient shall keep a list of group addresses for which ~~the DMS recipient~~it has requested DMS and that have been accepted by ~~the~~a DMS provider~~. The requesting STA~~, and shall discard group addressed frames that match a group address in this list until the DMS has been terminated. […]

NOTE—When the Last Sequence Control field in the DMS Response frame is not supported at ~~the~~a DMS provider (i.e., the sequence number value is not provided in the field), and a multicast MSDU that has sent using both individually addressed and group addressed frame transmission, termination of the DMS stream by the DMS provider might result in a DMS recipient receiving undetectable duplicate MSDUs that are not filtered out by the MAC. […]

If ~~the~~a DMS recipient supports both DMS and FMS, ~~the DMS recipient~~it shall not request both services for the same group addressed frames simultaneously~~. The DMS recipient~~, but may request them ~~different service (DMS vs. FMS)~~ for different group addressed frames simultaneously.

If ~~the~~a DMS provider supports both DMS and TFS, ~~the DMS provider~~it shall first apply TFS to the frame and then apply DMS.

In Table 11-12 add “field” after “Request Type”.

In Figure 6-26 and in 6.3.67.6.1 change “granted DMS” to “accepted DMS”.

In 9.4.2.88 change “indicates the DMS Status” to “indicates the DMS status”.

In 11.22.16.3.3 change “Deny” to “Denied”.

Change 11.22.16.3.4 as follows:

— The AP or a mesh STA providing GCR service successfully transmits an individually addressed DMS Response frame with a DMS Response element containing a DMS Status field with the DMSID identifying the group addressed stream that has the ~~Status~~Response Type field set to “Terminate.”

Proposed resolution:

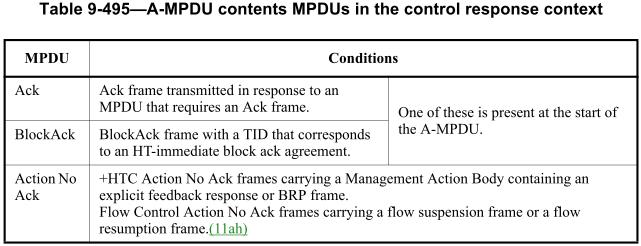
REVISED

Make the changes shown under “Proposed changes” for CID 1375 in <this document>, which specify the mechanism whereby multiple DMS streams may be terminated simultaneously.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1447  Mark RISON  9.7.3  1537.49 | "One of these is present at the start of the A-MPDU" -- but not clear about later on | Append "; these are not present other than at the start of the A-MPDU" |

Discussion:

The context is:



The intent is presumably that in the control response context there is some kind of ack at the start, and then any number of Action No Acks. There cannot be more than one Ack in a control response, since an Ack has no identifiers other than a RA. There cannot be more than one BlockAck in a control response, since an A-MPDU cannot contain QoS Data frames from more than one TID (see Table 9-521—A-MPDU contents in the data enabled immediate response context). The proposed change is to clarify the text in the relevant cell as follows:

One of these is present at the start of

the A-MPDU; these are not present other

than at the start of the A-MPDU.

Proposed resolution:

ACCEPTED

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1452  Mark RISON  10.2.6  1570.13 | The document sometimes implies an MPDU containing an entire MSDU a special case of a fragment, and sometimes that such an MPDU is not a fragment | At the end of the referenced subclause add a para "An MPDU containing an entire MSDU is sometimes considered a fragment and sometimes not, depending on context." |

Discussion:

Here an MPDU containing an entire MSDU is considered a fragment:

**9.2.4.4.3 Fragment Number field**

The Fragment Number field is a 4-bit field indicating the number of each fragment of an MSDU or MMPDU. The fragment number is set to 0 in the first or only fragment of an MSDU or MMPDU

Here an unencrypted MPDU containing an entire MSDU of size greater than dot11FragmentationThreshold is not considered a fragment:

**10.4 MPDU fragmentation(11ai)**

The MAC may fragment and reassemble MSDUs or MMPDUs that are carried in individually addressed MPDUs. The fragmentation and defragmentation mechanisms allow for fragment retransmission.

The length of each fragment shall be an equal number of octets for all fragments except the last, which may be smaller. The length of each fragment shall be an even number of octets, except for the last fragment of an MSDU or MMPDU, which may be either an even or an odd number of octets. The length of a fragment shall never be larger than dot11FragmentationThreshold unless security encapsulation is invoked for the MPDU.

… or is it?

If security encapsulation is active for the MPDU, then the MPDU shall be expanded by the encapsulation overhead and this may result in a fragment larger than dot11FragmentationThreshold.

A fragment is an MPDU, the Frame Body field of which carries all or a portion of an MSDU or MMPDU.

The term “fragment” appears about 700 times in md/D1.0.

In general, since there are things that can or cannot be done with fragments, it only makes sense for an MPDU carrying an entire MSDU/MMPDU not to be a fragment. So the spec should be moved in that direction.

Proposed changes:

Change 9.2.4.4.3 as follows:

The Fragment Number field is a 4-bit field indicating the number of each fragment of an MSDU or MMPDU. The fragment number is set to 0 in the first ~~or only~~ fragment of an MSDU or MMPDU and is incremented by one for each successive fragment of that MSDU or MMPDU. The fragment number is set to 0 in an MPDU containing ~~the only fragment of~~ an A-MSDU, and in an MPDU containing an MSDU or MMPDU that is not fragmented.

Change 10.4 as follows:

A fragment is an MPDU, the Frame Body field of which carries ~~all or~~ only a portion of an MSDU or MMPDU.

A STA shall be capable of receiving ~~fragments~~MPDUs, containing all or part of an MSDU, of arbitrary length that is less than or equal to the maximum MSDU size as defined in 9.2.3 (General frame format), plus any security encapsulation overhead, plus MAC header and FCS.

A STA shall be capable of receiving ~~fragments~~MPDUs, containing all or part of an MMPDU, of arbitrary length that is less than or equal to the minimum of

Each fragment ~~shall~~ contains a Sequence Control field, which comprises a sequence number and fragment number. When a STA is transmitting a~~n~~ fragmented MSDU or MMPDU, the sequence number shall remain the same for all fragments of that MSDU or MMPDU.

The Frame Control field also contains a bit, the More Fragments bit, that is equal to 0 to indicate the last ~~(or only)~~ fragment of the MSDU or MMPDU (or that the MSDU or MMPDU was not fragmented, if the Fragment Number subfield is also equal to 0).

The timer starts on the initial attempt to transmit the MSDU, or first fragment of the MSDU if the MSDU is fragmented. If the timer exceeds dot11MaxTransmitMSDULifetime, then ~~all~~any remaining fragments are discarded by the source STA and no attempt is made to complete transmission of the MSDU.

Change 10.5 as follows:

— *More Fragments indicator*: Indicates to the destination STA that this is not the last fragment of ~~the~~ a fragmented MSDU or MMPDU. Only the last ~~or sole~~ fragment of ~~the~~ a fragmented MSDU or MMPDU shall have this bit set to 0. All other fragments of ~~the~~ a fragmented MSDU or MMPDU shall have this bit set to 1.

As soon as the STA receives the fragment with the More Fragments bit equal to 0, the STA knows that no more fragments ~~may~~will be received for the MSDU or MMPDU.

The destination STA shall maintain a ~~R~~receive ~~T~~timer for each MSDU or MMPDU being received, for a minimum of three MSDUs or MMPDUs.

The receive ~~MSDU or MMPDU~~ timer starts on the reception of the first fragment of ~~the~~a fragmented MSDU or MMPDU. If the receive ~~MSDU~~ timer exceeds dot11MaxReceiveLifetime, then all received fragments of this MSDU or MMPDU ~~are~~shall be discarded by the destination STA. If additional fragments of this~~an individually addressed~~ MSDU or MMPDU are subsequently received ~~after its dot11MaxReceiveLifetime is exceeded~~, those fragments shall be acknowledged and discarded.

Change 10.7 as follows:

for which delivery of the MSDU or MMPDU has not yet been completed (i.e., an acknowledgment of the final fragment or only corresponding MPDU has not been received and the MSDU or MMPDU has not been discarded due to retries, lifetime, or for some other reason)

Change 9.4.2.21.11 as follows:

Queue Delay is expressed in TUs and is measured from the time the MSDU is passed to the MAC until the point at which the first or only ~~fragment~~corresponding MPDU begins transmission.

Change 9.2.5.2 as follows:

i) If the frame is the final ~~fragment~~frame of the TXOP, the estimated time required for the transmission of one Ack frame (including appropriate IFSs)

i) If the frame is the final ~~fragment~~frame of the TXOP, 0

Change the caption for Figure 10-21 as follows: Transmission of a ~~multiple-~~fragmented MSDU using SIFS. In 10.3.4.5 change “multiple-fragment MSDU” to “fragmented MSDU”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1452 in <this document>, which indicate that an MPDU carrying an entire MSDU/MMPDU is not a fragment.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1507  Mark RISON  8.3.5.17.2  723.43 | The only use of PHY-TXBUSY is as an immediate response to a PHY-TXSTART, where per 10.23.2.2.e) it is used to signal an internal collision. The IDLE state is never used | Delete "(STATE)" in 8.3.5.17.2. Delete the last para of 8.3.5.17.2. Delete "(BUSY)" in 10.23.2.2. Delete the "STATE" row of Table 8-3. Delete "The STATE of the primitive is set to BUSY. " and the last para of 8.3.5.17.3 |
| CID 1525  Mark RISON  8.3.5.17.2  723.57 | The only use of PHY-TXBUSY only applies when there is an MM-SME | Change "The primitive is generated when" to "The primitive is generated when an MM-SME is present and" at the referenced location |

Discussion:

As the commenter states, the only references to TXBUSY are mentions in Table 8-2—PHY SAP inter-(sub)layer service primitives and Table 8-3—PHY SAP service primitive parameters, 8.3.5.17 PHY-TXBUSY.indication and in 10.23.2.2.e), and in this case the IDLE state is never used:

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 11.32 (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.

Therefore the behaviour is that a STA coordinated by an MM-SME issues a PHY-TXSTART.request, and then one of two things happens:

* it gets a PHY-TXSTART.confirm, in which case it can proceed
* it gets a PHY-TXBUSY.indication, in which case it backs off

Therefore there is no use for the STATE; it is always BUSY. And the primitive only applies if there is an MM-SME.

Proposed changes:

Delete "(BUSY)" in 10.23.2.2. Delete the "STATE" row of Table 8-3.

Change 8.3.5.17 as follows:

8.3.5.17 PHY-TXBUSY.indication

8.3.5.17.1 Function

This primitive is an indication by the PHY to the local MAC entity(ies) of the current ~~transmission~~busy state of the PHY, when there are multiple MAC entities coordinated by an MM-SME.

8.3.5.17.2 Semantics of the service primitive

~~The primitive provides the following parameter:~~

The semantics of the primitive are as follows:

PHY-TXBUSY.indication ~~(STATE)~~

~~The STATE parameter can be one of two values: BUSY or IDLE. The parameter value is BUSY if the PHY is transmitting a PPDU and thus not available to respond with a PHY-TXSTART.confirm primitive to a PHY-TXSTART.request primitive. Otherwise, the value of the parameter is IDLE.~~

This primitive has no parameters.

8.3.5.17.3 When generated

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.~~

~~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.~~

8. 3.5.17.4 Effect of receipt

~~The effect of receipt of this primitive by the MAC is unspecified if the STATE of the primitive is set to IDLE. The effect of receipt of this primitive by the MAC is specified in 10.24.2.12 (Retransmit procedures) if the STATE of the primitive is set to BUSY.~~

The receipt of this primitive triggers backoff among MAC entities coordinated by an MM-SME (see 10.24.2.2).

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1507 and CID 1525 in <this document>, which address the issue in the direction suggested.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1415  Mark RISON  9.2.4.5.4  743.3 | 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)? | Change "The Ack Policy subfield is 2 bits in length and identifies the acknowledgment policy that is followed upon  the delivery of the MPDU." to "The Ack Policy subfield is 2 bits in length and identifies, together with other information such as whether it is in the context of an S-MPDU and the value of bit 6 of the Frame Control field, the acknowledgment policy that is followed upon  the delivery of the MPDU." at the referenced location" |
| CID 1526  Mark RISON  9.2.4.5.4  743.3 | 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)? | See 17/1243r6 |

Discussion:

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

|  |  |  |
| --- | --- | --- |
| b5 | b6 | Meaning(s) |
| 0 | 0 | Normal Ack  or Implicit Block Ack Request |
| 1 | 0 | No Ack |
| 0 | 1 | No explicit acknowledgment  or 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).

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]”. There was agreement in TGmd to this approach.

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 these proposed changes, “$noun” is to be understood as “Policy Indicator”, excluding the double quotes.

In Table 9-10 change “Ack Policy” to “Ack $noun” throughout.

Change 9.2.4.5.4 as follows:

* 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 a non-A-MPDU frame | ~~Normal Ack or Implicit Block Ack Request.~~  ~~In a frame that is a non-A-MPDU frame:~~  ~~w~~Where either the originator or the  addressed recipient does not support fragment BA procedure:  The addressed recipient returns an Ack or QoS +CF-Ack frame after a short interframe space (SIFS) period, according to the procedures defined in 10.3.2.11 (Acknowledgment procedure) and 10.24.3.5 (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~~.  ~~In a non-A-MPDU frame containing a fragment w~~Where both the originator and the addressed recipient support the fragment BA procedure:  The addressed recipient returns an NDP BlockAck frame after a SIFS, according to  the procedure defined in 10.3.2.12 (Fragment BA procedure(11ah)).  ~~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 not a non-A-MPDU frame  NOTE—This MPDU is sent under a block ack agreement. | 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 10.3.2.11 (Acknowledgment procedure), 10.26.6.5 (Generation and transmission of BlockAck frames by an HT STA or DMG STA), 10.26.7.3 (Operation of HT-delayed block ack), 10.30.3 (Rules for RD initiator), 10.30.4 (Rules for RD responder), and 10.35.3 (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 10.31.2.7 (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 10.26 (Block acknowledgment (block ack)). |

In 10.24.2.8 “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”.

Change 5.1.1.4 as follows:

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.

Change 9.2.5.2 as follows:

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:

Change 9.7.3 as follows:

All of the MPDUs within an A-MPDU are addressed to the same RA. 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~~$noun subfield of the QoS Control field.

In Figure 9-946 and Figure 9-932 change “Ack Policy” to “Ack $noun”.

Change 9.8.3.1 as follows:

The Ack ~~Policy~~$noun subfield identifies the acknowledgment policy that is followed upon the delivery of the MPDU, as defined in Table 9-528 (Ack Policy subfield in the Frame Control field for PV1 frames(11ah)).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | | * Ack ~~Policy~~$noun subfield in the Frame Control field for PV1 frames(11ah) |
| Ack policy | Ack ~~Policy~~$noun subfield | Other conditions | Meaning | | |
| Normal Ack | 0 | MPDU is non-A-MPDU frame | ~~Normal Ack or Implicit Block Ack Request.~~  ~~In a PV1 frame that is a non-A-MPDU frame (#233)w~~Where either the originator or the addressed recipient does not support fragment BA procedure:  The addressed recipient returns an Ack frame after a short interframe space (SIFS) period, according to the procedures defined in 10.3.2.10 (Dual CTS protection).  ~~In a PV1 frame that is part of an A-MPDU that is not an S-MPDU:~~  ~~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 10.3.2.10 (Dual CTS protection), and 10.26.7.3 (Operation of HT-delayed block ack).~~  ~~In a PV1 frame that is a fragment:~~  When both the originator and the addressed recipient support the fragment BA procedure, the addressed recipient returns an NDP BlockAck frame after a SIFS, according to the procedure defined in 10.3.2.12 (Fragment BA procedure(11ah)).  Ack ~~Policy~~$noun 0 is limited to at most one MU recipient per MU PPDU. | | |
| Implicit BAR | 0 | MPDU is not a non-A-MPDU frame | 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 10.3.2.10 (Dual CTS protection), and 10.26.7.3 (Operation of HT-delayed block ack). | | |
| No Ack | 1 | MPDU is non-A-MPDU frame | ~~No Ack or Block Ack Policy.~~  ~~In a PV1 frame that is a non-A-MPDU frame(#233):~~  The addressed recipient takes no action upon receipt of the frame. More details are provided in 10.27 (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. It ~~This combination~~ is not used for PV1 Data frames with a TID for which a ~~B~~**b**lock ~~A~~ack agreement exists.  ~~In a PV1 frame that is part of an A-MPDU frame that is not an S-MPDU:~~  ~~The addressed recipient takes no action upon the receipt of the frame except for recording the state. The recipient can expect a BlockAckReq frame in the future to which it responds using the procedure described in 10.26 (Block acknowledgment (block ack)).~~ | | |
| Block Ack | 1 | MPDU is not a non-A-MPDU frame | The addressed recipient takes no action upon the receipt of the frame except for recording the state. The recipient can expect a BlockAckReq frame in the future to which it responds using the procedure described in 10.26 (Block acknowledgment (block ack)). | | |

In Table 9-521 change “These have the Ack Policy field equal to Block Ack.” to “These have Block Ack ack policy.”, “One or more QoS Data frames with the Ack Policy field equal to Implicit Block Ack Request” to “One or more QoS Data frames with Implicit BAR ack policy” (2x), “QoS Null MPDU with the Ack Policy subfield set to No Ack” to “QoS Null MPDU with the No Ack ack policy” (3x, once “MPDU” twice “MPDUs”), “A BlockAckReq frame with an optional QoS Null MPDU the Ack Policy subfield set to No Ack” to “A BlockAckReq frame with an optional QoS Null MPDU with No Ack ack policy”, “NOTE—These MPDUs all have the Ack Policy field equal to the same value, which is either Implicit Block Ack Request or Block Ack.” to “NOTE—These MPDUs all have the same ack policy, which is either Implicit BAR or Block Ack.”

In Table 9-522 change “These have the Ack Policy field equal to Block Ack.” to “These have the Block Ack ack policy.”, “These have the Ack Policy field equal to No Ack” to “These have No Ack ack policy”.

In Table 9-523 change “Acknowledgment in response to data received with the Ack Policy field equal to PSMP Ack” to “Acknowledgment in response to data received with the PSMP Ack ack policy”, “QoS Data frames in which the Ack Policy field is equal to PSMP Ack or Block Ack” to “QoS Data frames with the PSMP Ack or Block Ack ack policy”, “These have the Ack Policy field equal to Block Ack.” to “These have Block Ack ack policy.”, “These have the Ack Policy field equal to No Ack.” to “These have No Ack ack policy.”

In 10.2.6 change “with its Ack Policy subfield set to Normal Ack” to “with Normal Ack ack policy”, “with the Ack Policy of the corresponding MPDUs set to Normal Ack” to “with Normal Ack ack policy for the corresponding MPDUs”.

In 10.3.2.11 change “Individually addressed QoS Data frames(Ed) where the Ack Policy subfield is equal to Normal Ack” to “Individually addressed QoS Data frames(Ed) with Normal Ack ack policy”.

Change 10.3.2.12 as follows:

An originator STA may send F-MPDUs ~~and set the Ack Policy field of the F-MPDU to~~ with Block Ack ack policy. A recipient STA shall not send any frame as an immediate response to an F-MPDU ~~that has the Ack Policy field equal to~~with Block Ack ack policy. An originator STA may solicit an immediate response following an F-MPDU by setting the ~~Ack Policy field~~ack policy of the eliciting F-MPDU to Implicit ~~Block Ack Request~~BAR.

The receiving STA that is the intended receiver of either an F-MPDU with ~~the Ack Policy field equal to~~ Implicit ~~Block Ack Request~~BAR ack policy or a BAR frame shall […]

In 10.3.2.17 change “Ack Policy field” to “Ack $noun field”.

In Table 10-7 change “The Ack Policy subfield in any included QoS Control field or in the Frame Control field of the first MPDU in the PPDU is equal to No Ack or Block Ack” to “The ack policy in any included QoS Data MPDU or the Ack $noun subfield in the Frame Control field of the first MPDU in the PPDU is No Ack or Block Ack”, “The Ack Policy subfield (if any) in the QoS Control field or in the Frame Control field is equal to Normal Ack or Implicit Block Ack Request.” to “The ack policy in any included QoS Data MPDU or the Ack $noun subfield in the Frame Control field of the first MPDU in the PPDU is Normal Ack or Implicit BAR.” (2x)

In 10.6.6.5.2 change “implicit BlockAck request” to “implicit block ack request” (2x).

In 10.7 change “set to Normal Ack or Implicit Block Ack Request, PSMP Ack, or Block Ack” to “the QoS Data frames that are used to send these MSDUs or A-MSDUs shall have Normal Ack, Implicit BAR, PSMP Ack or Block Ack ack policy”, “the Ack Policy subfield in the QoS Control field set to No Ack” to “No Ack ack policy”.

In 10.12 change “Ack Policy equal to Normal Ack” to “Normal Ack ack policy”.

In 10.13.8 change “A Data frame cannot indicate an Ack Policy of “Implicit Block Ack”” to “A QoS Data frame cannot have Implicit BAR ack policy”, “A Data frame could indicate an Ack Policy of “Implicit Block Ack”” to “A QoS Data frame could have Implicit BAR ack policy”.

In 10.15 change “All QoS Data frames within A-MPDUs within an A-PPDU shall have the same value of the Ack Policy subfield of the QoS Control field” to “All QoS Data frames within A-MPDUs within an A-PPDU shall have the same ack policy”.

In 10.24.3.2.3 change “with the Ack Policy subfield equal to Normal Ack,” to “with Normal Ack ack policy,” (2x).

In 10.24.3.5.1 change “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” to “A STA shall respond to QoS Data frames having Normal Ack ack policy with an Ack frame”.

In 10.24.4.2.3 change “an MPDU transmitted with Normal Ack policy” to “an MPDU transmitted with Normal Ack ack policy”.

In 10.26.6.2 change “It may adjust the Ack Policy field of transmitted QoS Data frames” to “It may adjust the ack policy of transmitted QoS Data frames”.

In 10.26.6.5 change “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)” to “receives an A-MPDU that contains one or more QoS Data frames with Implicit BAR ack policy”, “received A-MPDU with Ack Policy field equal to Normal Ack (i.e., implicit block ack request)” to “received QoS Data frame with Implicit BAR ack policy” (3x).

In 10.26.6.7 change “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” to “A STA may send a block of data in a single A-MPDU where each QoS Data frame Normal Ack ack policy”, “Alternatively, the originator may send an A-MPDU where each Data frame has its Ack Policy field set to Block Ack” to “Alternatively, the originator may send an A-MPDU where each QoS Data frame has Block Ack ack policy”, “a Data frame that was previously transmitted within an A-MPDU that had the Ack Policy field equal to Normal Ack” to “a QoS Data frame that was previously transmitted within an A-MPDU that had Normal Ack ack policy”, “MPDUs are transmitted with the Ack Policy subfield set to Block Ack” to “QoS Data MPDUs are transmitted with Block Ack ack policy”, “an MPDU or A-MPDU that has an Ack policy other than Normal Ack” to “a QoS Data frame has an ack policy other than Normal Ack”.

In 10.26.10.2 change “It can adjust the Ack Policy field of transmitted Data frames” to “It can adjust the ack policy of transmitted QoS Data frames”.

In 10.27 change “When a QoS Data frame is transmitted with the Ack Policy subfield set to No Ack” to “When a QoS Data frame is transmitted with No Ack ack policy”.

In 10.30.3 change “A QoS Data frame with the Ack Policy field equal to any value except PSMP Ack (i.e., including Implicit Block Ack Request)” to “A QoS Data frame with an ack policy other than PSMP Ack (i.e., including Implicit BAR)”.

In 10.30.4 change “the Ack Policy field equal to Normal Ack” to “the Normal Ack ack policy”.

In 10.31.2.6 change “Ack Policy field value” to “ack policy”, “An Ack Policy of” to “An ack policy of” (2x).

Change 10.31.2.7 as follows:

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 ack policy or for TIDs in a received Multi-TID BlockAckReq frame for which a BlockAck frame (Compressed BlockAck or Multi-TID BlockAck) has not yet been transmitted. An AP shall transmit a Multi-TID BlockAck frame during a PSMP-DTT addressed to the STA for the data received from that STA with ~~the Ack Policy field set to~~ PSMP Ack ack policy or for TIDs in a Multi-TID BlockAckReq frame received from that STA for which a BlockAck frame (Compressed BlockAck or Multi-TID BlockAck) has not yet been transmitted.

Data sent and received by a non-AP STA within a PSMP sequence may be contained in an A‑MPDU that contains MPDUs of multiple TIDs. Frames of differing TIDs may be transmitted in the same PSMP-DTT or PSMP-UTT and are not subject to AC prioritization.

The subtype subfield of Data frames and the ~~Ack Policy subfield~~ ack policy of QoS Data frames transmitted during either PSMP-DTT or PSMP-UTT periods are limited by the following rules:

* A QoS Data frame transmitted under an immediate or HT-immediate block ack agreement during either a PSMP-DTT or a PSMP-UTT shall have one of the following ~~Ack Policy values~~: PSMP Ack or Block Ack ack policy.
* A QoS Data frame transmitted under an HT-delayed block ack agreement during either a PSMP-DTT or a PSMP-UTT shall have ~~the Ack Policy field set to~~ Block Ack ack policy.
* A Data frame with the RA field containing an individual address transmitted during either a PSMP-DTT or a PSMP-UTT and for which no block ack agreement exists shall be a QoS data subtype and shall have ~~the Ack Policy field set to~~ No Ack ack policy.
* The ~~Ack Policy field~~ack policy of a QoS Data frame transmitted during a PSMP sequence shall not be ~~set to~~ ~~either~~ Normal Ack or Implicit ~~Block Ack~~BAR.

All TID values within a Multi-TID BlockAck frame or Multi-TID BlockAckReq frame shall identify a block ack agreement that is HT-immediate. QoS Data frames transmitted with ~~Ack Policy field equal to~~ PSMP Ack ack policy shall have a TID value that identifies a block ack agreement that is immediate or HT-immediate block ack.

NOTE—In this case, HT-immediate relates to the keeping of acknowledgment state for timely generation of a Multi-TID BlockAck frame. It does not imply that there is any response mechanism for sending a Multi-TID BlockAck frame after a SIFS. The timing of any response is determined by the PSMP schedule.

Acknowledgment for data transmitted under an (#57)HT-immediate block ack agreement may be requested implicitly using PSMP Ack ack policy~~setting of the Ack Policy field~~ in QoS Data frames or explicitly with a (#57)BlockAckReq or Multi-TID BlockAckReq frame. An AP that transmits QoS Data frames with ~~the Ack Policy field equal to~~ PSMP Ack ack policy or that transmits a (#57)BlockAckReq or Multi-TID BlockAckReq frame addressed to a STA in a PSMP-DTT shall allocate sufficient time for the transmission of a (#57)BlockAck frame or Multi-TID BlockAck frame, respectively, in a PSMP-UTT allocated to that STA within the same PSMP sequence. A STA that has received a PSMP frame and that receives a QoS Data frame with ~~the Ack Policy field equal to~~ PSMP Ack ack policy or that receives a (#57)BlockAckReq or Multi-TID BlockAckReq frame shall transmit a (#57)BlockAck frame or Multi-TID BlockAck frame, respectively, in the PSMP-UTT of the same PSMP sequence.

NOTE 1—If the STA does not receive the PSMP frame, it might still receive the downlink data, in which case it can record the status of the data in its block ack buffer, but it cannot transmit a Multi-TID BlockAck frame.

NOTE 2—A Multi-TID BlockAck frame or Multi-TID BlockAckReq frame might contain any TID related to an HT-immediate block ack agreement regardless of the contents of any prior transmission of Multi-TID BlockAck, Multi-TID BlockAckReq, or QoS Data frames.

An AP that receives a QoS Data frame with ~~the Ack Policy field equal to~~ PSMP Ack ack policy during a PSMP-UTT shall transmit a response that is a (#57)BlockAck frame or Multi-TID BlockAck frame in the next PSMP-DTT that it schedules for that STA, except if it has transmitted a BlockAck frame for such TIDs to the STA outside the PSMP mechanism.

NOTE 1—The exception might occur if the non-AP STA transmits one or more BlockAckReq frames or QoS Data frames with ~~the Ack Policy subfield(#1489) set to~~ Implicit ~~Block Ack~~BAR ack policy outside the PSMP mechanism.

NOTE 2—An AP might receive a Multi-TID BlockAck frame in the PSMP-UTT of the current PSMP sequence. If the Multi-TID BlockAck frame indicates lost frames or if the AP does not receive an expected Multi-TID BlockAck frame, the AP might schedule and retransmit those frames in a PSMP sequence within the current PSMP burst or in the next SP.

A Multi-TID BlockAck frame shall include all of the TIDs for which data were received with ~~Ack Policy field equal to~~ PSMP Ack ack policy and for the TIDs listed in any Multi-TID BlockAckReq frame received during the previous PSMP-DTT (STA) or PSMP-UTT (AP). The originator may ignore the bitmap for TIDs in the Multi-TID BlockAck frame for which the originator has not requested a Multi-TID BlockAck frame to be present either implicitly (by the transmission of Data frames with ~~the Ack Policy field set to~~ PSMP Ack ack policy) or explicitly (by the transmission of a Multi-TID BlockAckReq frame).

If a BlockAckReq frame for an HT-delayed block ack agreement is transmitted during a PSMP sequence, the BAR Ack Policy subfield of the BlockAckReq frame shall be set to the value representing No Acknowledgment.

In 10.35.2.4.3 change “with the Ack Policy field set to Normal Ack” to “with Normal Ack ack policy” (2x).

In 11.2.3.17 and 11.2.3.19 change “The STA receives a frame intended for it with the More Data subfield equal to 0 and the Ack Policy subfield in the QoS Control field is equal to No Ack or sends an acknowledgment if the Ack Policy subfield is not equal to No Ack” to “The STA receives a QoS Data frame intended for it with the More Data subfield equal to 0 and No Ack ack policy or sends an acknowledgment if the ack policy is not No Ack”.

In 11.4.4.4 change “the Ack Policy subfield” to “the TS Info Ack Policy subfield” (2x).

In 11.4.10 change “— Arrival of valid MA-UNITDATA.request primitives using this TS at the MAC SAP when the QoS Data frames are sent with the Ack Policy subfield equal to No Ack

— Confirmation of correctly sent MSDUs that belong to the TS within the MAC when the QoS Data frames are sent with the Ack Policy subfield set other than to No Ack” to

“— Arrival of valid MA-UNITDATA.request primitives using this TS at the MAC SAP when the QoS Data frames are sent with No Ack ack policy

— Confirmation of correctly sent MSDUs that belong to the TS within the MAC when the QoS Data frames are sent with ack policy other than No Ack” (2x).

In 11.5.4 change “the Ack Policy subfield in the QoS Control field of that MPDU header is Block Ack or Implicit Block Ack Request” to “the ack policy is Block Ack or Implicit BAR”, “receives Data frames with the Ack Policy subfield equal to Block Ack” to “receives QoS Data frames with Block Ack ack policy”.

In Table G-1 change “Normal Ack policy” to “Implicit BAR ack policy”, “the Ack Policy subfield equal to No Ack” to “No Ack ack policy”, “the Ack Policy subfield equal to Normal Ack” to “Normal Ack ack policy”, “Ack Policy field of QoS Data frame is equal to PSMP Ack” to “QoS Data frame with PSMP Ack ack policy”.

In G.4 change “PSMP Ack Ack Policy” to “PSMP Ack ack policy”.

In O.3 change “The Ack Policy field of the QoS Data frames in this PPDU is set to Implicit Block Ack Request.” to “The ack policy of the QoS Data frames in this PPDU is Implicit BAR.” (2x), “the Ack Policy field of its QoS Data frames set to Implicit Block Ack Request” to “Implicit BAR ack policy for its QoS Data frames”, “QoS Data frames with the Ack Policy field set to Implicit Block Ack” to “QoS Data frames with Implicit BAR ack policy”, “with the Ack Policy field set to Implicit Block Ack Request” to “with Implicit BAR ack policy”.

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

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1415 and CID 1526 in <this document>, which address the issues raised by defining the general concept of an “ack policy” and the specific signalling for each ack policy.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1480  Mark RISON  C.3  3815.08 | dot11EDThreshold is useless as it is undefined for PHYs other than DSSS and HR/DSSS | Delete dot11EDThreshold at the referenced location (lines 8-20) |

Discussion:

The issue is actually not that dot11EDThreshold is undefined for PHYs other than DSSS and HR/DSSS, but that its use is not specified in any PHY clause.

It is plausible that this MIB variable is intended to relate to the following in 15.4.6.5 CCA:

a) The ED threshold shall be ≤ –80 dBm for TX power > 100 mW, –76 dBm for 50 mW < TX power ≤ 100 mW, and –70 dBm for TX power ≤ 50 mW.

and in 16.3.8.5 CCA:

a) If a valid HR/DSSS signal is detected during its preamble within the CCA window, the ED threshold shall be less than or equal to –76 dBm for TX power > 100 mW; –73 dBm for 50 mW < TX power ≤ 100 mW; and –70 dBm for TX power ≤ 50 mW.

Proposed changes:

*Alternative 1:*

At the end of the bullet a) in 15.4.6.5 (2780.56 in D1.2) and 16.3.8.5 (2811.4 in D1.2) add a sentence “The ED threshold is the value contained in dot11EDThreshold.”

*Alternative 2:*

Delete the dot11EDThreshold row in Table 15-4 and Table 16-3.

Delete “,

dot11EDThreshold Integer32” at 4078.51 (in D1.2).

Delete 4079.46 to 4079.58.

Delete “,

dot11EDThreshold” at 4176.53.

Delete “dot11EDThreshold,” at 4179.18

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” Alternative 1 for CID 1480 in <this document>, which links dot11EDThreshold to the ED threshold for DSSS and HR/DSSS.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1465  Mark RISON  12.9.2 | In 12.9.2 there is text like "MSDU or A-MSDU has an individual RA" and "... has a group RA" (2058.38, 2059.50, 2060.12, 2060.33, 2060.59, 2063.43, 2064.50, 2065.28, 2066.11, 2068.15, 2068.29, 2068.42 (+missing "M")), but MSDUs/A-MSDUs don't have an RA, only MPDUs do. 1332.40/43/46/50/56 and 3196.2 are also suspect. [All refs are to mc/D6.0] | Either change all the references from RAs to DAs, or change all the subjects from MSDUs/A-MSDUs/MMPDUs to MPDUs (containing all or part of a MSDU/A-MSDU/MMPDU) |

Discussion:

As it says in the comment, only MPDUs have RAs. MSDUs and A-MSDUs have DAs and MMPDUs have destinations.

Proposed changes:

Change 10.7 from:

A non-QoS STA shall not have more than one MSDU or MMPDU from a particular SA to a particular individual RA outstanding at a time.

NOTE 1—A simpler, more restrictive alternative to the rule in the above paragraph that might be used is that no more than one MSDU with a particular individual RA be outstanding at a time.

For frames that are not sent within the context of a block ack agreement, a QoS STA shall not have more than one MSDU or A-MSDU for each TID or MMPDU from a particular SA to a particular individual RA outstanding at any time.

NOTE 2—A simpler, more restrictive alternative to the rule in the above paragraph that might be used is that no more than one MSDU or A-MSDU with any particular TID with a particular individual RA be outstanding at any time.

to:

A non-QoS STA shall not have outstanding at any time more than:

* one MSDU from a particular SA
* one MMPDU

transmitted in one or more MPDUs with a particular individual RA.

NOTE 1—A simpler, more restrictive alternative to the rule in the above paragraph that might be used is that no more than one MSDU transmitted in one or more MPDUs with a particular individual RA be outstanding at any time.

For frames that are not sent within the context of a block ack agreement, a QoS STA shall not have outstanding at any time more than:

* one MSDU or A-MSDU for each TID from a particular SA
* one MMPDU

transmitted in one more MPDUs with a particular individual RA.

NOTE 2—A simpler, more restrictive alternative to the rule in the above paragraph that might be used is that no more than one MSDU or A-MSDU with any particular TID transmitted in one or more MPDUs with a particular individual RA be outstanding at any time.

In 12.3.3.3.6 change “the MSDU’s TA” to “the MMPDU’s source” (2x).

In 12.9.2.2 change “MSDU or A-MSDU has an individual RA” to “MSDU or A-MSDU has an individual DA”,

“MPDU has a group addressed RA” to “MPDU has a group RA”.

In 12.9.2.3 change “MMPDU has an individual RA” to “MMPDU has an individual destination” (2x),

change “MMPDU has a group RA” to “MMPDU has a group destination” (2x),

change “the MMPDU’s RA” to “the MMPDU’s destination” (2x).

In 12.9.2.6 change “MPDU has a group addressed RA” to “MPDU has a group RA”.

In 12.9.2.7 change “MMPDU has an individual RA” to “MMPDU has an individual destination” (2x),

change “MMPDU has a group RA” to “MMPDU has a group destination” (2x),

change “the MMPDU’s RA” to “the MMPDU’s destination”.

In 12.9.2.9 change “MMPDU has individual RA” to “MMPDU has an individual destination” (2x),

“MPDU has group addressed RA” to “MMPDU has group destination”.

In C.3 change dot11RTSThreshold’s description as follows:

An RTS/CTS handshake is performed at the beginning of any frame

exchange sequence where the PSDU contains an MPDU ~~is~~ with the Type subfield equal to Data

or Management and~~, the PSDU has~~ an individual address in the Address 1 field,

and the length of the PSDU is greater than this threshold.

Change “has individual RA” to “has an individual RA” throughout.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1465 in <this document>, which change the references from RAs to DAs.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1379  Mark RISON | Use of "packet" is contrary to the style guide | Change "packet" to "PPDU", "MPDU", "frame" as appropriate |

Discussion:

As the comment says, “packet” is disrecommended. The canonical forms are “PPDU”, “MPDU” or “frame”.

There are 891 instances of “packet” in D1.2. Some of the more frequent ones are:

|  |  |  |
| --- | --- | --- |
| Form | Count (inc. xrefs) | Status |
| BRP packet | 113 | This is a PPDU (see Figure 20-20) |
| BRP-TX packet | 21 | " |
| BRP-RX packet | 54 | " |
| null data packet | 33 | This is a PPDU |
| HLP packet | 37 | OK as this is a higher-layer object |
| non-HT portion of packet / HT portion of packet | 30 | This is about a PPDU |
| sounding packet | 23 | This is a PPDU (many more instances of sounding PPDU) |
| packet number | 24 | Should be MPDU number? |
| EAP-Finish/Re-auth packet / EAP-Packet / EAP-RP packet | 13 | OK as this is a higher-layer object |
| Sync packet | 9 | OK as this is a higher-layer object |
| packet type (inc. PACKET-TYPE etc.), except in Clauses 12 and 13 | 53 | This is about the PPDU type |

Memo to self: packet not "brp packet" not "brp-rx packet" not "brp-tx packet" not "null data packet" not "hlp packet" not "ht portion of packet" not "sounding packet" not "packet number" not "packet type" not "auth packet" not "sync packet"

Proposed changes:

|  |  |  |
| --- | --- | --- |
| Change (case ignored) | To (case preserved except “PPDU” always all-uppercase) | In |
| BRP packet | BRP PPDU | whole document |
| BRP-TX packet | BRP-TX PPDU | whole document |
| BRP-RX packet | BRP-RX PPDU | whole document |
| null data packet | null data PPDU | whole document |
| non-HT portion of packet | non-HT portion of PPDU | whole document |
| HT portion of packet | HT portion of PPDU | whole document |
| sounding packet | sounding PPDU | whole document |
| packet type | PPDU type | whole document except Clauses 12 and 13 |
| PACKET-TYPE | PPDU-TYPE | whole document except Clauses 12 and 13 |
| packet | PPDU | 9.4.2.136 (2x), T9-313 (2x), T9-316, 10.32, 10.35.3 (4x), 10.35.5 (2x), 10.43.3.1 (6x), 10.43.3.2 (4x), 10.43.6.3.2 (5x), 10.43.6.3.3 (2x), 10.43.6.4.1 (2x), 10.43.6.4.4, 10.43.7 (12x not covered elsewhere), 10.43.9 (11x not covered elsewhere), 10.46.3.2.3, 10.54.4 (11x), 12.5.4.4 |
| packet | frame | 13.6.3, 14.12.2 |
| PHY packet | PPDU | 9.4.2.142.1, 9.4.2.232.1 |

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1379 in <this document>, which address the issue throughout the MAC clauses.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1455  Mark RISON | There are definitions in 3.2 for DMG PPDU and HT PPDU and VHT PPDU and non-HT PPDU but not other PHYs' PPDUs | Add definitions for every PHY's PPDUs |

Discussion:

The following PHY-specific definitions of PPDUs are present in 3.2:

**1 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 1 MHz transmit spectral mask defined in Clause 23 (Sub 1 GHz (S1G) PHY specification) and

that is a 1 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to CBW1).

**1 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 23 (Sub 1 GHz (S1G) PHY

specification) 1 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

CBW1).

**2 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 2 MHz transmit spectral mask defined in Clause 23 (Sub 1 GHz (S1G) PHY specification) and

that is one of the following:

a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW1)

b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW2)

**2 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 23 (Sub 1 GHz (S1G) PHY

specification) 2 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

CBW2) or a Clause 23 (Sub 1 GHz (S1G) PHY specification) 2 MHz S1G 1 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW2).

**4 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 4 MHz transmit spectral mask defined in Clause 23 (Sub 1 GHz (S1G) PHY specification) and

that is one of the following:

a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW1)

b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW2)

c) A 4 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW4)

**4 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 23 (Sub 1 GHz (S1G) PHY

specification) 4 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

CBW4), a Clause 23 (Sub 1 GHz (S1G) PHY specification) 4 MHz S1G 1 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW4), or a Clause 23 (Sub 1 GHz (S1G) PHY

specification) 4 MHz S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW4).

**8 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 8 MHz transmit spectral mask defined in Clause 23 (Sub 1 GHz (S1G) PHY specification) and

that is one of the following:

a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW1)

b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW2)

c) A 4 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW4)

d) An 8 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW8)

**8 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 23 (Sub 1 GHz (S1G) PHY

specification) 8 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

CBW8), a Clause 23 (Sub 1 GHz (S1G) PHY specification) 8 MHz S1G 1 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW8), or a Clause 23 (Sub 1 GHz (S1G) PHY

specification) 8 MHz S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW8).

**16 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 16 MHz transmit spectral mask defined in Clause 23 (Sub 1 GHz (S1G) PHY specification) and

that is one of the following:

a) A 1 MHz sub 1 GHz (S1G) non-duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW1)

b) A 2 MHz S1G non-duplicate or S1G 1 MHz duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW2)

c) A 4 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW4)

d) An 8 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW8)

e) An 16 MHz S1G non-duplicate, or S1G 1 MHz duplicate, or S1G 2 MHz duplicate (TXVECTOR

parameter CH\_BANDWIDTH equal to CBW16)

**16 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 23 (Sub 1 GHz (S1G) PHY

specification) 16 MHz sub 1 GHz (S1G) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal

to CBW16), a Clause 23 (Sub 1 GHz (S1G) PHY specification) 16 MHz S1G 1 MHz duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to CBW16), or a Clause 23 (Sub 1 GHz (S1G) PHY

specification) 16 MHz S1G 2 MHz duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW16).

**20 MHz mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) PPDU

transmitted using the 20 MHz transmit spectral mask defined in Clause 17 (Orthogonal frequency

division multiplexing (OFDM) PHY specification).

b) A Clause 18 (Extended Rate PHY (ERP) specification) orthogonal frequency division multiplexing

(OFDM) PPDU transmitted using the transmit spectral mask defined in Clause 18 (Extended Rate

PHY (ERP) specification).

c) A high-throughput (HT) PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to

HT\_CBW20 and the CH\_OFFSET parameter equal to CH\_OFF\_20 transmitted using the 20 MHz

transmit spectral mask defined in Clause 19 (High-throughput (HT) PHY specification).

d) A very high throughput (VHT) PPDU with TXVECTOR parameter CH\_BANDWIDTH equal to

CBW20 transmitted using the 20 MHz transmit spectral mask defined in Clause 21 (Very high

throughput (VHT) PHY specification).

e) A Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) PPDU

transmitted by a VHT STA using the transmit spectral mask defined in Clause 21 (Very high

throughput (VHT) PHY specification).

f) An HT PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to HT\_CBW20 and the

CH\_OFFSET parameter equal to CH\_OFF\_20 transmitted by a VHT STA using the 20 MHz

transmit spectral mask defined in Clause 21 (Very high throughput (VHT) PHY specification).

**20 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 15 (DSSS PHY specification for the

2.4 GHz band designated for ISM applications) PPDU, Clause 17 (Orthogonal frequency division

multiplexing (OFDM) PHY specification) PPDU (when using 20 MHz channel spacing), Clause 16 (High

rate direct sequence spread spectrum (HR/DSSS) PHY specification) PPDU, Clause 18 (Extended Rate

PHY (ERP) specification) orthogonal frequency division multiplexing (OFDM) PPDU, Clause 19 (High-

throughput (HT) PHY specification) 20 MHz high-throughput (HT) PPDU with the TXVECTOR parameter

CH\_BANDWIDTH equal to HT\_CBW20, or Clause 21 (Very high throughput (VHT) PHY specification)

20 MHz very high throughput (VHT) PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to

CBW20.

**40 MHz mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A 40 MHz high-throughput (HT) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

HT\_CBW40) transmitted using the 40 MHz transmit spectral mask defined in Clause 19 (High-

throughput (HT) PHY specification).

b) A 40 MHz non-HT duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

NON\_HT\_CBW40) transmitted by a non-very high throughput (non-VHT) STA using the 40 MHz

transmit spectral mask defined in Clause 19 (High-throughput (HT) PHY specification).

c) A 40 MHz non-HT duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to CBW40)

transmitted by a very high throughput (VHT) STA using the 40 MHz transmit spectral mask defined

in Clause 21 (Very high throughput (VHT) PHY specification).

d) A 20 MHz HT PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to HT\_CBW20

and the CH\_OFFSET parameter equal to either CH\_OFF\_20U or CH\_OFF\_20L transmitted using

the 40 MHz transmit spectral mask defined in Clause 19 (High-throughput (HT) PHY specification).

e) A 20 MHz VHT PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to CBW20

transmitted using the 40 MHz transmit spectral mask defined in Clause 21 (Very high throughput

(VHT) PHY specification).

f) A 40 MHz VHT PPDU with the TXVECTOR parameter CH\_BANDWIDTH equal to CBW40

transmitted using the 40 MHz transmit spectral mask defined in Clause 21 (Very high throughput

(VHT) PHY specification).

g) A 40 MHz HT PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to HT\_CBW40)

transmitted by a VHT STA using the 40 MHz transmit spectral mask defined in Clause 21 (Very

high throughput (VHT) PHY specification).

h) A 20 MHz non-HT PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to CBW20)

transmitted using the 40 MHz transmit spectral mask defined in Clause 19 (High-throughput (HT)

PHY specification).

i) A 20 MHz non-HT PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to CBW20)

transmitted by a VHT STA using the 40 MHz transmit spectral mask defined in Clause 21 (Very

high throughput (VHT) PHY specification).

**40 MHz physical layer (PHY) protocol data unit (PPDU):** A 40 MHz high-throughput (HT) PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to HT\_CBW40), or a 40 MHz non-HT duplicate PPDU

(TXVECTOR parameter CH\_BANDWIDTH equal to NON\_HT\_CBW40 or TXVECTOR parameter

CH\_BANDWIDTH equal to CBW40), or a 40 MHz very high throughput (VHT) PPDU (TXVECTOR

parameter CH\_BANDWIDTH equal to CBW40).

**80 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 80 MHz transmit spectral mask defined in Clause 21 (Very high throughput (VHT) PHY specification)

and that is one of the following:

a) An 80 MHz very high throughput (VHT) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal

to CBW80)

b) An 80 MHz non-high-throughput (non-HT) duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW80)

c) A 20 MHz non-HT, high-throughput (HT), or VHT PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW20)

d) A 40 MHz non-HT duplicate, HT, or VHT PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW40)

**80 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 21 (Very high throughput (VHT)

PHY specification) 80 MHz very high throughput (VHT) PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW80) or a Clause 21 (Very high throughput (VHT) PHY specification) 80

MHz non-high-throughput (non-HT) duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

CBW80).

**160 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using the

160 MHz transmit spectral mask defined in Clause 21 (Very high throughput (VHT) PHY specification) and

that is one of the following:

a) A 160 MHz very high throughput (VHT) PPDU (TXVECTOR parameter CH\_BANDWIDTH equal

to CBW160)

b) A 160 MHz non-high-throughput (non-HT) duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW160)

c) A 20 MHz non-HT, high-throughput (HT), or VHT PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW20)

d) A 40 MHz non-HT duplicate, HT, or VHT PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW40)

e) An 80 MHz non-HT duplicate or VHT PPDU (TXVECTOR parameter CH\_BANDWIDTH equal to

CBW80)

**160 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 21 (Very high throughput (VHT)

PHY specification) 160 MHz very high throughput (VHT) PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW160) or a Clause 21 (Very high throughput (VHT) PHY specification)

160 MHz non-high-throughput (non-HT) duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW160).

**80+80 MHz mask physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted using

the 80+80 MHz transmit spectral mask defined in Clause 21 (Very high throughput (VHT) PHY

specification) and that is one of the following:

a) An 80+80 MHz very high throughput (VHT) PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW80+80)

b) An 80+80 MHz non-high-throughput (non-HT) duplicate PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW80+80)

**80+80 MHz physical layer (PHY) protocol data unit (PPDU):** A Clause 21 (Very high throughput (VHT)

PHY specification) 80+80 MHz very high throughput (VHT) PPDU (TXVECTOR parameter

CH\_BANDWIDTH equal to CBW80+80) or a Clause 21 (Very high throughput (VHT) PHY specification)

80+80 MHz non-high-throughput (non-HT) duplicate PPDU (TXVECTOR parameter CH\_BANDWIDTH

equal to CBW80+80).

**China millimeter-wave multi-gigabit (CMMG) physical layer (PHY) protocol data unit (PPDU):** A

Clause 25 (China millimeter-wave multi-gigabit (CMMG) PHY specification(11aj)) PPDU transmitted or

received using the Clause 25 (China millimeter-wave multi-gigabit (CMMG) PHY specification(11aj))

physical layer (PHY).

**directional multi-gigabit (DMG) physical layer (PHY) protocol data unit (PPDU):** A Clause 20

(Directional multi-gigabit (DMG) PHY specification) PPDU.

**high-throughput (HT) physical layer (PHY) protocol data unit (PPDU):** A Clause 19 (High-throughput

(HT) PHY specification) PPDU that is either high-throughput (HT) mixed format (HT-MF) or high-

throughput (HT) greenfield format (HT-greenfield) format.

**non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** A PPDU

transmitted by a Clause 19 (High-throughput (HT) PHY specification) or Clause 21 (Very high throughput

(VHT) PHY specification) PHY with the TXVECTOR FORMAT parameter equal to NON\_HT and the

CH\_BANDWIDTH parameter equal to NON\_HT\_CBW40, CBW40, CBW80, CBW160, or CBW80+80.

**non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU) in**

**television white spaces (TVWS) band:** A PPDU transmitted by a Clause 22 (Television very high

throughput (TVHT) PHY specification) PHY with the TXVECTOR parameter FORMAT set to NON\_HT

and the TXVECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TVHT\_2W, TVHT\_4W,

TVHT\_W+W, or TVHT\_2W+2W.

**non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is

transmitted by Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications),

Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification), Clause 17

(Orthogonal frequency division multiplexing (OFDM) PHY specification), or Clause 18 (Extended Rate

PHY (ERP) specification) PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF

or VHT.

**sub 1 GHz (S1G) physical layer (PHY) protocol data unit (PPDU):** A PPDU transmitted with the

TXVECTOR parameter FORMAT equal to S1G, S1G\_DUP\_1M, or S1G\_DUP\_2M. The PPDU is

transmitted with the S1G\_SHORT, S1G\_LONG, or S1G\_1M preamble.

**sub 1 GHz 1M (S1G\_1M) physical layer (PHY) protocol data unit (PPDU):** A 1 MHz PPDU or 1

MHz duplicate PPDU that is transmitted with S1G\_1M preamble.

**sub 1 GHz long (S1G\_LONG) physical layer (PHY) protocol data unit (PPDU):** A 2 MHz, 4

MHz, 8 MHz, or 16 MHz PPDU with long preamble format.

**sub 1 GHz short (S1G\_SHORT) physical layer (PHY) protocol data unit (PPDU):** A 2 MHz, 4

MHz, 8 MHz, 16 MHz, or 2 MHz duplicate PPDU with short preamble format.

**TVHT\_2W mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W very high

throughput (VHT) PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W and

TXVECTOR parameter FORMAT set to VHT) transmitted using the TVHT\_2W transmit spectral

mask defined in 22.3.17.1 (Transmit spectrum mask)

b) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_2W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

c) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W VHT PPDU

(TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W and TXVECTOR parameter

FORMAT set to VHT) transmitted using the TVHT\_2W transmit spectral mask defined in 22.3.17.1

(Transmit spectrum mask)

d) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_2W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

**TVHT\_2W+2W mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W+2W very

high throughput (VHT) PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to

TVHT\_2W+2W and TXVECTOR parameter FORMAT set to VHT) transmitted using the

TVHT\_2W+2W transmit spectral mask defined in 22.3.17.1 (Transmit spectrum mask)

b) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W+2W

NON\_HT PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W+2W,

TXVECTOR parameter FORMAT set to NON\_HT, and TXVECTOR parameter

NON\_HT\_MODULATION set to NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_2W+2W

transmit spectral mask defined in 22.3.17.1 (Transmit spectrum mask)

c) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W VHT PPDU

(TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W and TXVECTOR parameter

FORMAT set to VHT) transmitted using the TVHT\_2W+2W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

d) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_2W+2W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

e) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W VHT PPDU

(TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W and TXVECTOR parameter

FORMAT set to VHT) transmitted using the TVHT\_2W+2W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

f) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_2W+2W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

**TVHT\_4W mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_4W very high

throughput (VHT) PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_4W and

TXVECTOR parameter FORMAT set to VHT) transmitted using the TVHT\_4W transmit spectral

mask defined in 22.3.17.1 (Transmit spectrum mask)

b) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_4W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_4W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_4W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

c) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W VHT PPDU

(TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W and TXVECTOR parameter

FORMAT set to VHT) transmitted using the TVHT\_4W transmit spectral mask defined in 22.3.17.1

(Transmit spectrum mask)

d) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_2W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_4W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

e) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W VHT PPDU

(TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W and TXVECTOR parameter

FORMAT set to VHT) transmitted using the TVHT\_4W transmit spectral mask defined in 22.3.17.1

(Transmit spectrum mask)

f) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_4W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

**TVHT\_MODE\_1 physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs: A

Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W VHT PPDU or

TVHT\_W NON\_HT PPDU.

**TVHT\_MODE\_2C physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs: A

Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W VHT PPDU or

TVHT\_2W NON\_HT PPDU.

**TVHT\_MODE\_2N physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs: A

Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W+W VHT PPDU or

TVHT\_W+W NON\_HT PPDU.

**TVHT\_MODE\_4C physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs: A

Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_4W VHT PPDU or

TVHT\_4W NON\_HT PPDU.

**TVHT\_MODE\_4N physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs: A

Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_2W+2W VHT PPDU or

TVHT\_2W+2W NON\_HT PPDU.

**TVHT\_W mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W very high

throughput (VHT) PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W and

TXVECTOR parameter FORMAT set to VHT) transmitted using the TVHT\_W transmit spectral

mask defined in 22.3.17.1 (Transmit spectrum mask)

b) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

**TVHT\_W+W mask physical layer (PHY) protocol data unit (PPDU):** One of the following PPDUs:

a) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W+W very high

throughput (VHT) PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W+W and

TXVECTOR parameter FORMAT set to VHT) transmitted using the TVHT\_W+W transmit

spectral mask defined in 22.3.17.1 (Transmit spectrum mask)

b) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W+W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W+W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_W+W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

c) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W VHT PPDU

(TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W and TXVECTOR parameter

FORMAT set to VHT) transmitted using the TVHT\_W+W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

d) A Clause 22 (Television very high throughput (TVHT) PHY specification) TVHT\_W NON\_HT

PPDU (TX\_VECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TXVECTOR parameter

FORMAT set to NON\_HT, and TXVECTOR parameter NON\_HT\_MODULATION set to

NON\_HT\_DUP\_OFDM) transmitted using the TVHT\_W+W transmit spectral mask defined in

22.3.17.1 (Transmit spectrum mask)

**very high throughput (VHT) physical layer (PHY) protocol data unit (PPDU):** A PPDU transmitted

with the TXVECTOR parameter FORMAT equal to VHT.

So this means we have the following definitions:

|  |  |  |
| --- | --- | --- |
| **PHY** | **PPDU definitions present for** | **$PHY PPDU definition** |
| DSSS (15) |  | *None* |
| HR/DSSS (16) |  | *None [also no definition of “CCK PPDU”, though there is a definition of “DSSS/CCK”]* |
| OFDM (17) |  | *None* |
| ERP (18) |  | *None* |
| HT (19) | HT | A Clause 19 PPDU that is either high-throughput (HT) mixed format (HT-MF) or high-throughput (HT) greenfield format (HT-greenfield) format. |
| DMG (20) | DMG | A Clause 20 PPDU. |
| VHT (21) | VHT | A PPDU transmitted with the TXVECTOR parameter FORMAT equal to VHT. |
| TVHT (22) | non-HT duplicate in TVWS  TVHT\_W/W+W/2W/2W+2W/4W mask  TVHT\_MODE\_1/2C/2N/4C/4N | *None* |
| S1G (23) | 1/2/4/8/16 MHz mask  1/2/4/8/16 MHz  S1G  S1G\_1M  S1G\_LONG  S1G\_SHORT | A PPDU transmitted with the TXVECTOR parameter FORMAT equal to S1G, S1G\_DUP\_1M, or S1G\_DUP\_2M. The PPDU is transmitted with the S1G\_SHORT, S1G\_LONG, or S1G\_1M preamble. |
| CDMG (24) |  | *None* |
| CMMG (25) | CMMG | A Clause 25 PPDU transmitted or received using the Clause 25 physical layer (PHY). |
| Multiple | 20/40/80/160/80+80 MHz mask  20/40/80/160/80+80 MHz  non-HT duplicate  non-HT | A PPDU transmitted by a Clause 19 or Clause 21 PHY with the TXVECTOR FORMAT parameter equal to NON\_HT and the CH\_BANDWIDTH parameter equal to NON\_HT\_CBW40, CBW40, CBW80, CBW160, or CBW80+80.  A PPDU that is transmitted by Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT. |

The cleanest pattern seems to be to talk about the PPDUs for given clauses, for the core $PHY PPDU definitions.

Proposed changes:

Add/change definitions in 3.2 as follows:

**China directional multi-gigabit (CDMG) physical layer (PHY) protocol data unit (PPDU):** A

Clause 24 PPDU.

**China millimeter-wave multi-gigabit (CMMG) physical layer (PHY) protocol data unit (PPDU):** A

Clause 25 PPDU ~~transmitted or received using the Clause 25 physical layer (PHY)~~.

**direct sequence spread spectrum (DSSS) physical layer (PHY) protocol data unit (PPDU):** A Clause 15 PPDU.

**directional multi-gigabit (DMG) physical layer (PHY) protocol data unit (PPDU):** A Clause 20 PPDU.

**extended rate physical layer (ERP) physical layer (PHY) protocol data unit (PPDU):** A Clause 18 PPDU that is not a Clause 16 PPDU.

**high rate direct sequence spread spectrum (HR/DSSS) physical layer (PHY) protocol data unit (PPDU):** A Clause 16 PPDU that is not a Clause 15 PPDU.

**high-throughput (HT) physical layer (PHY) protocol data unit (PPDU):** A Clause 19 PPDU that is ~~either high-throughput (HT) mixed format (HT-MF) or high-throughput (HT) greenfield format (HT-greenfield) format~~ not a Clause 15, Clause 16, Clause 17 or Clause 18 PPDU.

**non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU):** A PPDU

transmitted by a Clause 19 or Clause 21 PHY with the TXVECTOR FORMAT parameter equal to NON\_HT and the CH\_BANDWIDTH parameter equal to NON\_HT\_CBW40, CBW40, CBW80, CBW160, or CBW80+80.

**non-high-throughput (non-HT) duplicate physical layer (PHY) protocol data unit (PPDU) in**

**television white spaces (TVWS) band:** A PPDU transmitted by a Clause 22 PHY with the TXVECTOR parameter FORMAT set to NON\_HT and the TXVECTOR parameter CH\_BANDWIDTH set to TVHT\_W, TVHT\_2W, TVHT\_4W, TVHT\_W+W, or TVHT\_2W+2W.

**non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU):** A PPDU that is transmitted by a Clause 15, Clause 16, Clause 17, or Clause 18 PHY, or not using a TXVECTOR FORMAT parameter equal to HT\_MF, HT\_GF or VHT.

**orthogonal frequency division multiplexing (OFDM) physical layer (PHY) protocol data unit (PPDU):** A Clause 17 PPDU.

**sub 1 GHz (S1G) physical layer (PHY) protocol data unit (PPDU):** A Clause 23 PPDU ~~transmitted with the~~

~~TXVECTOR parameter FORMAT equal to S1G, S1G\_DUP\_1M, or S1G\_DUP\_2M. The PPDU is~~

~~transmitted with the S1G\_SHORT, S1G\_LONG, or S1G\_1M preamble~~.

**very high throughput (VHT) physical layer (PHY) protocol data unit (PPDU):** A Clause 21 PPDU ~~transmitted with the TXVECTOR parameter FORMAT equal to VHT~~ that is not a Clause 17 or Clause 19 PPDU.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1455 in <this document>, which complete and rationalise the per-PHY PPDU definitions.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1453  Mark RISON  8.3.5.9.3  715.20 | Every PHY needs to define what is covered by "PHY header" so that statements like "The PHY-TXHEADEREND.indication primitive is generated by a transmitter PHY entity at the end of transmission of the last symbol containing the PHY header. " are unambiguous. Need to define the HT PHY header in Clause 19 as being the L-SIG, if present and define the VHT PHY header in clause 21 as being the L-SIG | At the start of 19.3.2 add a para "The PHY header consists of the L-SIG field if present, and the SERVICE field." (by analogy with 17.3.2.1) and at the start of 21.1.4 add a para "The PHY header consists of all the fields from the L-SIG field to the SERVICE field inclusive" (by analogy with 19.3.2, though this means VHT has a much more extensive PHY header than HT and OFDM) |
| CID 1435  Mark RISON  6.5.4.2  700.30 | In addition to aPHYSigTwoLength there needs to be a aPHYSigTwoBeeLength to allow for VHT-SIG-B, and arguably a aPHYSigStuffInTheMiddleLength to account for the TFs between VHT-SIG-A and VHT-SIG-B. | In the table in the referenced subclause, below the "aPHYSigTwoLength" row add a row with cells "aPHYSigTwoBeeLength", "Integer", "Length of the VHT-SIG-B field (in microseconds)." and then a row with cells "aPHYSigStuffInTheMiddleLength", "Integer", "Length of the fields between and excluding the VHT-SIG-A and VHT-SIG-B fields (in microseconds)." |

Discussion:

Here are some examples of things that depend on the size of the PHY header in clauses prior to the PHY clauses:

The PHY-TXHEADEREND.indication primitive is generated by a transmitter PHY entity at the end of transmission of the last symbol containing the PHY header.

This primitive is an indication by the PHY to the local MAC entity that the PHY has received a valid start of a PPDU, including a valid PHY header.

(aPreambleLength + aPHYHeaderLength) is the duration (in microseconds) of the non-HT PHY preamble and L-SIG, defined in 6.5.4 (PLME-CHARACTERISTICS.confirm)

DMG STA: The received timestamp value shall be adjusted by adding an amount equal to the receiving STA’s delay through its local PHY components plus the time since the last data symbol of the PHY header, excluding any guard interval, was received as indicated by the PHY-RXSTART.indication primitive.

The DSSS PHY header is defined in Figure 15-1.

The HR/DSSS PHY header is defined in Figures 16-1 and 16-2.

The OFDM PHY header is defined in Figure 17-1.

The ERP PHY header is not explicitly defined. Table 18-5 suggests it is the same as the DSSS, HR/DSSS or OFDM PHY header, depending on the format.

The HT PHY header is not explicitly defined. Table 19-25 suggests it is not present at all for HT\_GF, and is the L-SIG symbol for HT\_MF.

The DMG PHY header is not explicitly defined. Figure 20-7 shows a “Header Block” for DMG control mode PPDUs. Figure 20-9 shows a “Header” for DMG SC PPDUs; per 20.6.2.2.1 the same header is used for DMG LP SC PPDUs. Table 20-28 does not include a value for aPHYHeaderLength.

The VHT PHY header is not explicitly defined. Figure 21-4 shows 4 fields after the legacy preamble (viz. VHT-SIG-A, VHT-STF, VHT-LTF and VHT-SIG-B).

The TVHT PHY header is not explicitly defined. Figure 22-1 shows 4 fields after the “legacy” preamble (viz. TVHT-SIG-A, TVHT-STF, TVHT-LTF and TVHT-SIG-B).

The S1G PHY header is not explicitly defined. Figure 23-1 shows a “SIG” for S1G\_SHORT format (followed by LTF2..N). Figure 23-2 shows a “SIG-A” for S1G\_LONG format (followed by D-STF, D-LTF1..N and SIGB). Figure 23-3 shows a “SIG” for S1G\_1M format (followed by LTF2..N). Table 23-37 does not include a value for aPHYHeaderLength but does include one for aPLCPHeaderLength.

The CDMG PHY header is not explicitly defined. Figure 24-4 shows a “Header Block” for CDMG control mode PPDUs. Figure 24-6 shows a “Header” for CDMG SC PPDUs; per 24.6.2.2.1 the same header is used for DMG LP SC PPDUs. Table 24-14 does not include a value for aPHYHeaderLength.

The CMMG PHY header is not explicitly defined. Figure 25-13 shows a “SIG” for CMMG control mode PPDUs. Figure 25-17 shows a “SIG” for CMMG SC PPDUs. Figure 25-22 shows a “SIG” for CMMG OFDM PPDUs. Table 25-37 does not include a value for aPHYHeaderLength.

Note: Per 6.5.4.2, aPHYHeaderLength is “The current PHY’s header length (in microseconds), excluding [HT-SIG] if present and the SERVICE field if it is in the Data field of the PPDU”.

Radical proposal: the MAC only needs to know about the PHY parameters it needs to know!

Proposed changes:

In Equation (10-16) change “(aPreambleLength + aPHYHeaderLength)” to “NonHTLength”, “aPHYServiceLength” to “PHYServiceLength” and “aPHYConvolutionalTailLength” to “PHYConvolutionalTailLength”.

Below Equation (10-16) change “(aPreambleLength + aPHYHeaderLength) is the duration (in microseconds) of the non-HT PHY preamble and L-SIG, defined in 6.5.4 (PLME-CHARACTERISTICS.confirm)” to “NonHTLength is 20 µs, the duration of the non-HT PHY preamble and L-SIG”, “aPHYServiceLength is the number of bits in the PHY SERVICE field, defined in 6.5.4 (PLME-CHARACTERISTICS.confirm) (PLME-CHARACTERISTICS.confirm)” to “PHYServiceLength is 16 bits, the number of bits in the PHY SERVICE field” and “aPHYConvolutionalTailLength is the number of bits in the convolutional code tail bit sequence, defined in 6.5.4 (PLME-CHARACTERISTICS.confirm)” to “PHYConvolutionalTailLength is 6 bits, the number of bits in the convolutional code tail bit sequence”.

Delete aPreambleLength and aPHYHeaderLength/aPLCPHeaderLength throughout (all table rows containing either, and 6.5.4.2 parameter list, and 22.4.4).

Similarly delete aDataPreambleLength, aControlPHYPreambleLength, aSTFOneLength, aSTFTwoLength, aLTFOneLength, aLTFTwoLength, aPHYSIGTwoLength/aPLCPSIGTwoLength, aPHYServiceLength/aPLCPServiceLength, aPHYConvolutionalTailLength throughout.

In Subclause 3.2 add a definition:

**physical layer (PHY) header**: The portion of a PHY protocol data unit (PPDU) up to and excluding the first symbol that contains part of the PHY service data unit (PSDU).

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 1453 and CID 1435 in <this document>, which define the PHY header and delete from PLME-CHARACTERISTICS.confirm PHY characteristics that are not used by the MAC.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 1387  Mark RISON  19.2.4  2748.35 | "NOTE---Support of 20 MHz non-HT format and 20 MHz HT format with one and two spatial streams is mandatory at APs. Support of 20 MHz non-HT format and 20 MHz HT format with one spatial stream is mandatory at non-AP STAs." -- there is no normative statement of this fact | Delete "NOTE---" in the cited text at the referenced location |
| CID 1388  Mark RISON  19.3.5  2759.25 | "An HT AP that is not a VHT AP shall support all EQM rates for two spatial streams  (MCSs 8 to 15) using a 20 MHz channel width." -- there is no reason a VHT AP should be inferior to an HT AP | Delete "that is not a VHT AP" in the cited text at the referenced location |

Discussion:

As CID 1388 indicates, there is in fact a normative statement of the fact that the requirements for an HT STA depend on whether it is also a VHT STA, at the end of 19.3.5:

An HT STA shall support all equal modulation (EQM) rates for one spatial stream (MCSs 0 to 7) using a 20 MHz channel width. An HT AP that is not a VHT AP shall support all EQM rates for two spatial streams (MCSs 8 to 15) using a 20 MHz channel width. All other MCSs and modes are optional

A VHT AP is not required to support two spatial streams, even for HT PPDUs.

The PICS currently indicates that only HT APs are allowed to support 2SS; this obviously needs to be fixed too (non-AP HT STAs and VHT APs are allow to too, just not required to).

Proposed changes:

Delete the NOTE at the end of 19.2.4:

~~NOTE—Support of 20 MHz non-HT format and 20 MHz HT format with one and two spatial streams is mandatory at APs. Support of 20 MHz non-HT format and 20 MHz HT format with one spatial stream is mandatory at non-AP STAs.~~

Change the second columns of the rows for dot11SupportedHTMCSTxValue and dot11SupportedHTMCSRxValue in Table 19-24 as follows:

MCS 0–76 for 20 MHz;

MCS 0–76 for 40 MHz

(MCS 0–7 for 20 MHz

mandatory at non-AP STA and at AP that is a VHT AP;

MCS 0–15 for 20 MHz

mandatory at AP that is not a VHT AP)

Change the fourth column for the rows for HTP2.3.2.1 to HTP2.3.2.8 in B.4.17.2 as follows:

(CFHT AND

CFAP AND

NOT CFVHT):M

(CFVHT AND

CFAP):O

(CFHT AND

NOT CFAP):O

Proposed resolution for CID 1387:

REJECTED

There is a normative statement of this fact at the end of Subclause 19.3.5.

Proposed resolution for CID 1388:

REVISED

Make the changes shown under “Proposed changes” for CID 1388 in <this document>, which make consistent throughout the existing rule (see 19.3.5) that a VHT AP is not required to support 2SS while an HT AP that is not a VHT AP is required to do so.

|  |  |  |
| --- | --- | --- |
| 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/D1.2 except where otherwise specified