IEEE P802.11  
Wireless LANs

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| LB 187 PICS Related Comments | | | | |
| Date: 2012-04-15 | | | | |
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|  |  |  |  |  |

Abstract

This submission includes proposed resolutions to CIDs, 4125, 4126, 4127, 4128, 4129, 4131, 4187, 4188, 4706, 4853, 4854, 4864, 4870, 5395, 5458, 5460, 5462, 5463, 5464, 5465, 5468, 5469, and 5421.

### Changes from r3:

Add changes discussed during TGac telecom, April 19, 2012 – 10:00 ET.

### Changes from r2:

|  |  |
| --- | --- |
| **CID** | **Changes from r2** |
| 4125 | proposed resolution is changed from Accpeted to Revised |
| 4126 | No changes |
| 4127 | No changes |
| 4128 | Added CF1 and CF2 as appropriate |
| 4129 | Revised. TX and RX of Group ID management frames are made conditional on STA being a BFer or a BFee. |
| 4131 | Revised. MCS 0-8 is conditional on MCS 0-7 and MCS 0-9 is conditional on MCS 0-8. Changes are made for all CBW values |
| 4187 and 4188 | TX and RX of Quiet Channel element are made conditional on 160 MHz support. |
| 4706 | No changes from r2 |
| 4853 | No Changes from r2 |
| 4854 | No Changes from r2 |
| 4864 | removed the table entry related to the reception of Extendded BSS Load element. |
| 4870 | Added a new secion (B4.23.2.1) on Higest supported data rates. Added the relevant NOTE |
| 5395 | Added STBC TX and RX parameters |
| 5458 | No changes from r2 |
| 5460 | Revised. Added a note to instruct the editor to add parantehsis around any terms in the Status column in Annex B. |
| CIDs 5462, 5463, 5464, 5465, 5468, 5469, 5421 are to be discussed | |

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| 4125 | 300.51 | B.4.3 | The reference from CFac is to a structure that describes the optional features, but none of the mandatory features. | Add reference to 4.3.10a to CFac row. |

Context: (B.4.3)

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| --- | --- | --- | --- | --- |
| \*CF16(11n)  (#4000) | High-throughput (HT) features | 8.4.2.58 (HT Capabilities element (11n)) | O  CFac:M | Yes  No  |
| CFac | Very High Throughput (VHT) Features | 8.4.2.160 (VHT Capabilities element) | O | Yes  No  N/A  |

Proposed Resolution: Revised

The reference used for CFac is similar to that used for CF16. For consistency of the PICS the proposed additional reference is not included. The Support value needs to be changed by eliminating the N/A option. In addition an asterisk needs to precede CFac given that CFac is referenced many times through the PICS table.

Proposed Changes:

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| --- | --- | --- | --- | --- |
| \*CF16(11n)  (#4000) | High-throughput (HT) features | 8.4.2.58 (HT Capabilities element (11n)) | O  CFac:M | Yes  No  |
| \*CFac | Very High Throughput (VHT) Features | 8.4.2.160 (VHT Capabilities element) | O | Yes  No  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4126 | 301.37 | B.4.14 | Why is support for MultiTID Block Ack mandatory?  See: 9.21.6: "The Multi-TID subfield of the BA Control field shall be set to 1 in all BlockAck frames related to an HTimmediate agreement transmitted inside a PSMP sequence and shall be set to 0 otherwise. The Multi-TID subfield of the BAR Control field shall be set to 1 in all BlockAckReq frames related to an HT-immediate agreement transmitted inside a PSMP sequence and shall be set to 0 otherwise."  It should be optional for an HT STA,that is an error in REVmb. However, by making it mandatory for HT, it is also mandatory for VHT, regardless of any reference to CF16. So we do need to fix this up. | Change QB4.4 Status to "CF12:O CF16 & PC37:M"  (i.e. removing the CFac: M insert and modifying the .11n condition) Also remove "CFac: M" at 303.23. |

Context:

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| --- | --- | --- | --- | --- |
| QB4.4 (11n) | MultiTID Block Ack | 8.3.1.8.4 (Multi-TID BlockAckReq variant(11n)) | CF12:O  CF16:M  CFac:M | Yes  No  N/A  |

Proposed Resolution: Accepted

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| --- | --- | --- | --- | --- |
| 4127 | 301.35 | B.4.14 | In Annex B, any insertion of "CFac:X" to accompany a "CF16:X" is superfluous.  As 300.47 shows, if CFac is true, then so is CF16. | Remove superfluous CFac:M statements at: 301.35, 301.55, 302.04, 302. 07, 302.11, 302.27, 302.31, 302.38, 302.46, 303.05, 303.13, 303.40, 303.44 |

Context and proposed changes

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| --- | --- | --- | --- | --- |
| QB4.1 (11n) | Immediate Block Ack | 8.3.1.8.1 (Overview(11n)), 8.3.1.8.2 (Basic BlockAckReq variant(11n)), 8.3.1.9.1 (Overview(11n)), 8.3.1.9.2 (Basic BlockAck variant(11n)),  8.5.5 (Block Ack Action frame details), 9.20 (Block Acknowledgment (Block Ack)) (except 9.20.7 (HT-immediate Block Ack extensions) and 9.20.8 (HT-delayed Block Ack extensions)), 10.5 (Block Ack operation) | CF12:O  CF16:M | Yes  No  N/A  |
| QB4.3 (11n) | Compressed Block Ack | 8.3.1.8.3 (Compressed BlockAckReq variant(11n)) | CF12:O CF16:M | Yes  No  N/A  |
| QB4.4 (11n) | MultiTID Block Ack | 8.3.1.8.4 (Multi-TID BlockAckReq variant(11n)) | CF12:O  CF16:M | Yes  No  N/A  |

**B.4.19 High-throughput (HT) features**

**B.4.19.1 HT MAC Features**

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| --- | --- | --- | --- | --- |
| **Item** | **Protocol Capabilities** | **References** | **Status** | **Support** |
|  | Are the following MAC protocol features supported? |  |  |  |
| HTM3 | MPDU aggregation |  |  |  |
| HTM3.1 | Reception of A-MPDU | 8.4.2.58.3 (A-MPDU Parameters field), 11.3 (RSNA confidentiality and integrity(11w) protocols), 9.12.2 (A-MPDU length limit rules(11n)) | CF16:M | Yes  No  N/A  |
| HTM3.2 | A-MPDU format | 8.6.1 (A-MPDU format(11n)) | CF16:M | Yes  No  N/A  |
| HTM3.3 | A-MPDU contents | 8.6.3 (A-MPDU contents (11n)) | CF16:M | Yes  No  N/A  |
| HTM3.4 | A-MPDU frame exchange sequences | 9.19.2.4 (Multiple frame transmission in an EDCA TXOP) | CF16:M | Yes  No  N/A  |
| HTM3.5 | Transmission of A-MPDU | 8.4.2.58.3 (A-MPDU Parameters field), 11.3 (RSNA confidentiality and integrity(11w) protocols) | CF16:O  CFac:M | Yes  No  N/A  |
| HTM4 | MSDU aggregation |  |  |  |
| HTM4.1 | Reception of A-MSDUs | 8.2.4.5 (QoS Control field), 8.3.2.2 (A-MSDU format(11n)) | CF16:M | Yes  No  N/A  |
| HTM4.2 | A-MSDU format | 8.3.2.2 (A-MSDU format(11n)) | CF16:M | Yes  No  N/A  |
| HTM4.3 | A-MSDU content | 8.3.2.2 (A-MSDU format(11n)) | CF16:M | Yes  No  N/A  |
| HTM4.4 | Transmission of A-MSDUs | 8.3.2.2 (A-MSDU format(11n)), 8.2.4.5 (QoS Control field) | CF16:O | Yes  No  N/A  |
| HTM5 | Block Ack |  |  |  |
| HTM5.1 | Block Ack mechanism | 8.3.1.8 (BlockAckReq(11n) frame format), 8.3.1.9 (BlockAck(11n) frame format), 8.4.1.14 (Block Ack Parameter Set field), 9.20 (Block Acknowledgment (Block Ack)), 10.15 (20/40 MHz BSS operation(11n)) | CF16:M | Yes  No  N/A  |
| HTM5.2 | Use of compressed bitmap between HT STAs | 8.3.1.9.3 (Compressed BlockAck variant(11n)), 9.20.6 (Selection of BlockAck and BlockAckReq variants(11n)), | CF16:M | Yes  No  N/A  |
| HTM5.3 | HT-immediate Block Ack extensions | 9.20.7 (HT-immediate Block Ack extensions) | CF16:M | Yes  No  N/A  |
| HTM5.4 | HT-delayed Block Ack extensions | 9.20.8 (HT-delayed Block Ack extensions) | CF16 and QB4.2:M | Yes  No  N/A  |
| HTM5.5 | Multiple TID Block Ack | 8.3.1.8.4 (Multi-TID BlockAckReq variant(11n)), 8.3.1.9.4 (Multi-TID BlockAck variant(11n)), 9.25.1.7 (PSMP acknowledgment rules(11n)) | PC37:M  (same as baseline) | Yes  No  N/A  |
| HTM8 | Duration/ID rules for A-MPDU and TXOP | 8.2.4.2 (Duration/ID field) | CF16:O  CFac:M | Yes  No  N/A  |
| HTM9 | Truncation of TXOP as TXOP holder | 9.19.2.7 (Truncation of TXOP(11n)) | CF16:O | Yes  No  N/A  |
| \*HTM11 | Reverse direction (RD) aggregation exchanges | 9.24 (Reverse Direction Protocol(11n)) | CF16:O | Yes  No  N/A  |

Proposed Resolution: Revised. Make changes as shown in the above table.

Since a VHT STA is also an HT STA, the commenter is right in observing that adding a CFac:X is redundant.

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| 4128 | 305.37 | B.4.23.1 | "VHTM4.1 and VHTM4.2: M"  I suspect that support for NDP is required if you are either a beamformee or a beamformer, not only if you are both. | Change "and" to "or". |

Context:

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| --- | --- | --- | --- | --- |
| \*VHTM4.1 | SU Beamformer Capable  (2511, 2520) | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.2 | SU Beamformee Capable  (2520) | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.3 | MU Beamformer Capable  (2511, 2520) | 8.4.2.94.2 (VHT Capabilities (11ac)) | VHTM4.1:O | Yes  No  N/A  |
| \*VHTM4.4 | MU Beamformee Capable  (2511, 2520) | 8.4.2.94.2 (VHT Capabilities (11ac)) | VHTM4.2:O | Yes  No  N/A  |
| VHTM4.3 | Null Data Packet | 9.31 (Null data packet (NDP) sounding) | VHTM4.1 and VHTM4.2: M | Yes  No  N/A  |

Proposed Resolution: Revised

The PICS entries related to transmission beamforming need to be modified to reflect:

* A beamformer is always an AP STA
* A beamformee is always an non-AP STA (independent STA)
* Transmission and reception of Null Data packets
* Correct entires numbering.

Proposed Changes:

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| --- | --- | --- | --- | --- |
| \*VHTM4.1 | SU Beamformer Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.2 | SU Beamformee Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.3 | MU Beamformer Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CF1 and VHTM4.1:O | Yes  No  N/A  |
| \*VHTM4.4 | MU Beamformee Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CF2 and VHTM4.2:O | Yes  No  N/A  |
| VHTM4.5 | Transmission of Null Data Packet | 9.31 (Null data packet (NDP) sounding) | VHTM4.1: M | Yes  No  N/A  |
| VHTM4.6 | Reception of Null Data Packet | 9.31 (Null data packet (NDP) sounding) | VHTM4.2:M | Yes  No  N/A  |

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| 4129 | 306.39 | B.4.23.1 | "CF: M" - incomplete | Replace with "CFac :M" |

Context:

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| VHTM9.2 | Reception of Group ID Management Frame | 8.15.6.3 (Group ID Management Frame Format) | CF:M |  |

Proposed Resolution: Revised.

Reception of the Group ID management frame is mandatory for MU beanformee STA. PICS table should reflect this fact. The same is true for the transmission of Group ID management frames by a MU beamformer.

Proposed Changes: accept the commenter proposed resolution and add Support column values.

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| --- | --- | --- | --- | --- |
| VHTM9.1 | Transmission of Group ID Management Frame | 8.15.6.3 (Group ID Management Frame Format) | VHTM4.3:M | Yes  No  N/A  |
| VHTM9.2 | Reception of Group ID Management Frame | 8.15.6.3 (Group ID Management Frame Format) | VHTM4.4:M | Yes  No  N/A  |

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| --- | --- | --- | --- | --- |
| 4131 | 311.23 | B.4.23.2 | "CFac: O" - This should be a conditional option | Initially "CFac and VHTP3.4: O" seems right. But this allows us to express an invalid combination where we support MCS 0-9 (VHTP8.2.3), but do not support MCS 0-8.  So, I think you need to state: "CFac and VHTP3.4: O CFac and VHTP8.2.3: M"  Likewise VHTP8.2.3 needs to be changed to: "CFac and VHTP3.4: O".  A similar change needs to be made throughout VHTP8 as follows: 1. Where the MCS is dependent on 80, 160 or 80+80, it should reference VHTP3.3, VHTP3.4 and VHTP3.5 respectively. (Also add "\*" in front of these 3 labels to signify depencies). 2. Where the MCS is a subset of another PICS entry, it should be "<that-entry>: M" |

Context: Entire MCS PICS enteries. Example is given below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTP8.2.2 | MCS with Index 0-8 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.3 | MCS with Index 0-9 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |

Proposed Resolution: Revised

Change the status of MCS 0-8 to be conditional on MCS 0-7 and change the status of MCS 0-9 to be conditional on both MCS 0-7 and MCS 0-8. These changes are to be made for all the channel bandwidth values. With the revised resolution a situation similar to the one mentioned by the commenter, e.g. supporting MCS 0-9 without supporting MCS 0-8, is not possible.

Proposed Changes:

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| --- | --- | --- | --- | --- |
| VHTP 8 | Modulation and coding schemes (MCS) |  |  |  |
| VHTP8.1 | CBW = 20 MHz, 40 MHz, and 80 MHz | 22.5 (Parameters fr VHT MCSs) |  |  |
| VHTP8.1.1 | MCS with Index 0-7 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | CFac:M | Yes  No  N/A  |
| VHTP8.1.2 | MCS with Index 0-8 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.1:O | Yes  No  N/A  |
| VHTP8.1.3 | MCS with Index 0-9 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.2:O | Yes  No  N/A  |
| VHTP8.1.4 | MCS with Index 0-7 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.5 | MCS with Index 0-8 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.4:O | Yes  No  N/A  |
| VHTP8.1.6 | MCS with Index 0-9 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.5:O | Yes  No  N/A  |
| VHTP8.1.7 | MCS with Index 0-7 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.8 | MCS with Index 0-8 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.7:O | Yes  No  N/A  |
| VHTP8.1.9 | MCS with Index 0-9 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.8:O | Yes  No  N/A  |
| VHTP8.1.10 | MCS with Index 0-7 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.11 | MCS with Index 0-8 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.10:O | Yes  No  N/A  |
| VHTP8.1.12 | MCS with Index 0-9 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.12:O | Yes  No  N/A  |
| VHTP8.1.13 | MCS with Index 0-7 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.14 | MCS with Index 0-8 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.13:O | Yes  No  N/A  |
| VHTP8.1.15 | MCS with Index 0-9 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.14:O | Yes  No  N/A  |
| VHTP8.1.16 | MCS with Index 0-7 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.17 | MCS with Index 0-8 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.16:O | Yes  No  N/A  |
| VHTP8.1.18 | MCS with Index 0-9 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.17:O | Yes  No  N/A  |
| VHTP8.1.19 | MCS with Index 0-7 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.20 | MCS with Index 0-8 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.19:O | Yes  No  N/A  |
| VHTP8.1.21 | MCS with Index 0-9 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.20:O | Yes  No  N/A  |
| VHTP8.1.22 | MCS with Index 0-7 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.1.23 | MCS with Index 0-8 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.22:O | Yes  No  N/A  |
| VHTP8.1.24 | MCS with Index 0-9 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | VHTP8.1.23:O | Yes  No  N/A  |
| VHTP8.2 | CBW = 160 MHz | 22.5 (Parameters fr VHT MCSs) |  |  |
| VHTP8.2.1 | MCS with Index 0-7 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP3.4: M | Yes  No  N/A  |
| VHTP8.2.2 | MCS with Index 0-8 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.1:O | Yes  No  N/A  |
| VHTP8.2.3 | MCS with Index 0-9 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.2:O | Yes  No  N/A  |
| VHTP8.2.4 | MCS with Index 0-7 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.5 | MCS with Index 0-8 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.4:O | Yes  No  N/A  |
| VHTP8.2.6 | MCS with Index 0-9 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.5:O | Yes  No  N/A  |
| VHTP8.2.7 | MCS with Index 0-7 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.8 | MCS with Index 0-8 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.7:O | Yes  No  N/A  |
| VHTP8.2.9 | MCS with Index 0-9 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.8:O | Yes  No  N/A  |
| VHTP8.2.10 | MCS with Index 0-7 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.11 | MCS with Index 0-8 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.10:O | Yes  No  N/A  |
| VHTP8.2.12 | MCS with Index 0-9 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.11:O | Yes  No  N/A  |
| VHTP8.2.13 | MCS with Index 0-7 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.14 | MCS with Index 0-8 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.13:O | Yes  No  N/A  |
| VHTP8.2.15 | MCS with Index 0-9 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.14:O | Yes  No  N/A  |
| VHTP8.2.16 | MCS with Index 0-7 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.17 | MCS with Index 0-8 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.16:O | Yes  No  N/A  |
| VHTP8.2.18 | MCS with Index 0-9 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.17:O | Yes  No  N/A  |
| VHTP8.2.19 | MCS with Index 0-7 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.20 | MCS with Index 0-8 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.19:O | Yes  No  N/A  |
| VHTP8.2.21 | MCS with Index 0-9 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.20:O | Yes  No  N/A  |
| VHTP8.2.22 | MCS with Index 0-7 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.2.23 | MCS with Index 0-8 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.22:O | Yes  No  N/A  |
| VHTP8.2.24 | MCS with Index 0-9 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | VHTP8.2.23:O | Yes  No  N/A  |
| VHTP8.3 | CBW 80+80 MHz | 22.5 (Parameters fr VHT MCSs) |  |  |
| VHTP8.3.1 | MCS with Index 0-7 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP3.5: M | Yes  No  N/A  |
| VHTP8.3.2 | MCS with Index 0-8 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.1:O | Yes  No  N/A  |
| VHTP8.3.3 | MCS with Index 0-9 and Nss = 1 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.2:O | Yes  No  N/A  |
| VHTP8.3.4 | MCS with Index 0-7 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.5 | MCS with Index 0-8 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.4:O | Yes  No  N/A  |
| VHTP8.3.6 | MCS with Index 0-9 and Nss = 2 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.5:O | Yes  No  N/A  |
| VHTP8.3.7 | MCS with Index 0-7 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.8 | MCS with Index 0-8 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.7:O | Yes  No  N/A  |
| VHTP8.3.9 | MCS with Index 0-9 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.8:O | Yes  No  N/A  |
| VHTP8.3.10 | MCS with Index 0-7 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.11 | MCS with Index 0-8 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.10:O | Yes  No  N/A  |
| VHTP8.3.12 | MCS with Index 0-9 and Nss = 4 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.11:O | Yes  No  N/A  |
| VHTP8.3.13 | MCS with Index 0-7 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.14 | MCS with Index 0-8 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.13:O | Yes  No  N/A  |
| VHTP8.3.15 | MCS with Index 0-9 and Nss = 5 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.14:O | Yes  No  N/A  |
| VHTP8.3.16 | MCS with Index 0-7 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.17 | MCS with Index 0-8 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.16:O | Yes  No  N/A  |
| VHTP8.3.18 | MCS with Index 0-9 and Nss = 6 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.17:O | Yes  No  N/A  |
| VHTP8.3.19 | MCS with Index 0-7 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.20 | MCS with Index 0-8 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.19:O | Yes  No  N/A  |
| VHTP8.3.21 | MCS with Index 0-9 and Nss = 7 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.20:O | Yes  No  N/A  |
| VHTP8.3.22 | MCS with Index 0-7 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |
| VHTP8.3.23 | MCS with Index 0-8 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.22:O | Yes  No  N/A  |
| VHTP8.3.24 | MCS with Index 0-9 and Nss = 8 | 22.5 (Parameters fr VHT MCSs) | VHTP8.3.23:O | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4187 | 307.32 | B.4.23.1 | Does "Quiet Channel element sent by AP" mean support for transmission of the element, or reception of the element? Given PICS entry VHTM5.3, I am guessing it means transmission. | Change to "Transmission of Quiet Channel element by AP or mesh STA" |
| 4188 | 308.03 | B.4.23.1 | Does "Quiet Channel element sent by an independent STA" mean support for transmission of the element, or reception of the element? Given PICS entry VHTM5.3, I am guessing it means transmission. | Change to "Transmission of Quiet Channel element by an independent STA" |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM5.1 | Quiet Channel element sent by AP or mehs STA | 8.3.3.2 (Beacon frame format), 8.3.3.10 (Probe Response frame format), 8.4.2.167 (Quiet Channel element), 10.9.3 (Quieting channels for testing) | (CF1 OR CH21) AND CF10 AND CFac:O | Yes  No  N/A  |
| VHTM5.2 | Quiet Channel element sent by an independent STA | 8.3.3.2 (Beacon frame format), 8.3.3.10 (Probe Response frame format), 8.4.2.167 (Quiet Channel element), 10.9.3 (Quieting channels for testing) | (CF1 OR CH21) AND CF10 AND CFac:O | Yes  No  N/A  |
| VHTM5.3 | Quiet Channel element received by an independent STA or mesh STA | 8.3.3.2 (Beacon frame format), 8.3.3.10 (Probe Response frame format), 8.4.2.167 (Quiet Channel element), 10.9.3 (Quieting channels for testing) | (CF1 OR CH21) AND CF10 AND CFac:M | Yes  No  N/A  |

Proposed Resolution: Revised

For consistency with the other elements in the PICS table, the words “transmission” and “reception” are used. The revised resolution is to use the same words for the Quiet element. There is also a need to adjust the numbering of these entries as well as replacing CF1 with CF2 in VHTM15.2 and VHTM15.3. A condition on the use of CBW = 160 MHz is added.

Proposed Changes:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM15.1 | Transmission of Quiet Channel element by an AP or mesh STA in Beacon and Probe Response frames. | 8.3.3.2 (Beacon frame format), 8.3.3.10 (Probe Response frame format), 8.4.2.167 (Quiet Channel element), 10.9.3 (Quieting channels for testing) | (CF1 OR CF21) AND CF10 AND CFac AND VHTP3.4:O | Yes  No  N/A  |
| VHTM15.2 | Transmission of Quiet Channel element by an independent STA or mesh STA in Beacon and Probe Response frames. | 8.3.3.2 (Beacon frame format), 8.3.3.10 (Probe Response frame format), 8.4.2.167 (Quiet Channel element), 10.9.3 (Quieting channels for testing) | (CF2 OR CF21) AND CF10 AND CFac AND VHTP3.4:O | Yes  No  N/A  |
| VHTM15.3 | Reception of Quiet Channel element by an independent STA or mesh STA in Beacon and Probe Response frames | 8.3.3.2 (Beacon frame format), 8.3.3.10 (Probe Response frame format), 8.4.2.167 (Quiet Channel element), 10.9.3 (Quieting channels for testing) | (CF2 OR CF21) AND CF10 AND CFac:M | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4706 | 303.18 | B.4.19.1 | HT-delayed BA is not an option worth keeping support for | Replace "CF16 and QB4.2:M" with "CF16 and QB4.2 and not CFac:M" |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTM5.4 | HT-delayed Block Ack extensions | 9.20.8 (HT-delayed Block Ack extensions) | CF16 and QB4.2:M | Yes  No  N/A  |

Proposed Resolution: Rejected

The Status values are those available in the current IEEE 802.11 specification (IEEE 802.11 Std – 2012). TGac draft hasn’t introduced any changes to those values. PICS tables reflect the status of the current draft. HT-delayed BA extensions are available for VHT STA. The existence of this optional feature adds no additional complexity to devices.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4853 | 303.23 | B.4.19.1 | Why is MTBA required? | Delete the CFac:M |

Context: see CID 4127

Proposed Resolution: Accepted

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4854 | 303.36 | B.4.19.1 | Why isn't obeying the Duration/ID rules mandatory for non-VHT HT? | Change to CF16:M and delete the CFac:M |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTM8 | Duration/ID rules for A-MPDU and TXOP | 8.2.4.2 (Duration/ID field) | CF16:O  CFac:M | Yes  No  N/A  |

Proposed Resolution: Rejected.

CF16:O is the Status value in the current IEEE 802.11 specification (IEEE 802.11 Std – 2012). Changing PICS values will make existing HT devices not compliant.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4864 | 306.00 | B.4.23.1 | What exactly is the requirement on receiving Extended BSS Load? | Delete this row |

The commenter may have quoted the wrong page number and line number. The reference to Extended BSS Load element is p307L19.

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM14 | Extended BSS Load Element |  |  |  |
| VHTM14.1 | Transmission of Extended BSS Load Element | 8.4.2.96(Extended BSS Load Element) | CFac:O | Yes  No  N/A  |
| VHTM14.2 | Reception of Extended BSS Load Element | 8.4.2.96(Extended BSS Load Element) | CFac:O | Yes  No  N/A  |

Proposed Resolution: Revised

Extended BSS load is used by the AP to indicate information related to MU-MIMO operation. The proposed change is to add a condition on the support of MU Beamformer capability.

Proposed Changes:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM14 | Extended BSS Load Element |  |  |  |
| VHTM14.1 | Transmission of Extended BSS Load Element | 8.4.2.96(Extended BSS Load Element) | CF1 and CFac:O | Yes  No  N/A  |

And

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \*VHTM4.3 | MU Beamformer Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | VHTM4.1:O | Yes  No  N/A  |
| \*VHTM4.4 | MU Beamformee Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | VHTM4.2:O | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4870 | 308.31 | B.4.23.2 | Support for the MCS ranges, apart from the mandatory ones, needs to be qualified by Highest Supported Data Rate | Add something like "where within the highest supported data rate" to the "Protocol capability" cells |

Context:

MCS related entries

Proposed Resolution: Revised

*Instruct the TGac Editor to create a new section B.4.23.1.1 and add the following:*

**B.4.23.1.1 Highest Supported Data Rate**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Protocol Capability | References | Status | Value |
| VHTM17 | Highest Supported Data Rate |  |  |  |
| VHTM 17.1 | Tx Highest Supported Data Rate | 8.4.2.160.3 (VHT Supported MCS Set field) | CFac:M |  |
| VHTM 17.2 | Rx Highest Supported Data Rate | 8.4.2.160.3 (VHT Supported MCS Set field) | CFac:M |  |

NOTE-- Required support for MCS might be limited by the declaration of Tx and Rx Highest Supported Data Rates.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5395 | 308.32 | B.4.23.2 | STBC is missing from VHT PHY features | Add STBC to the list of VHT PHY features. |

Context:

**B.4.19.2 HT PHY features**

(11n)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Protocol Capability** | **Reference** | **Status** | **Support** |
| \*HTP2.11 | Space-time block coding (STBC) | 19.3.11.9.2 (Space-time block coding (STBC)) | CF16:O | Yes  No  N/A  |

Proposed Resolution: Accepted

The only reference in the PICS is to HT STBC. There is a need to add a PICS entry for VHT STBC operation.

Proposed Changes:

Add to the end of the VHT PHY Deatures table on page 314

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \*VHTP9 | Space-time block coding (STBC) | 22.3.10.9.4 (Space-time block coding) | CFac:O | Yes  No  N/A  |

Add to the end of the VHT MAC Features table on p307

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM16 | Space-time block coding (STBC) Support |  |  |  |
| VHTM16.1 | STBC Operation | 8.4.2.160 (VHT Capabilities element)  9.15 (STBC Operation) | VHTP9:M | Yes  No  N/A  |
| VHTM16.2 | Transmission of at least 2x1 STBC | 8.4.2.160.2 (VHT Capabilities info field) | VHTP9:O.1 | Yes  No  N/A  |
| VHTM16.3 | Reception of 1 STBC spatial stream | 8.4.2.160.2 (VHT Capabilities info field) | VHTP9:O.1 | Yes  No  N/A  |
| VHTM16.4 | Reception of 2 STBC spatial streams | 8.4.2.160.2 (VHT Capabilities info field) | VHTM16.3:O | Yes  No  N/A  |
| VHTM16.5 | Reception of 3 STBC spatial streams | 8.4.2.160.2 (VHT Capabilities info field) | VHTM16.4:O | Yes  No  N/A  |
| VHTM16.6 | Reception of 4 STBC spatial streams | 8.4.2.160.2 (VHT Capabilities info field) | VHTM16.5:O | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5458 | 303.17 | B.4.19.1 | There is no change for Item HTM5.4. | Add CFac:M on Status column. |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| HTM5.4 | HT-delayed Block Ack extensions | 9.20.8 (HT-delayed Block Ack extensions) | CF16 and QB4.2:M | Yes  No  N/A  |

Proposed Resolution: Rejected

Since a VHT STA is also an HT STA, adding CFac:X is redundant as indicated by CID 4127.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5460 | 304.22 | B.4.23.1 | Parentheses are needed for "CFac and CF1." | As in comment. |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM1.2 | Signaling of STA capabilities in Probe Request, (Re)Association Request frames | 8.4.2.94 (VHT Capabilities element (11ac)), 8.3.3.9 (Probe Request frame format), 8.3.3.5 (Association Request frame format), 8.3.3.7 (Reassociation Request frame format) | CFac and CF1:M | Yes  No  N/A  |

Proposed Resolution: Revised. Instruct the editor to add paranthesis () around any terms in the status columns in Annex B.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM1.2 | Signaling of STA capabilities in Probe Request, (Re)Association Request frames | 8.4.2.94 (VHT Capabilities element (11ac)), 8.3.3.9 (Probe Request frame format), 8.3.3.5 (Association Request frame format), 8.3.3.7 (Reassociation Request frame format) | (CFac and CF1):M | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5462 | 305.46 | B.4.23.1 | Erroneous Status number for VHTM5.2. (VHT4.1:M -> VHTM4.2:M) | As in comment. |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM5.2 | VHT sounding protocol as SU beamformee | 9.31.5 (VHT Sounding Protocol) Sounding) | VHTM4.1: M | Yes  No  N/A  |

Proposed Resolution: Accepted

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM5.2 | VHT sounding protocol as SU beamformee | 9.31.5 (VHT Sounding Protocol) Sounding) | VHTM4.2: M | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5463 | 305.53 | B.4.23.1 | Erroneous Status number for VHTM5.4. (VHT5.1:M -> VHTM5.2:M) | As in comment. |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM5.4 | VHT sounding protocol as MU beamformee | 9.31.5 (VHT Sounding Protocol) Sounding) | VHTM5.1: M | Yes  No  N/A  |

Proposed Resolution: Accepted

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM5.4 | VHT sounding protocol as MU beamformee | 9.31.5 (VHT Sounding Protocol) Sounding) | VHTM5.2: M | Yes  No  N/A  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5464 | 306.34 | B.4.23.1 | In VHT MAC, transmission of Group ID management frame is supported only by an AP and a non-AP STA does not need to support this function. | Change the status to "(CFac and CF1):O." |

Context

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM9.1 | Transmission of Group ID Management frame | 8.15.6.3 (Group ID Management Frame Format) | CFac:O | Yes  No  N/A  |

Proposed Resolution: Revised

The commenter is correct in requesting the addition of CF1 since Group ID Management frame is transmitted by the AP and not by non-AP STA. Furthermore the AP transmits Group ID Management frame when it supports DL MU-MIMO. Therefore further conditioning is needed to reflect the dependency on MU-MIMO support.

Proposed Changes: see CID 4129 proposed changes.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5465 | 306.39 | B.4.23.1 | The status for Item VHTM9.2 is not correct. | Change status as "CFac:M." |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM9.2 | Reception of Group ID Management Frame | 8.15.6.3 (Group ID Management Frame Format) | CF:M |  |

Proposed Resolution: Revised

In addition to accepting the commenter proposed changes, there is the need to add the indication that the recipient of the Group ID Management frame is always a non-AP STA supporting MU-MIMO.

Proposed changes: see CID 4129 proposed changes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5468 | 309.53 | B.4.23.2 | VHTP8.1.3 is defined for CBW = 20 MHz, 40 MHz and 80 MHz; however, MCS index 9 for CBW = 20 MHz is not valid and this item is only for CBW = 40 MHz and 80 MHz. Ditto VHTP8.1.6, VHTP8.1.12, VHTP8.1.15, VHTP8.1.18, VHTP8.1.21 and VHTP8.1.24. | Add some notes to exclude bandwidth which does not have MCS index 9. |

Context:

MCS entries in PICS table

Proposed Resolution: Rejected

PICS table is concerned with support or lack of support of certain feature. It doesn’t specify what valid and invalid combination of a set of parameters. The validity of a certain set of parameters is indicated in the MCS tables, Clause 22.5.

MCS support is in one of three possibilities, MCS 0-7, MCS 0-8, or MCS 0-9. It seems legitimate to support MCS 0-9 for 20 MHz channel with Nss=3 while applying a valid MCS index other than MCS with Index 9. The same is true for Table 22-51 pp285, where the MCS with index 6 is not a valid option for CBW = 80 MHz and Nss=7. However support for MCS 0-7 is mandatory in this case.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5469 | 311.49 | B.4.23.2 | From Table 22-55, MCS Index 9 is not valid; therefore, VHTP8.2.9 shall not be defined. Ditto VHTP8.3.8 (P313/L23) | Delete the corresponding rows. |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTP8.2.9 | MCS with Index 0-9 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |

and;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTP8.3.9 | MCS with Index 0-9 and Nss = 3 | 22.5 (Parameters fr VHT MCSs) | CFac:O | Yes  No  N/A  |

Proposed Resolution: Rejected

PICS table is concerned with support or lack of support of certain feature. It doesn’t specify what valid and invalid combination of a set of parameters. The validity of a certain set of parameters is indicated in the MCS tables, Clause 22.5.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 5421 | 129.09 | 9 | 9.31.5 |  | This paragraph suggests that a STA which has MU Beamformer capability also shall support SU Beamformer capability. It means that SU Beamformer capability should be specified as mandatory feature for MU Beamformer capable STAs. The relation between SU and MU Beamformee capabilities is similar condition. | Change Status for VHTM4.1 in P305/L17 to VHTM4.3:M. Change Status for VHTM4.2 in P305/L22 to VHTM4.4:M. |

Context:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VHTM4 | Transmit beamforming |  |  |  |
| \*VHTM4.1  (3617) | SU Beamformer Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.2 | SU Beamformee Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.3  (3617) | MU Beamformer Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |
| \*VHTM4.4 | MU Beamformee Capable | 8.4.2.94.2 (VHT Capabilities (11ac)) | CFac:O | Yes  No  N/A  |

Proposed Resolution: Revised

Proposed Resolution: See CID 4128 proposed changes.**References:**