IEEE P802.11
Wireless LANs

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| Comment resolutions for additional rules for preassociation |
| Date: 2019-06-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D4.0 with the following CIDs (7 CIDs):

* 20072, 20128, 21297, 21300, 21522, 21523, 20373

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Contains changes deriving from the discussions during the ad-hoc meeting, and feedback received off-line from Mark. The changes address language for the two deferred CIDs 20072, and 21300. Also added resolution for CID 20373 in this document as per suggestion. Changes highlighted in this color.
* Rev 2: Some minor suggestion received. Changes highlighted in this color.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGax Editor: Editing instructions preceded by “TGax Editor” are instructions to the TGax editor to modify existing material in the TGax draft. As a result of adopting the changes, the TGax editor will execute the instructions rather than copy them to the TGax Draft.***

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 20072 | Abhishek Patil | 424.54 | The last sentence is bit ambiguous. Revised the text to clarify that an FILS Discovery frame or a broadcast Probe Response frame when carried in HE SU PPDU or HE MU PPDU shall be contained in an S-MPDU. Further consolidate the rule with the ones in 26.17.2.3.2 and specify them in one place (this sub-clause). Avoid duplication of rules. | As in comment | Revised –Agree in principle with the comment. Proposed resolution removes redundancies, adds a statement that all Class 1 and Class 2 frames are sent as an S-MPDU and added references to these rules from other clauses of interest. The rules for inclusion of group addressed frames (including FD and PRs) are added as a separate subclause, inline with the suggestion.TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 20072. |
| 20128 | Alfred Asterjadhi | 424.54 | The first sentence of this paragraph is similar to the sentences in 26.17.2.3.2. Suggest removing duplication (perhaps best to keep these rules here). Also the following two paragraphs apply to "any PPDU that is not HE TB PPDU". Please refer to 11-19/0097r3. | As in comment. | Revised –Agree in principle with the comment. Proposed resolution deletes this sentence, removing duplication, incorporates the changes as motioned in document 11-19/0097r2, while exempting PPDUs sent in response to Trigger frame from the minimum rate rules, since they have their own MCS rules dictated by AP in the Trigger frame, and moves the paragraph that is related to the PPDUs sent after association and follow the minimum rate field, since their current subclause is related to HE PPDU only and not for non-HT PPDUs. This subclause instead is more appropriate since it covers additional rules for 6 GHz band. The rules for inclusion of group addressed frames (including FD and PRs) are added as a separate subclause, inline with the suggestion. TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 20128. |
| 21297 | Robert Stacey | 424.51 | "pre-association" is not used in the baseline and not defined in 11ax. | Move this subclause to 26.17 (HE BSS operation) and rename "Synchronization in the 6 GHz band" | Revised –Agree in principle with the comment. Since these rules are relevant to the selection of the BW, NSS, MCS of the PPDU for the 6 GHz band, proposed resolution is to keep the subclause under the same hierarchy but rename it more appropriately without using the term “pre-association”. TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 21297. |
| 21300 | Robert Stacey | 424.59 | An S-MPDU is an MPDU is a frame so a frame cannot be carried in an S-MPDU. There is not need for a specific rule that FILS Discovery and Probe Response frames be sent as S-MPDUs. Presumably all Management frames sent to an unassociated STA would be sent as S-MPDUs (Association Response, etc.). Also, what about frames sent to the AP? We should have a general rule that a Management frame addressed to an unassociated STA or sent by an unassociated STA be sent as an S-MPDU. | Change to: "A Class 1 frame that is sent in an HE PPDU shall be sent as an S-MPDU. " | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested change, although this general rule is inserted in the general subclause of A-MPDU operation and added descriptive references to this general subclause from the two subclauses of interest. Also please note that the same applies for Class 2 frames as well. Accounted for this in the resolution as well.TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 21300. |
| 21522 | Yongho Seok | 424.55 | "An HE AP may transmit a FILS Discovery, or a broadcast Probe Response frame in a broadcast RU of the HE MU PPDU identified by STA\_ID\_LIST of 2045, which does not exceed 242-tone RU, is in the primary 20 MHz channel and is subject to the rules defined in 27.3.2.8 (RU restrictions for 20 MHz operation)."Rules in 26.5.1.3 (RU allocation in an HE MU PPDU) shall be also subject. | Change to "... is subject to the rules defined in 26.5.1.3 (RU allocation in an HE MU PPDU) and 27.3.2.8 (RU restrictions for 20 MHz operation)." | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested change. However, since a similar rule is present in 26.17.2.3.2, the proposed resolution is to remove this paragraph from here, amend the existing text in 26.17.2.3.2, and add a new subclause to cover all the rules for group addressed MPDU delivery in MU PPDU in one place and account for the suggested change from the commenter. TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 21522. |
| 21523 | Yongho Seok | 425.18 | "An HE STA that transmits an HE PPDU that is not an HE TB PPDU in the 6 GHz band and that contains a frame with the Address 1 field or the Address 3 field set to the MAC address of an AP with which it is not associated shall determine..."Why not all PPDU format? e.g., non-HT PPDU. | As in comment. | Revised –Agree with the comment. Proposed resolution accounts for the suggested change, inline with the motioned text in 11-19/0097r3, although specifying that in the non-HT PPDU case the rates are less to chose from (up to 54 Mbps), hence the exception. In addition, the proposed resolution removes an ambiguous sentence in subclause 26.15.2 since the cases of HE PPDUs containing control frames are explicitly listed in the rest of that subclause.TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 21523. |
| 20373 | Laurent Cariou | 431.22 | An AP collocated with a 6 GHz AP shall include an RNR describing the 6 GHz AP (26.17.2.4). In this paragraph, it says that the AP shall schedule FILS DF every 20 TUs, unless a collocated AP sends an RNR. So the "shall" statement in this paragraph does not apply to collocated APs. To ease the understanding, simplify the paragraph so that the requirement to send FILS SF applies only to 6 GHz-only APs. | Same as comment | Revised –It is correct that this statement does not apply to co-located AP. The rules in this subclause apply to the AP that operates in the 6 GHz band. While the rules in subclause 26.17.2.4 appy to the AP that is collocated with an AP that operates in the 6 Ghz band. The rule here is saying that the 6 GHz AP may omit transmitting the FILS Discovery frame if the BSSID, SSID, etc information is advertised in an RNR element advertised by a co-located AP. If this statement was to be removed, then it would not be clear what such an AP would do. Currently the case of the AP sending an unsolicited probe response when its collocated AP has set the respective bit to 1 is missing. Proposed resolution is to specify this case. TGax editor to make the changes shown in 11-19/0964r2 under all headings that include CID 20373. |

**Discussion: *Straw Poll was ran during the ad-hoc meeting.***

***Straw Poll: Which option do you support for the BW of the broadcast RU of an HE MU PPDU that contains group addressed frames that are intended only to associated STAs:***

* ***Option 1: Use broadcast RU within 20 MHz BW (3 votes)***
* ***Option 2: Use broadcast RU within the most recently declared BW supported by all associated STAs (as indicated by Channel Width capability and OMN/OM control signaling) (13 votes)***
* ***Abstain (3 votes)***

***Note: RU restrictions are still followed.***

**10.6.5.3 Rate selection for other group addressed Data and Management frames**

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 20072, 20128, 21522):***

This subclause describes the rate selection rules for group addressed Data and Management frames, excluding the following:

* Non-STBC Beacon, ER Beacon, HE SU Beacon, and non-STBC PSMP frames
* STBC group addressed Data and Management frames
* Data frames located in an FMS stream (see 11.22.8 (FMS multicast rate processing))
* Group addressed frames transmitted to the GCR concealment address (see 11.22.16.3.5 (Concealment of GCR transmissions))
* Group addressed Data and Management frames transmitted in an HE MU PPDU (see 26.15.6a (Additional rules for group addressed frames transmitted in an HE MU PPDU))*(#20072, 20128, 21522)*

**TGax Editor: *Insert a new subclause as follows (#CID 20072, 20128):***

26.15.6a Additional rules for HE MU group addressed frames

An HE AP may include group addressed frames in an HE MU PPDU subject to the rules defined below.

An HE AP shall not include a Beacon frame in an HE MU PPDU.

An HE AP that includes a group addressed frame in an HE MU PPDU shall ensure that the frame is included in a broadcast RU of the HE MU PPDU. The AP shall additionally ensure that the following are satisfied for the broadcast RU:

* The RU allocation complies with the rules in 26.5.1.3 (RU allocation in an HE MU PPDU) and 27.3.2.8 (RU restrictions for 20 MHz operation)
* The <HE-MCS, NSS> tuple shall have a mandatory HE-MCS and NSS = 1 and the RU size shall not exceed 106 subcarriers
* The broadcast RU shall be in the primary 20 MHz channel of the BSS except when:
	+ The group addressed frame is a FILS Discovery or a broadcast Probe Response frame, the primary 20 MHz channel does not coincide with a PSC and the AP is a 6 GHz-only AP, in which case the broadcast RU may be in a PSC that is within the BSS operating channel width (see 26.17.2.3 (Scanning in the 6 GHz band))
	+ The group addressed frame is addressed to one or more SST STAs, the primary 20 MHz channel does not coincide with the subchannel assigned to the SST STAs and the frame is not addressed to any STAs other than the SST STAs in that subchannel, in which case the broadcast RU may be in the subchannel assigned to the SST STAs (see 26.8.7.2 (SST operation)).
	+ The group addressed frame is addressed only to associated non-AP STAs that are in awake state, in which case the broadcast RU may be within a bandwidth that is supported in reception by all the receiving STAs.
* The TXVECTOR parameters listed below shall be set as follows:
	+ HE\_LTF\_TYPE to 2xHE-LTF and GI\_TYPE to 0u8s\_GI or 1u6s\_GI, or HE\_LTF\_TYPE to 4xHE-LTF and GI\_TYPE to 3u2s\_GI
	+ FEC\_CODING to BCC\_CODING
	+ STBC to 0
	+ DCM to 0
	+ DOPPLER to 0
	+ BEAMFORMED to 0
	+ NUM\_STS to 1
	+ NOMINAL\_PACKET\_PADDING to 16 μs
	+ NO\_SIG\_EXTN to false in the 2.4 GHz band and true otherwise
	+ BEAM\_CHANGE as defined in 26.11.3 (BEAM\_CHANGE)
	+ STA\_ID\_LIST element as defined in 26.11.1 (STA\_ID\_LIST)

Group addressed frames transmitted in an HE MU PPDU shall be sent as an S-MPDU (see Table 9-532 (A-MPDU contents in the S-MPDU context)) except for group addressed Data frames that may be sent as an A-MPDU subject to the rules in 10.13.4 (A-MPDU aggregation of group addressed Data frames).*(#21522, 20128, 20072)*

**TGax Editor: *Change the heading below of this subclause as follows (#CID 21297):***

* Additional rules for PPDUs sent in the 6 GHz band*(#21297)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21522, 20128, 20072):***

*(#21522, 20128, 20072)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21300, 20128, 20072):***

An HE STA that transmits aPPDU that is not sent in response to a Trigger frame in the 6 GHz band*(#20128)* and that contains a frame with the Address 1 field or the Address 3 field set to the MAC address of an HE AP with which it is not associated and from which it has received a FILS Discovery frame or an HE Operation element shall ensure that the PPDU*(#20128)* meets the following conditions:

* The bandwidth of the PPDU*(#20128)* is less than or equal to the operating bandwidth of the HE BSS as indicated in the BSS Operating Channel Width subfield of the FILS Discovery frame or in the Channel Width subfield of the HE Operation element sent by the AP
* The PPDU*(#20128)* is transmitted with a number of spatial streams that is less than or equal to the maximum number of spatial streams of the HE BSS as indicated in the Maximum Number of Spatial Stream subfield of the FILS Discovery frame or in the Basic HE-MCS and NSS Set field of the HE Operation element sent by the AP
* If the PPDU is an HE PPDU then the PPDU is transmitted with an <HE-MCS, NSS> tuple providing a data rate that is greater than or equal to the minimum rate indicated in the FILS Minimum Rate field (if present) of the FILS Discovery frame or in the Minimum Rate field of the HE Operation element sent by the AP
* If the PPDU is a non-HT PPDU then the PPDU is transmitted with a data rate that is greater than or equal to the minimum of <*R*, 54 Mb/s>, where *R* is the minimum rate indicated in the FILS Minimum Rate field (if present) of the FILS Discovery frame or in the Minimum Rate field of the HE Operation element sent by the AP*(#20128, 21300, 20072)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 20128):***

An HE STA that transmits a PPDU that is not sent in response to a Trigger frame in the 6 GHz band and that contains a frame with Address 1 field or Address 3 field set to the MAC address of the AP to which it is associated shall ensure that the PPDU meets the following conditions:

* If the PPDU is a non-HT (duplicate) PPDU then the PPDU is transmitted with a data rate that is greater than or equal to the minimum of <*R*, 54 Mb/s>, where *R* is the minimum rate indicated in the Minimum Rate field of the HE Operation element sent by the AP.
* If the PPDU is an HE PPDU then the PPDU is transmitted with an <HE-MCS, NSS> tuple providing a data rate that is not less than the data rate indicated in the Minimum Rate field of the HE Operation element sent by the AP.*(#20128)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21523, 21300, 20128, 20072):***

An HE STA that transmits a PPDU that is not an HE TB PPDU in the 6 GHz band *(#21523, 20128)* and that contains a frame with the Address 1 field or the Address 3 field set to the MAC address of an AP with which it is not associated shall determine a local maximum transmit power for that transmission following the rules in 11.7.5 (Specification of regulatory and local maximum transmit power levels), if the local maximum transmit power is received in Transmit Power Envelope elements and combinations of Country elements and Power Constraint elements in the most recently received Beacon or Probe Response frame, on the channel from that AP.*(#21300, 20072)*

* Additional rate selection constraints for HE PPDUs

A STA shall not transmit a 20 MHz or 40 MHz HE PPDU with an <HE-MCS, NSS> tuple that has HE-MCS 0, 1, 2 or 3 and NSS less than or equal to 4 to a receiver STA that has marked as unsupported the HT MCS with value HE-MCS + 8 ×(NSS – 1) in the Rx MCS Bitmask subfield in the Supported MCS Set field in the HT Capabilities element it transmits. The transmission of a 20 MHz or 40 MHz HE PPDU with HE-MCS greater than 3 is not subject to this constraint.

A STA shall not transmit an 80 MHz, 160 MHz or 80+80 MHz HE PPDU with an <HE-MCS, NSS> tuple that has HE-MCS 0 or 1 and NSS less than or equal to 4 to a receiver STA that has marked as unsupported the HT MCS values of both 2× HE-MCS + 8×(NSS – 1) and 2 ×HE-MCS + 1 + 8× (NSS – 1) in the Rx MCS Bitmask subfield in the Supported MCS Set field in the HT Capabilities element it transmits. The transmission of an 80 MHz, 160 MHz or 80+80 MHz HE PPDU with HE-MCS greater than 1 is not subject to this constraint.

An example tabulation of this behavior is given in Table 26-13 (Example of rate selection for HE PPDUs).

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| * Example of rate selection for HE PPDUs
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| HT MCSs that are marked as unsupported | <HE-MCS, NSS> tuples that are not used for CBW20 and CBW40 | <HE-MCS, NSS> tuples that are not used for CBW80, CBW160, and CBW80+80 |
| 0, 8, 16 | <0, 1>, <0, 2>, <0, 3> | - |
| 1, 9 | <1, 1>, <1, 2> | - |
| 10 | <2, 2> | - |
| 3 | <3, 1> | - |
| 0, 1 | <0, 1>, <1, 1> | <0, 1> |
| 2, 3 | <2, 1>, <3, 1> | <1, 1> |
| 0, 1, 8, 9 | <0, 1>, <1, 1>, <0, 2>, <1, 2> | <0, 1>, <0, 2> |

**TGax Editor: *Delete the paragraph below of this subclause as follows (#CID 20128):***

*(#20128)*

* AP behavior for fast passive scanning

(#15122)An AP operating in the 6 GHz band that is not co-located with an AP operating in the 2.4 GHz band or 5 GHz band is referred to as a 6 GHz-only AP.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21522, 20128, 20072):***

An AP operating in the 6 GHz band shall schedule for transmission FILS Discovery frames as described in 11.46.2.1 (FILS Discovery frame transmission), except that the following apply:

* If the FILS Discovery frame is contained in an DL HE MU PPDU then it shall be included in the broadcast RU of the DL HE MU PPDU as defined in 26.15.6a.*(#21522, 20128, 20072)*
* The transmission of FILS Discovery frames may be omitted if a BSSID, and SSID (or short SSID) indication of the AP is advertised in a Reduced Neighbor Report element in Beacon and Probe Response frames transmitted on a 2.4 GHz or 5 GHz channel by a co-located AP, or if a broadcast Probe Response frame or a Beacon frame is scheduled for transmission at that target transmit time instead of the FILS Discovery frame, or if the AP is a 6 GHz-only AP that does not intend to be discovered by STAs
* The AP shall set dot11FILSFDFrameBeaconMaximumInterval to a nonzero value that is less than or equal to 20 TUs and shall follow the rules in 11.1.3.8 if dot11MultiBSSIDImplemented is true

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21522, 20128, 20072, 20373):***

An AP operating in the 6 GHz band that is co-located with an AP that transmits a Reduced Neighbor Report and/or an Neighbor Report element with the 20 TU Probe Responses Active subfield reporting that 6 GHz AP shall schedule for transmission unsolicited broadcast Probe Response frame every dot11FILSFDFrameBeaconMaximumInterval.

An AP operating in the 6 GHz band may send an unsolicited broadcast Probe Response frame, and shall follow the rules in 11.1.3.8 if dot11MultiBSSIDImplemented is true. The Probe Response frame may be included in the broadcast RU of a DL HE MU PPDU as defined in 26.15.6a.

An HE AP operating in the 6 GHz band that transmits a FILS Discovery frame carrying an FD Capability field shall set the PHY Index subfield to 4.*(#21522, 20128, 20072)*

**26.6 A-MPDU operation**

**26.6.1 General**

A-MPDU operation for an HE PPDU follows the procedures defined in 10.13 (A-MPDU operation) and, additionally, the procedures defined in this subclause.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 21300, 20072):***

An HE STA that sends a Class 1 frame or a Class 2 frame in an HE PPDU shall send the frame as an S-MPDU (see Table 9-532 (A-MPDU contents in the S-MPDU context)).*(#21300, 20072)*

An HE STA that sends a VHT Capabilities element or an HT Capabilities element and an HE Capabilities element with Maximum A-MPDU Length Exponent Extension field of 0 shall support in reception an AMPDU pre-EOF padding with maximum length defined in 10.13.2 (A-MPDU length limit rules).

**9.4.2.243 HE Operation element**

The Minimum Rate field indicates the minimum rate with NSS no more than 3 and HE-MCS no more than 3 that is allowed for a STA to use in unit of 1 Mb/s.

**26.11.4 BSS\_COLOR**

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 21300, 20072):***

An HE STA that transmitted an HE Operation element shall set the TXVECTOR parameter BSS\_COLOR as follows:

* For an HE SU PPDU, HE ER SU PPDU or DL HE MU PPDU, the parameter BSS\_COLOR is set to the value indicated in the BSS Color subfield of the HE Operation element if all the recipient STAs are members of the HE STA's HE BSS or the PPDU carries at least one triggering frame.
* For an HE SU PPDU, HE ER SU PPDU, or DL HE MU PPDU the parameter BSS\_COLOR is set to 0 if the HE STA expects that at least one intended recipient STA is not a member of the HE STA’s HE BSS and the PPDU does not carry a triggering frame.*(#21300, 20072)*

…

An HE STA that received an HE SU PPDU, HE ER SU PPDU, or HE MU PPDU with the RXVECTOR parameter BSS\_ COLOR equal to 0 shall not discard the HE PPDU.*(#21300, 20072)*

**26.15.2 PPDU format selection**

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 21523):***

An HE STA that transmits non-HT, HT, or VHT PPDUs shall follow the rules in 10.6 (Multirate support). An HE STA may transmit an HE SU PPDU to a peer HE STA subject to the restrictions defined below.*(#21523)*