IEEE P802.11
Wireless LANs

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| Resolutions for some comments on 11md/D2.0 (LB236) |
| Date: 2019-05-24 |
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Abstract

This submission proposes resolutions for CIDs 2280, 2320, 2321, 2322, 2366, 2421, 2445, 2459, 2488, 2529, 2530, 2532, 2596, 2601, 2640 on 11md/D2.0. 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.

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| Identifiers | Comment | Proposed change |
| CID 2320Mark RISON9.8.3.11660.26 | "Ack Policy Indicator 0 is limited to at most one MU recipient perMU PPDU." -- this is not the meaning | Move this sentence to a table NOTE (since I understand these are normative, unlike running text NOTEs) |

Discussion:

It is not clear what the commenter means by “this is not the meaning”.

The commenter is wrong to say that NOTEs in tables are normative. It’s only footnotes thereto (although only by implication through omission in footnote 17 (155.64 in D2.1)). See 13/0697:

7.5.8 Foot notes to a table are normative, but notes are informative.

However the cited sentence is misplaced, because (a) it only covers the Normal Ack ack policy, not the Implicit BAR ack policy and (b) there is already a more general statement about this (though it only covers VHT).

Proposed resolution:

REVISED

In 9.7.3 A-MPDU contents (D2.1/1654.60), add “or S1G MU PPDU” after “PPDU” in “A VHT MU PPDU does not carry more than one A-MPDU that contains one or more MPDUs soliciting an immediate response.”

In Table 9-535—Ack Policy Indicator(#1415) subfield in the Frame Control field for PV1 frames (D2.1/1660.26), delete “Ack Policy Indicator 0 is limited to at most one MU recipient per MU PPDU.”

Note to the commenter: it is not the case that NOTEs in tables are normative. It’s only footnotes thereto (although only by implication through omission in footnote 17 (155.64 in D2.1)) that are. See 13/0697:

7.5.8 Foot notes to a table are normative, but notes are informative.

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| Identifiers | Comment | Proposed change |
| CID 2321Mark RISON10.151781.29 | 9.7.3 says (implicitly for all STAs) " 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 theAck Policy Indicator(#1415) subfield of the QoS Control field." But 10.15 says (for DMG STAs) " All QoS Data frames within A-MPDUs within an A-PPDU shall have the same ack policy." These are not the same (the ack policy is the combination of the Ack Policy Indicator field and other things) | Change 9.7.4 to say " All QoS Data frames within A-MPDUs within an A-PPDU shall have the same value for the Ack Policy Indicator subfield." |
| CID 2322Mark RISON10.151781.29 | 9.7.3 says (implicitly for all STAs) " 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 theAck Policy Indicator(#1415) subfield of the QoS Control field." But 10.15 says (for DMG STAs) " All QoS Data frames within A-MPDUs within an A-PPDU shall have the same ack policy." These are not the same (the ack policy is the combination of the Ack Policy Indicator field and other things) | Delete the cited sentence in 10.15 (since the 9.7.3 sentence covers it (presuming nothing other than HT-immediate is allowed for DMG)) |

Discussion:

9.7.3 A-MPDU contents does indeed say (D2.1/1654.4):

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 Indicator(#1415) subfield of the QoS Control field.

10.15 DMG A-PPDU operation does indeed say (D2.1/1781.29):

All QoS Data frames within A-MPDUs within an A-PPDU shall have the same ack policy(#1415).

The ack policy is the combination of the Ack Policy Indicator subfield and other information (e.g. whether the MPDU is a non-A-MPDU frame). Also, the second statement is not restricted to MPDUs sent under HT-immediate BA. So the second statement is wider than the first (i.e. QoS Data frames in DMG A-PPDUs are more constrained than other QoS Data frames).

Proposed resolution:

REJECTED

The ack policy is the combination of the Ack Policy Indicator subfield and other information (e.g. whether the MPDU is a non-A-MPDU frame). Also, the second statement is not restricted to MPDUs sent under HT-immediate BA. So the second statement is wider than the first (i.e. QoS Data frames in DMG A-PPDUs are apparently more constrained than other QoS Data frames).

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| Identifiers | Comment | Proposed change |
| CID 2421Mark RISON9.2.4.5.4791.1 | "Bits in QoS Control field" in Table 9-13---Ack policy should refer to Ack Policy Indicator subfield (cf. Table 9-535---Ack Policy Indicator(#1415) subfield in the Frame Control field for PV1 frames(11ah)) | Change the cited heading cell to "Ack Policy Indicator subfield" and renumber the bits below from 5, 6 to 0, 1 respectively |

Discussion:

Best practice is for subfield bit definitions to be stand-alone, not dependent on position within the parent field.

Multiple subfields of the QoS Control field violate this:







Proposed resolution:

REVISED

In Table 9-12—TID subfield (D2.1/790.11), change “Allowed values in bits 0–3 (TID subfield)” to “Allowed values”.

In the header row of Table 9-13—Ack policy (D2.1/791.8), change “Bits in QoS Control field” to “Ack Policy Indicator subfield” and change “Bit 5” and “Bit 6” to “Bit 0” and “Bit 1” respectively, as proposed by the commenter.

In Figure 9-10—Buffered AC subfield (D2.1/795.17), change the top row from “B10 B11 B12 B13” to “B0 B1 B2 B3”.

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| Identifiers | Comment | Proposed change |
| CID 2459Mark RISON10.24.4.2.31822.15 | "The MPDUExchangeTime equals the time required to transmit the MPDU sequence." -- it is not clear what an MPDU sequence is | Change the cited text at the referenced location to "The MPDUExchangeTime is the duration of the TXOP." |

Discussion:

The term “MPDU sequence” is not defined and is not used anywhere else.

Since this is about admission control, the intent must be to account for the time that the TXOP holder has ownership of the medium, since during this time other STAs cannot make use of the medium. Describing it as “the duration of the TXOP” captures this, and is flexible enough to account for corner cases like TXOP truncation.

Proposed resolution:

REVISED

At 1832.15 in D2.2, change:

b) After each successful or unsuccessful MPDU (re)transmission attempt,

to:

b) After each successful or unsuccessful frame exchange sequence,

At 1832.19 in D2.2, change:

The MPDUExchangeTime equals the time required to transmit the MPDU sequence.

to:

The MPDUExchangeTime is the duration of the frame exchange sequence.

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| Identifiers | Comment | Proposed change |
| CID 2529Mark RISON12.4.7.42537.43 | "Commit message" -- no such message | Prepend "SAE " to the cited text throughout the referenced subclause (7x) |

Discussion:

The only places where “Commit message” appears without “SAE” preceding it are the 7 locations identified, and Figure 4-34—Example using SAE authentication. Here is the subclause in question:

**12.4.7.4 Encoding and decoding of SAE Commit messages**

An SAE Commit message shall be encoded as an Authentication frame with an Authentication Algorithm

Number field set to 3, a Transaction Sequence Number of 1 and a Status Code of SUCCESS Status codes

not equal to SUCCESS indicate a rejection of a peer’s SAE Commit message and are described in 12.4.7.6

(Status codes).

An SAE Commit message shall consist of a Finite Cyclic Group field (9.4.1.42 (Finite Cyclic Group field))

indicating a group, a Scalar field (9.4.1.39 (Scalar field)) containing the scalar, and an FFE field containing

the element (9.4.1.40 (Finite field element (FFE) field)). If the SAE Commit message is in response to an

Anti-Clogging Token field(#2534) request (see 12.4.7.6 (Status codes)), the Anti-Clogging Token

field(#2534) is present (see 9.4.1.38 (Anti-Clogging Token field)). If a password identifier is used in

generation of the password element (PWE) the Password identifier element shall be present and the

identifier shall be encoded as a UTF-8 string in the Identifier portion of the element (see 9.4.2.216

(Password identifier element(M41))).(M41)

When transmitting an SAE Commit message, the scalar and element shall be converted to octet strings and

placed in the Scalar field and FFE field, respectively. The scalar shall be treated as an integer and converted

into an octet string of length m such that 28m > r, where r is the order of the group, according to 12.4.7.2.2

(Integer to octet string conversion), and the element shall be converted into (an) octet string(s) according to

12.4.7.2.4 (Element to octet string conversion). When receiving an SAE Commit message the component

octet strings in the Scalar field and Element field shall be converted into a scalar and element, respectively,

according to 12.4.7.2.3 (Octet string to integer conversion) and 12.4.7.2.5 (Octet string to element

conversion), respectively.

(M73)NOTE—Anti-clogging tokens, password identifiers, and vendor specific additions may be optionally present in a

received Commit message. Since the size of the Scalar field and Element field are determined by the Group field, any

anti-clogging token present will be of a size determined by the recipient, and the Password Identifier is an element with

a well-defined prefix, the Commit message can be unambiguously parsed using the following technique:

a) Compute the following values:

— Base length is the sum of the length of the Group field, the length of the Scalar field, and the length of the

Element field

— Token length is the size of a requested anti-clogging token

b) If the length of the Commit message equals the base length then there is no token, no password identifier, and

no vendor specific additions;

c) If the length of the Commit message is greater than the base length but less than the sum of the base length and

token length and a Password Identifier element follows the Element field, then there is a password identifier

and no token. If a Password Identifier element does not follow the Element field or the length of the Commit

message indicates there are additional octets following the Password Identifier element, then there are vendor

specific additions.

d) If the length of the Commit message is greater than the sum of the base length and the token length and a Pass-

word Identifier element follows the Element field, then there is a password identifier and a token. If a Password

Identifier element does not follow the Element field or the length of the Commit message indicates there are

additional octets following the Password Identifier element, then there are vendor specific additions.

Proposed resolution:

REVISED

Prepend “SAE ” to “Commit message” throughout the NOTE in Subclause 12.4.7.4 (7x), as proposed by the commenter (other instances in the rest of the subclause appear to have been fixed by D2.1).

In Figure 4-34—Example using SAE authentication (D2.1/289.24), change “Commit Message” to “SAE Commit message” (2x) and “Confirm Message” to “SAE Confirm message” (2x).

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| Identifiers | Comment | Proposed change |
| CID 2530Mark RISON12.4.7.42537.43 | "Element field" -- no such field | Change "Element field" to "FFE field" throughout the referenced subclause. In Table 9-43 change "Element is present" to "An FFE field is present", add "A " at the start of the 1st, 4th and 5th sentences of the bottom rightmost cell on p.875, add "An " at the start of the 4th, and add "field " before "is present" for the 1st, 3rd and 4th sentences |

Discussion:

There is no such field as the “Element field” (good thing, as this would be mega-confusing!). The field is called the FFE field:



So all of the following should refer to the FFE field:

**12.4.7.4 Encoding and decoding of SAE Commit messages**

An SAE Commit message shall be encoded as an Authentication frame with an Authentication Algorithm

Number field set to 3, a Transaction Sequence Number of 1 and a Status Code of SUCCESS Status codes

not equal to SUCCESS indicate a rejection of a peer’s SAE Commit message and are described in 12.4.7.6

(Status codes).

An SAE Commit message shall consist of a Finite Cyclic Group field (9.4.1.42 (Finite Cyclic Group field))

indicating a group, a Scalar field (9.4.1.39 (Scalar field)) containing the scalar, and an FFE field containing

the element (9.4.1.40 (Finite field element (FFE) field)). If the SAE Commit message is in response to an

Anti-Clogging Token field(#2534) request (see 12.4.7.6 (Status codes)), the Anti-Clogging Token

field(#2534) is present (see 9.4.1.38 (Anti-Clogging Token field)). If a password identifier is used in

generation of the password element (PWE) the Password identifier element shall be present and the

identifier shall be encoded as a UTF-8 string in the Identifier portion of the element (see 9.4.2.216

(Password identifier element(M41))).(M41)

When transmitting an SAE Commit message, the scalar and element shall be converted to octet strings and

placed in the Scalar field and FFE field, respectively. The scalar shall be treated as an integer and converted

into an octet string of length m such that 28m > r, where r is the order of the group, according to 12.4.7.2.2

(Integer to octet string conversion), and the element shall be converted into (an) octet string(s) according to

12.4.7.2.4 (Element to octet string conversion). When receiving an SAE Commit message the component

octet strings in the Scalar field and Element field shall be converted into a scalar and element, respectively,

according to 12.4.7.2.3 (Octet string to integer conversion) and 12.4.7.2.5 (Octet string to element

conversion), respectively.

(M73)NOTE—Anti-clogging tokens, password identifiers, and vendor specific additions may be optionally present in a

received Commit message. Since the size of the Scalar field and Element field are determined by the Group field, any

anti-clogging token present will be of a size determined by the recipient, and the Password Identifier is an element with

a well-defined prefix, the Commit message can be unambiguously parsed using the following technique:

a) Compute the following values:

— Base length is the sum of the length of the Group field, the length of the Scalar field, and the length of the

Element field

— Token length is the size of a requested anti-clogging token

b) If the length of the Commit message equals the base length then there is no token, no password identifier, and

no vendor specific additions;

c) If the length of the Commit message is greater than the base length but less than the sum of the base length and

token length and a Password Identifier element follows the Element field, then there is a password identifier

and no token. If a Password Identifier element does not follow the Element field or the length of the Commit

message indicates there are additional octets following the Password Identifier element, then there are vendor

specific additions.

d) If the length of the Commit message is greater than the sum of the base length and the token length and a Pass-

word Identifier element follows the Element field, then there is a password identifier and a token. If a Password

Identifier element does not follow the Element field or the length of the Commit message indicates there are

additional octets following the Password Identifier element, then there are vendor specific additions.

Ditto in Table 9-43—Presence of fields and elements in Authentication frames:

(#2471) Finite field element is present if the Status Code field is zero.

The other changes proposed to the SAE 1 row are valid too, but should be “The” and should be applied in other places too. There are various other editorial issues.

Proposed changes:

Change "Element field" to "FFE field" throughout Subclause 12.4.7.4, as proposed by the commenter (D2.2/2550.32 seems to be the only instance; others have been addressed already through other comments).

In Table 9-43—Presence of fields and elements in Authentication frames, change the rightmost cell of the SAE 1 and 2 rows (D2.2/878.9) as follows:

(Ed)The Scalar field(#2531) is present if the Status Code field is zero.

(#2471)(Ed)The FFE field(#2531) is present if the Status Code field is zero.

(Ed)The Anti-Clogging Token field(#2534) is present if ~~status~~the Status Code field is 76 or if the Authentication frame is in response to a previous rejection with the Status Code field equal to 76.

(Ed)The Finite Cyclic Group field(#2531) is present if the Status Code field is zero, 76, or 77.(M104)

(M41)(Ed)The Password Identifier element is optionally present if the Status Code field is zero or 123(Ed).

The Send-Confirm field is present.***<newline>***

The Confirm field is present.

In Table 9-43—Presence of fields and elements in Authentication frames, change “if Status Code” to “if the Status Code” (18 instances).

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2530 in <this document>, which address the issues raised by the commenter.

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| Identifiers | Comment | Proposed change |
| CID 2532Mark RISON12.4.7.42537.43 | "Group field" -- no such field | Change "Group field" to "Finite Cyclic Group field" throughout the referenced subclause |

Discussion:

The field containing the finite cyclic group should be referred to as the Finite Cyclic Group field throughout.

Proposed resolution:

REVISED

In 9.6.7.24 Public Key frame (D2.1/1520.21), change “Group” to “Finite Cyclic Group” throughout (2 instances). In 12.11.2 AP PeerKey protocol (D2.1/2671.6), change “Group field” and “group field” to “Finite Cyclic Group field” (3 instances of first and 2 instances of second).

In the NOTE in 12.4.7.4 Encoding and decoding of SAE Commit messages (D2.1/2539.7), change “Group” to “Finite Cyclic Group” (2 instances), as proposed by the commenter.

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| Identifiers | Comment | Proposed change |
| CID 2445Mark RISON12.7.42625.9 | "{Key Data} is a sequence of zero or more elements and KDEs" -- so it's not clear how you determine whether something is a VS element or a KDE | Change the cited text at the referenced location to "{Key Data} is a sequence of zero or more elements (that are not Vendor-Specifc elements) and KDEs" |

Discussion:

Actually, there is no way to distinguish, from the encoding, a vendor-specific KDE from a vendor-specific element.

Proposed resolution:

REVISED

In 12.7.2 EAPOL-Key frames j) (D2.1/2620.7), delete “Elements sent in the Key Data field include the Element ID and Length subfields.”

In 12.7.2 EAPOL-Key frames j) (D2.1/2620.7), change “zero or more key data cryptographic encapsulation(s) (KDEs) (such as GTK(s) or PMKID(s))” to “zero or more key data encapsulation(s) (KDEs) (such as the GTK KDE or PMKID KDE(s))”.

In 12.7.2 EAPOL-Key frames, after “The Type field shall be set to 0xdd. The Length field specifies the number of octets in the OUI, Data Type, and Data fields. The OUI field contains either an OUI or CID. The order of the OUI field is described in 9.2.2 (Conventions).” (D2.1/2620.22), insert a “NOTE—The KDE format is a subset of the Vendor Specific element format (see 9.4.2.25). It is generally not possible to distinguish, from the format, a Vendor Specific element and a vendor specific KDE.”

In 12.5.4.4 BIP replay protection (D2.1/2572.63), change “IGTK key data encapsulation (KDE)” to “IGTK KDE”.

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| Identifiers | Comment | Proposed change |
| CID 2280Mark Hamilton9.2.4.5.4791.19 | Ack behavior depends on "Where either the originator or the addressed recipient does not support fragment BA procedure". This is bad form, asking a RXr to know the originator's capabilities to know how to ACK something. Should be replaced with signalling/state known immediately by the RXr. Also, the cited sentence doesn't make sense (it starts with "Where", but doesn't have any subjunctive), and the following sentence "Otherwise" isn't clear (otherwise to what?). Lastly, is it reasonable to believe a RXr will be able to determine if a frame contains a fragment quickly enough to decide whether to Ack? | 1) Change this sentence (and the one above with the opposite case) to reference information known by the RXr.2) Fix the two sentences' (second "Where", and following "Otherwise") wording.3) Address whether a RXr will be able to determine if a frame contains a fragment quickly enough to decide whether to Ack. |

Discussion:

The editorial point (2) is valid. The technical points (1 and 3) are valid in theory too (especially 1, since it involves looking up by MAC address), but in practice since fragment BA is only allowed for S1G STAs and SIFS is 160 µs for S1G BSSes, there’s enough time to do the requisite processing.

Proposed changes:

Change Table 9-535—Ack Policy Indicator(#1415) subfield in the Frame Control field for PV1 frames(11ah) as follows:

(M86)Where the frame contains a fragment and both the originator

and the addressed recipient support the fragment BA procedure:

The addressed recipient returns an NDP BlockAck or BAT frame

after a SIFS, according to the procedures defined in 10.3.2.12

(Fragment BA procedure(11ah)) and 10.48.2 (TWT acknowledgment

procedure).

~~(#1415)(#233)Where the frame does not contain a fragment, or either~~

~~the originator or the addressed recipient does not support the~~

~~fragment BA procedure~~Otherwise:

The addressed recipient returns an Ack, TACK or STACK frame

after a short interframe space (SIFS) period, according to the

procedures defined in 10.3.2.11 (Acknowledgment procedure) and

10.48.2 (TWT acknowledgment procedure). (M86)

Change Table 9-13—Ack policy(#1415) as follows:

(M86)Where the frame contains a fragment ~~where~~and

both the originator and the addressed recipient

support the fragment BA procedure:

The addressed recipient returns an NDP BlockAck

or BAT frame after a SIFS, according to the

procedures defined in 10.3.2.12 (Fragment BA

procedure(11ah)) and 10.48.2 (TWT

acknowledgment procedure).

~~(#1415)(#233)Where the frame does not contain a~~

~~fragment, or either the originator or the addressed~~

~~recipient does not support the fragment BA~~

~~procedure.~~ Otherwise:

The addressed recipient returns an Ack,

STACK(M86), or QoS +CF-Ack frame after a short

interframe space (SIFS) period, according to the

procedures defined in 10.3.2.11 (Acknowledgment

procedure), (M86)10.48.2 (TWT acknowledgment

procedure), and 10.24.3.5 (HCCA transfer rules). A

non-DMG STA uses this ack policy for individually

addressed QoS Null (no data) frames.(M86)

Proposed resolution:

REVISED

In Table 9-535—Ack Policy Indicator(#1415) subfield in the Frame Control field for PV1 frames(11ah), change “Where the frame does not contain a fragment, or either the originator or the addressed recipient does not support the fragment BA procedure:” (D2.1/1660.18) to “Otherwise:”. In Table 9-13—Ack policy(#1415), delete “Where the frame does not contain a fragment, or either the originator or the addressed recipient does not support the fragment BA procedure.” (D2.1/791.19), insert a comma after “The addressed recipient returns an NDP BlockAck or BAT frame after a SIFS” and change “Where the frame contains a fragment where both the originator and the addressed recipient support the fragment BA procedure:” (D2.1/791.10) to “Where the frame contains a fragment and both the originator and the addressed recipient support the fragment BA procedure:”.

This addresses editorial point 2. Regarding technical points 1 and 3, these are rejected because:

* Fragment BA is only used in S1G BSSes (10.3.2.12: “Non-S1G STAs shall not use the fragment BA procedure described in this subclause.”)
* aSIFSTime in S1G BSSes is 160 µs (Table 23-37—S1G PHY characteristics)
* This should be sufficient time for the receiver to check the originator capabilities (looking up the TA) and examine the MAC header to determine whether a fragment is present (More Fragments set or Fragment Number non-zero)
* If this isn’t the case the receiver can simply not declare support for fragment BA (see Fragment BA Support subfield in S1G Capabilities Information field in S1G Capabilities element and dot11FragmentBAOptionImplemented)

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| Identifiers | Comment | Proposed change |
| CID 2488Mark RISON | "member of an IBSS" should canonically be "IBSS STA". Ditto for MBSS | Change "member of an IBSS" to "IBSS STA" throughout, changing any preceding "a" to "an". Change "member of an MBSS" to "MBSS STA" throughout, changing any preceding "a" to "an" |

Discussion:

“member of an IBSS” appears 20 times in D2.1; “IBSS STA” appears 75 times. The term “IBSS STA” is not, however, defined.

“member of a mesh BSS”/”member of an MBSS” appears 10/11 times; “MBSS STA” does not appear but “mesh STA” appears over 2000 times. A “mesh STA” is defined as “A quality-of-service (QoS) STA that implements the mesh facility.”

Proposed resolution:

REVISED

Note to the commenter: “member of a mesh BSS/MBSS” is not the same as “MBSS STA”, since the latter is defined as a STA that implements mesh, not a STA that is actually doing mesh. (Whether this is a good idea is a separate issue…)

In 3.1 add a definition “independent basic service set (IBSS) station (STA): A STA that has started or joined an IBSS.”

Change “a STA that is a member of an IBSS” to “an IBSS STA” in 5.2.5.2 Semantics of the service primitive.

Change “STA that is a member of an IBSS” to “IBSS STA” in Table 9-31—STA Info subfields and 10.37.5.2 Rules for VHT sounding protocol sequences (2x).

Change “a member of an IBSS” to “an IBSS STA” in 9.3.2.1.2 Address and BSSID fields; 10.28.2 Protection mechanism for non-ERP receivers (3x); 11.5.2.2 Procedure at the originator; 11.15.1 Rules for operation in 20/40 MHz BSS; 11.15.2 Basic 20/40 MHz BSS functionality; 11.39.4 Channel switching methods for a VHT BSS (2x), C.3 for dot11QMFActivated (2x).

Change “operating as a member of an IBSS” to “an IBSS STA” in 10.3.9 Determination of PLME aCWmin characteristics.

Change “sent by a STA that is a member of an IBSS to a STA or STAs that are members of an IBSS” to “sent by an IBSS STA to one or more IBSS STAs” in 10.22 Group ID, partial AID, Uplink Indication, and COLOR in S1G PPDUs.

Change “member of an IBSS” to “IBSS STA” in 10.23.5 Operation with coverage classes.

Change “A STA that is a member of an IBSS” to “An IBSS STA” in 10.28.3.1 General (under 10.28.3 Protection mechanisms for transmissions of HT PPDUs).

Change “members of an IBSS” to “IBSS STAs” in 9.3.3.1 Format of Management frames.

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| Identifiers | Comment | Proposed change |
| CID 2596Mark RISON10.24.4.2.11820.41 | Duplication: "; but, if it does not support that procedure and dot11RejectUnadmittedTraffic is false or not present, it shall use EDCA parameters of a lower priority AC, as indicated in Table 10-1 (UP-to-AC mappings), that does not require admission control. When a STA uses the EDCA parameters of a lower-priority AC for this purpose, it affects only the EDCA parameters used for channel access, i.e., it has no effect on the contents of the transmitted frame" and "If dot11RejectUnadmittedTraffic is false, a STA may send data without admission control for an AC that mandates admission control by using the EDCA parameters that correspond to a lower priority AC that does not require admission control. When a STA uses a lower priority AC for this purpose, the lower priority AC affects only the EDCA parameters used for channel access, i.e., it has no effect on the contents of the transmitted frame." Actually not duplication but contradiction since the first is shall and the second is may | Delete the first of the two cited blocks of text |

Discussion:

Start of 10.24.4.2.1 (bit in yellow is proposed for deletion):

A non-AP STA may support admission control procedures in 10.24.4.2.3 (Procedure at non-AP STAs) to send frames in the AC where admission control is mandated; but, if it does not support that procedure and dot11RejectUnadmittedTraffic is false or not present, it shall use EDCA parameters of a lower priority AC, as indicated in Table 10-1 (UP-to-AC mappings), that does not require admission control. When a STA uses the EDCA parameters of a (#149)lower-priority AC for this purpose, it affects only the EDCA parameters used for channel access, i.e., it has no effect on the contents of the transmitted frame. An AP shall support admission control procedures, at least to the minimal extent of advertising that admission is not mandatory on its ACs.

Middle of next para (bit in yellow is proposed to be kept):

The STA may transmit unadmitted traffic for the ACs for which the AP does not require admission control. If dot11RejectUnadmittedTraffic is false, a STA may send data without admission control for an AC that mandates admission control by using the EDCA parameters that correspond to a lower priority AC that does not require admission control. When a STA uses a lower priority AC for this purpose, the lower priority AC affects only the EDCA parameters used for channel access, i.e., it has no effect on the contents of the transmitted frame.

Note also the definition of the Reject Unadmitted Frame extended capability (sic):

When dot11RejectUnadmittedTraffic is true, the Reject Unadmitted Frame bit is set to 1 to indicate that the STA rejects MA-UNITDATA.request primitives for frames belonging to an unadmitted TS.

When dot11RejectUnadmittedTraffic is false, the Reject Unadmitted Frame bit is set to 0 to indicate that the STA is not required to reject MA-UNITDATA.request primitives for frames belonging to an unadmitted TS.

This does seem like duplication, and as regards the contradiction it seems the intent is to allow but not require a STA to downgrade if dot11RejectUnadmittedTraffic is false.

Proposed changes:

Change 10.24.4.2.1 (D2.2/1830.43) as follows:

An AP shall support admission control procedures, at least to the minimal extent of advertising that admission is not mandatory on its ACs. The AP uses the ACM (admission control mandatory) subfields advertised in the EDCA Parameter Set element to indicate whether admission control is required for each of the ACs. All ACs with priority higher than that of an AC with an ACM flag equal to 1 should have the ACM flag set to 1. While the CWmin, CWmax, AIFS, and TXOP limit parameters may be adjusted over time by the AP, the ACM bit shall be static for the duration of the lifetime of the BSS. ***[this text just moved from below with paragraphing modifications]***

 *[Alternative 1 for next para:]*

A non-AP STA may send frames in an AC where admission control is not mandated. A non-AP STA may support the admission control procedure~~s~~ in 10.24.4.2.3 (Procedure at non-AP STAs) to send frames in ~~the~~an AC where admission control is mandated~~;~~, but~~,~~ if it does not support that procedure or admission was denied then:~~and~~

* If dot11RejectUnadmittedTraffic is true, it shall not send such frames.
* If dot11RejectUnadmittedTraffic is false or not present, and if there is ~~it shall use EDCA parameters of~~ a lower priority AC~~, as indicated in~~ (see Table 10-1 (UP-to-AC mappings)), that does not require admission control, it may send such frames using the EDCA parameters of that lower priority AC for channel access. When ~~a STA uses the EDCA parameters of a (#149)(#2443)lower priority AC for this purpose~~it does this, ~~it affects only the EDCA parameters used for channel access, i.e., it has no effect on~~ the contents of the ~~transmitted~~ frames are unaffected.

 *[Alternative 2 for next para:]*

A non-AP STA may send frames in an AC where admission control is not mandated.

A non-AP STA may support the admission control procedure~~s~~ in 10.24.4.2.3 (Procedure at non-AP STAs) to send frames in ~~the~~an AC where admission control is mandated~~; but, i~~. If it does not support that procedure or admission was denied, and both of the following apply:~~and~~

* dot11RejectUnadmittedTraffic is false or not present~~,~~
* there is ~~it shall use EDCA parameters of~~ a lower priority AC~~, as indicated in~~ (see Table 10-1 (UP-to-AC mappings))~~,~~ that does not require admission control

then it may send such frames using the EDCA parameters of that lower priority AC for channel access;~~. When~~ ~~a STA uses the EDCA parameters of a (#149)(#2443)lower priority AC for this purpose, it affects only the EDCA parameters used for channel access, i.e., it has no effect on~~ the contents of the ~~transmitted~~ frames are unaffected. Otherwise, it shall not send such frames.

 *[End of alternatives]*

~~An AP shall support admission control procedures, at least to the minimal extent of advertising that admission is not mandatory on its ACs.~~ ***~~<remove the para break>~~*** ~~The AP uses the ACM (admission control mandatory) subfields advertised in the EDCA Parameter Set element to indicate whether admission control is required for each of the ACs. While the CWmin, CWmax, AIFS, and TXOP limit parameters may be adjusted over time by the AP, the ACM bit shall be static for the duration of the lifetime of the BSS.~~ ***~~<para break>~~***

A STA shall transmit an ADDTS Request frame to the HC in order to request admission of traffic in any direction (i.e., uplink, downlink, direct, or bidirectional) employing an AC that requires admission control. The ADDTS Request frame shall contain the UP associated with the traffic and shall indicate EDCA as the access policy. The AP shall associate the received UP of the ADDTS Request frame with the appropriate AC per the UP-to-AC mappings described in 10.2.3.2 (HCF contention based channel access (EDCA)). ~~The STA may transmit unadmitted traffic for the ACs for which the AP does not require admission control. If dot11RejectUnadmittedTraffic is false, a STA may send data without admission control for an AC that mandates admission control by using the EDCA parameters that correspond to a lower priority AC that does not require admission control. When a STA uses a lower priority AC for this purpose, the lower priority AC affects only the EDCA parameters used for channel access, i.e., it has no effect on the contents of the transmitted frame. All ACs with priority higher than that of an AC with an ACM flag equal to 1 should have the ACM flag set to 1.~~ ***<para break>***

The HC contained within an AP when dot11SSPNInterfaceActivated is true shall admit a non-AP STA’s request based on dot11NonAPStationAuthAccessCategories stored in that non-AP STA’s dot11InterworkingEntry, which is part of the dot11InterworkingTable. The dot11InterworkingEntry specifies the EDCA access classes and throughput limitations on each access class for which a non-AP STA is permitted to transmit.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2596 in <this document>, which make the change suggested by the commenter with additional editorial clarifications.

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| Identifiers | Comment | Proposed change |
| CID 2601Mark RISON19 | Re CID 1468: need to be clearer that the ED thresholds are based on declaring busy \*if\* a PPDU of a given type with energy above a certain threshold is present, not based on detecting a PPDU of a given type and \*then\* checking the energy is above the corresponding threshold | As it says in the comment |

Discussion:

CID 1468 was:

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| **Comment**The HT rules for CCA as they pertain to non-HT transmissions are not clear. The issue is that if you don't know you're dealing with a non-HT transmission (which you don't know unless you successfully pick up the preamble) you don't know you have to apply the rules ("CCA sensitivity requirements for non-HT PPDUs") | **Proposed change**Make it clear that the energy detect rules (not the CCA-ED rules, which are something different) from 18 and 19 apply even if you can't work out what type of PPDU/energy you're dealing with (these are "detect a medium busy condition within 4 us of any signal with areceived energy that is 20 dB above the minimum modulation and coding rate sensitivity" for 2.4 GHz and -- hm, 19.4.6 has no energy detect requirement, that's in 19.3.4 ... but there's no just energy detect requirement there too. Does this mean HT has no just energy detect requirements (again, not talking of CCA-ED here) in the 5 GHz band? | **Resolution**REJECTED (EDITOR: 2018-07-16 17:24:04Z) - The draft is already clear that pure energy detect is required for HT STAs, in both the 2.4 and 5 GHz bands: see 19.3.19.5.3. The draft already contains text matching the proposed change, in 19.3.19.5.3. |

The issue is that we have e.g. the following in Clause 19:

**19.3.19.5.3 CCA sensitivity for non-HT PPDUs**

CCA sensitivity requirements for non-HT PPDUs in the primary channel are described in 17.3.10.6 (CCA

requirements) and 18.4.6 (CCA performance).

**19.3.19.5.4 CCA sensitivity in 20 MHz**

For an HT STA with the operating channel width equal to 20 MHz, the start of a valid 20 MHz HT signal at a receive level greater than or equal to the minimum modulation and coding rate sensitivity of –82 dBm shall cause the PHY to set PHY-CCA.indication(BUSY) with a probability > 90% within 4 µs. The receiver shall indicate a channel busy condition for any signal 20 dB or more above the minimum modulation and coding rate sensitivity (–82 + 20 = –62 dBm) in the 20 MHz channel.

An HT STA that does not support the reception of HT\_GF format PPDUs shall indicate a channel busy

condition (PHY-CCA.indication(BUSY)) for any valid HT\_GF signal in the 20 MHz channel at a receive

level greater than or equal to –72 dBm.

Consider the highlighted sentences. One interpretation is “if you receive a non-HT PPDU, use the 17.3.10.6 requirements for CCA; if you receive an HT PPDU use the requirements here”. Another interpretation is “if presented with a non-HT PPDU (whether or not you actually receive it, i.e. there are no uncorrectable errors), you shall meet the 17.3.10.6 requirements for CCA; if presented with an HT PPDU, you shall meet the requirements here”.

The latter is the intended interpretation. However, the “valid” suggests the former, since it suggests you need to receive the HT header, at least, to determine whether it is valid. And in any case the standard is concerned with conformant implementations, so we need not concern ourselves with “invalid” transmissions (same reason we don’t/shouldn’t say “successfully receive”).

Proposed resolution:

REVISED

In the table in 6.5.4.3 When generated (in the aCCATime row), in 17.3.10.6 CCA requirements, in 18.4.6 CCA performance, in 19.3.19.5.4 CCA sensitivity in 20 MHz, in 19.3.19.5.5 CCA sensitivity in 40 MHz (2x), in 20.4.4.2.2 CCA, in 20.5.4.2.2 CCA, in 24.4.4.2.2 CCA, in 24.5.4.2.2 CCA, 25.4.6.2.2 CCA, 25.5.7.2.2 CCA, 25.6.9.3.2 CCA: change “a valid” to “a” or “an”, as appropriate for the starting sound of the following word.

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| Identifiers | Comment | Proposed change |
| CID 2640Mark RISON10.3.4.31730.22 | 10.3.4.3 (Backoff procedure for DCF) says (paragraph 5) [context:backoff suspended when medium busy]: "The medium shall be determined tobe idle for the duration of a DIFS --->\*or EIFS\*<---- as appropriate... before the backoff procedure is allowed to resume".This conflicts with a reading of the lettered paragraphs in 10.22.2.4,which determine the corresponding rules for EDCA. Note in particularthat the only mention of EIFS is in b), which is therefore crucial. The prologue to the lettered items says "EDCAFoperations shall be performed at slot boundaries, defined as follows onthe primary channel, for each EDCAF:". b) Following EIFS - DIFS + AIFSN[AC] x aSlotTime + aSIFSTime - aRxTxTurnaroundTime of idle medium after the last indicated busy medium as determined by the physical CS mechanism that was the result of a (11ah)non-S1G frame reception that has resulted in FCS error, or (11ah)of a frame reception that has resulted in PHY-RXEND.indication (RXERROR) primitive where the value of RXERROR is not NoError.Note in particular that EIFS here is applied only for busy medium thatwas the result of the error itself.So it seems that when there is later busy medium, and hence thebackoff is suspended in the sense of 10.3.4.3, the catch-all item e) forwhat to do following busy medium applies. This makes no mention ofusing EIFS, so the medium only has to be clear for the standard formulainvolving AIFS at this point.FWIW, the EDCA version probably makes more sense. The point of EIFS isto clear out a single possible bad frame from consideration. Repeateduse of EIFS after that has happened doesn't seem useful.[This was rejected in CID 1347, in a way that suggest the point was missed. Will present this time!] | Delete " or EIFS" in "The backoff counter is next decremented after the medium has been determined to beidle for the duration of a DIFS or EIFS, as appropriate" in 10.4.3.4 |

Discussion:

The fundamental question is: is EIFS used only for the first backoff after a frame error, or for all backoffs until medium contention is won? If we have a frame error, and the medium goes idle but then busy again, due to energy detect, before contention is won, is EIFS or DIFS used when the medium goes idle again?

The answer is that it is only used for the first backoff, and in the situation given, DIFS is used when the medium goes idle again. This should be made clearer.

Proposed changes:

Make the following changes:

**10.3.2.3.7 EIFS**

A DCF shall use EIFS before transmission, when it determines that the medium is idle immediately following reception of a frame for which the PHY-RXEND.indication primitive contained an error or frame for which the FCS value was not correct.

**10.3.3 Random backoff time *[DCF]***

If the medium is busy, the STA shall defer until the medium is determined to be idle without interruption for a period of time equal to ~~DIFS when the last frame detected on the medium was received correctly, or after the medium is determined to be idle without interruption for a period of time equal to~~ EIFS when the last transition to idle medium was a result of a frame detected on the medium that was not received correctly, or equal to DIFS otherwise.

**10.3.4.3 Backoff procedure for DCF**

All backoff slots occur following a DIFS ~~during which the medium is determined to be idle for the duration of the DIFS,~~ or ~~following an~~ EIFS ~~during which the medium is determined to be idle for the duration of the EIFS,~~ as appropriate (see ~~10.3.2.3 (IFS)~~10.3.3 and 10.3.2.3.7)

The backoff counter is next decremented after the medium has been determined to be idle for the duration of a DIFS or EIFS, as appropriate (see ~~10.3.2.3 (IFS)~~10.3.3 and 10.3.2.3.7), plus aSlotTime.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2640 in <this document>, which clarify that EIFS is only used immediately following the medium going idle at a frame error.

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| Identifiers | Comment | Proposed change |
| CID 2366Mark RISON | The concept of a "MAC variable" appears to have sprouted up, but this concept is not described anywhere. Even worse is that in some places it's being used to define something that is not a variable at all, but a PHY characteristic (e.g. aSlotTime) | Delete "MAC" in "MAC variable" in 10.48.1 and 6.3.5.2.3 and 11.3.9.2 (6x). Change 10.3.2.16 to "A STA in which dot11ShortSlotTimeOptionImplemented is true shall force the PHY characteristic aSlotTime tothe short slot value upon transmission or reception of Beacon, Probe Response, Association Response, andReassociation Response frames from the BSS that the STA has joined or started and that have the short slot subfield equal to 1. The STA shall force the PHY characteristic aSlotTime to the long slot value upon transmissionor reception of Beacon, Probe Response, Association Response, and Reassociation Response frames fromthe BSS that the STA has joined or started and that have the short slot subfield equal to 0.A STA in which dot11ShortSlotTimeOptionImplemented is false shall force the PHY characteristic aSlotTime tothe long slot value at all times. A STA in which dot11ShortSlotTimeOptionImplemented is not present, orwhen the PHY supports only a single slot time value shall use the PHY characteristic aSlotTime obtained from the attached PHY." |

Discussion:

Both points made in the comment are valid.

The changes proposed by the commenter are:

**6.3.5.2.3 When generated**

*[D2.2/346.63]* (11ah)When dot11S1GCentralizedAuthenticationControlActivated is true and a STA’s local ~~MAC~~ variable AuthenticationRequestTransmission is false, then the STA shall not invoke this primitive.

**10.3.2.16 Operation of aSlotTime**

*[D2.2/1734.62]* A STA in which dot11ShortSlotTimeOptionImplemented is true shall ~~set the MAC variable~~force the PHY characteristic aSlotTime to the short slot value upon transmission or reception of Beacon, Probe Response, Association Response, and Reassociation Response frames from the BSS that the STA has joined or started and that have the short slot subfield equal to 1. The STA shall ~~set the MAC variable~~force the PHY characteristic aSlotTime to the long slot value upon transmission or reception of Beacon, Probe Response, Association Response, and Reassociation Response frames from the BSS that the STA has joined or started and that have the short slot subfield equal to 0.

A STA in which dot11ShortSlotTimeOptionImplemented is false shall ~~set the MAC variable~~force the PHY characteristic aSlotTime to the long slot value at all times. A STA in which dot11ShortSlotTimeOptionImplemented is not present, or when the PHY supports only a single slot time value shall ~~set the MAC variable~~use the PHY characteristic aSlotTime ~~to the slot value appropriate for~~obtained from the attached PHY.

**10.48.1 TWT overview**

*[D2.2/2063.12]* A ~~MAC~~ variable AdjustedMinimumTWTWakeDuration is defined for each TWT of each TWT agreement and has a value equal to Nominal Minimum TWT Wake Duration minus the elapsed time from the scheduled start of the TWT SP to the actual start of the SP

**11.3.9.2 Centralized authentication control**

*[D2.2/2224.7]* A non-CAC STA is not constrained by the Authentication Control rules specified in this subclause when it transmits an Authentication Request frame to the AP. A CAC STA sets the local ~~MAC~~ variable AuthenticationRequestTransmission to true when it is initialized.

A CAC STA shall generate a random number v when it is initialized. The generated random number v shall be uniformly distributed between 0 and 1022 (inclusive). The STA may generate a new random value for v after receiving an Authentication Response (Ed)frame from an AP.

A CAC STA shall compare v with the Authentication Control Threshold subfield value in the most recently received Authentication Control element from the AP to which it intends to send an Authentication Request frame if the Control and the Deferral subfields are equal to 0. If v is less than (M101)the Authentication Control Threshold subfield, the STA may transmit an Authentication Request frame to the AP and shall set the local ~~MAC~~ variable AuthenticationRequestTransmission to true. Otherwise, the STA shall set the local ~~MAC~~ variable AuthenticationRequestTransmission to false and the STA shall not transmit an Authentication Request frame to the AP. A CAC STA shall update its MIB values of the CAC parameters based on the values received in the Authentication Control element.

A CAC STA shall set the local ~~MAC~~ variable AuthenticationRequestTransmission to false and shall defer the transmission of an Authentication Request frame to an AP from which it has received an individually addressed (Ed)probe response if the Probe Response (Ed)frame contains an Authentication Control element with the Control subfield equal to 0 and the Deferral subfield equal to 1. The deferral begins at the end of the reception of the Probe Response (Ed)fame and extends for a period of time equal to the value contained in the Authentication Control Threshold subfield value in the Probe Response (Ed)frame. At the end of the deferral time period, the STA shall set the local ~~MAC~~ variable AuthenticationRequestTransmission to true and may transmit an Authentication Request frame to the AP.

A CAC STA shall set the local ~~MAC~~ variable AuthenticationRequestTransmission to true when it receives a Beacon or Probe Response frame that does not include an Authentication Control element from the AP that it intends to join.

One location has been missed by the commenter:

**10.3.9 Determination of PLME aCWmin characteristics**

*[D2.2/1749.10]* In the case of the Clause 18 (Extended Rate PHY (ERP) specification) ERP, the aCWmin value is dependent on the requester’s characteristic rate set. The characteristic rate set is equal to the IBSS’s basic rate set when the STA is operating as a member of an IBSS. It is equal to the AP’s operational rate set when the STA is associated with an AP. At all other times, it is equal to the STA’s mandatory rate set. The MAC variable aCWmin is set to aCWmin(0) if the characteristic rate set includes only rates in the set 1, 2, 5.5, 11; otherwise, aCWmin is set to aCWmin(1). If the returned value for aCWmin is a scalar, then the MAC always sets the variable aCWmin to the returned scalar value of aCWmin.(#65)

Also, all the talk of “local [MAC] variable” is confusing, since clearly a STA cannot set or read a remote variable.

Proposed resolution:

REVISED

Make the changes proposed by the commenter. Additionally, at D2.2/2224.32 change “fame” to “frame” and at D2.2/1749.14 delete “MAC”.

Also delete “local” in “local variable” at D2.2/2152.33, D2.2/2313.35, D2.2/2319.22/45, D2.2/2322.18/25/46 and “local” in “local MAC variable” in 6.3.5.2.3 and 11.3.9.2 at the same locations where “MAC” is being deleted.

Also change “short time slot subfield” to “Short Slot Time subfield” at D2.2/3561.46 and “the short slot subfield” to “the Short Slot Time subfield” at D2.2/1734.64 and D2.2/1735/3. Also change to “short slot time”: “the short slot time option” at D2.2/901.44, “the Short Slot Time mode” at D2.2/2958.27, “the Short Slot Time option” at D2.2/2958.27, D2.2/4182.64, D2.2/4183.12. At D2.2/2958.33 delete “A STA shall use short slot if the BSS indicates short slot.” At D2.2/3636.49 change “Implement Short Slot Time option” to “Support short slot time”.

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

Discussion:

Proposed changes:

Proposed resolution:

REVISED

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

**References:**

802.11md/D2.0 except where otherwise specified