IEEE P802.11  
Wireless LANs

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

This submission proposes resolutions for CIDs 2280, 2316, 2320, 2321, 2322, 2366, 2417, 2421, 2445, 2459, 2488, 2529, 2530, 2532, 2565, 2568, 2596, 2601, 2608, 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 2320  Mark RISON  9.8.3.1  1660.26 | "Ack Policy Indicator 0 is limited to at most one MU recipient per  MU 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 2321  Mark RISON  10.15  1781.29 | 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 the  Ack 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 2322  Mark RISON  10.15  1781.29 | 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 the  Ack 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

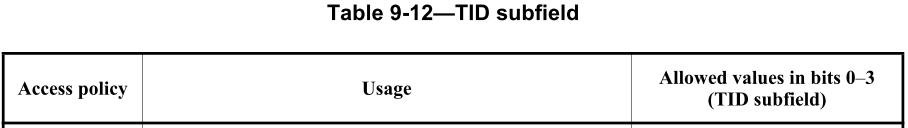
The ack policy is the combination of the Ack Policy Indicator subfield and other information (e.g. whether the MPDU is a non-A-MPDU frame). Also, the second statement is not restricted to MPDUs sent under HT-immediate BA. So the second statement is wider than the first (i.e. QoS Data frames in DMG A-PPDUs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

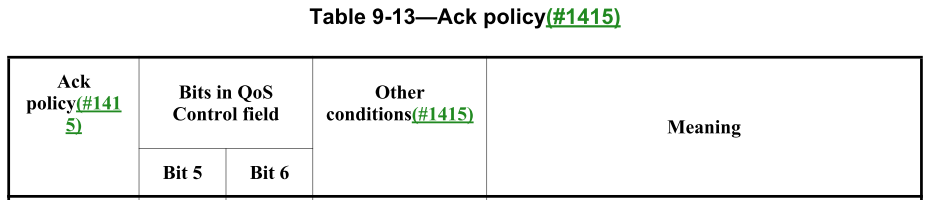
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| Identifiers | Comment | Proposed change |
| CID 2421  Mark RISON  9.2.4.5.4  791.1 | "Bits in QoS Control field" in Table 9-13---Ack policy should refer to Ack Policy Indicator subfield (cf. Table 9-535---Ack Policy Indicator(#1415) subfield in the 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 |

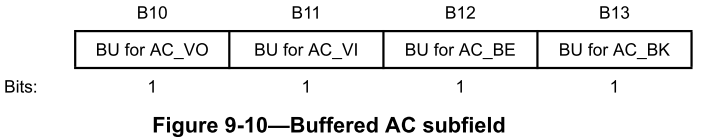
Discussion:

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 2459  Mark RISON  10.24.4.2.3  1822.15 | "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 2529  Mark RISON  12.4.7.4  2537.43 | "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

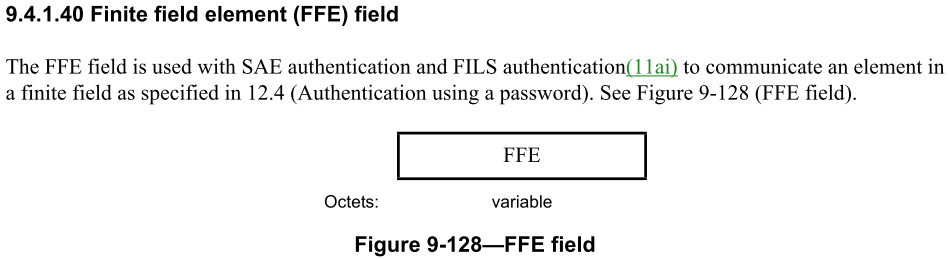
Prepend “SAE ” to “Commit message” throughout the NOTE in Subclause 12.4.7.4 (7x), as proposed by the commenter (other instances in the rest of the subclause appear to have been fixed by D2.1).

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 2530  Mark RISON  12.4.7.4  2537.43 | "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 2532  Mark RISON  12.4.7.4  2537.43 | "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 2445  Mark RISON  12.7.4  2625.9 | "{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 2280  Mark Hamilton  9.2.4.5.4  791.19 | 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 2488  Mark 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 2596  Mark RISON  10.24.4.2.1  1820.41 | 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]***

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.

~~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 2601  Mark RISON  19 | 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 a  received 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 2640  Mark RISON  10.3.4.3  1730.22 | 10.3.4.3 (Backoff procedure for DCF) says (paragraph 5) [context:  backoff suspended when medium busy]: "The medium shall be determined to  be 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 particular  that the only mention of EIFS is in b), which is therefore crucial. The prologue to the lettered items says "EDCAF  operations shall be performed at slot boundaries, defined as follows on  the 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 that  was the result of the error itself.  So it seems that when there is later busy medium, and hence the  backoff is suspended in the sense of 10.3.4.3, the catch-all item e) for  what to do following busy medium applies. This makes no mention of  using EIFS, so the medium only has to be clear for the standard formula  involving AIFS at this point.  FWIW, the EDCA version probably makes more sense. The point of EIFS is  to clear out a single possible bad frame from consideration. Repeated  use 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 be  idle 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 2366  Mark 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 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 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 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 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 2316  Mark RISON | References to "within a beacon interval" are not clear as to whether they mean "the nominal duration of one beacon period relative to a starting point that might not be a TBTT" or "the period of time between two consecutive TBTTs" | Change "within a beacon interval" to "between one TBTT and the next TBTT" throughout and change " at least one beacon interval has elapsed" to " an interval of time equal to one beacon interval has elapsed" in 11.31.2 |

Discussion:

Comment is clear. An example of the meaning being the former is “The beacon interval within an IBSS is established by the STA at which the MLME-START.request primitive is performed to create the IBSS” in 11.1.3.5. An example of the meaning being the latter is “The grpID 0 STAs are allowed to transmit within a beacon interval regardless of whether it is a sectorized beacon interval or not.” in 9.4.2.195, and 10.40.2 Access periods within a beacon interval.

Actually, there is a third possible interpretation, namely “the period of time between two beacons on the air”. This is probably what is intended in “The STAs included in a page slice and indicated by the Page Slice element are served during the beacon intervals within a page period, starting from the Beacon frame that carries the Page Slice element for the page” in 9.4.2.192, and possibly also in 10.40.2.

The wording “within an interval of time equal to one beacon interval” already appears in 10.2.3.2.

Having said all this, there is a definition of “beacon interval”:

**beacon interval:** The time interval between two consecutive target beacon transmission times (TBTTs).

so anything that is referring to either the time between beacons on the air or the time to the next beacon or TBTT is using the wrong terminology.

Proposed changes:

In D2.2:

At 1379.30 (9.4.2.195) change “The grpID 0 STAs are allowed to transmit within a beacon interval regardless of whether it is a sectorized beacon interval or not.” to “grpID 0 STAs are allowed to transmit regardless of whether within a sectorized beacon interval or not.”

At 1697.64 (10.2.3.2) change “within an interval of time equal to one beacon interval” to “within one beacon interval”.

At 1950.16 (10.40.2) and within 10.40.2 change “within a beacon interval” to “in the time interval between Beacon frames” throughout (1950.16/20/54/63, 1951.12/31).

At 2449.36 (11.31.2) consider “an interval of time equal to at least one beacon interval has elapsed”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2316 in <this document>, which make changes in the direction suggested by the commenter.

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| Identifiers | Comment | Proposed change |
| CID 2417  Mark RISON  9.4.1.49  934.35 | Table 9-78---Subcarriers for which a Compressed Beamforming Feedback Matrix subfield and surrounding should refer to subcarrier indices (not just subcarriers) where it's referring to an index rather than the general concept. Also, "Each SNR value per tone" should refer to "subcarrier" not "tone" (also a few other instances in other Clause 9 subclauses) | In Subclauses 9.4.1.27/28/29/49/50/52/62 change "tone" to "subcarrier" throughout. In Subclauses 9.4.1.26/27/28/29 change "carrier" to "subcarrier" throughout, when not in "subcarrier" |

Discussion:

Subcarriers are identified by a subcarrier index and should be referred to as being so identified.

The term “tone” is PHY slang, and the MAC should consistently use “subcarrier”.

Proposed changes:

In the caption and heading row for Table 9-78 (D2.2/945.1/5) change “Subcarriers” to “Subcarrier indices”.

At 948.56 change “NOTE 1—Subcarrier *x*(L) denotes subcarrier index x in the frequency segment lower in frequency, and subcarrier *x*(H) denotes subcarrier index x in the frequency segment higher in frequency.” to “NOTE 1—*x*(L) denotes subcarrier index *x* in the frequency segment lower in frequency, and *x*(H) denotes subcarrier index *x* in the frequency segment higher in frequency.”

In the heading row for Table 9-81 (D2.2/953.25) change “Subcarriers” to “Subcarrier indices”. At 955.53 change “NOTE 2—Subcarrier *x*(L) denotes subcarrier index *x* in the frequency segment lower in frequency, and subcarrier *x*(H) denotes subcarrier index *x* in the frequency segment higher in frequency.” to “NOTE 2—*x*(L) denotes subcarrier index *x* in the frequency segment lower in frequency, and *x*(H) denotes subcarrier index *x* in the frequency segment higher in frequency.”

In the caption and heading row for Table 9-91 (D2.2/966.4/8) change “Subcarriers” to “Subcarrier indices”.

At D2.2/966.31 delete “The” in “The *scidx()* is defined in Table 9-91”.

Change “frequency tone” to “subcarrier” (might be plural) at D2.2/805.36/38.

Change “tone” to “subcarrier” (might be plural) at D2.2/918.57, 919.52, 921.14, 921.15, 921.57, 924.3, 924.4, 924.6, 924.58, 924.35, 924.49, 924.52, 950.28, 950.58, 955.63, 968.31 (2x), 1920.37, 1925.1,

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2417 in <this document>, which consistently refer to subcarriers as such in the MAC clauses, and consistently identify them using an index.

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| Identifiers | Comment | Proposed change |
| CID 2565  Mark RISON | "packet number" should not be used as the term "packet" is imprecise | Change "packet number" to "frame number" throughout |

Discussion:

As the commenter says, “packet” is to be eschewed.

Proposed resolution:

REVISED

In D2.2, change “packet number” to “frame number” (case-preservingly) at 206.48/50, 210.61, 213.30, 289.11/14/44, 303.43, 304.39 (2x), 307.37 (2x), 1155.53, 1414.41, 1591.29, 2216.24, 2574.14, 2580.14, 2587.51, 2636.41, 4157.21/38, 4158.6/23.

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| Identifiers | Comment | Proposed change |
| CID 2568  Mark RISON  1.4 | The terminology "<blah> frame" to refer to a frame of type Action or Action No Ack where the Action/Category fields indicate <blah> is never spelt out | Add in 1.4 "The construction "<name> frame" is sometimes used to refer to an Action or Action No Ack frame whose Category and Action Details fields indicate <name>." |

Discussion:

For some frames it’s spelt out, but not for all. There is a statement about the term for whole categories in 9.4.1.11:

Action frames of a given category are referred to as *<category name> Action frames.* For example, frames in the QoS category are called *QoS Action frames*.

(This suggests no frame should have the same name as the category plus “Action”, or ambiguity will arise.)

Actually, the wording is just all over the place in 9.6!

Proposed changes:

In D2.2:

At the end of the second para in 9.4.11 add a sentence “Action frames of a given category and further identified by a subfield in the Action Details field are referred to as *<subfield name> frames.* For example, frames in the QoS category with a QoS Action subfield of ADDTS Request are called *ADDTS Request frames*.”.

At the end of the para in 9.6.1 add a sentence “The frames defined in this subclause are Action frames, unless stated explicitly to be Action No Ack frames.”

At 1488.22 change “Spectrum management Action frames” to “Spectrum Management Action frames”.

At 1488.41/43/58, 1489.24 change “Measurement” to “Spectrum Measurement”.

At 1488.56, 1489.21/55, 1490.18, 1490.44, 1507.8, 1508.3, 1524.58, 1577.41, 1578.7, 1578.34, 1579.3, 1579.32, 1580.24, 1580.56, 1582.3, 1584.12, 1586.13, 1587.12, delete “ uses the Action frame body format and”.

At 1525.52, 1526.21, delete “ uses the Action frame format and”.

At 1504.36, 1505.8, delete “ uses the Action frame body format. It”.

At 1512.25, 1513.24, 1530.25, delete “ is an Action frame. It”.

At 1517.33 change “is a Public Action frame requesting” to “requests”.

At 1518.58, 1520.7, 1521.37, 1522.10, 1530.54, 1534.3, delete “ is a Public Action frame. It”.

At 1532.42 delete “ is a Public Action frame that”.

At 1526.49, 1527.17, 1527.51, 1528.35 change “The Action field format of” to “The format of the Action field of”.

At 1502.54 delete “format”.

At 1510.59 change “The Measurement Pilot frame uses the Action frame format. The format of the Action field is shown in Figure 9-851 (Measurement Pilot frame Action field format).” to “The format of the Action field of the Measurement Pilot frame is shown in Figure 9-851 (Measurement Pilot frame Action field format).”

At 1533.3 change “The GDD Enablement Request frame is a Public Action frame. The format of the GDD Enablement Request frame action field is shown in Figure 9-876” to “The format of the Action field of the GDD Enablement Request frame is shown in Figure 9-876”.

At 1533.34 change “The GDD Enablement Response frame is a Public Action frame. The format of the GDD Enablement Response frame action field is shown in Figure 9-877” to “The format of the Action field of the GDD Enablement Response frame is shown in Figure 9-877”.

At 1535.3 change “The White Space Map Announcement frame is a Public Action frame. The format of the White Space Map Announcement frame body is shown in Figure 9-879” to “The format of the Action field of the White Space Map Announcement frame is shown in Figure 9-879”.

At 1555.10 change “The On-channel Tunnel Request frame format is defined to allow” to “The On-channel Tunnel Request frame allows”.

At 1559.15 change “The format of the Action field is shown in Figure 9-899 (SA Query Request frame Action field format).” to “The format of the Action field of the SA Query Request frame is shown in Figure 9-899 (SA Query Request frame Action field format).”

At 1559.42 change “The format of the Action field is shown in Figure 9-900 (SA Query Response frame Action field format).” to “The format of the Action field of the SA Query Response frame is shown in Figure 9-900 (SA Query Response frame Action field format).”

At 1563.65 delete “PSMP is an Action frame of category HT.”

At 1584.63 change “The format of the Action field” to “The format of the Action field of the FMS Request frame”.

At 1585.50 change “The format of the Action field” to “The format of the Action field of the FMS Response frame”.

At 1593.26 change “The format of the Action field” to “The format of the Action field of the QoS Traffic Capability Update frame”.

At 1618.18 delete “The Information Request frame is an Action frame of category DMG.”

At 1619.6 delete “The Information Response frame is an Action frame of category DMG.”

At 1619.57 delete “The Handover Request frame is an Action frame of category DMG.”

At 1620.28 delete “The Handover Response frame is an Action frame of category DMG.”

At 1631.29 delete “The FST Setup Request frame is an Action frame of category FST.”

At 1632.28, 1633.26, 1633.56, 1634.30, delete “ is an Action frame of category FST. This frame”.

At 1635.3 delete “The On-channel Tunnel Request frame is an Action frame of category FST.”

At 1640.54, 1641.17 delete “ is an Action frame of category VHT. It”.

At 1643.3 change “The AID Switch Request frame is an Action frame of category Unprotected S1G. A STA that is changing its device characteristic as defined in 9.4.2.193 (AID Request element(11ah)) uses the frame” to “A STA that is changing its device characteristic as defined in 9.4.2.193 (AID Request element(11ah)) uses the AID Switch Request frame”.

At 1643.39, 1644.12, 1644.41, 1646.3, 1646.37, 1648.44, delete “ is an Action frame of category Unprotected S1G. It”.

At 1658.30 delete “ is an Action frame of category CMMG. It”.

At 1659.24 delete “ an Action frame”.

At 1803.37, 1885.20, 1885.44/46/48 change “Action frame” to “Action and Action No Ack frame”.

At 1870.26 change “GLK Groupcast Mode Change Notification action frame” to “GLK Groupcast Mode Change Notification frame”.

At 2412.26 change “protected dual of public action frames” to “Protected Dual of Public Action frames”. At 479.34 change “Protected dual of” to “Protected Dual of”. At 2495.16, 4078.44/59, 4079.7/21 change “protected duals of” to “Protected Dual of”.

At 2468.3 change “action frame” to “Action frame”.

At 2489.12/14 change “management action frame(s)” to “Action frame(s)”.

At 1488.28, 1503.42, 1504.7, 1558.51, 1576.39, 1598.29, 1600.32, 1605.61, 1612.15, 1636.12, delete “ octet” in “the octet field”.

At 1503.41 delete “An Organization Identifier, in the octet field immediately after the Category field, differentiates the vendors (see 9.4.1.31 (Organization Identifier field)).”

At 1636.12 change “An Action field,” to “An Unprotected DMG Action field,”.

At 1488.58, 1489.24, 1489.56, 1490.19, 1490.47, 1518.59, 1519.1, 1520.9, 1520.13, 1521.38, 1521.43, 1522.12, 1522.16, 1523.34, 1523.38, 1524.60, 1525.6, 1529.25, 1529.34, 1535.30, 1535.41, 1536.24, 1536.38, 1553.26, 1553.31, 1554.17, 1554.21, 1577.43, 1577.52, 1578.8, 1578.17, 1578.35, 1578.44, 1579.4, 1579.13, 1579.34, 1579.43, 1580.26, 1580.36, 1580.58, 1581.45, 1582.6, 1582.20, 1584.14, 1584.25, 1585.31, 1585.59, 1586.15, 1586.23, 1587.13, 1587.23, 1588.10, 1588.22, 1588.44, 1588.54, 1589.6, 1589.14, 1590.7, 1590.25, 1592.36, 1592.45, 1592.62, 1593.6, 1593.35, 1594.4, 1594.14, 1594.39, 1594.51, 1595.22, 1595.32, 1595.52, 1595.61, 1596.14, 1596.22, 1596.38, 1596.47, 1597.53, 1597.62, 1598.55, 1599.13, 1599.26 add “frame ” before “Action field”.

At 1587.43, 1587.54, 1589.30, 1589.43, 1642.11, 1653.1, 1653.33 add “ Action field” after “frame”.

At 1642.4 at the end of the para add a sentence “The format of the Action field of the FILS Container frame is shown in Figure 9-947.”.

At 1652.63 change “The frame format of this frame is shown Table 9-513” to “The format of the Action field of the Control Response MCS Negotiation Request frame is shown in Table 9-513”.

At 1653.28 change “The frame format of this frame is shown in” to “The format of the Action field of the Control Response MCS Negotiation Response frame is shown in”.

At 1587.43 add “ the” after “format of”.

At 1657.52 delete “frame format”.

At 1498.34/44 change “Action” to “QoS Action”.

At 1598.52, 1599.17 change “Action” to “Unprotected WNM Action”.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2568 in <this document>, which address the point raised by the commenter and more generally make the definitions of Action frames clearer and more consistent.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 2608  Mark RISON | "existing block ack agreement" -- can hardly be about a past or future one! | Delete "existing" in the cited text in 10.2.6 and 11.5.2.2 |

Discussion:

Clearly, past block ack agreements are of no relevance.

Interestingly, though, future block ack agreements are relevant in that sometimes the test is about the mechanisms used to establish such an agreement.

Proposed resolution:

REVISED

In D2.2:

At 1701.50 change "an existing block ack agreement" to "a block ack agreement".

At 1866.4 change "an established block ack agreement" to "a block ack agreement"

At 2246.6 change "no other existing block ack agreement" to "no block ack agreement"

At 2462.34 change "the established block ack agreement is operating" to "the block ack agreement is to operate"

At 2462.38 change "the block ack agreement shall operate" to "the block ack agreement is to operate"

At 2462.51 change "the established block ack agreement is operating" to "the block ack agreement is to operate"

At 2462.58 change "the block ack agreement, if established, shall operate" to "the block ack agreement is to operate"

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 2314  Mark RISON | The concept "S1G Control frame" is unnecessary, since it's just a Control frame (that happens to be send in an S1G PPDU, but that's the only thing an S1G STA can send anyway). Futhermore, it leaves it unclear whether all the rules that pertain to vanilla Control frames also apply to S1G Control frames, though presumably they do. Oh, and it's confusing with dot11S1GControlFieldOptionImplemented | Delete “S1G” in “S1G Control” (changing “an” to “a” if preceding) throughout except as stated in the following. In 9.2.4.1.1 delete “The Control frames carried by S1G PPDUs are called S1G Control frames.” and change “The Frame Control field of S1G Control frames is defined in 9.3.1.1 (Format of Control frames).” to “For a frame carried in an S1G PPDU, when the value of the Type subfield is equal to 1, the format of the Frame  Control field is defined in 9.3.1.1 (Format of Control frames).” In 9.3.1.1 change "S1G Control frame" to "Control frame carried in an S1G PPDU" (6x) |

Discussion:

As the commenter says, we don’t need to use different terminology for Control frames sent by an S1G STA (just as we didn't need to introduce “DMG Control frame” terminology). Various STAs have different sets of permissible Control frames (e.g. HT STAs don't use SSW frames; they are only used by DMG STAs), but they’re still all Control frames and obey the rules for Control frames.

Proposed changes:

In D2.2:

**9.2.4.1.1 General**

The first three subfields of the Frame Control field of a PV0 frame(11ah) are Protocol Version, Type, and Subtype. The remaining subfields of the Frame Control field depend on the setting of the Type and Subtype subfields. ~~(11ah)The Control frames carried by S1G PPDUs are called S1G Control frames.~~

~~(11ah)The Frame Control field of S1G Control frames is defined in 9.3.1.1 (Format of Control frames).~~ For a frame carried in an S1G PPDU, when the value of the Type subfield is equal to 1, the format of the Frame Control field is defined in 9.3.1.1 (Format of Control frames).

(11ah)In a~~n S1G~~ Control frame carried in an S1G PPDU, when the Subtype subfield is not equal to 3 and not equal to 10, the format of the Frame Control field is shown(#243) in Figure 9-27 (Frame Control field format(#2607) in S1G Control frames when Subtype is not equal to 3 and not equal to 10(11ah)).

Figure 9-27—Frame Control field format(#2607) in ~~S1G~~ Control frames carried in an S1G PPDU

when Subtype is not equal to 3 and not equal to 10(11ah)

(11ah)In a~~n S1G~~ Control frame carried in an S1G PPDU, when the Subtype subfield is equal to 3, the format of the Frame Control field is shown(#243) in Figure 9-28 (Frame Control field format(#2607) in S1G Control frame when Subtype subfield is equal to 3(11ah)).

Figure 9-28—Frame Control field format(#2607) in ~~S1G~~ Control frames carried in an S1G PPDU

when Subtype subfield is equal to 3(11ah)

(11ah)In a~~n S1G~~ Control frame carried in an S1G PPDU, when the Subtype subfield is equal to 10, the format of the Frame Control field is shown(#243) in Figure 9-29 (Frame Control field format(#2607) in S1G Control frames when Subtype subfield is equal to 10(11ah)).

Figure 9-29—Frame Control field format(#2607) in ~~S1G~~ Control frames carried in an S1G PPDU

when Subtype subfield is equal to 10(11ah)

**9.3.1.21 TACK frame format(11ah)**

The Frame Control field is defined in 9.2.4.1 (Frame Control field) and is shown(#243) in Figure 9-28 (Frame Control field format(#2607) in S1G Control frame when Subtype subfield is equal to 3(11ah)).

**10.6.6.6 Channel Width selection for Control frames**

(11ah)An S1G STA transmitting a~~n S1G~~ Control frame or an NDP CMAC frame(#1143) shall set the TXVECTOR parameter FORMAT depending on the value of the TXVECTOR parameter CH\_BANDWIDTH:

— If CH\_BANDWIDTH is equal to CBW1 then the FORMAT shall be S1G

— If CH\_BANDWIDTH is equal to CBW2 then the FORMAT shall be:

— S1G\_DUP\_1M if the RXVECTOR parameter CH\_BANDWIDTH of the eliciting ~~S1G~~ Control frame is equal to CBW1 and the Bandwidth Indication field in the Frame Control field is 1.

— S1G\_DUP\_1M if the S1G STA intends to transmit a duplicate 1 MHz Control frame(M101) to an S1G STA that supports duplicate 1 MHz frames as indicated in the duplicate 1 MHz Support field of the S1G Capabilities element received from that S1G STA.

— S1G otherwise.

— Otherwise, the FORMAT shall be S1G DUP\_2M.

**10.6.12 Channel Width in non-HT and non-HT duplicate PPDUs**

(11ah)An S1G STA transmitting a~~n S1G~~ Control frame that is not a control response frame shall set the Bandwidth Indication field in the Frame Control field of the frame to a value that is equivalent to the (#1456)TXVECTOR parameter CH\_BANDWIDTH.

(11ah)An S1G STA shall not transmit a~~n S1G~~ Control frame or an NDP CMAC frame with the TXVECTOR parameter S1G\_DUP\_1M to another S1G STA, unless the Duplicate 1 MHz Support field of the S1G Capabilities element received from that STA contained a value of 1.

(11ah)An S1G STA transmitting a non-NDP ~~S1G C~~control response frame that is sent as a response to a~~n S1G~~ Control frame shall set the Bandwidth Indication field in the Frame Control field of the frame to the value of the Bandwidth Indication field in the Frame Control field of the eliciting frame, except for an S1G STA that has indicated the use of 1 MHz control response frames (see 10.6.6.6 (Channel Width selection for Control frames)) in which case the Bandwidth Indication field in the Frame Control field of the non-NDP ~~S1G C~~control response frame shall be set to 0.

(11ah)An S1G STA shall set the Dynamic Indication field in the Frame Control field of ~~S1G~~ Control frames, other than RTS frame, to 0.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2314 in <this document>, which make the changes suggested by the commenter with some minor editorials.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 2047  Assaf Kasher  25.7.2.4  3510.1 | "Any transmit signal transients that occur due to this TX AWV configuration change" - which TX AWV configuration chagne? None were discussed in this sub clause | Move this sentence afterh the first sentence of the next paragraph |

Discussion:

As the commenter says, talking about “this TX AWV configuration change” presupposes that a TX AWV configuration change has hitherto been discussed.

Note: TX AWV configuration change is also discussed in 20.9.2.2.6 TRN field and 25.7.2.6 Beam refinement TRN-T subfield, but at the end, so fine.

Proposed changes:

Move sentences as shown (in D2.2):

**20.9.2.2.5 AGC field**

The beam refinement AGC fields are composed of 4N repetitions of the sequence [Ga64 Ga64 Ga64 Ga64 Ga64] when the packet is transmitted using the (#64)SC mode and [Gb64 Gb64 Gb64 Gb64 Gb64] when the packet is transmitted using the control mode. The sequences Ga64 and Gb64 are defined in 20.10 (Golay sequences). The sequences are transmitted using rotated π/2-BPSK modulation. ~~Any transmit signal transients that occur due to this TX AWV configuration change shall completely settle by the end of the first Ga64 or Gb64 subsequence.~~

In a BRP-TX PPDU(#1379), the transmitter may change the TX AWV configuration at the beginning of each AGC subfield. Any transmit signal transients that occur due to this TX AWV configuration change shall completely settle by the end of the first Ga64 or Gb64 subsequence. The set of AWVs used for the AGC subfields should be the same as that used for the TRN-T subfields. In a BRP-RX PPDU(#1379), the transmitter shall use the same TX AWV as in the preamble and data fields of the packet.

**24.9.2.2.5 AGC field**

The beam refinement AGC fields are composed of 4N repetitions of the sequence [Ga64 Ga64 Ga64 Ga64 Ga64] when the packet is transmitted using the SC mode and [Gb64 Gb64 Gb64 Gb64 Gb64] when the packet is transmitted using the control mode. The sequences Ga64 and Gb64 are defined in 20.10 (Golay sequences). The sequences are transmitted using rotated π/2-BPSK modulation. ~~Any transmit signal transients that occur due to this TX AWV configuration change shall completely settle by the end of the first Ga64 or Gb64 subsequence.~~

In a BRP-TX PPDU(#1379), the transmitter may change the TX AWV configuration at the beginning of each AGC field. Any transmit signal transients that occur due to this TX AWV configuration change shall completely settle by the end of the first Ga64 or Gb64 subsequence. The set of AWVs used for the AGC subfields should be the same as that used for the TRN-T fields. In a BRP-RX PPDU(#1379), the transmitter shall use the same TX AWV as in the preamble and data fields of the packet.

**25.7.2.4 Beam refinement AGC field**

The beam refinement AGC fields are composed of 4N repetitions of the sequence […] when the packet is transmitted using the control mode in bandwidth 540 MHz, […] when the packet is transmitted using the SC mode in bandwidth 540 MHz, […] when the packet is transmitted using the OFDM mode in bandwidth 540 MHz, […] when the packet is transmitted using the control mode in bandwidth 1080 MHz, […] when the packet is transmitted using the SC mode in bandwidth 1080 MHz, and […] when the packet is transmitted using the OFDM mode in bandwidth 1080 MHz. The sequences […] are defined in 25.8 (ZCZ sequence). The sequences are transmitted using rotated π/2-QPSK modulation. ~~Any transmit signal transients that occur due to this TX AWV configuration change shall completely settle by the end of the first […] subsequence in bandwidth 540 MHz and […] subsequence in bandwidth 1080 MHz.~~

In a BRP-TX PPDU(#1379), the transmitter may change the TX AWV configuration at the beginning of each AGC subfield. Any transmit signal transients that occur due to this TX AWV configuration change shall completely settle by the end of the first […] subsequence in bandwidth 540 MHz and […] subsequence in bandwidth 1080 MHz. The set of AWVs used for the AGC subfields should be the same as that used for the TRN-T subfields. In a BRP-RX PPDU(#1379), the transmitter shall use the same TX AWV as in the preamble and data fields of the packet.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 2047 in <this document>, which make the change proposed by the commenter, and additionally make a similar change in Clauses 20 and 25.

|  |  |  |
| --- | --- | --- |
| 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