IEEE P802.11  
Wireless LANs

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| LB 236 comments assigned to Hamilton | | | | |
| Date: 2019-07-11 | | | | |
| Author(s): | | | | |
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Abstract

This submission contains comments on REVmd LB 236, assigned to Mark Hamilton for preparation of proposed resolutions.

The first section contains comments with proposed resolutions ready for review or discussion by TGmd. The latter sections are comments not ready for discussion yet, or already completed.

R0 – initial version. CIDs ready for TGmd review: 2437, 2438, 2087, 2078, 2077, 2342, 2361, 2379, 2409, 2428, 2453, 2458, 2460, 2461, 2468, 2410 and 2391.

R1 – Minor updates (marked with blue highlight), after off-line review.

R2 – Moved agreed resolutions to the Completed section. Updated proposed resolutions for CIDs 2437, 2438, and 2342, based on discussion in the June 26, 2019 teleconference.

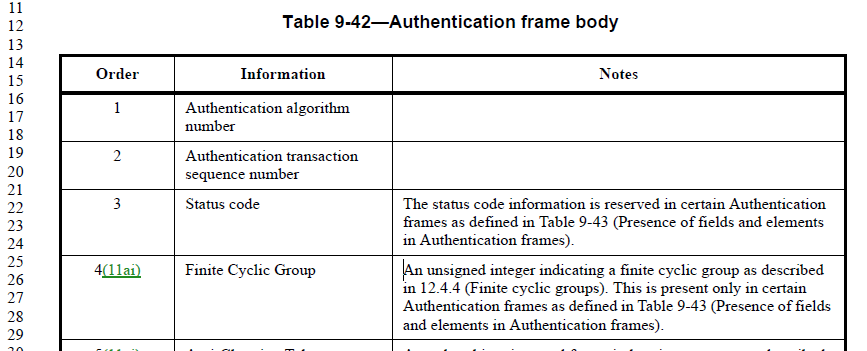
R3 – Moved agreed resolutions to the Completed section. CID 2410 still needs clarifying discussion. CIDs with new proposed resolutions ready for review: 2510

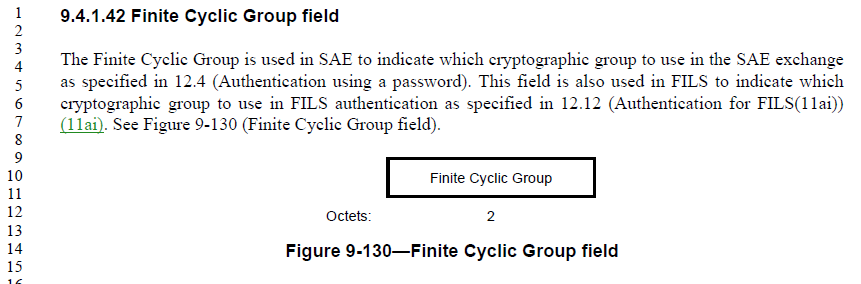
R4 – Updated resolution to CID 2437, after off-line review. Updated resolution to CID2410, as directed on June 28 teleconference. Added proposed resolutions for CIDs 2510, 2295, 2119, 2351, 2091, 2692, and 2480. CID 2340 needs discussion.

**For review by TG:**

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2437 | 873.25 | 9.3.3.12 | "An unsigned integer indicating a finite cyclic group" -- need to say how many octets, because this is needed to be able to disambiguate the various things that can be in an Auth frame (esp. one that includes e.g. a Password Identifier field) | Change the cited text at the referenced location to "A 42-octet long unsigned integer indicating a finite cyclic group" |

Discussion:

Here is the definition of the Finite Cyclic Group field in the Authentication frame body:

Subclause 9.4.1.42 defines the format for this field (because it is not an element):

However, this definition of the format is a little unclear, as it only specifies it is 2 octets, without a clear reference to what is in those octets. Suggest adding a reference to how these 2 octets indicate a finite cyclic group.

Originally proposed resolution:

Revised. Insert text in 9.4.1.42 as shown:

The Finite Cyclic Group is used in SAE to indicate an unsigned integer taken from the IANA registry for “Group Description”, which specifies the cryptographic group to use in the SAE exchange as specified in 12.4 (Authentication using a password).

Revisit, June 28, 2019:

After review by a security expert and other off-line discussion, the alternative resolution below is proposed. This resolution has the benefit of covering the FILS scenario as well, with the same mention of using the IANA registry.

One additional concern was discovered: The dot11RSNAConfigDLCGroupIdentifier (within the dot11RSNAConfigDLCGroupTable) is defined in the MIB to be an “unsigned32”. These Identifier values are supposed to be used as the values in the Finite Cyclic Group field, at least for FILS. Thus, these need to be 2 octet (unsigned, 16-bit) values. The IANA registry for Group Description values (<https://www.iana.org/assignments/ipsec-registry/ipsec-registry.xhtml#ipsec-registry-10>) also clearly assumes 16-bit values. Recommend changing the MIB structure so this table holds 16-bit Identifier values.

Proposed Resolution: - Below is agreed on June 28 telecon, with these comments:

* Updated resolution based on review by Dan Harkins
* Update the Table 9-42 in the resolution.
* Either we should specify the registry or make the text more generic.
* This will be the resolution unless some new proposal is brought.

Revised.

In 9.4.1.42, replace:

The Finite Cyclic Group field(M101) is used in SAE to indicate (M101)the cryptographic group to use in the SAE exchange as specified in 12.4 (Authentication using a password). This field is also used in FILS to indicate (M101)the cryptographic group to use in FILS authentication as specified in 12.12 (Authentication for FILS(11ai)) (11ai). See Figure 9-130 (Finite Cyclic Group field format(#2607)).

with:

The Finite Cyclic Group field is used by SAE, as specified in 12.4 (Authentication using a password), and FILS, as specified in 12.12 (Authentication for FILS), to indicate an unsigned integer taken from an IANA registry for "Group Description" which specifies the cryptographic group to use in the exchange. See Figure 9-130 (Finite Cyclic Group field).

In the MIB definition of Dot11RSNAConfigDLCGroupEntry, change the type of dot11RSNAConfigDLCGroupIdentifier from “Unsigned32” to “Unsigned32 (0..65535)”.

Update the reference in Table 9-42 (row for Finite Cyclic Group) from “as described in 12.4.4” to “as described in 9.4.1.42”.

From off-line discussion, since June 28:

Propose to update the resolution to make clause 9 generic w.r.t. SAE, FILS and AP PeerKey protocols, which all use this field (in similar ways). Note that SAE mentions this table in 12.2.4, 12.4.4.1; AP PeerKey mentions this table in 12.11.2; FILS mentions this table in 12.12.

Also, noted that the proposed changes to the MIB were incorrect in form, and should have updated the definition of the sub-element in the table entry.

Finally, agreed to update the wording within the SAE, FILS and AP PeerKey descriptions in clause 12, and within the MIB Description, to all be similar, to avoid confusion.

Proposed Resolution:

Revised.

In 9.4.1.42, replace:

The Finite Cyclic Group field(M101) is used in SAE to indicate (M101)the cryptographic group to use in the SAE exchange as specified in 12.4 (Authentication using a password). This field is also used in FILS to indicate (M101)the cryptographic group to use in FILS authentication as specified in 12.12 (Authentication for FILS(11ai)) (11ai). See Figure 9-130 (Finite Cyclic Group field format(#2607)).

with:

The Finite Cyclic Group field is used as specified in Clause 12 to indicate an unsigned integer, from a repository maintained by IANA as “Group Description” attributes for IETF RFC 2409 (IKE) [B18][B33], that specifies the cryptographic group to use in a cryptographic exchange. See Figure 9-130 (Finite Cyclic Group field).

In the MIB definition of dot11RSNAConfigDLCGroupIdentifier, change the SYNTAX from “Unsigned32” to “Unsigned32 (0..65535)”.

Update the reference in Table 9-42 (row for Finite Cyclic Group) from “as described in 12.4.4” to “as described in 9.4.1.42”.

Update the second paragraph of 12.2.3.2 (to be similar to wording in 12.4.4.1 and 12.11.2):

“If PFS is desired, the STA selects a finite cyclic group from the (M85)dot11RSNAConfigDLCGroupTable, which comprises identifying numbers from a repository maintained by IANA as “Group Description”

attributes for IETF RFC 2409 (IKE) [B18][B33]. The STA then …”

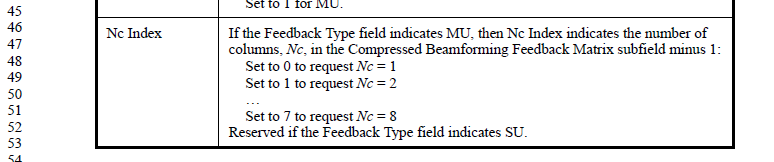
In C.3 update the wording (to also align):

This variable uniquely identifies a domain parameter set for a group in the repository maintained by IANA ~~registry~~ as `Group Description' attributes for IETF RFC 2409 (IKE) [B18][B33].

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2410 |  | 9 | It is reasonable to expect people reading the 802.11 specification to be capable of understanding the concept "minus 1" without needing further details | In Table 9-31 replace ": Set to 0 to request Nc = 1 Set to 1 to request Nc = 2 ... Set to 7 to request Nc = 8" with ".". In Table 9-72 replace ": Set to 0 for Nc = 1 Set to 1 for Nc = 2 ... Set to 7 for Nc = 8" with "." and ": Set to 1 for Nr = 2 ... Set to 7 for Nr = 8" with ".". In Table 9-87 and Table 9-57 replace ": Set to 0 for Nc = 1 Set to 1 for Nc = 2 Set to 2 for Nc = 3 Set to 3 for Nc = 4" with "." and ": Set to 0 for Nr = 1 Set to 1 for Nr = 2 Set to 2 for Nr = 3 Set to 3 for Nr = 4" with ".". In Table 9-57 replace ": Set to 1 for Nr = 2 Set to 2 for Nr = 3 Set to 3 for Nr = 4" with ".". In 9.3.4.2 delete " For example, when the number of SSW frames allowed per sector sweep is 5, the subfield contains the value 4.". In 9.4.2.170.2 delete "For example, a value of 0 indicates that one TBTT Information field is included. " In 9.6.7.36 delete " (the length of the Short SSID in octets minus 1)". In 9.3.1.8.3 delete "For example, a value of 2 in the TID\_INFO subfield means that information for three TIDs is present." and change "less one" to "minus one" in the preceding sentence |

Discussion:

From Table 9-31 in 9.3.1.19:



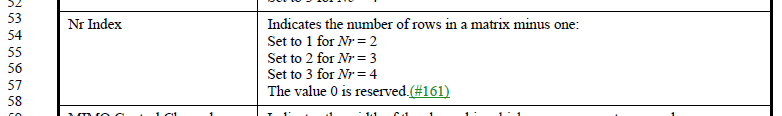
The above example appears to agree with the comment, assuming the text is sufficiently clear about what the “minus 1” is subtracted from, then the list of examples is not needed. However, the sentence leading up to the “minus 1” is a bit confusing, and could be hard to parse, especially for non-native speakers.

Recommend re-wording:

“If the Feedback Type field indicates MU, then Nc Index indicates the number of columns minus 1, (*Nc-1)*, in the Compressed Beamforming Feedback Matrix subfield:”

and removing the “examples”.

In Tables 9-72, 9-87 and 9-57, the Nc Index and Nr Index Descriptions are similar but much simpler (no complex sentence leading into the “minus 1”), except that in Table 9-57 for Nr, there is no row for “Set to 0” and instead there is a statement that “The value 0 is reserved.”:



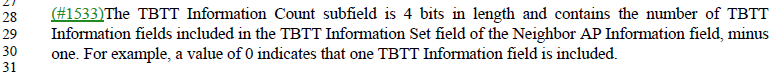
In these cases, it seems fine to remove the examples, as long as the exception line is retained.

In 9.3.4.2, the cited text is:



Here, again, the placement of the “minus one” is a little confusing, since it could be attempted to apply it to the “per sector sweep slot”. Recommend keeping the example here.

In 9.4.2.170.2, the cited text is:



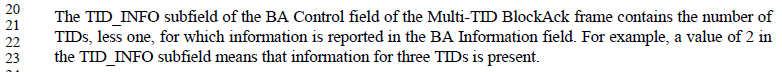
In this case, the comma saves it. Okay to remove the example.

In 9.6.7.36, the cited text is:



This example, just on the face of it, is confusing. Clearly, the situation is confusing. Recommend keeping the example to help the reader confirm they understand the interrelationship of these fields.

And, finally, in 9.3.1.8.3, the cited text is:



This case is straightforward. Recommend deleting the example. Agree with changing “less one” to “minus one”.

Proposed Resolution – agreed on June 28:

Revised.

In Table 9-31, replace

“If the Feedback Type field indicates MU, then Nc Index indicates the number of columns, Nc, in the Compressed Beamforming Feedback Matrix subfield minus 1:”

with

“If the Feedback Type field indicates MU, then Nc Index indicates the number of columns minus 1, *(Nc-1)*, in the Compressed Beamforming Feedback Matrix subfield:”

and replace

":  
Set to 0 to request Nc = 1  
Set to 1 to request Nc = 2  
...  
Set to 7 to request Nc = 8"

with

".".

[ Note to editor, the ‘-‘ in ‘Nc-1’ should be a minus glyph, not a hyphen. ]

In Table 9-72 replace

":  
Set to 0 for Nc = 1  
Set to 1 for Nc = 2  
...  
Set to 7 for Nc = 8"

with

"."

and replace

":  
Set to 1 for Nr = 2  
...  
Set to 7 for Nr = 8"

with

"."

In Table 9-87 and Table 9-57 replace

":  
Set to 0 for Nc = 1  
Set to 1 for Nc = 2  
Set to 2 for Nc = 3  
Set to 3 for Nc = 4"

with

"."

and in Table 9-87 only, replace

":  
Set to 0 for Nr = 1  
Set to 1 for Nr = 2  
Set to 2 for Nr = 3  
Set to 3 for Nr = 4"

with

"."

and in Table 9-57 only, replace

":  
Set to 1 for Nr = 2  
Set to 2 for Nr = 3  
Set to 3 for Nr = 4"

with

".".

[ Note to Editor, in Table 9-57, “Nr Index” row, retain the statement “The value 0 is reserved.” ]

In 9.4.2.170.2 delete "For example, a value of 0 indicates that one TBTT Information field is included. "

9.3.1.8.3 delete "For example, a value of 2 in the TID\_INFO subfield means that information for three TIDs is present." and change "less one" to "minus one" in the preceding sentence

Need to revisit the two missing textual context deletions:

In 9.3.4.2, the cited text is:



Proposal: in 9.3.4.2, make changes as shown:

The FSS subfield specifies the number of SSW frames allowed per sector sweep slot minus one (10.43.5 (Beamforming in A-BFT)), as number of SSW frames allowed minus one. The range of this subfield is 0 to 15. ~~For example, when the number of SSW frames allowed per sector sweep is 5, the subfield contains the value 4.~~

In 9.6.7.36, the cited text is:



In this case, the example provided is to cover the special case where an independent bit (the Short SSID Indicator) has a given value, that implies the length of the field discussed in the paragraph (the SSID/Short SSID subfield) is fixed, because a Short SSID has fixed length (4 octets), thus the SSID Length subfield happens to be known and predictable, as “3”. Thus, the example is not ‘helping’ the reader understand what “minus one” means, but rather to notice the linkage between these subfields, and the a prior known value of this SSID Length subfield, in this specific case.

Proposal: in 9.6.7.36, make no changes.

Proposed Resolution:

Revised.

In Table 9-31, replace

“If the Feedback Type field indicates MU, then Nc Index indicates the number of columns, Nc, in the Compressed Beamforming Feedback Matrix subfield minus 1:”

with

“If the Feedback Type field indicates MU, then Nc Index indicates the number of columns minus 1, *(Nc-1)*, in the Compressed Beamforming Feedback Matrix subfield:”

and replace

":  
Set to 0 to request Nc = 1  
Set to 1 to request Nc = 2  
...  
Set to 7 to request Nc = 8"

with

".".

[ Note to editor, the ‘-‘ in ‘Nc-1’ should be a minus glyph, not a hyphen. ]

In Table 9-72 replace

":  
Set to 0 for Nc = 1  
Set to 1 for Nc = 2  
...  
Set to 7 for Nc = 8"

with

"."

and replace

":  
Set to 1 for Nr = 2  
...  
Set to 7 for Nr = 8"

with

"."

In Table 9-87 and Table 9-57 replace

":  
Set to 0 for Nc = 1  
Set to 1 for Nc = 2  
Set to 2 for Nc = 3  
Set to 3 for Nc = 4"

with

"."

and in Table 9-87 only, replace

":  
Set to 0 for Nr = 1  
Set to 1 for Nr = 2  
Set to 2 for Nr = 3  
Set to 3 for Nr = 4"

with

"."

and in Table 9-57 only, replace

":  
Set to 1 for Nr = 2  
Set to 2 for Nr = 3  
Set to 3 for Nr = 4"

with

".".

[ Note to Editor, in Table 9-57, “Nr Index” row, retain the statement “The value 0 is reserved.” ]

In 9.4.2.170.2 delete "For example, a value of 0 indicates that one TBTT Information field is included. "

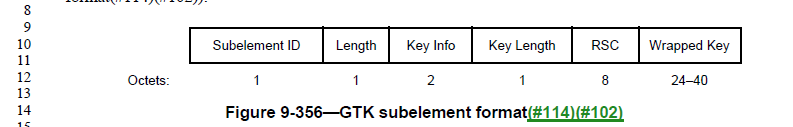
9.3.1.8.3 delete "For example, a value of 2 in the TID\_INFO subfield means that information for three TIDs is present." and change "less one" to "minus one" in the preceding sentence

In 9.3.4.2, make changes as shown:

The FSS subfield specifies the number of SSW frames allowed per sector sweep slot minus one (10.43.5 (Beamforming in A-BFT)), as number of SSW frames allowed minus one. The range of this subfield is 0 to 15. ~~For example, when the number of SSW frames allowed per sector sweep is 5, the subfield contains the value 4.~~

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2510 | 1148.04 | 9.4.2.47 | "The Wrapped Key field contains the wrapped IGTK being distributed. The length of the resulting AES-Key-wrapped IGTK in the Wrapped Key field is Key Length + 8 octets." Assuming this wrapping is the wrapping described in 13.8.5 per the description of GTK KDEs above, the second statement is only true of the IGTK is exactly 8 octets long, which even if true now might not be in the future (i.e. spec rot). Actually, even that's not possible since the wrapping (padding) only occurs "if the key length is less than 16 octets or  if it is not a multiple of 8", but Figure 9-356/358 suggest the field is at least 24 octets long | Change the cited text to just "The Wrapped Key field contains the encrypted IGTK as described in 13.8.5 (FT authentication sequence:  contents of fourth message)." (cf. 1147.40) |

Discussion:





From discussion with Dan:

AES-keywrap always adds 64 bits to the wrapped data, to carry the integrity check used by the receiver to know that the decryption was successful. So, len(AES-Keywrap(GTK)) will always be len(GTK)+64.

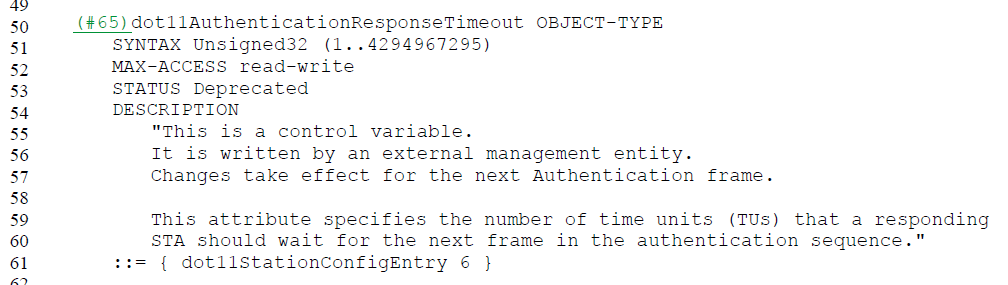
In fact, we don’t have any ciphers in use in 802.11 that use a 64-bit key, so the IGTK is never 8 octets, currently.

Proposed Resolution:

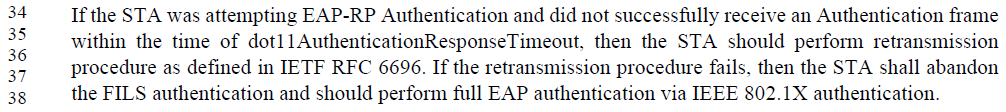
Rejected: The commenter fails to identify a problem. The length is the length of the IGTK plus 8 octets, regardless of the length of the IGTK. The IGTK is (currently) always at least 16 octets long, so the figures are correct.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2295 | 3778.50 | C.3 | dot11AuthenticationResponseTimeout is deprecated, but it doesn't say why (by convention, it should). There is no obvious reason why this is deprecated. | Change "Deprecated" to "current" |

Discussion:



Currently, the only mention of dot11AuthenticationResponseTimeout (outside the MIB) is in the context of EAP-RP Authentication, added with FILS (in 12.12.2.3.5):



Per the MIB description, dot11AuthenticationResponseTimeout is supposed to be used to timeout each message exchange in an Authentication sequence. While AuthenticateFailureTimeout does a timeout across the entire sequence (apparently, per the MLME-AUTHENTICATE.request primitive description). It does not seem that we really need both.

A reasonable answer to the CID might be to add that it was deprecated because it was redundant with AuthenticateFailureTimeout, which can serve effectively the same purpose, while the implementation can follow the rules for RFC 6696 as an implementation detail, if applicable.

If dot11AuthenticationResponseTimeout is left as deprecated, the text quoted above (for EAP-RP) needs to be updated to not depend on this attribute. Suggest:

Replace the quoted text in 12.12.2.3.5, with:

If the STA was attempting EAP-RP Authentication and did not successfully receive an Authentication frame ~~within the time of dot11AuthenticationResponseTimeou~~t, then the STA should perform retransmission procedure as defined in IETF RFC 6696, and with implementation-specific timeouts as guided by the AuthenticateFailureTimeout provided in the MLME-AUTHENTICATE.request. If the retransmission procedure fails, then the STA shall abandon the FILS authentication and should perform full EAP authentication via IEEE 802.1X authentication.

Proposed Resolution:

In 12.12.2.3.5, modify the sentence as shown:

If the STA was attempting EAP-RP Authentication and did not successfully receive an Authentication frame ~~within the time of dot11AuthenticationResponseTimeou~~t, then the STA should perform retransmission procedure as defined in IETF RFC 6696, and with implementation-specific timeouts as guided by the AuthenticateFailureTimeout provided in the MLME-AUTHENTICATE.request.

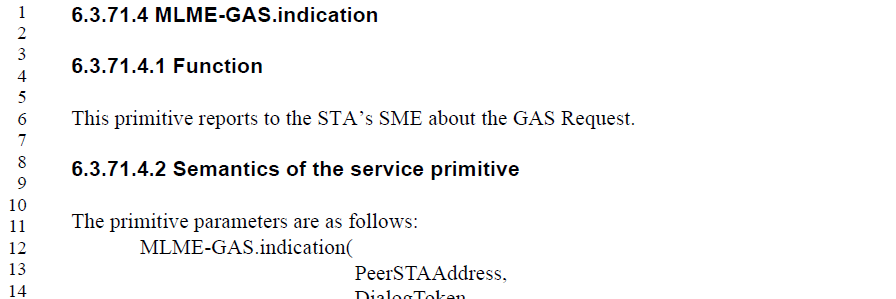
In C.3, add the following as a new first sentence in the DESCRIPTION for the MIB attribute dot11AuthenticationResponseTimeout:

Deprecated, as redundant in purpose with the AuthenticateFailureTimeout parameter provided in an MLME-AUTHENTICATE.request.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2119 | 584.13 | 6.3.71.4.2 | "PeerSTAAddress" shall be "STAAddress" to be consistent with MLME-GAS.indication. In MLME-GAS.request and MLME-GAS.confirm primitives, the first parameter is "STAAddress". In MLME-GAS.indication primitive, the parameter is named as "PeerSTAAddress". To be consistent, "PeerSTAAddress" shall be "STAAddress" in MLME-GAS.indication. | In 6.3.71.4.2, change "PeerSTAAddress" to "STAAddress" at 584.13 and 584.29. |

Discussion:

As the comment says, in the MLME-GAS.indication, the first parameter is called “PeerSTAAddress”, but in other MLME-GAS primitives have “STAAddress”.



(Some of?) This came from 802.11aq, which added the concept that a GAS request could be a group address behaviour. But, it appears to be inconsistent, now. The current situation can be summarized as follows:

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| Primitive | Parameter name | Comments |
| .request | STAAddress | Described as a peer, or the broadcast address, to which the request is sent. Non-specific is correct. No change. |
| .indication | PeerSTAAddress | Described as the peer entity from which the query (request) message was received. Should be specific to a single peer, and is. No change. |
| .response | STAAddress | Described as the entity or the broadcast address, to which the response is sent. Non-specific is correct. No change. |
| .confirm | STAAddress | Described as the peer entity from which the response is received. Should be “PeerSTAAddress”. Recommend changing it. |

Proposed Resolution:

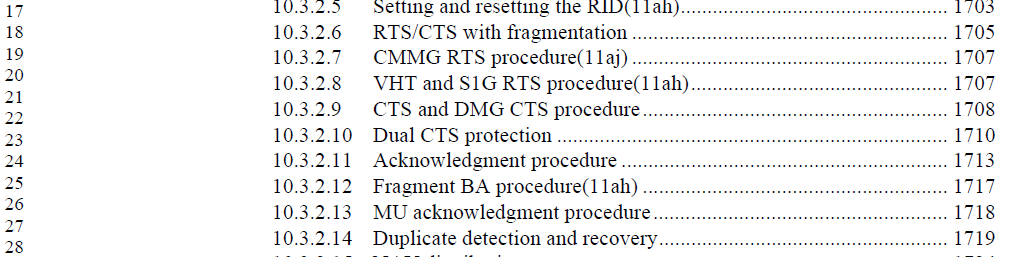
Change “STAAddress” to “PeerSTAAddress” in the parameter list and parameter description table for the MLME-GAS.confirm primitive (subclause 6.3.71.3.2).

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2351 |  |  | It's sometimes "fragment BA option", sometimes "procedure", sometimes "session" | "procedure" seems most popular, so change "fragment BA session" to "fragment BA procedure" in 9.9.2.6.1 (2x), 9.9.2.6.2 (2x); "fragment block ack operation" to "fragment block ack procedure" in 4.3.14.1 |

Discussion:

This author suggests the feature is called just “fragment BA”. (Many other features are just the name, not with a noun trailing.) Similarly, for “asymmetric block ack”. Thus, the following are proposed:

Title of 10.3.2.12 can stay as “procedure” to match style of other nearby subclauses:



Drop “operation” in 4.3.14.1, and shorten to “fragment BA”/”asymmetric BA”:





Change “the fragment BA procedure” -> “fragment BA” in Table 9-13, Table 9-535. (2x in each table.) For example:

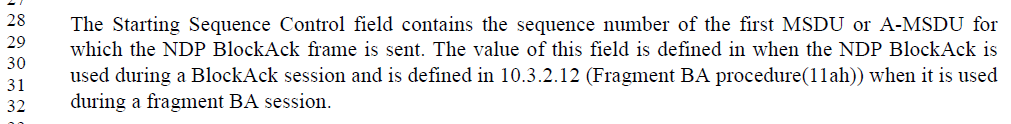




Change “fragment BA procedure” to “fragment BA” in Table 9-301, PICS (S1GM22.3). For example:



Leave “fragment BA session” in 9.9.2.6.1 and 9.9.2.6.2, to match “BlockAck session” (Note “BlockAck session” and “Block Ack session” is not defined, just assumed the reader knows what we mean.)





Change “the fragment BA procedure” to “fragment BA” in NOTE 3 in 10.2.6,:



Change “the fragment block ack option” -> “fragment BA” in the MIB:



Change “the asymmetric block ack operation” -> “asymmetric BA”, and “asymmetric BlockAck operation” -> “asymmetric BA”, in Table 9-54:





Change “Asymmetric Block Ack Operation” -> “Asymmetric BA” and “asymmetric block ack operation” -> “asymmetric block ack” in PICS (S1GM27)



Change “Asymmetric Block Ack” .> “Asymmetric BA” in Table 9-301:





Change “asymmetric block ack [operation]” to “asymmetric BA” where shown (4 places):





Change “[Tt]he asymmetric Block ACK” -> “asymmetric BA” in MIB (x2):





Proposed Resolution:

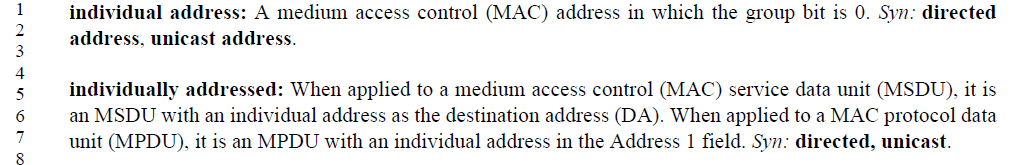
Incorporate the changes as described in 11-19/0551r4 for CID 2351, which changes the phrasing to simply “fragment BA”, similarly to other features. These changes also make similar updates to the phrasing for “asymmetric block ack [operation, etc.]”

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2091 | 1474.15 | 9.5.2 | Change (I think 3) instances of "unicast adress" to "individual address". | As suggested, first one listed only.  Additionally, after removing these last remaining references to "unicast address", remove "unicast address" from Section 3.4 (Abbreviations and acronyms) altogether (2 instances). |

Discussion:

There are the following occurrences of “unicast” in the draft, discussed below.

In Definitions (subclause 3.1):





Since these are explaining that the reader’s understanding of “unicast address(ed)” is defined as “individual address(ed)” in the Standard, it seems appropriate to keep these occurrences.





Recommend these occurrences are changed to “individually addressed”.

In 4.3.28.2:



Recommend replacing “unicast MPDUs” with “individually addressed MPDUs”.

In the MLME-GAS.request primitive, and similarly in the MLME-GAS.response primitivie:



Recommend changing these occurrences to “an individually addressed GAS frame”.

In 9.5.2 (Dynamic Allocation Info field, within certain DMG frames):



Recommend changing this to “an individual address”.

In 10.3.2.14.2 (Transmitter requirements for duplicate detection and recovery), there are 4 occurrences:





Recommend changing this as shown:

NOTE—Group addressed retransmissions of BUs use the same sequence number as the initial group addressed transmission of the BU. ~~Unicast~~ Individually addressed retransmissions of a group addressed BU delivered via DMS use the same sequence number as the initial ~~unicast~~ individually addressed transmission of the BU. When a BU is delivered both using group and individual addressing ~~and unicast~~ (e.g., when DMS is active but there are other associated STAs not using DMS), the sequence number might differ between the group and individually addressed ~~and unicast~~ transmissions of the same BU.

In 10.55.4 (Group addressed frame operation for S1G relay):





Recommend changing this to “an individually addressed transmission”.

In 11.2.3.1:





Recommend changing this to “individually addressed frames”.

In 11.22.16.3.1 (in the comparison of DMS and GCR):





Recommend changing “multicast-to-unicast” to “group-to-individually addressed”. This is consistent with the previous bullet and also how the DMS subclause describes DMS’ operation.

In 11.23.3.1:





Recommend changing this to “an individually or group addressed GAS Query Response.”





Recommend changing this to “incoming individually addressed MSDUs”. Make the same change in a very similar occurrence at line 53 on the same page.

In 11.46.3.2 (FILS higher layer protocol encapsulation):





Recommend changing this to “an individual address” in both occurrences.

In 12.7.10.1 (RSNA state machine’s initialization state):





There does not appear to be any significance to the term “unicast cipher” other than the normal English usage, as “cipher(s) that apply to unicast [individually-addressed] communication”. Recommend changing this to “If individually-addressed cipher is supported …”

In the MIB and R.4.2.4, occurrences of “dot11NonAPStationUnicastCipherSuite”: due to the complexity and ‘ripple-effect’ of changing a MIB name, recommend leaving this unchanged.





Recommend changing both occurrence to “individually-addressed”.





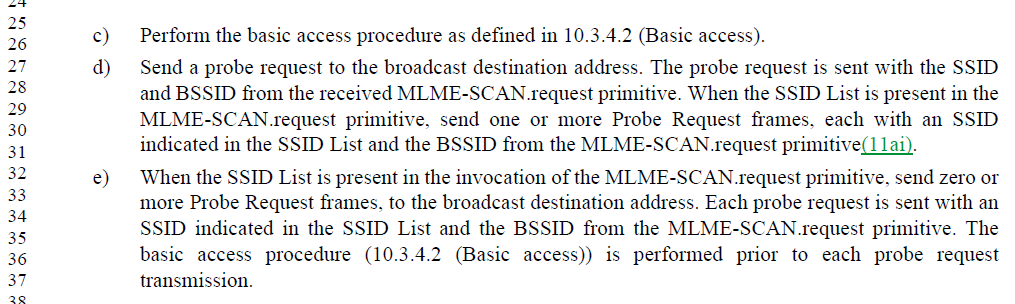
Recommend changing to “individually-addressed communication”.

Proposed Resolution:

Revised. Incorporate the changes indicated as “Recommended” in 11-19/0551r4 for CID 2091.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2692 | 2127.32 | 11.1.4.3.2 | Step (e) seems fully duplicative of steps (c) and (d) | Check and potentially remove step (e) |

Discussion:



Dissecting these bullets, we see that (c) and (d) state:

* Perform basic access procedure [ *is this done only once?* ]
* Send a probe request to the broadcast address, with SSID and BSSID from MLME-SCAN parameters.
* If SSID List is present in MLME-SCAN.request, send *one or more* probe requests, each with an SSID from the list and BSSID from the primitive’s parameter. [ *It’s unclear if these probes are sent to the broadcast address.* ]

And, (e) states:

* If SSID List is present, send *zero or more* probe requests to the broadcast address, each with and SSID from the list and the BSSID from the primitive’s parameter.
* Each of the above probes is preceded by a basic access procedure.
* [ *There is no mention of sending a probe with the SSID from the MLME-SCAN parameter.* ]

The commenter claims that (e) is duplicative of text included in (c) and (d). For the most part, (e) does seem to be a subset of (c) and (d). However, there are two exceptions: 1) bullet (e) clarifies that the basic access procedure is required before the probes derived from the SSID List; 2) bullet (e) permits sending zero probes derived from the SSID List.

Exception (1) appears to be an oversight in (d), as there is no indication elsewhere that a STA may send multiple probe requests without performing channel access between them (unless permitted by the basic channel access procedure, such as a continuation TXOP).

Exception (2) is partially addressed by the purpose of the SSID List stated in 4.3.19.15:

The SSID List element enables the non-AP STA to request information on a list of SSIDs. This is intended to reduce the number of Probe Request frames sent by the non-AP STA.

To maximize the opportunity to send as few probe request frames as possible, it should be allowed for the STA to send only the “main” probe request (to the SSID provided directly in the primitive) containing an SSID List element, and complete the procedure (if sufficient responses are determined to have been received).

Proposed Resolution:

Modify bullets (c) and (d) as shown:

c) Perform the basic access procedure as defined in 10.3.4.2 (Basic access). Send a probe request to the broadcast destination address. The probe request is sent with the SSID and BSSID from the received MLME-SCAN.request primitive.

d) ~~Send a probe request to the broadcast destination address. The probe request is sent with the SSID and BSSID from the received MLME-SCAN.request primitive.~~ When the SSID List is present in the MLME-SCAN.request primitive, send ~~one~~ zero or more Probe Request frames, each with an SSID indicated in the SSID List and the BSSID from the MLME-SCAN.request primitive(11ai). The basic access procedure (10.3.4.2 (Basic access)) is performed prior to each probe request transmission, as required.

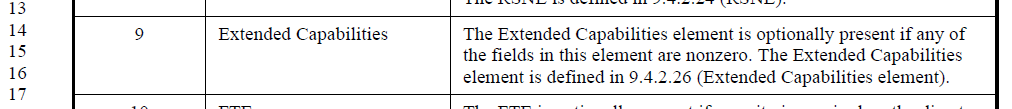
Delete bullet (e).

Renumber references (2x) to “step i)” to reference “step h)”.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2340 | 1515.14 | 9.6.7.16 | "The Extended Capabilities element is optionally present if any of the fields in this element are nonzero." -- I think this is trying to say that the EC element is present if and only if there are some extended capabilities to advertise. However, as it's written it's actually saying you don't have to advertise your extended capabilities (even in assoc) even if you have some | Delete "optionally" in the cited text at the referenced location and also in Tables 9-412, 9-434, 9-435 |

Discussion:

The context for this comment is within the Action field of a TDLS Discovery Response (Public Action) frame:



In all other frames, such as a Beacon, (Re)Association, etc. this field is described as:

The Extended Capabilities element is present if any of the fields in this element are nonzero.

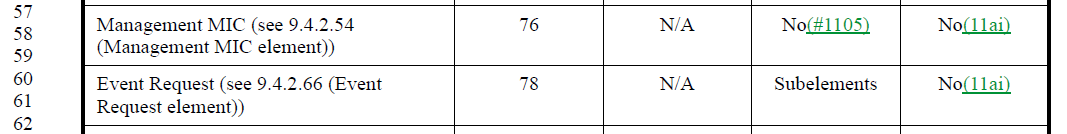
Note that the RSNE and FTE fields are also “optionally present” in the TDLS Discovery Response frame. For FTE that might make sense, since use of FT is at the discretion of the STAs, although this is described based on other parameter state in the description of other frames, such as Reassociation Request.. RSN(E) is described as present (not optional) if RSNA is activated (“security is required”) for other frame types.

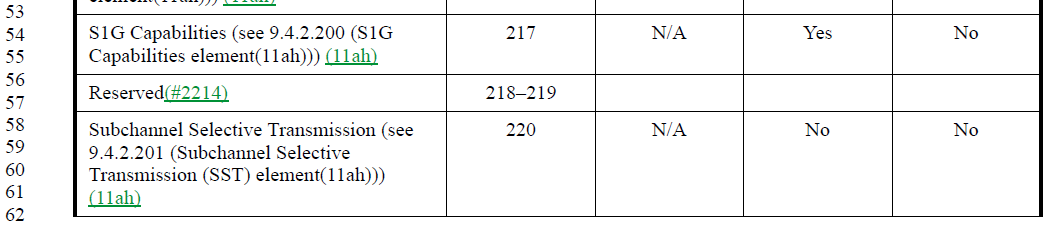
Need to check all this with Menzo. Is this optionality intentional for TDLS Discovery, for some reason?

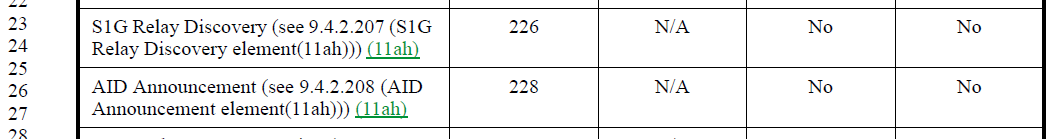
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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2480 | 966.32 | 9.4.2.1 | Missing elements 77, 218, 219, 227 | Add a row for each of these, showing them explictly as reserved |

Discussion:

The referenced entries in Table 9-94, in Draft 2.2 are in context:







Entries for 218 and 219 were added with CID 2214. Element numbers 77 and 227 are indeed missing.

Proposed Resolution:

Add a row in the Element IDs table for entries 77 and 227, with “Element” column of “Reserved” and “Element ID extension”, “Extensible” and “Fragmentable” columns left blank.

Note to commenter, entries for 218 and 219 were added as a result of resolution for CID 2214, as shown above.

**Not ready for review, yet:**

Not (obviously) submission required:

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2005 | 1129.06 | 9.4.2.36 | Delayed Block Ack and Immediate Block Ack were removed from Capabilities Information field (see 9.4.1.4) | Figure 9-335 should be updated to not show Delayed Block Ack and Immediate Block Ack subfields |
| 2009 | 2130.51 | 11.1.4.3.4 | There are too many double negations in this paragraph making it hard to follow - e.g., "shall not respond... is not a mesh STA and none of following are met..." | Reorganize the paragraph to remove double negations |
| 2188 | 1217.00 | 9.4.2.79 | Table 9-222 - TFS Action Code field values: table call for "the STA is to be sent" - this is poor wording - it should say the "AP will transmit" | Replace the "STA is to be sent" with "AP will transmit" |
| 2250 | 2204.00 | 11.3.5.4 | At (D0.1 numbering) P1774L9, this should be clear that it is for reassociation to the same AP, for these to be not affected. | To the start of the sentence, add, "If the reassociation is to the same AP, " |
| 2252 | 1794.00 | 10.23.5 | Wording in 10.22.5 is a bit confusing saying that 3us is the "ceiling" for the example BSS. | Change "3 ╬╝s would be the ceiling for BSS maximum one-way distance" to "3 ╬╝s would be the maximum round-trip delay for a BSS with maximum coverage distance" |
| 2275 | 2203.00 | 11.3.5.3 | CID 1588 was mostly done - the fixes in 9.4.1.8 are good. But, we still need something in 11.3.5.3 that says these rules about AID assignment are used for different device/BSS types. | Add a numbered item, "3) In either case, the AID(s) are allocated from the ranges described in 9.4.1.8. Same thing in 11.3.5.5 item (k). |
| 2618 | 2351.00 | 11.22.7.1 | "A STA with dot11BSSTransitionActivated equal to true shall support BSS transition management" -- should also have implemented set to true. This was rejected in CID 1382 on the basis that "For dot11BSSTransitionActivated to be true, logically, dot11BSSTransitionImplemented must also be true without needing to state so" but this while plausible sounding needs to be supported by actual normative text | In the referenced subclause, delete "A STA that implements BSS transition management has dot11BSSTransitionImplemented equal to true. When dot11BSSTransitionImplemented is true, dot11WirelessManagementImplemented shall be true." In C.3. delete the OBJECT-TYPE for dot11BSSTransitionImplemented and its inclusion in Dot11WirelessMgmtOptionsEntry |
| 2219 | 1683.00 | 10.2.1 | HCF doesn't really use DCF architecturally. It 'replaces' DCF. Consider folding DCF into HCF (EDCA), as a degenerate case. Would restructure 10.2, Figure 10-1, etc. | Change Figure 10-1 to show HCF (EDCA and HCCA) as directly using the PHY. Cleanup text in 10.2, 10.3 and 10.22 to not describe HCF as using DCF. A submission will be provided. |
| 2230 | 1235.00 | 9.4.2.91 | In 9.4.2.92, (at the end) "A STA uses this field to indicate" should be "A STA may use this field to indicate" because this field is optional. | Change "uses" to "may use" per the comment. |
| 2235 | 1683.00 | 10.2.1 | 10.2.1 (for non-DMG STA) lists PCF, HCF and MCF as using DCF. But, there is no mention similar to the bullets that DCF is provided in all these STA types. It seems like a non-QoS, non-mesh STA can only use PCF. (This is clarified in 10.2.2, but still ...) | At the end of the first bullet, add "The MAC also provides direct access to the DCF service." |
| 2237 | 1650.00 | 9.7.1 | In 9.7.1: "Each nonfinal A-MPDU subframe in an A-MPDU has padding octets ..." Next paragraph has, "In an HT PPDU, the final A-MPDU subframe is not padded." Is that redundant? Is there another option (for non HT PPDU)? Clarify if a non-HT PPDU has another option, or simplify if this is a general/always requirement. | Clarify if a non-HT PPDU has another option, or simplify if this is a general/always requirement. |
| 2239 | 1095.00 | 9.4.2.26 | 9.4.2.27 (Extended Capabilities element), the length of the Extended Capabilities field is a variable n. Presumbaly this is not a fixed length for backward compatibility with older implementations that had less bits to indicate. But, this isn't really made clear anywhere, and at this point (this reviion of the Standard), we could say it is 0 to 11 octets although more might exist in a received element (from a future device). Or, perhaps just say "variable" in the figure and explain all this in the text? Second, Table 9-153 implies that there are "n" bits, not "n" octets, so that's in conflict. | Change the "Octets" count to "variable' in Figure 9-291.  In the third paragraph, replace the sentence, "The length of the Extended Capabilities field is a variable n" with "The length of the Extended Capabilities field is variable. In the current version of this Standard, the length is 11 octets, however older implementations may send less octets and the rest of the Extended Capabilities field bits are assumed to be zero. Similarly, future implementations may send more octets, and the extra octets are ignored upon reception by a current or older implementation."  In Table 9-153, change "n" in the last row to 87. |
| 2472 | 998.00 | 9.4.2.18 | "A value of 1 indicates that the switch occurs immediately before the next TBTT. " -- don't include statements of the obvious from immediately preceding sentence | Delete the cited text at the referenced location and in 9.4.2.52. In 9.4.2.22 delete "A value of 1 indicates the quiet interval starts during the beacon interval starting at the next TBTT." |
| 2242 | 2311.00 | 11.15.12 | This sentence doesn't parse correctly. | Change "The STA sets the Forty MHz Intolerant field of the 20/40 BSS Coexistence element based on A STA's FortyMHzIntolerant" to "The STA sets the Forty MHz Intolerant field of the 20/40 BSS Coexistence element per the rules listed in 11.15.11." |
| 2603 | 2212.00 | 11.3.9.3 | "beacon interval units" is confusing, because it might be understood as the units for a BI, namely Tus | Reword as "units of a beacon interval" (3x) |
| 2279 | 1739.00 | 10.4 | 10.4 ("MPDU fragmentation") 4th paragraph references 9.2.3 as the requirement for support for various MSDU sizes. That would probably be better as a reference to 9.2.4.7, since that's where MSDU size limits are discussed. | Change the reference to 9.2.3 to be reference to 9.2.4.7. |
| 2282 | 1876.00 | 10.29.11 | Element fragmentation is written in declarative language. | Change "is" at P1876.62 to "shall be" (or perhaps "may be" for to avoid backwards non-compliance). Change "is not" on 1877.2 to "shall not be". Change "appears" on P1877.2 to "shall appear". Change "are" to "shall be" at P1878.27. |
| 2287 | 1902.00 | 10.37.5.2 | Mixes of "AID subfield" and "AID field" in this subclause. Also, there is no "AID subfield", only an "AID12 subfield" or an "AID13 subfield". Since this is a VHT subclause, it must be specifying a non-S1G STA, and therefore the STA Info field has a AID12 subfield (and not an AID13 subfield). | Change "AID field" to "AID12 subfield" at P1924.62 and P1925.3. Replace "AID subfield" with "AID12 subfield" throughout this subclause. |
| 2288 | 2159.00 | 11.2.3.11 | In 11.2.3.11 (PSMP stuff): "a STA\_INFO field that has the STA\_INFO Type subfield equal to 2 and the AID field matching the STA's AID". But, PSMP defines a "PSMP STA Info" field, with subfields of STA\_INFO Type and STA\_ID. Is the STA\_AID subfield in PSMP STA Info formatted per 9.4.1.8? | Change the first "STA\_INFO field" to "PSMP STA Info", and change the first "AID" to "STA\_ID". At the end of the sentence at P913.1, add ", and is formatted per 9.4.1.8 (AID field)." |
| 2292 | 2462.00 | 11.35.3 | Clause 10.40 (DMG dynamic tone pairing) was removed. The reference to 10.40 in the NOTE in 11.35.3 is now broken. The NOTE would appear to still be valid (the destination REDS does need its antenna pattern to cover the source REDS and RDS). Is there still text somewhere that describes how this is accomplished? If so, put a reference to that text here. If not, we have a gap. | Replace the broken text (the stuff in parenthesis) with an appropriate reference. |
| 2296 | 1166.00 | 9.4.2.56 | Per CID 1412, "dual beacon" went from deprecated to obsolete in REVmd, but "STBC Beacon" (and some references to dual beacon) is still only deprecated. Change all these references to Obsolete. Similar issues with "Dual CTS" | At the cited location, change "deprecated" to "obsolete". Also at 1166.61, P1735.32, P3664.9, and P3664.18. |
| 2240 | 1355.00 | 9.4.2.185 | Editorial (?): What does "onwards in 12.7.2" mean? | Change the sentence to, "The KDE List field contains one of more KDEs encapsulated using the format shown(#243) in Figure 12-35. |
| 2558 | 819.00 | 9.3.1.5.1 | "The (11ah)Duration/ID field contains the AID value assigned to the STA transmitting the frame by the AP in the (Re)Association Response frame that established that STA's current association, with the two MSBs set to 1." -- not true if it's a PS-Poll+BDT | Add a new subclause heading "Non-BDT variant of the PS-Poll frame format" above this para |
| 2486 | 1725.00 | 10.3.2.17 | Field name components should not start with a lowercase letter | Change "Link Adaptation per Normal Control Response Capable" to "Link Adaptation Per Normal Control Response Capable" throughout. In Table 9-301 change "normal control frame" to "a Control frame that is not an NDP CMAC frame". In 10.3.2.17 change "normal control response frame" to "control response frame that is not an NDP CMAC frame". In 10.33.3 change "normal control response frames" to "control response frames that are not NDP CMAC frames" and "normal control frame" to "a Control frame that is not an NDP CMAC frame" |
| 2495 |  | 11.22.16.2 | Sometimes "DMSID" is used implicitly to refer to the DMSID field (e.g. "the DMSID shall be set to") and sometimes conversely "DMSID field" is used to refer to the identifier itself (e.g. "The DMSID field is assigned by the AP") | Add "field" after "DMSID" throughout the document, except in Figures |
| 2502 | 1582.00 | 9.6.13.20 | "The Subelement ID field is set to 0." duplicates Table 9-427 | Delete the cited sentence at the referenced location |
| 2503 | 1582.00 | 9.6.13.20 | "The Subelement ID field is set to 1." duplicates Table 9-427 | Delete the cited sentence at the referenced location |
| 2513 | 2302.00 | 11.15.3.3 | "When switching a 20/40 MHz BSS to 20 MHz BSS mode" -- "20 MHz BSS mode" is not described anywhere. Ditto "the 20/40 BSS mode" in O.5.2 | change "to 20 MHz BSS mode" in 11.15.3.3 to "to an operating channel width of 20 MHz"; change "the 20/40 BSS mode" in O.5.2 to "40 MHz operating channel width" |
| 2617 | 2351.00 | 11.22.7.1 | "A STA with dot11BSSTransitionActivated equal to true shall support BSS transition management" -- should also have implemented set to true. This was rejected in CID 1382 on the basis that "For dot11BSSTransitionActivated to be true, logically, dot11BSSTransitionImplemented must also be true without needing to state so" but this while plausible sounding needs to be supported by actual normative text | In the cited text at the referenced location add "shall have dot11BSSTransitionImplemented set to true," after "equal to true" |
| 2556 | 785.00 | 9.2.4.2 | "In all other frames sent by non-QoS STAs and Control frames sent by QoS STAs," -- not all Control frames | Change the cited text at the referenced location to "In all other frames sent by non-QoS STAs and other Control frames sent by QoS STAs," |
| 2562 | 1626.00 | 9.6.20.7 | "The MMPDU Frame Body subfield carries the content of the Frame Body field of an MMPDU that would be constructed if the MMPDU for the corresponding management frame type were transmitted over the air (i.e., all of the octets after the MAC header and up to, but not including, the FCS)." -- not clear if this includes encryption, if PMF is in effect | After "transmitted" add "unencrypted" in the cited text at the referenced location |
| 2566 | 2478.00 | 11.41 | "It might take a long time for a STA to change its operating mode following the transmission of the Operating Mode Notification frame and during that time the STA might not be able to receive frames resulting in frame loss. If a non-AP STA cannot tolerate frame loss during that period it can set the Power Management subfield of the Frame Control field of the Operating Mode Notification frame to 1 to indicate that the STA has entered power save. When the non-AP STA has completed its operating mode change, it can send another frame (such as a QoS Null) with the Frame Control Power Management subfield set to 0 to indicate that the STA has exited power save." -- the mixing of plain "STA" and "non-AP STA" is confusing (it suggests two different STAs") | Delete "non-AP " throughout the cited text at the referenced location |
| 2576 | 1336.00 | 9.4.2.170 | The Reduced Neighbor Report is actually about BSSes not APs. So the fields therein should refer to BSSes not APs | Throughout the referenced subclause change "AP" to "BSS" |
| 2577 | 2133.00 | 11.1.4.3.4 | " the SSID of the responding STA" -- BSSes have an SSID, not STAs | Change to "the SSID of the BSS the responding STA is a member of" |
| 2578 | 2133.00 | 11.1.4.3.4 | " the SSID of the responding STA" -- BSSes have an SSID, not STAs. Ditto "compressed SSID of the AP.", "corresponding SSID of the responding AP.", "corresponding SSID of that AP", "SSID of the AP", "SSID of the AP or PCP". Ditto "BSSID of" | Change to refer to the BSS the STA/AP is a member of |
| 2581 | 2137.00 | 11.1.4.3.8 | "If a Probe Request frame includes a Request element that the element ID of the Reduced Neighbor Report Request element" is garbled | Add "contains" after "that" in the cited text at the referenced location |
| 2476 | 2131.00 | 11.1.4.3.4 | "The SSID in the Probe Request frame matches the SSID of the STA's." -- the STA's what? | Change the cited text to "The SSID in the Probe Request frame matches the SSID of the BSS the STA is a member of, if any." At line 21 change "STA's BSS" to "BSS the STA is a member of, if any" |
| 2553 | 834.00 | 9.3.1.18 | Should not be spreading the rules for Duration field setting across multiple places | At the referenced location change "The Duration field is set to the value obtained from the Duration/ID field of the immediately previous Grant frame minus the time, in microseconds, required to transmit the Grant Ack frame and its SIFS interval." to "The Duration field value is set as defined in 9.2.5 (Duration/ID field (QoS STA)). " |

Submission Required:

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2123 | 1770.00 | 10.7 | The non-QoS STA is required not to transmit more than a certain amount of outstanding MPDUs at any time. However, is not clear what is the relationship between the subclauses that refer to MSDU from particular SA and MMPDU: - Can the non-QoS STA transmit outstanding MPDU of one MSDU from particular SA OR outstanding MPDU of one MMPDU but not on the same time? - Can the non-QoS STA transmit outstanding MPDU of one MSDU from particular SA AND outstanding MPDU of one MMPDU on the same time? | Please clarify the relationship between the 2 subclauses within that requirement (as proposed in comment) |
| 2124 | 1771.00 | 10.7 | The QoS STA without Block ACK agreement is required not to transmit more than a certain amount of outstanding MPDUs at any time. However, is not clear what is the relationship between the subclauses that refer to MSDU from particular SA and MMPDU:  - Can the non-QoS STA transmit outstanding MPDU of one MSDU/ A-MSDU from particular SA OR outstanding MPDU of one MMPDU but not on the same time?  - Can the non-QoS STA transmit outstanding MPDU of one MSDU / A-MSDU from particular SA AND outstanding MPDU of one MMPDU on the same time? | Please clarify the relationship between the 2 subclauses within that requirement (as proposed in comment) |
| 2125 | 1740.00 | 10.5 | "A STA shall support the concurrent reception of fragments of at least three MSDUs or MMPDUs." The requirement for STA to support concurrent reception of fragments of at least three MSDUs or MMPDUs is in conflict with the rule in section 10.7 for not having more than on outstanding MSDU (transmitted in one or more MPDUs) at any time. | Please resolve the conflict between having concurrent fragments of at least 3 MSDUs and the rule not to have more than a single outstanding MSDU at any time |
| 2086 | 1497.00 | 9.6.6.5 | Spec is inconsistent in treating elements at the end of a frame as a field:  (1) Some frame definitions indicate if a "field" X is present it contains "element" Y (e.g., see the "DMG Link Margin" field in 9.6.6.5 Link Measurement Report frame format) (2) Classic frames (e.g., beacon, probe, association...) just list the frame body, often in a table format, and list the elements after fields, which is also consistent with the sentence at P847L24. (3) Some other frams (e.g., 9.6.7.7 Extended Channel Switch Announcement frame format) list the elements directly in a figure representing teh frame, without a table, which is also consistent with (2)  I think (1) is the anomaly, and propose not to represent any IE appended to a frame as a field in that frame. This will simplify the text too, as teher is no field to define (see example in proposed change). | Comment is general; by way of example, and using Link Measurement Report frame, either  -- Establish somewhere (e.g., P847L24) that everything is a field, and some fields include an element, (not in favor), or  - Preferably, indicate elements as just "elements" in all frame definitions, including those that are defined through a table (beacon, probe, association .., and they happen to follow this convention), and those without a table, e.g., Link Measurement Report.  The second path generally simplifies the text; in the Link Measurement Report frame example, if adopting the second (and preferred) path, the last two boxes in Figure 9-844 would be named as "DMG Link Margin element (optional)" and "DMG Link Adaptation Acknowledgement element (optional)", and the last two paragraphs in section 9.6.6.5 would go away. |
| 2301 | 2308.00 | 11.15.8 | DSSS/CCK in 40 MHz language could still use more clarifications. | A submission will be provided. |
| 2616 | 1439.00 | 9.4.3 | All the statements of the form "The $blah field contains zero or more subelements. The subelement format and ordering of subelements are defined in 9.4.3 (Subelements)." are unclear as to whether you can have more than one subelement with the same Subelement ID. Having more than one could lead to interop issues (for example, if there are two Originator Requesting STA MAC Address subelements in a Location Civic request, how does the receiver know the requesting STA MAC address?) | Add a para at the end of 9.4.3: "Unless stated otherwise, no more than one subelement with the same Subelement ID, apart from Vendor Specific subelements, is present within an element." |

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2653 |  | 11.32.5 | It should be possible to use the ChannelList when doing OCT scanning to specify the peer NT-MLME channels. Currently, the Multi-band local in the MLME-SCAN.req is not used for anything except  identifying the local TR-MLME(s) -- it does not go on the air or anything.  We should therefore replace it with a list of { band ID, channel, MAC address }  tuples (or a single band ID parameter and a list of { channel, MAC address } tuples  if the TR-MLMEs have to be all on the same channel) and then OCT scanning will  just be a clear extension to normal scanning. I think you wouldn't need the  Multi-band peer because it would be implicit in the combination of the local  NT-MLME the SME sends to (which identifies an NT band and channel)  and the BSSID parameter. Then you'd be able to say "I want to find APs on  5G channels 36, 40 or 44, tunnelling over 2G4 channels 1, 2, 3" by setting  in the MLME-SCAN.req:  Channel List = 36, 40, 44  BSSID = wildcard  Local TRs = { 2G4, 1, MAC address for 1 }, { 2G4, 2, MAC address for 2 }, { 2G4, 3, MAC address for 3 }  and sending to an NT-MLME on the 5G ban | As it says in the comment |

Discussion:

TBD

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2291 | 3096.50 | 20.9.2.2 | BRP packet structure has some problems in details.  The bullet list items in 20.9.2.2.1 both say, "BRP-[TR]X PPDUs are packets that have TRN training subfields appended to them." First, this isn't necessarily true, as the BRP PPDU could be a request for training TRNs, and not carry any itself. Also, these two sentences look like the define/describe BRP PPDUs, but they define the RX and TX variants identically, which isn't useful. The following sentences are the useful part.  The definition of "training field(s)" is not clear, so the meaning of "Traning Length" in Table 20-11 (etc) is not clear. In fact, this field is not a length at all, but a number \_N\_ that can be used to derive the number (and therefore length of) the AGC and TRN subfields.  Also, the AGC/TRN subfields are sometimes called "training fields" and sometimes "a training field". Since both of these fields actually have internal structure (they are not just a list of AGC sequences, nor TRN subfields, it is probably best to call these a distinguishable and singular name.  Why does subclause 20.9.2.2.2 start with (or detail at all) the rules about setting [TR]XVECTOR parameters?  20.4.2 and 20.5.2 claim to be definitions of the PPDU formats, but there is no (obvious) definition of the AGC and TRN subfields in those clauses. A reference would be helpful.  "A value of N in the Training Length field indicates 4├ùN AGC subfields" - does this mean the AGC (sub)field(s) has that many "AGC fields" (each of which is 4N repetitions of the Golay sequence), or there are just a total of 4N repetitions of the Golay sequence?  "and that the TRN-R/T field has N TRN-Units" - There is no TRN-R/T field. | A submission will be provided. |

Discussion:

TBD

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2325 | 1757.00 | 10.6.7 | The CMMG rules being separated (in 10.6.8) causes the exclusion rules structure of 10.6.5.x to be confusing or broken. DMG started it with 10.6.7. | Delete 10.6.7 and 10.6.8 |
| 2324 | 1757.00 | 10.6.7 | The CMMG rules being separated (in 10.6.8) causes the exclusion rules structure of 10.6.5.x to be confusing or broken. DMG started it with 10.6.7. | Merge 10.6.7 and 10.6.8 into 10.6.5. I think perhaps the other Mark has some ideas about this |

Discussion:

TBD

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2246 | 1982.58 | 10.42.2.1 | Grammar issues (and confusing references to "BI 1", "B1 2" and "BI 3") in 10.42.2.1. | A submission will be provided. |

Discussion:

TBD

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2294 | 305.1 | 5.1.57 | There's no figure in clause 5 (like Figure 5-7) for a DMG Relay. Do we need one? | TGm to discuss. A submission will be provided, depending on direction decided. |

Discussion:

TBD

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2266 | 284.48 | 4.10 | The 802.11 Style Guide says clause 4 should be written in delcarative, not normative, language, and that it is intended to provide only a general description of the system. There are parts of clause 4 (4.10, for example), that get quite detailed (like specific frame exchange diagrams) and seem to be both beyond a "general description" and potentially are the only normative specification for these behaviors. There are also a few uses of "may" and many uses of "can" that should be checked/changed to clearly informative language. | At least 4.10, and potentially all of clause 4, needs to be scrubbed for details that are beyond "general description" and/or are the best/only normative specification in the Standard of any behaviors, and move such text to a later clause.  TGm should consider whether claues 4 should be labelled as "Informative", if that is the intent of the clause.  TGm should discuss this topic, and based on agreement on direciton, a detailed submission for changes will be provided. |

Discussion:

TBD

**Completed:**

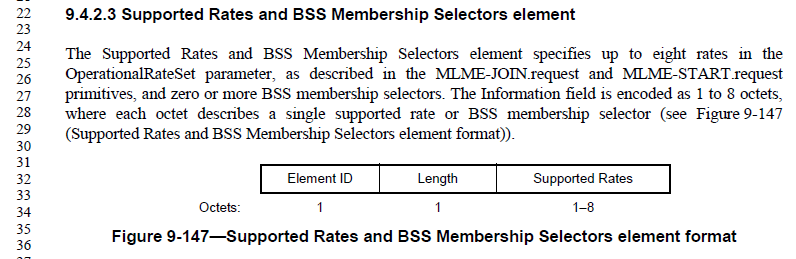
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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2087 | 867.35 | 9.3.3.11 | Refer to "Supported Rates and BSS Membership Selectors" as element | Change "field" to "element" in last column. |

Discussion:

Here is the definition of the Supported Rates and BSS Membership Selectors in the Probe Response frame body:



Subclause 9.4.2.3 defines the format for the Supported Rates and BSS Membership Selectors element:



Supported Rates and BSS Membership Selectors is indeed an element (defined in 9.4.2 and not in 9.4.1), and additionally of varying length, so needs to be encoded as an element within the frame.

Proposed Resolution:

Accepted.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2078 | 867.27 | 9.3.3.11 | There is no information for the first three fields of the Probe Response frame. The Timestamp field and how it is set for Probe Response) is important in particular. | Define what these fields do, whether they are always or optionally present (and under what conditions if optionally), and/or provide reference to relevant sections. |

Discussion:

Here is the start of the definition of the Probe Response frame body; the first three fields are not described, per the comment:



In other frames, Timestamp (for example) has these “Notes”:

See 9.4.1.10 (Timestamp field) for Timestamp format.

Suggest adding similar Notes for all the first three fields. This same issue exists in many frame format tables.

Proposed Resolution:

Revised. Insert the following text in the first three rows, in the Notes column, in Table 9-41:

See 9.4.1.10 (Timestamp field) for Timestamp format.

See 9.4.1.3 (Beacon Interval field) for Beacon Interval format.

See 9.4.1.4 (Capability Information field) for Capability Information format.

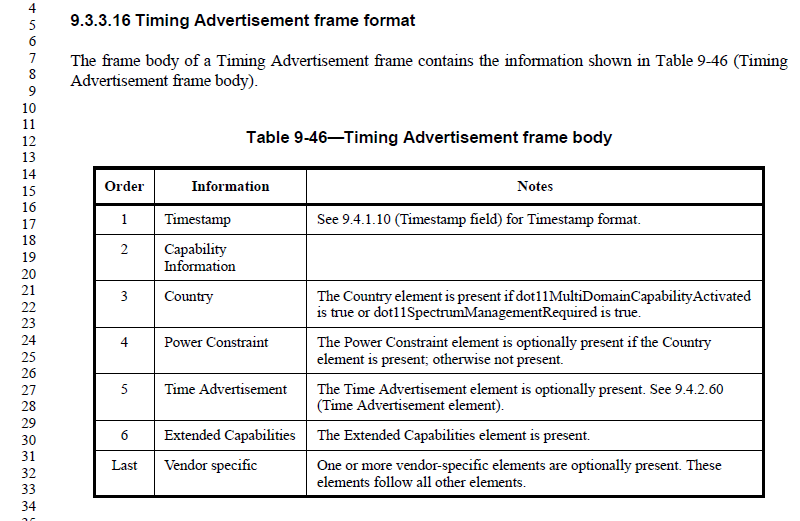
Do the same for matching rows in Tables 9-34, 9-36, 9-37, 9-38, 9-39, and 9-46.

Note to Editor: This is the same resolution as for CID 2077.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2077 | 879.18 | 9.3.3.16 | "Capability Information" notes missing | Define what this field does, whether it is always or optionally present (and under what conditions if optionally), and/or provide reference to relevant sections. |

Discussion:

Here is the definition of the Capability Information field in the Timing Advertisement frame body:



See the discussion above, for CID 2078.

Proposed Resolution:

Revised. Insert the following text in the first three rows, in the Notes column, in Table 9-41:

See 9.4.1.10 (Timestamp field) for Timestamp format.

See 9.4.1.3 (Beacon Interval field)

See 9.4.1.4 (Capability Information field)

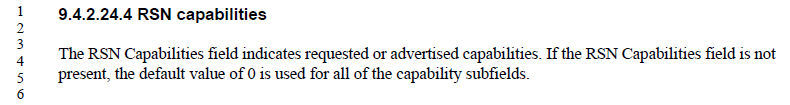
Do the same for matching rows in Tables 9-34, 9-36, 9-37, 9-38, 9-39, and 9-46.

Note to Editor: This is the same resolution as for CID 2078.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2118 | 1535.59 | 9.6.7.36 | "The FD RSN Information subfield contains an RSN Capability subfield, as specified in Figure 9-289 (RSN Capabilities field format) in 9.4.2.24.4 (RSN capabilities)." In 9.4.2.24.4, the refered field is named as "RSN Capabilities". To be consistent and avoid search error, suggest renaming the "RSN Capability" subfield in 9.6.7.36 to "RSN Capabilities" subfield. | In 9.6.7.36, change "RSN Capability" to "RSN Capabilities", and change "RSN capability" to "RSN capabilities". 3 instances in total. |
| 2396 | 1535.40 | 9.6.7.36 | Should rename the three instances of "RSN Capability"/"RSN capability" to "RSN Capabilities"/"RSN capabilities" so the same term is used as in RSNEs | Change each of the 3 instances of "RSN Capability"/"RSN capability" to "RSN Capabilities"/"RSN capabilities" (preserving case) |

Discussion:

Agree with commenters: subclause 9.4.2.24.4 does in fact define “RSN Capabilities”, not “RSN Capability”:



There are three occurrences of “RSN [Cc]apability” in the Draft, all in 9.6.7.36 on page 1535:



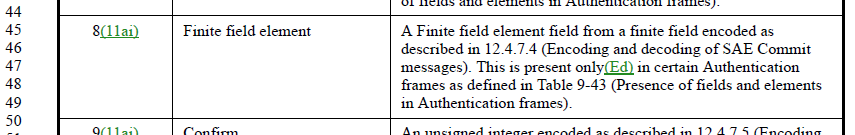
Proposed Resolution:

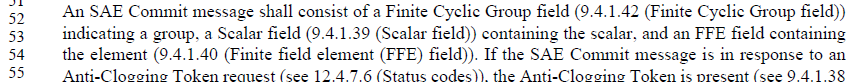
Accepted.

Note to EDITOR the resolutions of CIDs 2118 and 2396 are the same.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2438 | 873.45 | 9.3.3.12 | "A Finite field element field" -- the Finite field element field is as its name indicates a field. What we need here is a description of what it contains | At the referenced location change "A Finite field element field from a finite field" to "An element from a finite field" |

Discussion:

Here is the definition of the “Finite field element” field in the Authentication frame body:



Subclause 12.4.7.4 describes the usage of this field in SAE Commit messages:

From the context in 12.4.7.4, we can agree that this field (in an Authentication frame body) carries the description of one element of a finite field.

Originally proposed resolution:

Accepted.

From June 26 teleconference: Need to check with changes Dan has made in this area.

Update, June 28, 2019:

It appears that the “changes Dan has made” were partially in the resolution of CID 2531, and partially handed over to Mark Rison, to be resolved along with CID 2530, now contained in document 11-19/0856r3.

Neither of those resolutions changes the cited text above, in 9.3.3.12 (Authentication frame format). However, perhaps one of them should have? From these two changes, it seems we now have a field in the Authentication frame format, called “Finite Field Element field”, whose “Notes” description does not capitalize “element”, and whose presence in Table 9-43 calls it “The FFE field”. The definition of the field in 9.4.1.40 calls this the “FFE field”. Most of the text in clause 12 also calls it an FFE field.

In fact, in D2.2, there are now exactly two occurrences of the phrase “finite field element” (ignoring capitalization), this field name in Table 9-42, and the acronym list for what FFE stands for.

Recommend we change the name of the field, in Table 9-42, to FFE, to match all the other uses.

Finally, this is further complicated by CID 2302, which has these instructions:

Change "Finite field element (FFE) field" to "FFE field" throughout. Also in T9-42 change "A Finite field element field from a finite field" to "An element in a finite field" (cf. 9.4.1.40)

This change made the comment here (CID 2438) nearly moot. There is one subtle difference, CID 2302 changed the Notes to say “An element in a finite field” and this comment would change the Notes to say “An element from a finite field”. The phrase “from a finite field” is never used in the current draft. The phrase “in a finite field” is used in 9.4.1.10, where this field is defined. Thus, to keep it consistent, recommend we leave it as “in”.

Proposed Resolution:

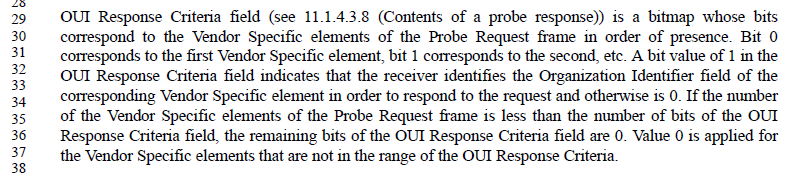
Revised.

In Table 9-42 (Authentication frame body), change the entry in the “Information” column from “Finite Field element” (or “Finite Field Element field” after application of CID 2531), to “FFE field”.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2342 | 1347.36 | 9.4.2.177 | "Value 0 is applied for the Vendor Specific elements that are not in the range of the OUI Response Criteria." is gibberish | Delete the cited text at the referenced location |

Discussion:

The cited location:



As can be seen, the OUI Response Criteria field is defined to have bit 0 correspond to the first Vendor Specific element. Thus, the only bits that can be missing, are off the end of the bitmap. Those bits are covered by the penultimate sentence. So, there are no Vendor Specific elements “that are not in the range of OUI Response Criteria” and need to be defined.

Agree with the commenter, the cited sentence is confusing at best, and appears to be unnecessary.

Originally proposed resolution:

Accepted.

From June 26 teleconference: No – reread that penultimate sentence. Fix the last sentence.

Update, June 28, 2019:

The ultimate sentence is meant to cover the case where there are more Vendor Specific elements in the Probe Request frame than there are bits in the OUI Response Criteria. The OUI Response Criteria, per 9.4.2.177 is a 2 octet field within the FILS Request Parameters element in a Probe Request frame, so it has fixed size and therefore limited range. There appears to be no limit to the number of Vendor Specific elements that can be included in the Probe Request, along with the FILS Request Parameters element. Thus, this condition can occur.

Proposed Resolution:

Revised.

Replace the cited sentence with:

If the number of bits in the OUI Response Criteria field is less than the number of Vendor Specific elements in the Probe Request frame, the corresponding bits not present in the OUI Response Criteria field are assumed to be 0.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2361 | 1535.40 | 9.6.7.36 | "The FD RSN Information subfield contains the RSN information, including: RSN capability, an authentication suite selector, a pairwise cipher suite selector, a group data cipher suite selector, and a group management cipher suite selector. Its format is defined in Figure 9-883 (Format of the FD RSN Information subfield(11ai)). " is an ideal breeding ground for spec rot | Change the cited text at the referenced location to "The FD RSN Information subfield is defined in Figure 9-883 (Format of the FD RSN Information subfield(11ai)). " |

Discussion:



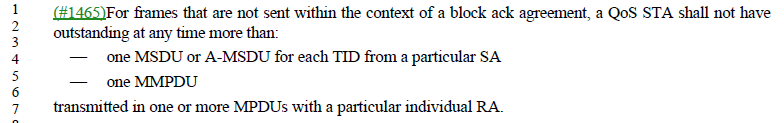
Agree with the commenter, the cited sentence adds nothing that isn’t indicated in the Figure.

Proposed Resolution:

Accepted.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2379 | 1771.01 | 10.7 | "For frames that are not sent within the context of a block ack agreement, a QoS STA shall not have outstanding at any time more than: --- one MSDU or A-MSDU for each TID from a particular SA --- one MMPDU transmitted in one or more MPDUs with a particular individual RA." is ambiguous as to whether you can only have MSDUs from one particular SA, or can you can MSDUs from multiple SAs (as long as you have only one from any given SA) | Change "a particular" to "any particular" |

Discussion:



Agree with commenter, “any particular” is more clear.

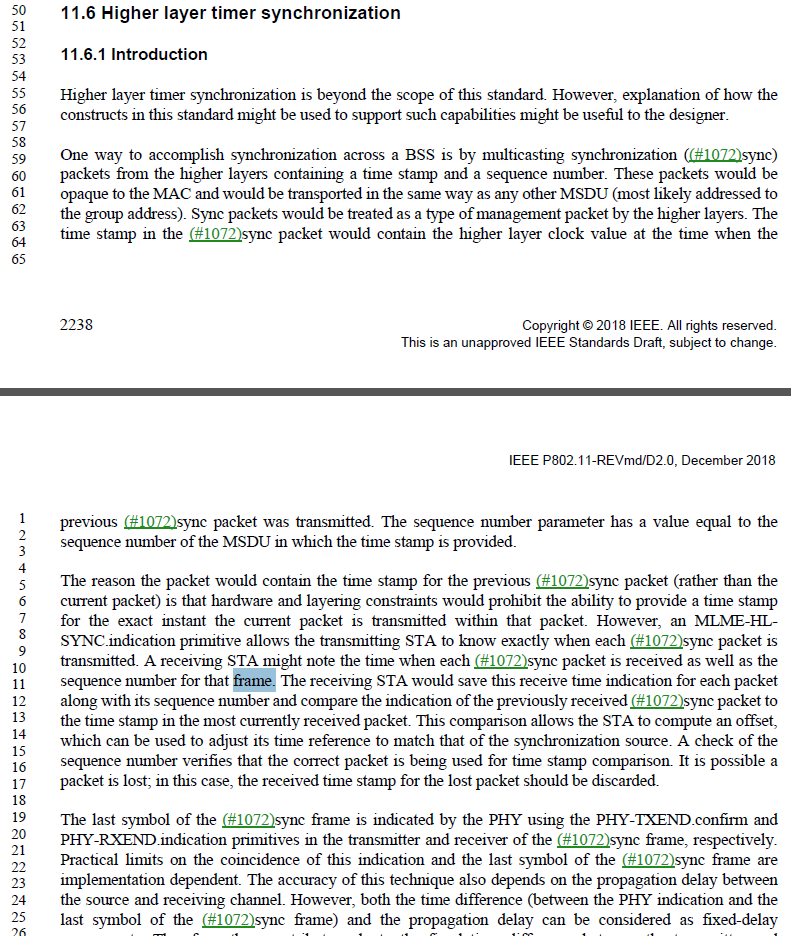
However, there are two occurrences of “any particular” so we need to be clear about which one.

Proposed Resolution:

Revised. In 10.7, change “from a particular SA” to “from any particular SA” in two locations (D2.2 P1780.56 and P1781.4).

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2409 | 2238.50 | 11.6 | The "sync frame"s in Subclause 11.6 are higher-layer constructs and so are properly referred to as "sync packet"s | Throughout 11.6 change "sync frame" to "sync packet" |

Discussion:





The first references to the sync protocol units uses “packet”, but starting in the third paragraph, the usage changes to “frame” more often. The inconsistent usage is confusing and appears to have no meaning/intention.

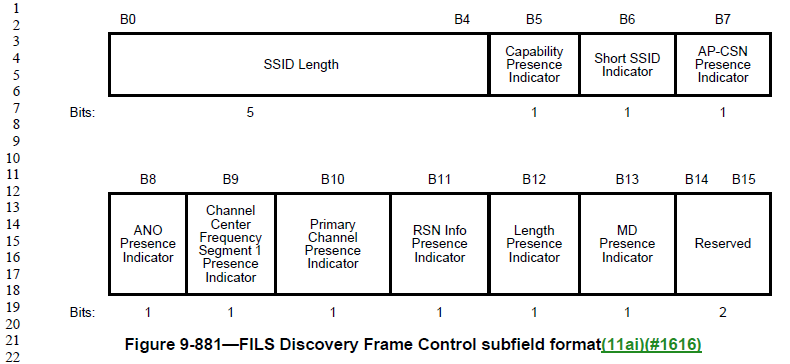
Agree with the commenter that this use of “frame” is at best confusing, since clause 3.1 lists “MAC frame” as a synonym for MPDU, and “PHY frame” as a synonym for PPDU, and those are the common uses in the Draft. As this subclause is discussing a higher layer protocol, these are not MPDUs or PPDUs, and it more clear to say “packet” to help disambiguate.

Proposed Resolution:

Accepted.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2428 | 1532.19 | 9.6.7.36 | b14 and b15 of the FILS Discovery Frame Control subfield are used by an industry-wide proprietary specification | Mark b14 and b15 of the FILS Discovery Frame Control subfield as "Reserved (used by the Wi-Fi Alliance)" |

Discussion:



Per the liaison exchange in 11-19/0185 and 11-19/0277, it has been confirmed that the Wi-Fi Alliance does use these bits, and has requested that the bits be reserved for their use.

Propose to indicate these bits as not only “Reserved”, but that they are used by the Wi-Fi Alliance, in the same manner as Category value 17 (Table 9-53 and Table 11-17).

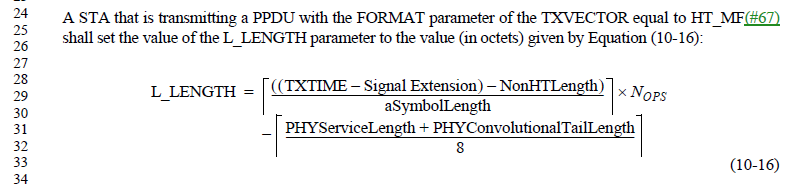
Proposed Resolution:

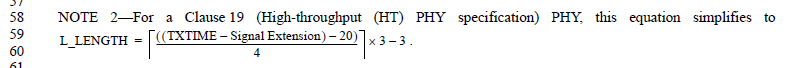
Revised.

In Figure 9-881 (P1532.19) change the indication for bits B14 and B15 from “Reserved” to “Reserved (used by the Wi-Fi Alliance \*)” and add a footnote “\* See http://www.wi-fi.org.”.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2453 | 1874.58 | 10.28.4 | "NOTE 2---For a Clause 19 (High-throughput (HT) PHY specification) PHY, this equation simplifies to" this equation is only used for HT PPDUs ("A STA that is transmitting a PPDU with the FORMAT parameter of the TXVECTOR equal to HT\_MF(#67) shall set the value of the L\_LENGTH parameter to" above) so this qualification is confusing | Just say "NOTE 2---This equation simplifies to" |

Discussion:





This is the only reference to Equation 10-16, so it does seem correct that this is intended only for transmitters that have set the TXVECTOR FORMAT to HT\_MF. Since Note 2 is filling in variables and simplifying, based on HT PHY parameters, it would appear to the be equivalent equation.

Can just replace NOTE 2.

Proposed changes:

Replace NOTE 2 (P1874.58) with the following:

Equation (10-16) can be simplified to Equation (10-16a)

 (10-16a)

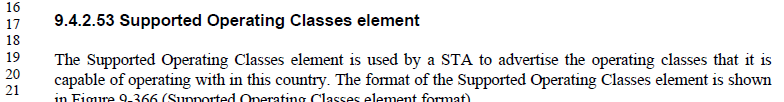
Proposed Resolution:

Revised; Incorporate the proposed changes in doc 11-19/551r3: <https://mentor.ieee.org/802.11/dcn/19/11-19-0551-03-000m-revmd-lb236-comments-assigned-to-hamilton.docx>, for CID 2453 which replaces the note with an equation.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2458 | 1152.16 | 9.4.2.53 | "in this country" -- it's not clear which country is being referred to | Delete "in this country" throughout the referenced subclause |

Discussion:

There are 4 occurrences of “in this country” in subclause 9.4.2.53. All are of the form, “operating classes that [the STA | it] is capable of operating with in this country”. For example:



Agree with the commenter that “this country” is not clear. The point of the phrase is that these are operating classes within which the STA is currently configured to operate.

Proposed Resolution:

Revised.

Change all four occurrences as shown:

“operating classes ~~that~~ within which [the STA | it] is ~~capable of operating with in this country~~ currently configured to operate”

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2460 | 2497.64 | 11.46.3.2 | "MA-UNITDATA.indicate" -- no such primitive | Change to "MA-UNITDATA.indication" |

Discussion:

Agree with the comment. Based on a search, this is the only occurrence of “.indicate” in the Draft.

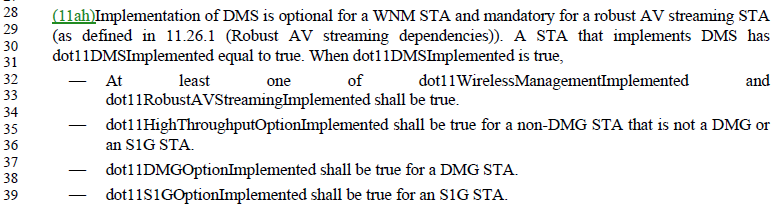
Proposed Resolution:

Accepted.

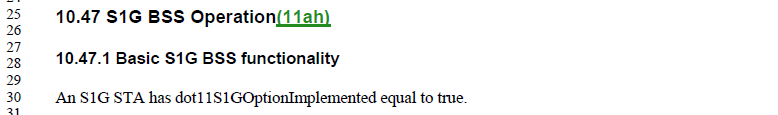
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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2461 | 2363.37 | 11.22.16.2 | "- dot11DMGOptionImplemented shall be true for a DMG STA. - dot11S1GOptionImplemented shall be true for an S1G STA." -- both of these are always true, by definition | Delete the cited text at the referenced location |

Discussion:

The fourth paragraph of 11.22.16.2:



It is correct that stating these requirements here, in the subclause about DMS procedures, should be redundant. However, there is no statement that a DMG STA is a STA with dot11DMGOptionImplemented equal to true. There is such a statement for an S1G STA, however:



Proposed Resolution:

Revised.

Delete the last two bullets of the fourth paragraph of 11.22.16.2, as proposed by the commenter.

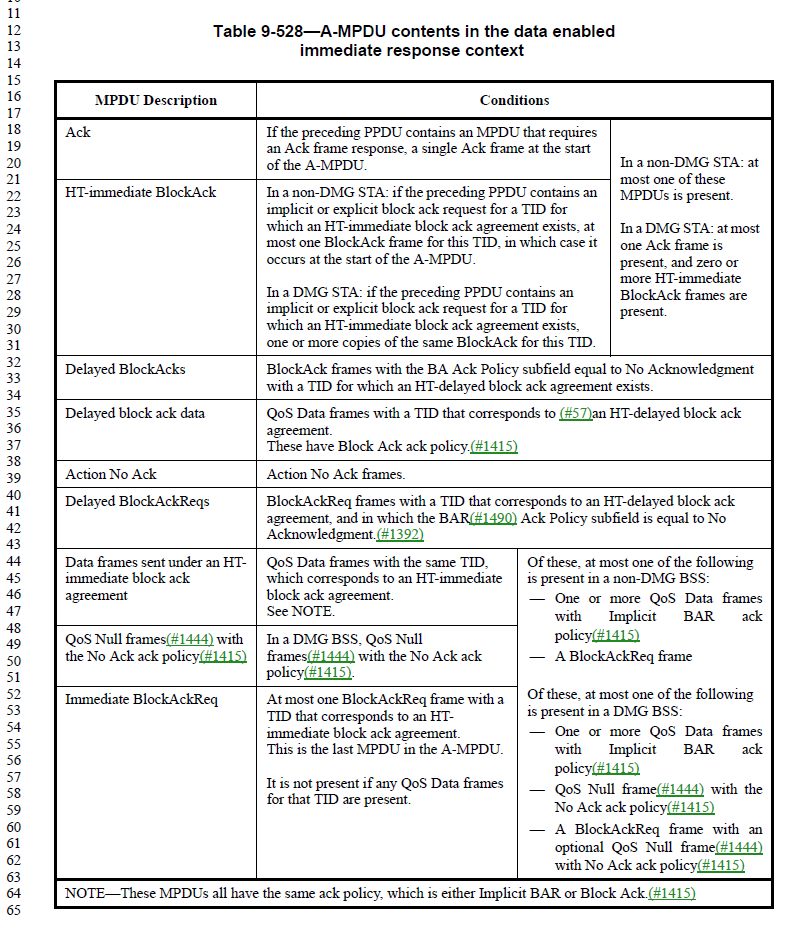
Add a new first paragraph to 11.38 (DMG MAC sublayer attributes):

A DMG STA has dot11DMGOptionImplemented equal to true.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2468 | 1655.00 | 9.7.3 | "at most one of the following is present: x, y, z" is not clear. Does it mean that only what is specified in x or y or z can be present, or can e.g. you have stuff in x plus other stuff as long as it is not in y or z? | Add ", and no other frames" before the colon in each case |

Discussion:

This phrase occurs within Table 9-528:





From the context, it appears that the intention is to include either none of the items in the following list, or only one of them. The suggestion to say “and no other frames” is confusing, because it seems to go beyond this list and say no other frames can be included in the A-MPDU.

From off-line email discussion:

Proposed: Replace “at most one of the following is present” with “either none or only one of the following is present” in Table 9-528.

It seems that the commenter does not think these occurrences are the ones that are not clear. So, this change is not necessary. Does anyone else think they are necessary/useful?

Rather, it is the usage in the first row(s) that is causing the concern:

In a non-DMG STA: at

most one of these

MPDUs is present.

In a DMG STA: at most

one Ack frame is

present, and zero or

more HT-immediate

BlockAck frames are

present.

To address this, the proposal is to add “of these” to the second phrase. (It’s already in the first phrase.)

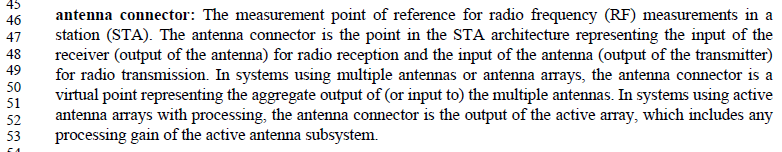
Proposed Resolution:

Revised. Replace “In a non-DMG STA: at most one” with “Of these, in a non-DMG STA: at most one” in Table 9-528. Replace “In a DMG STA: at most one” with “Of these, in a DMG STA: at most one” in Table 9-528.

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** |
| 2391 | 2285.55 | 11.10.14 | "A multiple BSSID set is characterized as follows:  --- All members of the set use a common operating class, channel, Channel Access Functions, and  antenna connector. " -- sounds as if they can't do MIMO | Change the cited text at the referenced location to "A multiple BSSID set is characterized as follows:  --- All members of the set use a common operating class, channel, Channel Access Functions, and  (set of) antenna connector(s). " |

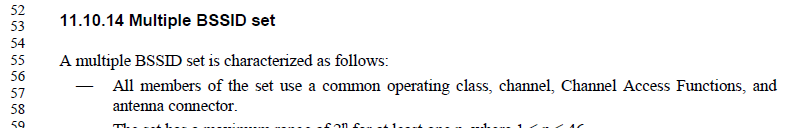
Discussion:

As discussed on the June 24 teleconference, there is a definition of “antenna connector” already in the baseline, which includes these plural situations within the singular term:

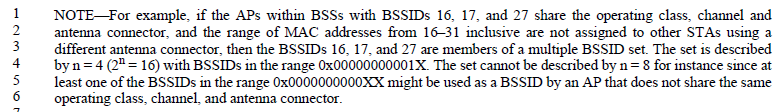


After discussion agreed that the singular is correct, given this definition. However:

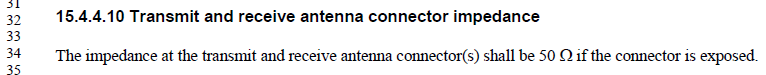
* We still want to keep one capitalization correction in the 11.10.14 context (shown in the Proposed Resolution below)



* We still want to keep the addition of the word “same” in the 11.10.14 context (also shown below)



* We want to fix any existing uses of antenna connector that are (optionally) plural, to use the agreed singular style (these are also listed below).



This same text appears in 16.3.6.11, 17.3.8.7 and 19.3.17.

Proposed Resolution:

Revised.

In the first bullet of 11.10.14, replace “Channel Access Functions” with “channel access functions”

In the first line of the NOTE in 11.10.14, insert the word “same”, to be: “share the same operating class, channel, …”

In 15.4.4.10, 16.3.6.11, 17.3.8.7 and 19.3.17, change “transmit and receive antenna connector(s)” to “transmit antenna connector and receive antenna connector”. Change “if the connector” to “if that connector”.

In Table 19-1, RSSI entry, change “the power observed at the antenna connectors” to “the power observed at the antenna connector”.

In 19.3.19.1 and 21.3.18, change “input levels are measured at the antenna connectors” to “input levels are measured at the antenna connector”.

In 20.3.3.8 and 24.3.3.8 (two occurrences), change “defined at the antenna connector(s)” to “defined at the antenna connector”.

In Tables 21-1, 22-1 and 23-1, RSSI entry for FORMAT is VHT, change “power observed at the antenna connectors” to “power observed at the antenna connector”.