IEEE P802.11  
Wireless LANs

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| --- | --- | --- | --- | --- |
| Resolutions for some comments on 11me/D5.0 (SA2) | | | | |
| Date: 2024-04-18 | | | | |
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Abstract

This submission proposes resolutions for various CIDs on 11me/D5.0. 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”/“No Markup” view should be selected in Word (this means Word comments can be disregarded by the Editor).

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7165  Mark RISON  12.4.7.2.1  3008.60 | "integer-to-octet string conversion" should be spaces not hyphens | As it says in the comment |

Discussion:

802.11 editorial policy is to not use hyphens even when the grammar would demand them.

The instances of octet-string conversion (or octet string conversion) are:

**11.21.6.4.5.4 Overview of secure HE-LTF octet stream generation(11az)**

Integer to octet string conversion (MSB first) specified in 12.4.7.2.2 (Integer to octet string conversion) shall be used to encode the value of the Secure HE-LTF Counter subfield in the KDF as well as in the transmitted LTF sequence information.

**12.4.2 Assumptions on SAE**

D2OS() represents the data to octet string conversion functions in 12.4.7.2 (Data type conversion)

**12.4.7.2 Data type conversion**

**12.4.7.2.1 General**

This protocol requires elements in finite cyclic groups to be converted to octet strings prior to transmission and back again upon receipt. To convert an element into an octet string, the first step is to represent the element in integer format and then employ an integer-to-octet string conversion prior to transmission. To convert an octet string into an element requires an octet string to integer conversion and then representing the integer(s) as an element.

**12.4.7.2.2 Integer to octet string conversion**

An integer, x, shall be converted into an octet string whose length is the smallest integer m such that 28m > x by first representing x in its binary form and then converting the result to an (#1288)octet string.

Given x, m, represent x as […]

**12.4.7.2.3 Octet string to integer conversion**

An octet string shall be converted into an integer by […]

**12.4.7.2.4 Element to octet string conversion**

For ECC groups, each element, except the “point at infinity,” is a point on the elliptic curve satisfying the curve equation and consists of two components: an x-coordinate and a y-coordinate. To convert this point to an octet string, […]

**12.4.7.2.5 Octet string to element conversion**

To convert an octet string into a point on an elliptic curve it is necessary to […]

To convert an octet string into an element in a prime modulus group the octet string shall […]

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

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

**12.10.2 AP PeerKey protocol**

Q1 is the public key used by AP1 in the AP PeerKey protocol encoded as an octet stream using the Element to Octet string conversion from 12.4.7.2.3 (Octet string to integer conversion).

Q2 is the public key used by AP2 in the AP PeerKey protocol encoded as an octet stream using the Element to Octet string conversion from 12.4.7.2.3 (Octet string to integer conversion).

**12.11.2.3.2 Non-AP STA construction of Authentication frame**

and the ephemeral public key shall be encoded in the FFE field (see 9.4.1.38 (FFE field)) according to the element to (#1288)octet string conversion in 12.4.7.2.4 (Element to octet string conversion).

**12.11.2.3.3 AP processing of Authentication frame**

If PFS is being used, the STA’s public key shall be converted from an octet string to an element according to the conversion in 12.4.7.2.5 (Octet string to element conversion).

**12.11.2.3.5 Non-AP STA processing of Authentication frame**

If PFS is being used for the exchange, the AP’s public key shall be converted from an octet string to an element according to the conversion in 12.4.7.2.5 (Octet string to element conversion).

**12.11.2.4.2 Prior to exchange**

The STA’s ephemeral public key shall be encoded into the FFE field (see 9.4.1.38 (FFE field)) according to the element to (#1288)octet string conversion in 12.4.7.2.4 (Element to octet string conversion).

**12.11.2.4.3 Processing after receipt**

The public key is converted from an octet string to an element according to the conversion in 12.4.7.2.5 (Octet string to element conversion).

**12.11.2.4.4 Post processing**

The AP’s ephemeral public key is encoded in the FFE field (see 9.4.1.38 (FFE field)) according to the element to (#1288)octet string conversion in 12.4.7.2.4 (Element to octet string conversion).

**12.11.2.4.5 Upon receipt**

The public key is converted from an octet string to an element according to the conversion in 12.4.7.2.5 (Octet string to element conversion).

It was suggested at the Denver F2F that the conversion functions are canonically defined in <https://secg.org/sec1-v2.pdf> and that the terms there should be used. This defines the following conversions involving octet strings:

2.3.1 Bit-String-to-Octet-String Conversion

2.3.2 Octet-String-to-Bit-String Conversion

2.3.3 Elliptic-Curve-Point-to-Octet-String Conversion

2.3.4 Octet-String-to-Elliptic-Curve-Point Conversion

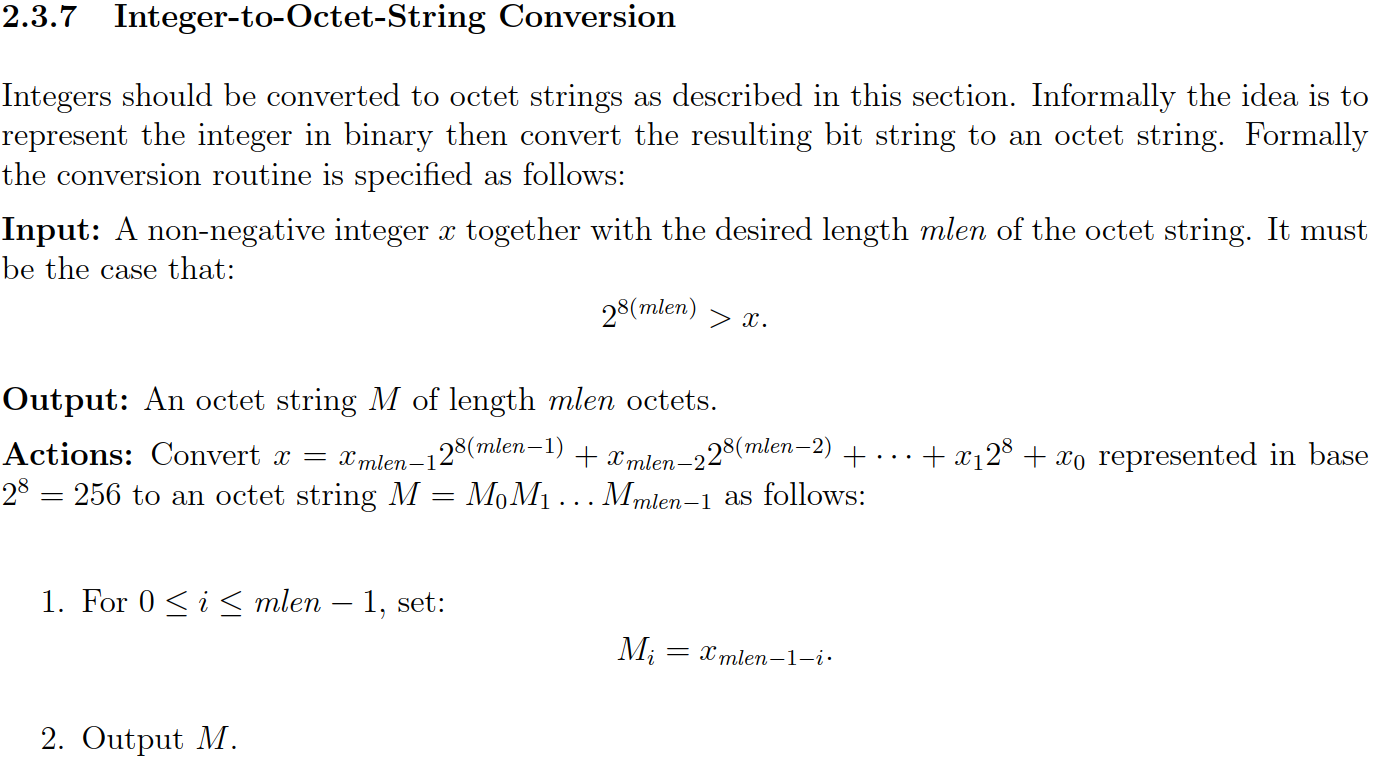
2.3.5 Field-Element-to-Octet-String Conversion

2.3.6 Octet-String-to-Field-Element Conversion

2.3.7 Integer-to-Octet-String Conversion

2.3.8 Octet-String-to-Integer Conversion

However, these appear to be just section headings, not actual function names, e.g.:



This is grammatical (“integer-to-octet-string” is an adjective for the “conversion”); the capitals are just because in that document the convention is to use uppercase initials for non-trivial words in section headings. Also note it’s not OctetString as had been suggested in Denver.

So since we have a hatred of hyphens, they just have to be replaced by spaces. The instance identified in the comment is the only one.

Proposed resolution:

ACCEPTED

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| Identifiers | Comment | Proposed change |
| CID 7198  Mark RISON | Should say "m" not "meter[s]" | As it says in the comment |

Discussion:

The name of the unit is “meter” (in American) but the SI abbreviation “m” should be used after numbers. However there was some debate in Denver about whether this is distributive.

Proposed resolution:

REVISED

At 980.2 change

The top of the building is 67.4 meters above sea level, and a starting altitude of 0 meters above sea level is assumed.

to

The top of the building is 67.4 m above sea level, and a starting altitude of 0 m above sea level is assumed.

At 1000.41 change

NOTE 5—Seven decimal places of latitude and longitude provide sufficient resolution to achieve under 0.01 meters of latitude error and longitude error throughout the globe. Considering the sizes of devices whose positions are being estimated and the use cases for the estimated positions, a map georegistration error of under 0.01 meters is generally regarded as sufficient to avoid compromise of the estimated positions.(#6068)

to

NOTE 5—Seven decimal places of latitude and longitude provide sufficient resolution to achieve under 0.01 m of latitude error and longitude error throughout the globe. Considering the sizes of devices whose positions are being estimated and the use cases for the estimated positions, a map georegistration error of under 0.01 m is generally regarded as sufficient to avoid compromise of the estimated positions.(#6068)

At 2634.7 change

the user interface might retrieve the map image and display it from (–50, –100) to (49.9, 0) meters, place a pin at (0, 0) meters labelled “Lobby Entrance”, and place a second pin at (0, –1.5) meters labelled “You Are Here”.

to

the user interface might retrieve the map image and display it from (–50 m, –100 m) to (49.9 m, 0 m), place a pin at (0 m, 0 m) labelled “Lobby Entrance”, and place a second pin at (0 m, –1.5 m) labelled “You Are Here”.

At 1118.2 change “1 microsecond units” to “1 <micro>s units”.

At 1228.37 change “50 milliseconds” to “50 ms”.

At 2025.6 change “8 microsecond” to “8 <micro>s”.

At 2465.26, 2478.38 change “231–1 microseconds” to “231–1 <micro>s”.

At 2653.55 change “30 seconds” to “30 s”.

At 2911.51, 5294.41, 5296.62, 5347.24 change “60 seconds” to “60 s”.

At 3119.24 change “300 seconds” to “300 s”.

At 3136.45 change “five seconds” to “5 s”.

At 3136.61 change “5 seconds” to “5 s”.

At 3340.17 change “1 microsecond” to “1 <micro>s”.

At 3556.41, 3557.60, 3935.29, 3936.47 change “100 nanosecond” to “100 ns”.

At 3881.34/57 change “1 microsecond” to “1 <micro>s”.

At 3965.52 change “100 picosecond” to “100 ps”.

At 4490.52 change “0.1 nanosecond” to “100 ps”.

At 4892.27 change “10 nanosecond” to “10 ns”.

At 5296.29, 5346.57 change “32 seconds” to “32 s”.

At 5296.46 change “256 seconds” to “256 s”.

At 5347.9 change “512 seconds” to “512 s”.

At 5575.5 change “1stream” to “1 stream”.

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| Identifiers | Comment | Proposed change |
| CID 7220  Mark RISON | The 11az amendment uses the term "if and only if". This was sadly retired a few generations ago in favour of an explicit blah; otherwise blah | Change the "X if and only if Y"s to "X if Y; otherwise Z"s (17x) |

Discussion:

In TGmb or something all the “if and only if”s were abandoned in favour of the much more verbose (and inconsistently worded) “if X; otherwise Y”. This was a mistake, but we are where we are.

Proposed changes:

At 1454.28 change

The Index Adjustment TBTT Count field is present if and only if the Index Adjustment Factor field is present and nonzero.

to

The Index Adjustment TBTT Count field is present if the Index Adjustment Factor field is present and nonzero; otherwise it is not present.

At 2383.61 change

A STA that has sent an NDP Paging Response with the TWT Setup Command field equal to 4 (Accept TWT) shall schedule an NDP Paging frame as the first frame for transmission at the TWTs indicated by the NDP Paging Response, if any of the following conditions is satisfied:

— There are BUs for the requesting STA.

— No NDP Paging frame was sent in the N consecutive preceding TWT(s), where N is equal to the

value of the Max NDP Paging Period subfield in the NDP Paging Response.

to

A STA that has sent an NDP Paging Response with the TWT Setup Command field equal to 4 (Accept TWT) shall schedule an NDP Paging frame as the first frame for transmission at the TWTs indicated by the NDP Paging Response, if either of the following conditions is satisfied:

— There are BUs for the requesting STA.

— No NDP Paging frame was sent in the N consecutive preceding TWT(s), where N is equal to the

value of the Max NDP Paging Period subfield in the NDP Paging Response.

Otherwise the STA shall not schedule an NDP Paging frame.

At 2384.18 change

The P-ID field of the NDP Paging frame shall be set to the same value as P-ID field in the NDP Paging Response if and only if there are BUs for the STA identified by the partial AID indicated in the P-ID field of the NDP Paging Request.

to

The P-ID field of an NDP Paging frame shall be set to the same value as the P-ID field in the NDP Paging Response.

At 2509.27 change

A TPU buffer STA shall transmit an individually addressed TDLS Peer Traffic Indication frame to a TPU sleep STA, through the AP, if and only if all of the following conditions are met:

— A BU destined for a TPU sleep STA was placed into a buffer at the TPU buffer STA;

— The buffer into which the BU was placed contained no other frames with the same RA; and

— One or more periods of dot11TDLSPeerUAPSDIndicationWindow beacon intervals have expired

after the last service period.

to

A TPU buffer STA shall transmit an individually addressed TDLS Peer Traffic Indication frame to a TPU sleep STA, through the AP, if all of the following conditions are met:

— A BU destined for a TPU sleep STA was placed into a buffer at the TPU buffer STA;

— The buffer into which the BU was placed contained no other frames with the same RA; and

— One or more periods of dot11TDLSPeerUAPSDIndicationWindow beacon intervals have expired

after the last service period.

Otherwise it shall not transmit this frame.

At 2093.36 change

An SLS shall include a BRP if and only if the RequestBRP parameter of the MLME-BF-TRAINING.request primitive is true.

to

An SLS shall include a BRP if the RequestBRP parameter of the MLME-BF-TRAINING.request primitive is true; otherwise it shall not include a BRP.

At 2958.56 change

dot11GLKImplemented is true if and only if a STA implements the GLK facility.

to

dot11GLKImplemented is true if a STA implements the GLK facility, and false or absent otherwise.

At 3030.34 change

the separate replay counter for individually addressed Protected Fine Timing frames shall be used if and only if the FTM subfield of CCMP Header (Figure 12-15 (Expanded CCMP MPDU(#3525)(11az))) signals that the management PDU is a Protected Fine Timing frame.

to

the separate replay counter for individually addressed Protected Fine Timing frames shall be used if the FTM subfield of the CCMP Header (Figure 12-15 (Expanded CCMP MPDU(#3525)(11az))) signals that the management PDU is a Protected Fine Timing frame; it shall not be used otherwise.

At 3077.7 change

A KDK is derived if and only if any of the following are true:

— WUR frame protection is negotiated(11az)

— dot11SecureLTFImplemented is true and the peer STA has advertised secure HE-LTF support

capability in its RSNXE (see 9.4.2.240 (RSNXE(#1776))))(11az)

to

A KDK is derived if either of the following are true:

— WUR frame protection is negotiated(11az)

— dot11SecureLTFImplemented is true and the peer STA has advertised secure HE-LTF support

capability in its RSNXE (see 9.4.2.240 (RSNXE(#1776))))(11az)

Otherwise, it is not derived.

At 3086.33 change

A KDK shall be derived if and only if any of the following are true:(11az)

—WUR frame protection is negotiated(11az)

—dot11SecureLTFImplemented is true and the peer STA has advertised secure HE-LTF support capability in its RSNXE (see 9.4.2.240 (RSNXE(#1776)))(11az)

to

A KDK shall be derived if either of the following are true:(11az)

—WUR frame protection is negotiated(11az)

—dot11SecureLTFImplemented is true and the peer STA has advertised secure HE-LTF support capability in its RSNXE (see 9.4.2.240 (RSNXE(#1776)))(11az)

Otherwise, it shall not be derived.

At 3147.63 change

a KDK shall be derived if and only if any of the following are true:(11az)

— WUR frame protection is negotiated(11az)

— dot11SecureLTFImplemented is true and the peer STA has advertised secure HE-LTF support

capability in its RSNXE (see 9.4.2.241 (RSN Extension element (RSNXE)))(11az)

to

a KDK shall be derived if either of the following are true:(11az)

— WUR frame protection is negotiated(11az)

— dot11SecureLTFImplemented is true and the peer STA has advertised secure HE-LTF support

capability in its RSNXE (see 9.4.2.241 (RSN Extension element (RSNXE)))(11az);

otherwise it shall not be derived.

At 3233.17 change

The discovered neighbor mesh STA shall be considered a candidate peer mesh STA if and only if all of the following conditions are met:

[…]

to

The discovered neighbor mesh STA shall be considered a candidate peer mesh STA if all of the following conditions are met:

[…]

Otherwise it shall not be considered a candidate peer mesh STA.

At 3268.2 change

A mesh STA updates its current path to the root mesh STA if and only if the PREQ element contains a greater HWMP SN, or the HWMP SN is the same as the current path and the PREQ element offers a better metric than the current path to the root mesh STA.

to

A mesh STA updates its current path to the root mesh STA if the PREQ element contains a greater HWMP SN, or the HWMP SN is the same as the current path and the PREQ element offers a better metric than the current path to the root mesh STA; otherwise it does not update its current path.

At 4050.32 change

A STA shall update the intra-BSS NAV with the duration information indicated by the received frame in a PSDU if and only if all the following conditions are met:

[…]

A STA shall update the basic NAV with the duration information indicated by the received frame in a PSDU if and only if all the following conditions are met:

[…]

A STA that is a TXOP holder shall not update the intra-BSS NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION.

A STA that is not a TXOP holder shall update the intra-BSS NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION for an HE PPDU if and only if all the following conditions are met:

[…]

A STA shall update the basic NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION for an HE PPDU if and only if all the following conditions are met:

[…]

to

A STA shall update the intra-BSS NAV with the duration information indicated by the received frame in a PSDU if all the following conditions are met:

[…]

Otherwise it shall not so update the intra-BSS NAV.

A STA shall update the basic NAV with the duration information indicated by the received frame in a PSDU if all the following conditions are met:

[…]

Otherwise it shall not so update the basic NAV.

A STA that is a TXOP holder shall not update the intra-BSS NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION.

A STA that is not a TXOP holder shall update the intra-BSS NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION for an HE PPDU if all the following conditions are met:

[…]

Otherwise it shall not so update the intra-BSS NAV.

A STA shall update the basic NAV with the duration information indicated by the RXVECTOR parameter TXOP\_DURATION for an HE PPDU if all the following conditions are met:

[…]

Otherwise it shall not so update the basic NAV.

At 4911.21 change

A transmitter shall use the NGV-LTF-2x-Repeat format if and only if the NGV Data field of a 10 MHz NGV PPDU is modulated with BPSK-DCM and one spatial stream; the transmitter shall use the NGV-LTF-2x if the NGV Data field is modulated with two spatial streams; the transmitter shall use the NGV-LTF-2x for NGV ranging NDP; otherwise, the transmitter can choose either NGV-LTF-2x or NGV-LTF-1x.

to

A transmitter shall use the NGV-LTF-2x-Repeat format if the NGV Data field of a 10 MHz NGV PPDU is modulated with BPSK-DCM and one spatial stream; the transmitter shall use the NGV-LTF-2x format if the NGV Data field is modulated with two spatial streams; the transmitter shall use the NGV-LTF-2x format for an NGV ranging NDP; otherwise, the transmitter shall choose either NGV-LTF-2x or NGV-LTF-1x format.

At 5284.15 change

A STA uses the defined outside the context of a BSS procedures if and only if this attribute is true.

to

A STA uses the defined outside the context of a BSS procedures if this attribute is true; otherwise it does not use them.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7220 in <this document URL>, which transform the “if and only if”s into a more verbose form.

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| Identifiers | Comment | Proposed change |
| CID 7166  Mark RISON  2 | Some months are abbreviated and some not | Abbreivate all months to three letters |

Discussion:

At the moment it’s inconsistent, though generally it’s abbreviated with a full stop (except for May, of course).

Proposed resolution:

REVISED

At 189.1 change “October 1969” to “Oct. 1969”.

At 189.3 change “Sept. 1981” to “Sep. 1981”.

At 189.31 change “April 1999” to “Apr. 1999”.

At 189.37 change “July 2003” to “Jul. 2003”.

At 189.40 change “Sept. 2002” to “Sep. 2002”.

At 189.46 change “Sept. 2003” to “Sep. 2003”.

At 189.51 change “June 2004” to “Jun. 2004”.

At 189.61 change “June 2005” to “Jun. 2005”.

At 190.10/13 change “Sept. 2007” to “Sep. 2007”.

At 190.20 change “July 2008” to “Jul. 2008”.

At 190.45 change “Sept. 2010” to “Sep. 2010”.

At 190.49 change “July 2011” to “Jul. 2011”.

At 190.55 change “July 2012” to “Jul. 2012”.

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7199  Mark RISON  3 | Is it not clear whether group addressed frames are "addressed to" STAs | Clarify, maybe under the definition of group addressed in C3 |
| CID 7200  Mark RISON  9.2.2  1891.23 | "A STA that receives at least one (#4179)frame in a PSDU can update its NAV" -- that one for example doesn't have to be addressed to the STA | After the para in 9.2.2 "Without further qualification, reception by the MAC sublayer implies that the frame contents are valid, and that the protocol version is supported (see 9.2.4.1.2 (Protocol Version subfield)), with no implication regarding frame addressing or regarding whether the frame type or other fields in the MAC header are meaningful to the MAC entity, where the frame is addressed to the STA (individually addressed or group addressed).(#6185)" add " except that in some contexts the frame can be addressed to another STA" |

Discussion:

Jouni MALINEN comments:

There are some clear cases where broadcast frames are addressed to all non-AP STAs associated with an AP, but there are places that I cannot easily determine whether they include all, some, or even none, group addressed frames..

For many (most?) cases I’d expect FromDS=1 ToDS=0 Data frames with A1=group A2=BSSID to not be addressed to STAs that are not associated in the identified BSS, but even if a STA is associated with that BSS, the frame might not be addressed to it for non-broadcast (i.e., multicast) cases. Probe Request frames use A1=broadcast, but I would not claim them to be addressed to all STAs listening on the channel. It should also be noted that we cases uses “addressed to the same RA” instead of the “addressed to a STA” and that RA might be group address (or a combination of individual and group addresses in some cases). We also use “addressed to one or more WUR non-AP STAs that are identified by the WUR IDs included in the Frame Body field” which seems to imply that something the frame body can actually determine whether the frame is addressed a particular STA. The definition of reception by the MAC sublayer (D5.0 P603 L55-60) is somewhat interesting in this context as well.

Making this all clear would be a significant effort and would likely require going through all those hundreds of places one by one.. It might actually make sense to do that for \_*some*\_ more interesting/complex/meaningful ones, since some of these could likely result in unexpected behavior if things are interpreted differently. I’d do this only based on specific comments identifying each such place instead of a generic comment (which could just get a sentence […] getting added as a lazy way of “fixing” this).

Proposed resolution:

REVISED

In 9.2.2 Conventions, at the end of the para:

Without further qualification, reception by the MAC sublayer implies that the frame contents are valid, and that the protocol version is supported (see 9.2.4.1.2 (Protocol Version subfield)), with no implication regarding frame addressing or regarding whether the frame type or other fields in the MAC header are meaningful to the MAC entity, where the frame is addressed to the STA (individually addressed or group addressed).(#6185)

add:

Unless explicitly specified, a group addressed frame might or might not, depending on the context, be considered “addressed to” a particular STA. Additionally, in certain contexts a frame individually addressed to a STA might be considered “received” by another STA (see e.g. 10.3.2.4).

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| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7201  Mark RISON  9.6.19.17  1786.23 | "The Block Ack Starting Sequence Control field is set to the corresponding value within the immediately previously received Relay Ack Request frame." is behaviour | Move to Clause 10 |

Discussion:

It is indeed behaviour, not format. This is in Subclause 9.6.19.17 Relay Ack Response frame format.

Proposed changes:

REVISED

At 1786.23 delete “The Block Ack Starting Sequence Control field is set to the corresponding value within the immediately previously received Relay Ack Request frame.”

At 2365.55 change “Upon reception of a Relay Ack Request frame, the RDS shall respond with a Relay Ack Response frame and set the BlockAck Bitmap field to indicate which frames have been received by the destination REDS.” to “Upon reception of a Relay Ack Request frame, the RDS shall respond with a Relay Ack Response frame with the Block Ack Starting Sequence Control field set to the same value as in the Relay Ack Request frame and the BlockAck Bitmap field set to indicate which frames have been received by the destination REDS.”

At 674.26 change “The Fragment Number subfield of the Block Ack Starting Sequence Control subfield is set to all 0s” to “The Fragment Number subfield of the Block Ack Starting Sequence Control subfield is set to 0”.

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| Identifiers | Comment | Proposed change |
| CID 7160  Mark RISON  9.6.7.7 | It should be possible to specify a Max Channel Switch Time in an ECSA frame | At the end of Figure 9-1191—Extended Channel Switch Announcement frame Action field format add a cell "Max Channel Switch Time element" with "Zero or more" above and "6" below. Ditto in Figure 9-1178—Channel Switch Announcement frame Action field format |

Discussion:

The Max Channel Switch Time element can currently be passed in a beacon/probe rsp when a Channel Switch Announcement or an Extended Channel Switch Announcement element is also present. The behaviour is:

**11.8 DFS procedures**

**11.8.8 Selecting and advertising a new channel**

**11.8.8.2 Selecting and advertising a new channel in a non-DMG infrastructure BSS**

When an AP transmits a frame containing an Extended Channel Switch Announcement element, it should include a Max Channel Switch Time element in the frame if the Channel Switch Count field is nonzero and it may include the element if the field is 0.(#6027) When the AP includes the Max Channel Switch Time element(#6), the AP shall transmit the first Beacon frame in the new channel no later than the time indicated in the Switch Time field of the Max Channel Switch Time element after the last Beacon frame transmitted in the current channel, unless the AP determines that it is unable to operate on the new channel.(#1812)

(#6)A STA that receives a Max Channel Switch Time element from its associated AP should not transmit a frame to the AP on the new channel until it receives a frame on the new channel from the AP.

**11.9 Extended channel switching (ECS)**

**11.9.3 Selecting and advertising a new channel and/or operating class**

**11.9.3.2 Selecting and advertising a new channel in an infrastructure BSS**

When an AP transmits a frame containing an Extended Channel Switch Announcement element, it should include a Max Channel Switch Time element in the frame if the Channel Switch Count field is nonzero and it may include the element if the field is 0.(#6027) When the AP includes the Max Channel Switch Time element(#6), the AP shall transmit the first Beacon frame in the new channel no later than the time indicated in the Switch Time field of the Max Channel Switch Time element after the last Beacon frame transmitted in the current channel, unless the AP determines that it is unable to operate on the new channel.

(#6027)NOTE 1—An Extended Channel Switch Announcement frame does not contain an Extended Channel Switch Announcement element (see 9.6.7.7 (Extended Channel Switch Announcement frame format)).

A STA that receives a Max Channel Switch Time element from its associated AP should not transmit a frame to the AP on the new channel until it receives a frame on the new channel from the AP.

However, this means that the STA doesn’t get to find out the channel switch time if it’s not listening for, or not receiving, beacons, or if the channel switch is non-extended. The mechanism should be extended to CSA and ECSA frames, and to CSA elements, keeping it as a “should” so that existing implementations are not affected.

Proposed changes:

In 9.6.2.6 Channel Switch Announcement frame format and 9.6.7.7 Extended Channel Switch Announcement frame format:

At the end of Figure 9-1178—Channel Switch Announcement frame Action field format and Figure 9-1191—Extended Channel Switch Announcement frame Action field format add a cell “Max Channel Switch Time element” with “Zero or one” above and “0 or 6” below.

At the end of the subclause add a para:

The Max Channel Switch Time element is defined in 9.4.2.216 (Max Channel Switch Time element).

Change as follows:

**11.8 DFS procedures**

**11.8.8 Selecting and advertising a new channel**

**11.8.8.2 Selecting and advertising a new channel in a non-DMG infrastructure BSS**

When an AP transmits an Extended Channel Switch Announcement frame or a frame containing a Channel Switch Announcement element or an Extended Channel Switch Announcement element, it should include a Max Channel Switch Time element in the frame if the Channel Switch Count field is nonzero and it may include the element if the field is 0.(#6027) When the AP includes the Max Channel Switch Time element(#6), the AP shall transmit the first Beacon frame in the new channel no later than the time indicated in the Switch Time field of the Max Channel Switch Time element after the last Beacon frame transmitted in the current channel, unless the AP determines that it is unable to operate on the new channel.(#1812)

(#6)A STA that receives a Max Channel Switch Time element from its associated AP should not transmit a frame to the AP on the new channel until it receives a frame on the new channel from the AP.

**11.9 Extended channel switching (ECS)**

**11.9.3 Selecting and advertising a new channel and/or operating class**

**11.9.3.2 Selecting and advertising a new channel in an infrastructure BSS**

When an AP transmits an Extended Channel Switch Announcement frame or a frame containing a Channel Switch Announcement element or an Extended Channel Switch Announcement element, it should include a Max Channel Switch Time element in the frame if the Channel Switch Count field is nonzero and it may include the element if the field is 0.(#6027) When the AP includes the Max Channel Switch Time element(#6), the AP shall transmit the first Beacon frame in the new channel no later than the time indicated in the Switch Time field of the Max Channel Switch Time element after the last Beacon frame transmitted in the current channel, unless the AP determines that it is unable to operate on the new channel.

~~(#6027)NOTE 1—An Extended Channel Switch Announcement frame does not contain an Extended Channel Switch Announcement element (see 9.6.7.7 (Extended Channel Switch Announcement frame format)).~~

A STA that receives a Max Channel Switch Time element from its associated AP should not transmit a frame to the AP on the new channel until it receives a frame on the new channel from the AP.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7160 in <this document URL>, which allow the max channel switch time to be communicated for ECSA frames and for frames containing a CSA element (including CSA frames).

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7213  Mark RISON  11.5.3.4  2588.63 | "a) Discard all MPDUs that have not been acknowledged, up to and including the last (highest in sequence number space) MPDU transmitted, and b) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number immediately after that of the last (highest in sequence number space) MPDU transmitted." should allow last one to be retxed, i.e. a) to allow not last if not acked and b) to say use that SN if retxing | Commenter to bring specific wording proposal |

Discussion:

The D4.0 wording was:

When the originator receives a DELBA frame, it shall

a) Discard any MPDU that has been transmitted and not acknowledged, with the possible exception if it was the last MPDU to be sent and it was not a retransmission, and

b) Set the sequence number to either that of the last MPDU that is sent if it intends to retransmit or one beyond the last MPDU sent.

This meant that if SN 42 was transmitted but not acked and not retried, and SN 43 was never transmitted, then the originator could choose to retry SN 42 after the DELBA (the D5.0 wording doesn’t allow this). If, however, SN 42 was retried at least once, it could not. It is not clear why the latter restriction was applied: the recipient might have received the initial transmission of SN 42 in any case. But the point is that if the originator wants to keep trying SN 42, it should be allowed to do so.

Proposed changes:

Change 11.5.3.4 Procedure at the block ack originator(#6171) as follows:

When a block ack agreement is torn down, the originator shall, for MPDUs under that block ack agreement (i.e., recipient and TID), irrespective of whether it transmitted or received a DELBA frame:

a) Discard all MPDUs that have not been acknowledged, up to and optionally including the last (highest in sequence number space) MPDU transmitted, and either

b) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number immediately after that of the last (highest in sequence number space) MPDU transmitted, or

c) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number of the last (highest in sequence number space) MPDU transmitted, if this was not acknowledged and it wishes to retry this MPDU.

Alternative:

Change 11.5.3.4 Procedure at the block ack originator(#6171) as follows:

When a block ack agreement is torn down, the originator shall (save for the alternative immediately below), for MPDUs under that block ack agreement (i.e., recipient and TID), irrespective of whether it transmitted or received a DELBA frame:

a) Discard all MPDUs that have not been acknowledged, up to and including the last (highest in sequence number space) MPDU transmitted, and

b) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number immediately after that of the last (highest in sequence number space) MPDU transmitted

Alternatively, if the last (highest in sequence number space) MPDU transmitted was not acknowledged, and the originator wishes to retry this, the originator may, for MPDUs under that block ack agreement (i.e., recipient and TID), irrespective of whether it transmitted or received a DELBA frame:

a) Discard all MPDUs that have not been acknowledged, up to and excluding the last (highest in sequence number space) MPDU transmitted, and

b) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number of the last (highest in sequence number space) MPDU transmitted.

Althreenative:

Change 11.5.3.4 Procedure at the block ack originator(#6171) as follows:

When a block ack agreement is torn down, the originator shall, for MPDUs under that block ack agreement (i.e., recipient and TID), irrespective of whether it transmitted or received a DELBA frame, behave as follows:

If the last (highest in sequence number space) MPDU transmitted was not acknowledged, and the originator wishes to retry this, the originator shall:

a) Discard all MPDUs that have not been acknowledged, up to and excluding the last (highest in sequence number space) MPDU transmitted, and

b) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number of the last (highest in sequence number space) MPDU transmitted.

Otherwise, the originator shall:

a) Discard all MPDUs that have not been acknowledged, up to and including the last (highest in sequence number space) MPDU transmitted, and

b) Set the sequence number of the next MPDU to be transmitted outside the block ack agreement to the sequence number immediately after that of the last (highest in sequence number space) MPDU transmitted.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 7213 in <this document URL>, which allow the originator to keep trying the last MPDU if this was not acknowledged (even if it had been retried).

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7191  Mark RISON  12.7.6.4  3107.29 | "the Supplicant verifies that the PMKR1Name in the PMKID List field of the RSNE is identical to the value it sent in message 2 and verifies that" should be "the Supplicant shall verifiy that the PMKR1Name in the PMKID List field of the RSNE is identical to the value it sent in message 2 and shall verify that" (maybe other bullets) | As it says in the comment |

Discussion:

It is not clear that the “shall” that introduces all the bullets applies to anything beyond the first verb in each line.

Proposed changes:

Change from 3107.26 as follows:

The Supplicant (#1243)shall also:

a) (#1243)Verify the RSNE and, if present, the RSNXE. If this message 3 is part of a fast BSS transition initial mobility domain association or an association started through the FT protocol, the Supplicant shall verify~~ies~~ that the PMKR1Name in the PMKID List field of the RSNE is identical to the value it sent in message 2, ~~and verifies~~ that all other fields of the RSNE are identical to the fields in the RSNE present in the Beacon or Probe Response frames and ~~verifies~~ that the FTE and MDE are the same as in the (Re)Association Response frame. Otherwise, the Supplicant shall verify~~ies~~ that the RSNE is identical to that the STA received in the Beacon or Probe Response frame. If the RSNXE is present, the Supplicant shall verify~~ies~~ that the RSNXE is identical to that the STA received in the Beacon or Probe Response frame. If any of these verification steps indicates a mismatch, the STA shall disassociate or deauthenticate. If a second RSNE is provided in the message, the Supplicant shall use~~s~~ the pairwise cipher suite specified in the second RSNE or deauthenticate~~s~~.

b) (#1243)Verify the message 3 MIC or AEAD decryption operation result. If the calculated MIC does not match the MIC that the Authenticator included in the (#1836)EAPOL-Key PDU or AEAD decryption operation returns failure, (#6110)the Supplicant shall silently discard message 3.

c) (#1243)Update the last-seen value of the Key Replay Counter field.

d) If the Extended Key ID for Individually Addressed Frames subfield of the RSN Capabilities field is 1 for both the Authenticator and Supplicant: Use~~s~~ the MLME-SETKEYS.request primitive to configure the IEEE 802.11 MAC to receive individually addressed MPDUs protected by the PTK with the assigned (#3493)key ID.

e) (#1243)Construct message 4.

f) (#1243)Send message 4 to the Authenticator.

g) (#1243)Use the MLME-SETKEYS.request primitive to configure the IEEE 802.11 MAC to send and, if the receive key has not yet been installed, to receive individually addressed MPDUs protected by the PTK. The GTK is also configured by MLME-SETKEYS.request primitive. (11ba)If WUR frame protection is negotiated, the WTK, and if applicable the WIGTK, is also configured by using the MLME-SETKEYS.request primitive.

At 3108.58 change “the MLME-SETKEYS primitive” to “the MLME-SETKEYS.request primitive”.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 7217  Mark RISON  9.4.2.5.1 | I see no behavioural references to the Traffic Indicator field (whether in S1G or in non-S1G). I do see some behavioural references to "AID 0" | Add some behavioural rules for the Traffic Indicator field (tx and rx) |

Discussion:

Here are the AID 0 instances:

**Table 9-9—Duration/ID field encoding**

AID 0 is used for broadcast transmission in S1G PPDU, reserved if not in S1G PPDU.

*[not relevant to the Traffic Indicator field]*

**9.4.2.5 TIM element**

(#6033)The Traffic Indicator field contains the traffic indication virtual bitmap bit associated with AID 0. This bit is set to 1 in TIM elements with the DTIM Count field set to 0 when one or more group addressed MSDUs/MMPDUs are buffered at the AP or the mesh STA and they are not to be delivered using group AID as described in 10.54 (Group AID).

**11.2.3.3 AP TIM transmissions**

AID 0 (zero) is reserved to indicate the presence of buffered non-GCR-SP group addressed BUs (M118)to be delivered using MPDUs with an RA other than a SYNRA but that are not delivered using group AID. The AP shall identify those STAs for which it is prepared to deliver38 buffered BUs by setting bits in the TIM’s partial virtual bitmap that correspond to the appropriate AIDs.

**11.2.3.6 AP operation**

The bit for AID 0 (zero) in the Bitmap Control field of the TIM element shall be set to 1 when non-GCR-SP non-SYNRA group addressed traffic that is not to be delivered using group AID is buffered, according to 9.4.2.5 (TIM element).

[…]

the AP shall set the bit for AID 0 (zero) in the TIM element to 1 for a single BSSID or set the corresponding group address bit to 1 for multiple BSSIDs, as defined in 9.4.2.5 (TIM element)

**14.4 Mesh peering management (MPM)**

AID 0 (zero) is reserved to indicate the presence of buffered group addressed MSDUs and MMPDUs (see 14.15.4 (TIM transmissions in an MBSS)).

**14.15.4 TIM transmissions in an MBSS**

The TIM element identifies the peer mesh STAs for which traffic is pending and buffered in the reporting mesh STA. This information is coded in a partial virtual bitmap, as described in 9.4.2.5 (TIM element). In addition, the TIM contains an indication whether group addressed traffic is pending. Every neighbor peer mesh STA is assigned an AID by the reporting mesh STA as part of the mesh peering establishment process (see 14.4.1 (General)). The mesh STA shall identify those peer mesh STAs for which it is prepared to deliver41 buffered MSDUs and MMPDUs by setting bits in the TIM’s partial virtual bitmap that correspond to the appropriate AIDs.

**14.15.7 Power save support**

The mesh STA sets the bit for AID 0 (zero) in the Bitmap Control field of the TIM element to 1 when group addressed traffic is buffered, according to 9.4.2.5 (TIM element).

**Figure 26-6—Illustration of UORA procedure**

*[not relevant to the Traffic Indicator field]*

**Figure L-1/2/3/5/6/7 (not 4/8/9/10/11/12/13/14/15)— Partial Virtual Bitmap examples** (not all searchable)

*[Being handled by Dave HALASZ under CID 7218.]*

So there’s some behavioural description, but it’s hidden behind references to AID 0.

Having said that, I can’t find anything to describe the rx behaviour for the Traffic Indicator field!

Note also the subtlety that the AID 0 bit in the bitmap is replicated in the Traffic Indicator field, and indeed the AID 0 bit need not be transmitted in the PVB:

NOTE 1—The bit numbered 0 in the traffic indication virtual bitmap need not be included in the Partial Virtual Bitmap field even if that bit is set.

Proposed changes:

Change as follows:

**9.4.2.5 TIM element**

(#6033)The Traffic Indicator field contains the traffic indication virtual bitmap bit associated with AID 0. This bit is set to 1 in TIM elements with the DTIM Count field set to 0 when one or more group addressed MSDUs/MMPDUs are buffered at the AP or the mesh STA and they are not to be delivered using group AID as described in 10.54 (Group AID).

*[no change needed]*

**11.2.3.3 AP TIM transmissions**

AID 0 ~~(zero)~~ is reserved to indicate the presence of buffered non-GCR-SP group addressed BUs (M118)to be delivered using MPDUs with an RA other than a SYNRA but that are not delivered using group AID. The AP shall identify those STAs for which it is prepared to deliver38 buffered BUs by setting bits in the TIM’s partial virtual bitmap that correspond to the appropriate AIDs.

NOTE—AID 0 is signalled in the Traffic Indicator field when the DTIM Count field is zero.

**11.2.3.6 AP operation**

The Traffic Indicator field ~~bit for AID 0 (zero)~~ in the Bitmap Control field of the TIM element shall be set to 1 when non-GCR-SP non-SYNRA group addressed traffic that is not to be delivered using group AID is buffered, according to 9.4.2.5 (TIM element).

[…]

the AP shall set the Traffic Indicator field ~~bit for AID 0 (zero)~~ in the TIM element to 1 for a single BSSID or set the corresponding group address bit to 1 for multiple BSSIDs, as defined in 9.4.2.5 (TIM element)

**11.2.3.7 Receive operation for STAs in PS mode**

e) When dot11FMSActivated is false and ReceiveDTIMBeacons(#4221) is true, the STA shall transition to awake state(#6038) early enough to be able to receive either every non-STBC DTIM or every STBC DTIM sent by the AP of the BSS. If the Traffic Indicator field in the TIM element in the DTIM beacon is equal to 1, the STA shall remain in the awake state to receive the group addressed MPDUs transmitted by the AP as described in 11.2.3.1 General and 11.2.3.4 TIM types.

**14.4 Mesh peering management (MPM)**

AID 0 ~~(zero)~~ is reserved to indicate the presence of buffered group addressed MSDUs and MMPDUs (see 14.15.4 (TIM transmissions in an MBSS)).

**14.15.4 TIM transmissions in an MBSS**

The TIM element identifies the peer mesh STAs for which traffic is pending and buffered in the reporting mesh STA. This information is coded in a partial virtual bitmap, as described in 9.4.2.5 (TIM element). In addition, the TIM contains an indication whether group addressed traffic is pending, in the Traffic Indicator field, which signals AID 0. Every neighbor peer mesh STA is assigned an AID by the reporting mesh STA as part of the mesh peering establishment process (see 14.4.1 (General)). The mesh STA shall identify those peer mesh STAs for which it is prepared to deliver41 buffered MSDUs and MMPDUs by setting bits in the TIM’s partial virtual bitmap that correspond to the appropriate AIDs.

**14.15.7 Power save support**

The mesh STA sets the Traffic Indicator field ~~bit for AID 0 (zero)~~ in the Bitmap Control field of the TIM element to 1 when group addressed traffic is buffered, according to 9.4.2.5 (TIM element).

Proposed resolution:

REVISED

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

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

Discussion:

Proposed changes:

Proposed resolution:

REVISED

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

**References:**

802.11me/D5.0 except where otherwise specified