IEEE P802.11
Wireless LANs

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| Resolutions for some comments on 11me/D6.0 (SA3) |
| Date: 2024-07-18 |
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Abstract

This submission proposes resolutions for various CIDs on 11me/D6.0. 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).

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| Identifiers | Comment | Proposed change |
| CID 8149Mark RISON12.5.2.4.43037.6 | "the separate replay counter for individually addressed Protected Fine Timing frames shall be used if the FTM subfield of the CCMP Header" -- what if GCMP is used rather than CCMP? | As it says in the comment |

Discussion:

There is an FTM subfield in the GCMP header too:



Proposed resolution:

REVISED

Change “FTM subfield of the CCMP Header (Figure 12-15 (Expanded CCMP MPDU(#3525)(11az)))” to “FTM subfield of the CCMP or GCMP header (Figure 12-15 (Expanded CCMP MPDU(#3525)(11az)) or Figure 12-28 (Expanded GCMP MPDU(11az)))”.

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| Identifiers | Comment | Proposed change |
| CID 8214Mark RISON9.3.3.11772 | In Table 9-71—Presence of fields and elements in Authentication frames, RSNXE is only shown in FT message 1 not FT messages 3 and 4, but Table 13-1—FT authentication elements shows it in messages 3 and 4 too | Add it for messages 3 and 4 here too |

Discussion:

Jouni MALINEN has clarified that:

Table 13-1 discussion on the third and fourth message is most likely only for the FT protocol case (i.e., the one without resource allocation) and as such, the RSNXE comments there are for Reassocation Request/Response frames; not Authentication frames.

Proposed changes:

Make the following changes in Table 13-1:

(#6301)(#4070)The RSNXE is present in the first message if any subfield of the Extended RSN Capabilities field in this element is nonzero, except the Field Length subfield.

(#6301)If the third message is transmitted in a Reassociation Request frame, t~~T~~he RSNXE is present in the third message if an RSNXE is present in a Beacon or Probe Response frame that the FTO has received from the target AP and the FTO set to 1 any subfield, except the Field Length subfield, of the Extended RSN Capabilities field in this element.

(#6301)If the fourth message is transmitted in a Reassociation Response frame, t~~T~~he RSNXE is present in the fourth message if an RSNXE was present in the third message and the target AP set to 1 any subfield, except the Field Length subfield, of the Extended RSN Capabilities field in this element.

(#6301)Otherwise, the RSNXE is not (#7041)present.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 8214 in <this document URL>, which restrict inclusion of the RSNXE in the third and fourth messages to Reassociation Request/Response frames.

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| Identifiers | Comment | Proposed change |
| CID 8200Mark RISON12 | There are various references to "an AEAD cipher" but no list of which ciphers are AEAD ciphers. There's a "NOTE 3—AEAD cipher mode is described in 12.11.2.7 (AEAD cipher mode for FILS)." but that only identifies AEAD ciphers for FILS, not AEAD ciphers generally | As it says in the comment |

Discussion:

Jouni MALINEN has stated:

I agree that the AEAD cipher things are confusing and should really been done differently.. For the REVme effort, I guess there are practical limits on how much can be done now, so maybe the minimal approach would be acceptable.. We should not define or list AEAD ciphers in general since that would be even more confusing. For the current need, the key question is on whether the key wrap algorithm (see Table 12-11) used with KEK (i.e., how the Key Data field in EAPOL-Key frames is protected) is an AEAD cipher. We have defined three different variants of key wrap algorithms: ARC4, NIST AES Key Wrap, and AES-SIV(-256/512), AES-SIV is an AEAD cipher; the other two are not.

Proposed resolution:

REVISED

Add a second note at the end of Table 12-11:

NOTE 2—AES-SIV-256 and AES-SIV-512 are AEAD ciphers.

and number the existing NOTE as NOTE 1 (2 locations).

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| Identifiers | Comment | Proposed change |
| CID 8219Mark RISON9 | In some places the compressed SSID appears to be the same as the short SSID, but in others it's the 16 lsbs | Call the 32-bit ones short SSIDs, not compressed SSIDs |

Discussion:

A short SSID is the CRC of the SSID, and is carried in a Short SSID field. (Note this means it is big-endian.)

We also have Compressed SSID fields. Some of these are 32-bit ones, and are in fact referring to short SSIDs. Compressed SSIDs are the 16 lsbs of short SSIDs (the endianness is not super-clear; see other comment).

Proposed changes:

Change “Compressed SSID” to “Short SSID” (case-preservingly unless stated otherwise) in all the places where they are 32 bits, i.e.:

421.53

Compressed SSID Integer N/A

The Compressed SSID of the received frame (PV1 Probe Response or S1G Beacon) from the found BSS.

This parameter is optionally present if dot11S1GOptionImplemented is true; otherwise not present.

608.41

Compressed SSID Present

616.52

9.2.4.1.16 Compressed SSID Present subfield

The Compressed SSID Present subfield is set to 1 if the Compressed SSID field is present; otherwise, it is set to 0.

785.61

The Compressed SSID field is present if the Compressed SSID Present field in the Frame Control is 1 and indicates a 32-bit CRC calculated over the SSID contained in the S1G Beacon frame (calculation is performed as defined in 9.2.4.9 (FCS field) where the SSID is the calculation fields). Otherwise, it is not present.

785.31

Compressed SSID (optional)

1373.51

~~Full~~ SSID element if the bit is set to 1,

and Compressed SSID field if the bit is set to 0

1862.34

Compressed SSID (optional)

1862.61

Either a Compressed SSID field or an SSID element is included in the PV1 Probe Response frame.

1863.1

~~The~~A Compressed SSID field is present if the Full SSID Present subfield in the Frame Control field is 0 and it contains a 32-bit CRC calculated over the SSID contained in the Probe Response or S1G Beacon frame (calculation is performed as defined in 9.2.4.9 (FCS field) where the SSID is the calculation fields). An SSID element is not present if the Full SSID Present subfield in the Frame Control field is 0.

An SSID element as defined in 9.4.2.2 (SSID element) is present in the Optional Elements field of the PV1 Probe Response frame if the Full SSID Present subfield in the Frame Control field is 1. ~~The~~A Compressed SSID field is not present if the Full SSID Present subfield in the Frame Control field is 1.

1863.27

The Full SSID Present field indicates whether a ~~Full~~ SSID or a Compressed SSID ***[also change to lowercase “short”]*** is included in the PV1 Probe Response frame. Setting the field to 1 indicates that an SSID element is included and ~~the~~a Compressed SSID field is not included in the PV1 Probe Response frame. Setting the field to 0 indicates that ~~the~~a Compressed SSID field is included and ~~the~~an SSID element is not included in the PV1 Probe Response frame.

2480.2

that has either a compressed SSID or an access network option. The NDP probing procedure is allowed when an S1G STA knows the operating frequency bands and regulatory domains. A non-S1G STA shall not transmit an NDP Probe Request frame.

APs receiving an NDP Probe Request frame shall transmit a broadcast Probe Response only if

a) The compressed SSID in the NDP Probe Request frame is the specific compressed SSID of the AP’s BSS.

2481.40

— Either the SSID element or the compressed SSID ***[also change to uppercase “Short”]*** field.

— If the Request Full SSID ~~bit~~field in the PV1 Probe Response Option element is equal to 1, then the

SSID element shall be present in the PV1 Probe Response frame and the Compressed SSID ***[also add “field”]*** shall not be present. If it is equal to 0 or is not present in the PV1 Probe Response Option element, then the Compressed SSID ***[also add “field”]*** shall be present and the SSID element shall not be present.

3039.47

e) Compressed SSID (if present).

3040.1

Compressed SSID

3040.13

e) Compressed SSID (if present).

3040.23

Compressed SSID

DO NOT CHANGE “Compressed SSID” 3895.52

Compressed SSID/Access Network Option

DO NOT CHANGE “Compressed SSID” at 3895.63

The CSSID/ANO Present field indicates if the NDP Probe Request frame contains a Compressed SSID field or an Access Network Option field:

— Set to 0 if the NDP Probe Request frame contains the Compressed SSID field.

— Set to 1 if the NDP Probe Request frame contains the Access Network Option field.

When the CSSID/ANO Present field is 0, the Compressed SSID/Access Network Option field bits [0:15] are set to the c~~C~~ompressed SSID, which is the 2 least significant octets of a 32-bit CRC calculated as defined 9.2.4.9 (FCS field), wherein the calculated fields is the ~~Full~~ SSID.

When the CSSID/ANO Present field is 1, the Compressed SSID/Access Network Option field bits [0:7] are set to Access Network Option, which is defined in 9.4.2.90 (Interworking element) (see Figure 9-564 (Interworking element format)). The Compressed SSID/Access Network Option field bits [8:15] are reserved (#455)and shall be set to all 0s on transmit and ignored on receive.

3896.31

Compressed SSID/Access Network Option

3896.41

The CSSID/ANO Present field indicates if the NDP Probe Request frame contains a Compressed SSID field or an Access Network Option field:

— Set to 0 if the NDP Probe Request contains the Compressed SSID field.

— Set to 1 if the NDP Probe Request contains the Access Network Option field.

When the CSSID/ANO Present field is 0, the Compressed SSID/Access Network Option field bits [0:31] are set to the Compressed SSID ***[also change to lowercase “short”]***, which is a 32-bit CRC calculated as defined in 9.2.4.9 (FCS field), wherein the calculated fields is the ~~Full~~ SSID.

When the CSSID/ANO Present field is 1, the Compressed SSID/Access Network Option field bits [0:7] are set to Access Network Option, which is defined in 9.4.2.90 (Interworking element) (see Figure 9-564 (Interworking element format)). The Compressed SSID/Access Network Option field bits [8:31] are reserved (#455)and shall be set to all 0s on transmit and ignored on receive.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 8219 in <this document URL>, which refer to things as short SSIDs when they are the 32-bit CRC of the SSID.

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| Identifiers | Comment | Proposed change |
| CID 8218Mark RISON9 | There is nothing about the endianness of the compressed SSID, so presumably it is little-endian, but this is confusingly different from the short SSID, which is big-endian. Actually, it's worse than that, since in some places it's referred to as a CRC, which would make it big-endian per 9.2.2, but in other places it's not referred to as a CRC, just as the lsbs of the short SSID | Clarify the endianness of the compressed SSID wherever it appears (S1G beacon, PV1 probersp, WUR discovery, BIP for S1G beacons, NDP\_1M/2M probereq) |
| CID 8220Mark RISON9.9.3.31873.45 | Where the compressed SSID is 16 bits, it's said to be the 16 lsbs. However what this means is not clear since the Short SSID field is big-endian, and the compressed SSID is derived from a short SSID | Clarify exactly which 2 octets are to be used, and in what order |

Discussion:

This is all a grotesque mess, because the short SSID is defined as some kind of CRC, which then makes it big-endian, but the (16-bit) compressed SSID is not defined as a CRC. If you then try to combine “the short SSID is transmitted commencing with the coefficient of the highest order term of the short SSID” with talk of the “lsbs” you have about 4 different possible interpretations.

Proposed changes:

At 1873.45:

The Compressed SSID field contains the 16 LSBs of the short SSID as defined in 9.4.2.169.3 (Calculating the short SSID).

NOTE—This is encoded per 9.2.2 (Conventions).  For example, if the short SSID has the coefficient of the highest order term set, and the coefficient of the next-to-lowest order term set, and all other coefficients clear, then the Compressed SSID field contains 0x02 followed by 0x00.

3896.5

When the CSSID/ANO Present field is 0, the Compressed SSID/Access Network Option field ~~bits [0:15] are~~ is set to Compressed SSID, which is the 2 least significant octets of a 32-bit CRC calculated as defined 9.2.4.9 (FCS field), wherein the calculated fields is the Full SSID.

NOTE—This is encoded per 9.2.2 (Conventions).  For example, if the short SSID has the coefficient of the highest order term set, and the coefficient of the next-to-lowest order term set, and all other coefficients clear, then the Compressed SSID/Access Network Option field contains 0x02 followed by 0x00.

3896.48

When the CSSID/ANO Present field is 0, the Compressed SSID/Access Network Option field ~~bits [0:31] are~~ is set to Compressed SSID, which is a 32-bit CRC calculated as defined in 9.2.4.9 (FCS field), wherein the calculated fields is the Full SSID.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 8218 and 8220 in <this document URL>, which clarify the composition of the 2 octets for a Compressed SSID field.

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| Identifiers | Comment | Proposed change |
| CID 8174Mark RISON12.7.8.4.33128.59 | (#6149)If the (#3488)Information field of the RSNE, with the exception of the pairwise cipher suite count and pairwise cipher suite list, is not the same as that sent by the TDLS initiator STA in mes-sage 1 of this sequence, then the TDLS initiator STA shall reject the response with status code INVALID\_RSNE. -- also need to ignore the version as it could in theory differ (see above "(#3241)The Version field shall be set to the minimum of the maximum version supported by the TDLS responder STA and the version number received in the RSNE of message 1(#6163).") | Change to "… with the exception of the version, pairwise cipher suite count …" |
| CID 8175Mark RISON12.7.8.4.33128.59 | (#6149)If the (#3488)Information field of the RSNE, with the exception of the pairwise cipher suite count and pairwise cipher suite list, is not the same as that sent by the TDLS initiator STA in mes-sage 1 of this sequence, then the TDLS initiator STA shall reject the response with status code INVALID\_RSNE. -- count has to be 1 anyway so can delete the "with the exception" bit | Delete ", with the exception of the pairwise cipher suite count and pairwise cipher suite list," |

Discussion:

As CID 8174 says, the Version field could (in theory) differ between T1 and T2, though presumably version 0 is not valid.

As CID 8175 says, the pairwise cipher list in T1 now only contains a single selector.

Proposed resolution:

REVISED

Change

(#6149)If the (#3488)Information field of the RSNE, with the exception of the pairwise cipher suite count and pairwise cipher suite list, is not the same as that sent by the TDLS initiator STA in message 1 of this sequence, then the TDLS initiator STA shall reject the response with status code INVALID\_RSNE.

to

(#6149)If the (#3488)Information field of the RSNE is not the same as that sent by the TDLS initiator STA in message 1 of this sequence, except that the version may be lower as long as it is nonzero, then the TDLS initiator STA shall reject the response with status code INVALID\_RSNE.

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| Identifiers | Comment | Proposed change |
| CID 8132Mark RISON | As far as I can tell, a BSSID index and a "NonTXBSS ID" are the same thing | Change "NonTXBSS ID" (with a space) to "BSSID index" throughout |

Discussion:

The current twinning makes it hard to work out what’s going on, and additionally “NonTXBSS ID” is inconsistent/confusing with “NonTXBSSID Profile” (and with “AID”). There is no need to invent “NonTXBSS ID”s since these are just BSSID indices.

Proposed changes:

Change as follows:

906.58

When dot11MultiBSSIDImplemented is true, the Partial Virtual Bitmap field of the TIM element is constructed as follows, where the maximum possible number of BSSIDs is an integer power of 2, n = log2 (maximum possible number of BSSIDs).

— The bits 1 to (2n – 1) of the bitmap are used to indicate that one or more group addressed frames are buffered for each AP corresponding to a nontransmitted BSSID ~~and are called NonTxBSS identifiers (NonTxBSS IDs)~~. The ~~NonTxBSS ID~~ bit position equals the value carried in the BSSID Index field of the Multiple BSSID-Index element carried in its nontransmitted BSSID profile (see 9.4.2.44 (Multiple BSSID element)). The AIDs from 1 to (2n – 1) are not allocated to a STA (in each page for an S1G STA). A bit position corresponding to an inactive nontransmitted BSSID is reserved and set to 0 (in each page for an S1G STA). The remaining AIDs are shared by the BSSs corresponding to the transmitted BSSID and all nontransmitted BSSIDs.

— When the DTIM Count field carried in a Multiple BSSID-Index element is 0 for a BSS that has a nontransmitted BSSID, and one or more group addressed frames are buffered at the AP for this BSS, the corresponding ~~NonTxBSS ID~~ bit is set to 1.

907.48

c) Method C: The Partial Virtual Bitmap field of the TIM that is carried in an S1G PPDU consists of a concatenation of Encoded Block subfields that contain ~~NonTxBSS IDs~~ BSSID indices and Encoded Block subfields that contain AIDs. When using this method, the Page Slice Number subfield is equal to 31, and the Page Index subfield is equal to the page index of the TIM to which the AIDs belong.

908.1

the Partial Virtual Bitmap field consists of the octets number 0 to N0 – 1 where N0 is the largest positive integer such that (N0 × 8 – 2n < 8). For Method C, the Partial Virtual Bitmap field consists of Encoded Block subfields that contain the ~~NonTxBSS IDs~~ BSSID indices of the BSSs for which there are buffered group addressed frames. In this case for Method A and Method B, the Bitmap Offset subfield value contains the number 0, and the Length field is N0+3, while for Method C, the Length field is equal to 3 plus the size of the encoded blocks that carry the ~~NonTxBSS IDs~~ BSSID indices, which are present in the TIM element.

When the TIM with a nonzero Partial Virtual Bitmap field is carried in an S1G PPDU, the Partial Virtual Bitmap field is constructed with one or more Encoded Block subfields as shown in Figure 9-216 (Partial Virtual Bitmap field format). The Encoded Block subfield consists of the Block Control subfield, the Block Offset subfield, and the Encoded Block Information subfield as shown in Figure 9-217 (Encoded Block subfield format). When dot11MultiBSSIDImplemented is true, the Partial Virtual Bitmap field contains zero or more Encoded Block subfields that contain ~~NonTxBSS IDs~~ BSSID indices.

2465.25

The Partial Virtual Bitmap field of the TIM element carried in the Beacon, S1G Beacon, or TIM frame shall indicate the presence or absence of traffic to be delivered to all stations associated (11ax)with an AP corresponding to a transmitted or nontransmitted BSSID. The first 2n bits of the bitmap are reserved for the indication of group addressed frame for the transmitted and all nontransmitted BSSIDs (see 9.4.2.5.1 (General)). (M165)The Traffic Indicator field of the Bitmap Control field shall be set to 1 to indicate that one or more non-GCR-SP non-SYNRA group addressed frames, that are not to be delivered using group AID, are buffered at the AP corresponding to the transmitted BSSID. The field corresponding to a ~~NonTxBSS ID~~ BSSID index (i.e., a bit position between 1 and 2n – 1 of the Partial Virtual Bitmap field matching the BSSID index of a nontransmitted BSSID) shall be set to 1 to indicate that one or more non-GCR-SP non-SYNRA group addressed frames, that are not to be delivered using group AID, are buffered at the AP corresponding to that nontransmitted BSSID.

2508.26

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 beacon(#7217) or every STBC DTIM beacon(#7217) sent by the AP of the BSS. (M165)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) when:

— the STA is associated with either an AP that has not set to 1 the Multiple BSSID field of the Extended Capabilities element it transmits or corresponds to the transmitted BSSID in a multiple BSSID set, and the Traffic Indicator field in the TIM element in the DTIM beacon is equal to 1, or (M165)

— the STA is associated with an AP that corresponds to a nontransmitted BSSID in a multiple BSSID set, and the field corresponding to the ~~NonTxBSS ID~~ BSSID index (i.e., a bit position between 1 and 2n – 1 of the Partial Virtual Bitmap field matching the BSSID index of a nontransmitted BSSID) in the TIM element is equal to 1 in the DTIM beacon of that nontransmitted BSSID.(M165)

Figures L-5 and L-6 and L-7 ***(hm, last one not found in text search?)***

~~NonTxBSS IDs~~BSSID indices (for group addressed frame buffering for nontransmitted BSSIDs)

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 8132 in <this document URL>, which refer to BSSID indices rather than “NonTXBSS ID”s.

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| Identifiers | Comment | Proposed change |
| CID 8179Mark RISON10.46.6 | NDP Paging frame does not appear to be defined | As it says in the comment |

Discussion:

I see no definition.

Proposed resolution:

REVISED

As the body of 23.3.12.2.8 insert “An NDP Paging frame is an NDP\_1M Paging frame or an NDP\_2M Paging frame, as defined in this subclause.”

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| Identifiers | Comment | Proposed change |
| CID 8164Mark RISON | There are still maybe 60 "DTIM" that are unadorned and should probably be "DTIM beacon" (exclude surrounding beacon period count interval dot11 aroundtime adtime midtime) | As it says in the comment |

Discussion:

Under CID 3309 (and maybe also CID 4221) we stopped hand-wavingly calling beacons that have DTIMness just DTIMs, and calling them DTIM beacons.

Proposed changes:

246.58

space-time block coding (STBC) delivery traffic indication map (DTIM) beacon: [STBC DTIM beacon] An STBC beacon transmission that is a DTIM beacon(#3309).

298.3

The flexible multicast service enables a non-AP STA to request an alternate delivery traffic indication map (DTIM) beacon delivery interval for one or more sets of group addressed streams that the non-AP STA receives. This enables the non-AP STA to transition to awake state(#6038) at the alternate DTIM interval rather than every DTIM beacon and enables significant power saving when a non-AP STA receives group addressed traffic.

905.6

The DTIM Count field indicates how many Beacon frames (including the current frame) appear before the next DTIM beacon. A DTIM count of 0 indicates that the current ~~TIM~~beacon is a DTIM beacon.

2388.8

— If the Action subfield of the NDP Paging Response is 3, the STA shall be in the awake state at the first DTIM beacon that happens after a time indicated by the Min Sleep Duration field in the NDP Paging Response after the end of reception of the NDP Paging frame to receive the DTIM beacon(#3309).

2399.38

The AP shall transmit the first page slice in the N-th Beacon frame after the DTIM beacon in which the Page Slice element appears, where N is equal to the TIM offset subfield. Subsequent page slices indicated in the Page Slice element appear sequentially in the following ~~B~~beacons, e.g., the second slice appears in (N+1)th Beacon frame after the DTIM beacon that contained the Page Slice element.

2400.2

The STAs check the DTIM beacon(#4221) comprising of the Page Bitmap field and the Block Bitmap fields in the Page Slice element and TIM, respectively. The Page Bitmap field in the Page Slice element provides an early indication of buffered data for all blocks in the assigned page slices. If a bit in the Page Bitmap field of the Page Slice element is equal to 0, it indicates that there is no buffered data for STAs with AIDs located in the block corresponding to that bit. These STAs may return to doze state immediately when there is no buffered group addressed data or after receiving buffered broadcast/group data as indicated in the DTIM beacon. If the block bit in the Page Bitmap field is equal to 1, then it indicates that there is buffered data at the AP for at least one of the STAs with AIDs in that block.

For STAs that have their AIDs that correspond to a block for which the bit in the Page Bitmap field of the Page Slice element is equal to 1, they compute the length of the page slice and the corresponding TIM to transition to awake state(#6038). If they are not assigned in page slice 1 that is allocated to DTIM slice, then these STAs may return to doze state immediately or after receiving buffered broadcast/group data as indicated in the DTIM beacon till their scheduled TIM.

2453.35

NOTE 1—To achieve this requirement, the AP suspends any pending transmissions until the beacon has been transmitted. In the case of a DTIM beacon, the AP also suspends any pending individually addressed transmissions until any pending group addressed transmissions have been performed (see 11.2.3.4 (TIM types)).

2499.1

The AP shall transmit a TIM with every Beacon frame except when the frame is scheduled for transmission in a TSBTT that is not a TBTT. Every dot11DTIMPeriod, a TIM of type DTIM ***[should not be italicised]*** is transmitted within a Beacon frame, rather than an ordinary TIM. An S1G AP with dot11ShortBeaconInterval equal to true may include a TIM in a Beacon frame that is scheduled for transmission in a TSBTT that is not a TBTT. An S1G AP with dot11ShortBeaconInterval equal to true may transmit a TIM of type DTIM in an S1G Beacon frame every dot11ShortBeaconDTIMPeriod.

Figure 11-16 (Infrastructure power management operation) illustrates the AP and STA activity under the (#3250)assumption that a DTIM beacon is transmitted once every three TIMs.

2504.49

When dot11FMSActivated is false, the AP shall transmit all buffered non-GCR-SP non-SYNRA group addressed BUs immediately after every DTIM beacon or during broadcast TWT SPs within that beacon interval as defined in 26.8.3.2 (Rules for TWT scheduling AP).(11ax)

When dot11FMSActivated is true and the AP has established an FMS delivery interval for a multicast stream, the AP shall transmit all non-GCR-SP non-SYNRA group addressed BUs belonging to particular FMS stream immediately after the DTIM beacon that has the Current Count field of the FMS Counter field set to 0 for that particular FMS stream or during broadcast TWT SPs within that beacon interval as defined in 26.8.3.2 (Rules for TWT scheduling AP).(11ax)

The More Data subfield of each group addressed frame shall be set to indicate the presence of further buffered non-GCR-SP group addressed BUs (M118)to be delivered using MPDUs with an RA other than a SYNRA. If the AP is unable, before the primary or secondary TBTT following the DTIM beacon, to transmit all of the buffered non-GCR-SP group addressed BUs (M118)to be delivered using MPDUs with an RA other than a SYNRA, then the AP shall set the Traffic Indicator field(#7217) 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), and when dot11FMSActivated is true, shall set the appropriate bits in the FMS Descriptor element as described in 9.4.2.73 (FMS Descriptor element) to indicate for which non-GCR-SP non-SYNRA group addresses there are still buffered BUs, until all buffered non-GCR-SP group addressed BUs (M118)to be delivered using MPDUs with an RA other than a SYNRA have been transmitted.

When the AP transmits an STBC ~~DTIM or TIM~~ Beacon frame, the AP shall retransmit all non-GCR-SP group addressed BUs (M118)to be delivered using MPDUs with an RA other than a SYNRA and that were transmitted following the non-STBC ~~DTIM or TIM~~ Beacon frame except that they are transmitted using the basic STBC MCS. It may be the case that a complete set of buffered non-GCR-SP non-SYNRA group addressed BUs is sent over a period of time during which non-STBC and STBC transmissions are interleaved, but the transition from non-STBC group addressed transmissions to STBC group addressed transmissions shall be preceded by the transmission of an STBC Beacon frame and the transition from STBC group addressed transmissions to non-STBC group addressed transmissions shall be preceded by the transmission of a non-STBC Beacon frame.

2508.44

When dot11FMSActivated is true and ReceiveDTIMBeacons(#4221) is true and the STA has been granted by the AP an alternate delivery interval for a multicast stream, the STA shall transition to awake state(#6038) before the ~~non-STBC DTIM or STBC~~ DTIM beacon having the Current Count field of the FMS Counter field set to 0 for that particular FMS stream.

2515.48

— An AP shall transmit MSDUs belonging to the same FMSID in the same order that they were received at the MAC Data SAP. MSDUs belonging to the different FMSIDs are transmitted by the AP at the appropriate DTIM beacon in the order received at the MAC data SAP based on the interval configured for the FMS stream.

2670.30

A 40MC HT AP 2G4 that detects either BSS channel width trigger event TE-B or TE-C or that determines that the value of the MAC variable 20/40 Operation Permitted has changed from true to false shall set the Secondary Channel Offset field to SCN in transmitted HT Operation elements beginning at the next DTIM beacon or next TBTT if no DTIM beacons(#4221) are transmitted to indicate that no secondary channel is present (i.e., that the BSS operating width is 20 MHz).

3320.26

The mesh STA shall define a series of TBTTs exactly dot11BeaconPeriod TUs apart. Time zero is defined to be a TBTT with the Beacon frame ~~containing~~being a DTIM beacon. At each TBTT, the mesh STA shall schedule a Beacon frame as the next frame for transmission according to the medium access rules specified in Clause 10 (MAC sublayer functional description). The Address 1 field of the Beacon frame shall be set to the broadcast address.

NOTE—To achieve this requirement, the mesh STA suspends any pending transmissions until the beacon has been transmitted. In the case of a DTIM beacon, the mesh STA also suspends any pending individually addressed transmissions until any pending group addressed transmissions have been performed (see 14.15.5 (TIM types)).

3327.38

A mesh STA transmits group addressed frames after ~~the Beacon frame containing DTIM~~ a DTIM beacon when any of its peer mesh STAs is in light sleep mode or deep sleep mode for the mesh peering with the mesh STA (see 14.15.4 (TIM transmissions in an MBSS) and 14.15.5 (TIM types)).

3330.42

There are two different TIM types: TIM and DTIM. A mesh STA shall transmit a TIM with every Beacon frame. Every DTIMPeriod, a TIM of type DTIM is transmitted with a Beacon frame. After transmitting a ~~Beacon frame containing a~~ DTIM beacon, the mesh STA shall send the buffered group addressed MSDUs and MMPDUs, before transmitting any individually addressed frames.

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 8164 in <this document URL>, which address the vague “DTIM”s.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 8191Mark RISON9.3.3 | The VHT Capabilities element is present when dot11VHTOptionImplemented is true and the STA is not a STA 6G. suggests you can be in the 6G band but have dot11VHTOptionImplemented true. However, in that case you might alternatively be in the 2G4 band, in which case you don't want to be sending a VHT Capabilities element either, since VHT operation is not defined in the 2G4 band. If you're starting/joining a BSS in the 2G4 band you should have dot11VHTOptionImplemented false ... but even so you might end up in the 2G4 band as the result of an extended channel switch. | Change "when dot11VHTOptionImplemented is true and the STA is not a STA" to "in the 5 GHz band when dot11VHTOptionImplemented is true" (11x) |

Discussion:

As it says in the comment. Maybe the question is whether a STA that is willing to channel switch to a different band has dot11\*Implemented set to true for PHYs on other bands than the one it starts/joins on? But also take a look at 1664.57, 1726.41, 1728.48, 1763.30, 1764.6 (TDLS). These do not consider the band.

Proposed resolution:

REVISED

Make the change at 737.5, 741.29, 745.37, 750.26, 756.14, 760.33, 765.42.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID 8182Mark RISON | "A frame including a TWT element with the NDP Paging field present is referred to as NDP Paging Request or NDP Paging Response as clarified later." -- should be lowercast NDP paging request/response. Mostly in 10.46.6 NDP Paging setup but a few others: 9.4.2.198 (last para), 23.3.12.2.8.1 NDP\_1M Paging, 23.3.12.2.8.2 NDP\_2M Paging, S1GM6.9/10 | As it says in the comment |

Discussion:

These are not actual frame etc. names, so should be lowercase. Ditto requester/responder (this is already the case in some instances).

Proposed changes:

Lowercase the highlighted letters as follows (and delete a few “STA”s as highlighted):

9.4.2.198 TWT element

Upon reception of an NDP Paging frame with matching P-ID field as defined in 10.46.6 (NDP Paging setup), the TWT STA that is an NDP Paging requester takes an action indicated by the Action field as described in Table 9-350 (Action field).

10.46.6 NDP Paging setup

This subclause defines a protocol for power saving at a STA by using the TWT protocol to set up scheduled wakeup intervals and by defining efficient signaling for the presence of BUs and synchronization.

A frame including a TWT element with the NDP Paging field present is referred to as NDP Paging Request or NDP Paging Response as clarified later. A STA sending an NDP Paging Request is referred to as NDP Paging requester. A STA sending an NDP Paging Response in a response to an NDP Paging Request is referred to as NDP Paging responder.

A STA requests an NDP Paging TWT by sending an NDP Paging Request. A non-S1G STA shall not transmit NDP Paging frames.

The setup procedure follows the protocol described in 10.46.1 (TWT overview), unless otherwise described in this subclause.

A non-AP STA sending an NDP Paging Request shall set the P-ID field of the NDP Paging Request to one of the partial AIDs assigned to it by the intended receiver of the NDP Paging Request (see 10.21 (Group ID, partial AID, Uplink Indication, and COLOR in S1G PPDUs)).

An AP sending an NDP Paging Request to a non-AP STA should set the P-ID field of the NDP Paging Request to the partial BSSID.

(#1045)A SIFS after receiving an NDP Paging Request, the recipient STA shall respond with an NDP Paging Response with the NDP Paging fields set as follows:

— The P-ID subfield should be set to the same value as the P-ID subfield of the NDP Paging Request.

— The Max NDP Paging Period subfield shall be set to any value that is less than or equal to the Max

NDP Paging Period subfield of the NDP Paging Request.

— The Action subfield shall be set to one of the values in Table 9-350 (Action field).

— The Partial TSF Offset subfield and Min Sleep Duration subfield are reserved.

The NDP Paging setup is successful if the TWT Setup Command subfield of the Request Type field in the

NDP Paging Response is equal to 4 (Accept TWT), otherwise the setup is considered as failed.

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.

Otherwise the STA shall not schedule an NDP Paging frame.(#7220)

The AP shall schedule an NDP Paging frame if there are critical updates to the S1G Beacon frame as defined in 10.45.2 (System information update procedure) and 11.2.3.14 (TIM Broadcast). An AP may additionally send an NDP Paging frame at any of the TWTs indicated by the NDP Paging Response.

If the NDP Paging frame is sent by the AP to the NDP Paging requester then this frame shall precede any frame that is sent by the AP to it during its indicated TWT SP and shall have the Direction field equal to 1.

If any frame is sent by a non-AP STA to an NDP Paging requester during its indicated TWT SP then the first frame sent shall be an NDP Paging frame with the Direction field equal to 0.

(#7220)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. The P-ID field shall be set to 0 to indicate the presence of group addressed BUs.

NOTE—When a group AID is assigned to (#1653)the corresponding group address as described in 10.54 (Group AID), then the P-ID field can be set to the partial AID that corresponds to the group AID as defined in 10.21 (Group ID, partial AID, Uplink Indication, and COLOR in S1G PPDUs).

If the Direction field of the NDP Paging frame is equal to 1, the subfields of the APDI field of the NDP Paging frame shall be set as follows:

— The PTSF subfield is set to TSF[Partial TSF Offset + 4 : Partial TSF Offset + 11], where TSF is the 8-octet value of the TSF timer and Partial TSF Offset is the value of the Partial TSF Offset field in the NDP Paging Request.

— The Check Beacon Flag subfield shall be set to the LSB of the Change Sequence field in the most recently transmitted S1G Beacon frame or of the Check Beacon field in the most recently transmitted TIM frame, if any was sent before the NDP Paging frame.

If the Direction field of the NDP Paging frame is equal to 0, the Partial AID field of NDP Paging frame indicates the partial AID of the STA transmitting the NDP Paging frame.

If no NDP Paging frame is received during the TWT, the TWT requester STA may transition to doze state at the end of the Nominal Minimum TWT Wake Duration for the TWT. If an NDP Paging frame is received, the TWT requester STA may transition to doze state immediately after receiving the NDP Paging frame, unless Min Sleep Duration field was equal to 0 and Action subfield equal to 1 in the NDP Paging Response frame that successfully completed the NDP Paging setup, in which case the STA shall be in active mode.

Upon reception of an NDP Paging frame with the P-ID field matching the value of the P-ID field in the NDP Paging Response, the NDP Paging requester ~~STA~~ shall behave as follows:

— If the Action subfield of the NDP Paging Response is 0:

— If the NDP Paging requester ~~STA~~ is a non-AP STA, it shall send a (NDP) PS-Poll frame or

uplink trigger frame addressed to the NDP Paging responder, after either SIFS or using EDCA within Nominal Minimum TWT Wake Duration.

— If the NDP Paging requester ~~STA~~ is an AP, it shall send an NDP CTS frame to self with the duration field equal to 0 after either SIFS or using EDCA within Nominal Minimum TWT Wake Duration.

— If the Action subfield of the NDP Paging Response is 1, the STA shall be in the awake state starting at a time indicated by the Min Sleep Duration field after the end of reception of the NDP Paging frame, and it shall remain in the awake state until a frame is received from the NDP Paging responder with the EOSP subfield equal to 1.

— If the Action subfield of the NDP Paging Response is 2, the STA shall be in the awake state at the first TBTT that occurs after a time indicated by the Min Sleep Duration field in the NDP Paging Response after the end of reception of the NDP Paging frame to receive the S1G Beacon frame.

— If the Action subfield of the NDP Paging Response is 3, the STA shall be in the awake state at the first DTIM that happens after a time indicated by the Min Sleep Duration field in the NDP Paging Response after the end of reception of the NDP Paging frame to receive the DTIM beacon(#3309).

— If the Action subfield of the NDP Paging Response is 4, the STA shall be in the awake state starting at a time T after the end of reception of the NDP Paging frame and it shall remain in the awake state until a frame is received from the NDP Paging responder with the EOSP subfield equal to 1. The value of T is in units of SIFS and is equal to the value of the Min Sleep Duration field of the NDP Paging Request plus the value of the ASD subfield in the APDI field of the NDP Paging frame.

If the NDP Paging requester is an AP, values 2–7 of the Action subfield are reserved.

A non-AP STA that has set up NDP Paging and receives an NDP Paging frame with Direction field equal to 1 and the Check Beacon Flag subfield value different from the LSB of the most recently received Change Sequence value shall either be awake to receive the next S1G Beacon frame that is transmitted at a TBTT or TSBTT or shall queue for transmission a Probe Request frame to obtain the updated system information as described in 10.45.2 (System information update procedure).

23.3.12.2.8.1 NDP\_1M Paging

The P-ID field is the identifier of the NDP paging requester, as described in 10.46.6 (NDP Paging setup).

If the Direction field is 1 the APDI/partial AID field indicates the AP direction information (APDI), where

— The 8 MSBs of the APDI, depending on the value of the Action subfield of the NDP Paging Response, contain

— The PTSF subfield if the Action subfield is not equal to 4. The PTSF subfield is set to the value

of the partial TSF of the transmitting STA as defined in 10.46.6 (NDP Paging setup).

— The ASD subfield if the Action subfield is equal to 4. The ASD subfield is the additional sleep

duration and is set to the time, in units of SIFS, after which the receiver STA is in awake state as described in 10.46.6 (NDP Paging setup).

— The LSB of the APDI is the Check Beacon Flag subfield and is an indicator of critical changes in the

Beacon frame as described in 10.46.6 (NDP Paging setup).

If the Direction field is 0, the APDI/partial AID field indicates the partial AID of the NDP paging responder

STA.

The Direction field is set to 1, if the NDP paging responder is an AP, otherwise it is set to 0.

23.3.12.2.8.2 NDP\_2M Paging

The P-ID field is the identifier of the NDP paging requester, as described in 10.46.6 (NDP Paging setup).

If the Direction field is 1, the APDI/partial AID field indicates the APDI (AP Direction Information) where:

— The 8 MSBs of the APDI, depending on the value of the Action subfield of the NDP Paging

Response, contain

— The PTSF subfield if the Action subfield is not equal to 4. The PTSF subfield is set to the value

of the partial TSF of the transmitting STA as defined in 10.46.6 (NDP Paging setup).

— The ASD subfield if the Action subfield is equal to 4. The ASD subfield is the additional sleep

duration and is set to the time, in units of SIFS, after which the receiver STA is in awake state as described in 10.46.6 (NDP Paging setup).

— The LSB of the APDI is the Check Beacon Flag subfield and is an indicator of critical changes in the

Beacon frame as described in 10.46.6 (NDP Paging setup).

If the Direction field is 0, the APDI/partial AID field indicates the partial AID of the NDP paging responder

STA.

The Direction field is set to 1, if the NDP paging responder is an AP, otherwise it is set to 0.

B.4.28.1 S1G MAC features

S1GM6.9 Request NDP Paging Setup

S1GM6.10 Accept the NDP Paging Setup request

Proposed resolution:

REVISED

Make the changes shown under “Proposed changes” for CID 8182 in <this document URL>, which lowercase “paging request/response/requester/responder/setup” after “NDP”.

|  |  |  |
| --- | --- | --- |
| Identifiers | Comment | Proposed change |
| CID xxxMark RISON |  |  |

Discussion:

Proposed changes:

Proposed resolution:

REVISED

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

**Miscellaneous already communicated to Chair:**

CID 8105: Think should be referring to the HT NDP Announcement field

CID 8128: Delete sentence at 743.34, 748.24, 752.29, 758.57, 761.54, 769.26, 778.22, 782.16

**References:**

802.11me/D6.0 except where otherwise specified