###  **IEEE P802.11Wireless LANs**

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| 802.11bi MAC Fixes for OTA MAC Collision warning |
| Date: 2024-07-12 |
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**Abstract**

This submission proposes resolutions for following CIDs received for TGbi D0.4:

1010, 1029, 1120, 1141, 1142, 1177, 1178, 1284, 1285, 1286, 1287, 1288, 1291, 1292, 1293, 1294, 1295, 1296, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366.

**Revisions:**

* Rev 0: Initial version of the document

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1010 | Chaoming Luo | 10.71.2.6 | 57.60 | Correct the name of the frame. | Change to: an otaMAC Collision Warning Action frame | **Revised** The frame was renamed throughout OTA MAC Collision Warning action frame, also to align with 4.5.4.10 where the term OTA MAC was already introduced. |
| 1029 | Chaoming Luo | 10.71.2.6 | 57.61 | Definition for "non-AP MLD specific Epoch Number" is missing. Is it a field in a frame or a value derived from a field? | Add definition for "non-AP MLD specific Epoch Number" | **Revised** It is a field defined in 9.4.2.340, text now clarifies that it is a value in the OTA MAC collision warning frame. |
| 1120 | stephane baron | 10.71.2.6 | 57.64 | remove the note. AID computation mechanism is not defined yet | as in comment | **Accepted** |
| 1177 | Patrice Nezou | 10.71.2.6 | 57.60 | Please clarify that the "specific Epoch Number" is included in the otaMAC collision warning element. | As in comment | **Revised** As per the comment. Clarified that the epoch offset was signaled in the AP OTA MAC Collision Warning action frame (number became offset from a verbal comment during resolution with version 0 of this document) |
| 1178 | Patrice Nezou | 10.71.2.6 | 57.60 | Please clarify which kinds of actions are performed following of the reception of the otaMAC collision warning action frame. The collision status can introduce misalignment between AP and STA. | Please clarify the action to do. | **Revised**. Added the STA response. The STA shall respond with an OTA MAC Collision Warning action frame acknowledging the AP warning, and either accepting or rejecting the AP proposed remediation  |
| 1359 | Mark RISON | 10.71.2.6 | 57.57 | "the OTA MAC address that a CPE non-AP MLD is bound to use" -- what kind of "bound" is this here? The normal English "has a commitment"? Or some specific technical binding? | As it says in the comment | **Revised** Replaced with “anticipated” |
| 1360 | Mark RISON | 10.71.2.6 | 57.58 | "MAC of other CPE non-AP MLD(s)" should be "MAC address of another CPE non-AP MLD" | As it says in the comment | **Accepted** |
| 1361 | Mark RISON | 10.71.2.6 | 57.58 | "a collision with the OTA MAC of other CPE non-AP MLD(s)" -- what about a collision with a device that is not a CPE non-AP MLD? Shouldn't that be avoided too? | As it says in the comment | **Revised** Added the risk of collision with an other entity in the ESS. Also in 9.4.2.340. |
| 1362 | Mark RISON | 10.71.2.6 | 57.59 | "otaMAC" is horrific | Fix throughout the draft | **Revised** The frame was renamed throughout OTA MAC Collision Warning action frame, also to align with 4.5.4.10 where the term OTA MAC was already introduced. Also added the OTA abbreviation in 3.4 |
| 1363 | Mark RISON | 10.71.2.6 | 57.58 | "such collision" should be "such a collision" | As it says in the comment | **Accepted** |
| 1364 | Mark RISON | 10.71.2.6 | 57.61 | " collision epoch" is not defined | As it says in the comment | **Revised** Modified the sentence to reflect that this is not a special term, it is the epoch where the collision is anticipated to occur (epoch where the collision is anticipated to risk occurring) |
| 1365 | Mark RISON | 10.71.2.6 | 57.61 | "Epoch Number" wrong case | As it says in the comment | **Revised**epoch is lower case, number changed to offset, as what the AP sends in the field is the epoch offset, not the epoch number. |
| 1366 | Mark RISON | 10.71.2.6 | 57.63 | "NOTE--the non-AP MLD participating to an EPD epoch applies the BSS-specific AID offset to OTA AID, when the Epoch Number changes. " -- many case horrors. Also you participate in not to. Also missing article | As it says in the comment | **Revised**Note was deleted with CID 1120. |
| 1284 | Mark RISON | 9.4.2.340 | 43.50 | "otaMAC Collision Warning element (oMCWE)" -- elements have only one name | As it says in the comment | **Revised** The element is now named OTA MAC Collision Warning element (as per #1285), and oMCWE is removed as per this comment. |
| 1285 | Mark RISON | 9.4.2.340 | 43.50 | "otaMAC Collision Warning element" -- bleargh! | Rename to "OTA MAC Collision Warning element" | **Accepted** |
| 1286 | Mark RISON | 9.4.2.340 | 43.52 | "The otaMAC Collision Warning element is present in the otaMAC Collision Warning protected action frame" -- don't say this as this is duplication and prone to rot | As it says in the comment | **Revised** Removed the segment “is present in the otaMAC Collision Warning protected action frame “ Also because comment 1119 suggest to define the action frame carrying this element. |
| 1288 | Mark RISON | 9.4.2.340 | 0.00 | What is an "otaMAC address"? (2x) | Clarify | **Revised**Changed to OTA MAC, which is defined in 3.4 and 4.5.4.10. |
| 1141 | Po-Kai Huang | 9.4.2.340 | 44.09 | Clause 9 for frame format usually does not have shall requirement except 9.1. Consider not to use "shall" in 9.4.2.340. If "shall" is needed, may want to move the sentence to normative clause in clause 10. | As in comment | **Revised** Reworded the sentence to remove ‘shall’ as the clause is descriptive, and moved to clause 10 the AP and STA ‘shall’ action. |
| 1142 | Po-Kai Huang | 9.4.2.340 | 44.09 | Should mention that other value of Collision status are reserved. A table with value to be used and description may help. | As in comment | **Accepted**The table exists, and was augmented with the reserved values. Text was added to the clause. |
| 1291 | Mark RISON | 9.4.2.340 | 44.03 | "The Collision Status field indicates the intent of the oMCWE. The AP MLD shall set the Collision Status to 0 when signaling to a non-AP MLD the risk of otaMAC collision in a future epoch. The non-AP MLD shall set the Collision Status to 1 when responding to an AP MLD otaMAC Collision Warning action frame, acknowledging the warning and indicating that the non-AP MLD will skip epoch parameters as suggested by the AP MLD. The non-AP MLD shall set the Collision Status to 2 when responding to an AP MLD ota-MAC Collision Warning action frame, and rejecting the AP MLD's suggestions." duplicates/overlaps with Table 9-401ah--otaMAC Collision Warning values (which incidentally is not referred to anywhere) | Provide information once and only once. Also make it more explicit that 0 is transmitted by AP MLD only and 1 and 2 are transmitted by non-AP MLD only | **Revised**Text was removed, text in the table was clarified to reflect the suppressed text, and the direction matching the numbers was added to the text. |
| 1292 | Mark RISON | 9.4.2.340 | 44.28 | "The Colliding Epoch field indicates the future epoch at which MAC collision is likely to occur. The epoch is indicated in units of epochs. A value of 0 indicates the current epoch." -- first and last sentences are incompatible | As it says in the comment | **Revised** To “a value of 1 indicates the next epoch”. |
| 1293 | Mark RISON | 9.4.2.340 | 44.33 | "if the current epoch is 0" -- it would be better if the description were more general | As it says in the comment | **Revised** The explanation was moved to clause 10 as per the group input during r0 reading of this comment resolution, and the ‘if the current epoch is 0’ segment was removed, as it does not matter what the current epoch is, what matters is when the collision might occur. The sentence was reworded to make the description more general. |
| 1294 | Mark RISON | 9.4.2.340 | 44.34 | "indicating that the collision is expected to occur m epochs after the current epoch," -- duplicates previous para | Delete the cited text | **Rejected**With #1293, the sentence was reworded, with this suggested deletion the explanation becomes unclear. |
| 1295 | Mark RISON | 9.4.2.340 | 44.35 | "use the non-AP MLD Specific value" -- what is "the non-AP MLD Specific value" and how do you "use" it? | As it says in the comment | **Revised**The OTA MAC is the target here. |
| 1296 | Mark RISON | 9.4.2.340 | 44.35 | "Epoch Number m+n" -- what is n? Also bogus uppercase | As it says in the comment | **Revised**Uppercase removed. However, ‘n’ is defined in the previous sentence, no need to redefine it. |

**Discussion**

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***Changes indicated via Word track changes***

**3.4 Abbreviations and acronyms**

OTA over the air (#1362)

* General

***Modify 9-130 (Element IDs) as follows:***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | Element ID | Element ID Extension | Extensible | Fragmentable |
| ...... |  |  |  |  |
| ~~FILS~~ Nonce (see 9.4.2.188 (FILS Nonce element))(#762r2) | 255 | 13 | No | No |
| ..... |  |  |  |  |
| DS MAC Address (see 9.4.2.336 (DS MAC Address element))(#Ed) | 255 | <ANA> |  |  |
| Enhanced Data Privacy (EDP) element(#Ed) | 255 | <ANA> |  |  |
| Minimum Epoch Pacing element(#Ed) | 255 | <ANA> |  |  |
| Enhanced Group Privacy Availability (EGPA) element(#Ed) | 255 | <ANA> |  |  |
| OTA MAC Collision Warning element(#Ed) (#1010, #1362) | 255 | <ANA> |  |  |
| EDP Epoch Setting element(#Ed) | 255 | <ANA> |  |  |
| ... |  |  |  |  |
| NOTE—See 10.28.6 (Element parsing) on the parsing of elements. |

* Element IDs
* OTA MAC Collision Warning element (#604r11) (#1284, #1285)

The OTA MAC Collision Warning element (#1286) is used when an OTA MAC (#1288) address expected to be used by the by a non-AP EDP MLD in an upcoming epoch is calculated to collide with the MAC address of another STA (#1361).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Collision Status | Colliding Epoch | MLD Specific Epoch Number Offset |
| Octets: | 1 | 1 | 1 | 1 | 1 | 1 |

* OTA MAC Collision Warning element

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1 (General).

The Collision Status field indicates the intent of the OTA MAC Collision Warning element. The field takes value 0 when sent by the AP MLD, and values 1 or 2 when sent by the EDP non-AP MLD in response to the AP MLD OTA MAC Collision Warning action frame (#1141, #1291). Table 9-401h lists the possible values and their meaning. (#1291)

* OTA MAC Collision Warning values

|  |  |
| --- | --- |
| Collision Status field value | Meaning |
| 0 | AP MLD signals collision risk to the non-AP MLD and suggest a remediation action to skip the OTA MAC intended for one or more epochs where collision risk is expected |
| 1 | Non-AP MLD acknowledges collision warning message and will take suggested action |
| 2 | Non-AP MLD acknowledges collision warning message but will not take suggested action |
| 3-255 | Reserved (#1142) |

The Colliding Epoch field indicates the future epoch at which MAC collision is likely to occur. The value is indicated in units of epochs. A value of 1 indicates the next epoch (#1292).

The non-AP MLD Specific Epoch Number Offset field indicates the Epoch count that the non-AP MLD skips to mitigate the OTA MAC address collision. Value 0 is reserved.

**10.71.2.6. OTA MAC address collision avoidance**(#604r11) (#1010, #1362)

A CPE AP MLD may calculate that the OTA MAC address that a CPE non-AP MLD is anticipated (#1359) to use in a subsequent epoch may cause a collision with the OTA MAC address of another (#1360) CPE non-AP MLD(s) or another STA in the ESS (#1361). When such a (#1363) collision is detected, the CPE AP MLD shall send to the CPE non-AP MLD an OTA MAC (#1362) Collision Warning (#1010) action frame before the epoch where the collision is anticipated (#1359) to risk occurring (#1364) and indicated in the Colliding Epoch field, instructing the non-AP MLD to apply the non-AP MLD specific epoch (#1365) offset signaled in the AP MLD OTA MAC Collision Warning action frame (#1177, 1029) to avoid address collision. (#1293)

(#1141) Thus, if the Colliding Epoch value is m, indicating that the collision is expected to occur m epochs after the current epoch (#1294), and if the non-AP MLD Specific Epoch Number Offset is n, then for the epoch occurring m epochs later (#1293), the CPE AP MLD is requesting the CPE non-AP MLD to use the CPE non-AP MLD OTA MAC address (#1295) that the CPE non-AP MLD had planned to use for the epoch occurring (#1296) m+n epochs later (#1293). In the subsequent epoch, the CPE non-AP MLD is expected to use the CPE non-AP MLD OTA MAC address that the CPE non-AP MLD had planned to use m+n+1 epochs later (#1293), unless the CPE AP MLD also signals a collision warning for that epoch (#1293). The CPE non-AP MLD shall respond with an OTA MAC Collision Warning action frame acknowledging the CPE AP MLD warning, and either accepting the CPE AP MLD-proposed remediation (#1178, #1366), thus applying the offset requested by the CPE AP MLD, or rejecting the CPE AP MLD-proposed remediation, and thus using the CPE non-AP MLD OTA MAC address that the CPE non-AP MLD had planned to use for that epoch before receiving the CPE AP MLD OTA MAC Collision Warning action frame (#1178).