IEEE P802.11
Wireless LANs

|  |
| --- |
| 11bi D0.4 CR for various clauses –misc comments |
| Date: 2024-10-28 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Jerome Henry | Cisco Systems |  |  | jerhenry@cisco.com |
| Domenico Ficara | Cisco Systems |  |  | dficara@cisco.com |
| Ugo Campiglio | Cisco Systems |  |  | ucampigl@cisco.com |
| Javier Contreras | Cisco Systems |  |  | jacontre@cisco.com |

Abstract

This submission proposes resolutions for the following CIDs:

1232, 1163, 1319, 1320, 1321, 1024, 1322, 1164, 1165, 1108, 1324, 1025, 1325, 1018, 1111, 1326, 1502, 1327, 1505, 1356, 1342, 1506, 1235, 1257, 1281, 1289, 1290.

Revisions:

* Rev 0: Initial version of the document.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbi D0.4 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbi D0.4 Draft. (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents). TGbi Editor: Editing instructions preceded by “TGbi Editor” are instructions to the TGbi editor to modify existing material in the TGbi draft. As a result of adopting the changes, the TGbi editor will execute the instructions rather than copy them to the TGbi Draft.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 1232 | Mark RISON | 9.4.2.240 | 39.39 | "Group EpochSupport field" should be "Group EDP EpochSupport field" | As it says in the comment | ACCEPTED |
| 1163 | Patrice Nezou | 10.71.2.1 | 54.34 | The sentence addresses CPE AP and CPE STA that are not really defined. A STA should be a non-AP STA or an AP STA. | Please harmonize wording with other paragraphs by replacing CPE AP with CPE AP MLD and CPE STA by non-AP MLD. Please do the same thing in any subclauses of the draft. | REVISEDThere are functions related to the MLD, others to the AP/STA. The harmonization should still maintain that distinction. Incorporate the proposed changes for CID 1163 in this document. |
| 1319 | Mark RISON | 10.71.2.1 | 54.34 | It seems plausible that a CPE AP is a CPE STA | Change "A CPE AP and CPE STA anonymizes selected OTA MAC Header fields of individually addressed frames of the CPE STA within EDP epochs." to "A CPE STA anonymizes selected OTA MAC Header fields of individually addressed frames of the CPE non-AP STA within EDP epochs." | REVISEDThe correct terms should have been AP MLD and non-AP MLD, thus removing the ambiguity, Incorporate the proposed changes for CID 1319 in this document. |
| 1320 | Mark RISON | 10.71.2.1 | 54.34 | I'm not sure about the capitalisation of "MAC Header fields" | As it says in the comment | REVISEDBaseline uses MAC header (lower case for header), we should use the same here. Incorporate the proposed changes for CID 1320 in this document. |
| 1321 | Mark RISON | 10.71.2.1 | 54.38 | It is not clear what it means for a feature to be "valid" | Clarify | REVISEDWe can delete the sentence as EDP epoch operation is part of FA, for which MLO requirement is already specificed. Incorporate the proposed changes for CID 1321 in this document. |
| 1024 | Chaoming Luo | 10.71.2.1 | 54.40 | Change "CPE AP" to "CPE AP MLD", and change "CPE STA" to "CPE non-AP MLD" in this paragraph. | As in comment. | REVISEDAddressed as part of CID 1319 |
| 1322 | Mark RISON | 10.71.2.1 | 54.40 | "A CPE AP MLD signals support of the EDP epoch in beacons and probe responses. A CPE AP advertises " -- is a deliberate distinction being made here between an AP MLD and an AP? | As it says in the comment | REVISEDTerm corrected to AP MLD with CID 1319 |
| 1164 | Patrice Nezou | 10.71.2.1 | 54.41 | The way to advertise the parameters of the EDP groups should be indicated. | Please specify the usage of EDP element to do advertisement or give a link to the corresponding subclause. | REVISEDIncorporate the proposed changes for CID 1164 in this document, pointing to the correct clause. |
| 1165 | Patrice Nezou | 10.71.2.1 | 54.41 | For clarity, it will be interesting to define a variable that sets to 1 for supporting EDP Epoch and another for supporting EDP features. | As in comment | REJECTED(during group discussion, conclusion was to defer to later – EDP Epoch is the target of this clause, there may be other features in EDP, but this clause should not define them) |
| 1108 | stephane baron | 10.71.2.1 | 54.50 | Remove "(" in the text "for EDP epoch (sequence" | as in comment | ACCEPTED |
| 1324 | Mark RISON | 10.71.2.1 | 54.50 | "The AP MLD advertises the EDP epoch (sequence parameters as defined in 10.71.2.3 (Group EDP epoch)." -- paren imbalance | Delete the first paren? | ACCEPTED |
| 1025 | Chaoming Luo | 10.71.2.1 | 54.55 | Change "the AP" to "the AP MLD". | As in comment. | ACCEPTEDTerm corrected to AP MLD with CID 1319 |
| 1325 | Mark RISON | 10.71.2.1 | 54.63 | "EDP Epoch" should be "EDP epoch" (also on next page) | As it says in the comment | ACCEPTED |
| 1018 | Chaoming Luo | 10.71.2.1 | 55.01 | What are the "EDP parameters"? There is no definition. | Define them. | REJECTEDEDP Parameters are defined in 3.2 |
| 1111 | stephane baron | 10.71.2.2 | 55.01 | replace STA by non-AP STA | as in comment | REVISEDReplaced to non-AP MLD, fixed with #1163 |
| 1326 | Mark RISON | 10.71.2.1 | 55.01 | "the EDP parameters assigned to a STA during the preceding EDP Epoch, shall remain valid only for the following operations:" -- spurious comma | Delete the comma | ACCEPTED |
| 1502 | Mark RISON | 10.71.2.1 | 55.01 | "During the transition period of an EDP Epoch, the EDP parameters assigned to a STA during the preceding EDP Epoch, shall remain valid only for the following operations:-- Retransmission of a frame.-- Reception of a retransmitted frame." -- won't a combination of old frames using the old epoch parameters and new frames using the new one allow an attacker to track a device across the epochs, somehow? | As it says in the comment | REJECTEDNo proposed resolution.Besides, changing the parameters is intended to hide the device identity, although it is clear that other parameters (like pattern, power level) will allow STA identification, but the group seems to have concluded that this direction was beyond the group’s scope for now. |
| 1327 | Mark RISON | 10.71.2.1 | 55.28 | "Epoch(n)" should have a space before the opening paren | As it says in the comment | REJECTEDIn the equation, (n) is a parameter of the function Epoch, in the explanation, the space is present. |
| 1505 | Mark RISON | 10.71.2.5 | 57.42 | "To account for clock drifts, the CPE non-AP MLD and CPE AP MLD shall begin to accept individually addressed frames that use the new anonymization parameters for a dot11EpochStartTimeMargin before the start of new epoch." -- the MIB attribute might be set to different values on each side; can't this cause problems? Ditto "The CPE non-AP MLD and CPE AP MLD shall accept individually addressed frames with the old anonymization parameters for dot11EpochTransitionTime after the start of the new epoch." | As it says in the comment | REVISEDWe define default values in the annex (100 units of 0.1 ms). However, non default values may cause one side to reject frames if the other side’s drift is excessive. Incorporate the proposed changes for CID 1505 in this document. |
| 1356 | Mark RISON | 10.71.2.5 | 57.45 | "start of new epoch" missing article | As it says in the comment | REVISED.Added ‘the’. Incorporate the proposed changes for CID 1356 in this document. |
| 1342 | Mark RISON | 10.71.2.4 | 0.00 | Second para refers to (Re)Association Request frame but third para only refers to Association Response frame | As it says in the comment | REVISEDChanged to (re)association response. Incorporate the proposed changes for CID 1342 in this document. |
| 1506 | Mark RISON | C.3 | 91.09 | "UNITS "1 TUs"" should be "UNITS "TUs"" | As it says in the comment | ACCEPTED |
| 1235 | Mark RISON | 9.4.2.337 | 0.00 | "Enhanced Data Privacy (EDP) element" -- elements have exactly one name. Either it's an EDP element (or even an EDPE!) or it's an Enhanced Data Privacy element | As it says in the comment | REVISEDWe use EDP element in references, changed to EDP element, Incorporate the proposed changes for CID 1235 in this document. |
| 1257 | Mark RISON |   | 0.00 | Do not duplicate figure information such as length in the text, e.g. "The length of the Epoch Sequence Duration field is 1 octet. " | As it says in the comment | REVISEDSentence deleted. |
| 1281 | Mark RISON |   | 0.00 | Either "255 is reserved" or "The value 255 is reserved", not "Value 255 is reserved". Other instances too (also for 0) | As it says in the comment | REVISED.Changed to The value (0 / 255) is reserved Incorporate the proposed changes for CID 1281 in this document. |
| 1289 | Mark RISON |   | 0.00 | Aaargh, please make your field names consistent. For example is it MLD Specific Epoch Number Offset or is it non-AP MLD Specific Epoch Number Offset?! | As it says in the comment | REVISEDWe use non-AP MLD in the text, changed in the figure to non-AP MLD as well. Incorporate the proposed changes for CID 1289 in this document. |
| 1290 | Mark RISON |   | 0.00 | "Epoch count", "Epoch Number", etc. -- all these things need to be lowercase | As it says in the comment | REVISEDFound one instance, changed to lower case. Incorporate the proposed changes for CID 1290 in this document. |

CID1232

Accepted

9.4.2.240 RSNXE

***ert the following new rows to Table 9-373 while maintaining the numerical order and updating the reserved range (not all lines shown):***

**Extended RSN Capabilities field**

|  |  |  |
| --- | --- | --- |
| **Bit** | **Information** | **Notes** |
| … |  |  |
| <ANA> | EDP Robust Individually Addressed Management Frame Support | An EDP STA sets the EDP Robust Individually Addressed Management Frame Support field to 1 if dot11EDPRobustIndividuallyAddressedManagementFrameActivated is true. Otherwise, this subfield is set to 0. See 12.14.2 (EDP Robust Individually Addressed Management Frame and Robust Individually Addressed Beamforming/CSI/CQI Frame). |
| <ANA> | EDP Robust Individually Addressed Beamforming/CSI/CQI Frame Tx Support | An EDP STA sets the EDP Robust Individually Addressed Beamforming/CSI/CQI Frame Tx Support field to 1 if dot11EDPRobustIndividuallyAddressedBeamformingCSICQIFrameTxActivated is true. Otherwise, this subfield is set to 0. See 12.14.2 (EDP Robust Individually Addressed Management Frame and Robust Individually Addressed Beamforming/CSI/CQI Frame). |
| <ANA> | EDP Robust Individually Addressed Beamforming/CSI/CQI Frame Rx Support | An EDP STA sets the EDP Robust Individually Addressed Beamforming/CSI/CQI Frame Rx Support field to 1 if dot11EDPRobustIndividuallyAddressedBeamformingCSICQIFrameRxActivated is true. Otherwise, this subfield is set to 0. See 12.14.2 (EDP Robust Individually Addressed Management Frame and Robust Individually Addressed Beamforming/CSI/CQI Frame). |
| <ANA> | EDP Capabilities And Operation Parameters Request/Response Support | An EDP STA sets the EDP Capabilities And Operation Parameters Request/Response subfield to 1 if dot11EDPCapabilitiesAndOperationParametersRequestResponseActivated is true. Otherwise, this subfield is set to 0. See 12.14.3 (EDP capabilities and operation parameters request and response procedure). |
| <ANA> | (Re)Association Frame Encryption Support(#1231, #1488) | An EDP STA sets the (Re)Association Frame Encryption Support(#1488) field to 1 if dot11EDPReAssociation FrameEncryptionSupportActivated(#1042) is true. Otherwise, this subfield is set to 0. See 12.14.5 ((Re)Association Request/Response Frame Encryption(#1488)). |
| <ANA> | IEEE 802.1X Authentication Utilizing Authentication Frame Support | An EDP STA sets the IEEE 802.1X Authentication Utilizing Authentication Frame Support field to 1 if dot11EDPIEEE8021XAuthenticationUtilizingAuthenticationFrameActivated is true. Otherwise, this subfield is set to 0.(#1426)  |
| <ANA> | PMKSA Caching Privacy Support | An EDP STA sets the PMKSA Caching Privacy Support field to 1 if dot11EDPPMKSACachingPrivacySupportActivated is true. Otherwise, this subfield is set to 0. See 12.14.6 (PMKSA caching privacy). |
| <ANA> | Group EDP Epoch Supported | A non-AP MLD sets the Group EDP Epoch Supported field to 1 when dot11GroupEpochActivated is true and sets it to 0 otherwise.  |

CID 1163, 1319

Revised

**10.71.2.1 Introduction**

A CPE AP MLD and CPE ~~STA~~ non-AP MLD (#1163) anonymize~~s~~ selected OTA MAC Header fields of individually addressed frames of ~~the~~ affiliated CPE STA(s) within EDP epochs.

EDP epoch operation is an EDP feature that is valid when MLO is supported.

A CPE AP MLD signals support of the EDP epoch in beacons and probe responses. A CPE AP MLD advertises at least a default EDP group and associated EDP epoch sequence parameters, and possibly other EDP groups and associated EDP epoch sequence parameters. ~~A group EDP epoch has zero or more STAs as its members~~. All CPE non-AP MLDs (#1163) ~~STAs~~ joining the BSS may be placed in the default group EDP epoch by default upon association (see 10.71.2.2 (EDP epoch request)). If a CPE non-AP MLD (#1163) ~~STA~~ chooses not to join any existing group EDP epochs, it may send an EDP Epoch Sequence Request frame to the CPE AP MLD (#1163) to create a new group EDP epoch. A CPE non-AP MLD ~~STA~~ (#1163) can request to leave any group and/or join a different group at any time.

The AP MLD advertises the EDP epoch (sequence parameters as defined in 10.71.2.3 (EDP Groups(#1113)). Each non-AP MLD applies the group EDP epoch sequence parameters of the group EDP epoch to determine the EDP epoch sequence of one or more EDP epoch start times.

EDP epoch operation allows the AP MLD (#1163) to define an MLD specific(#Ed) schedule of anonymization events to anonymize selected OTA fields (e.g., STA address, AID, PN, SN, etc.) of individually addressed frames.

At any given time, an AP MLD has at most one EDP epoch assigned to a given associated non-AP MLD.

A non-AP MLD has at most one EDP epoch.

Each EDP Epoch starts with a transition period.

During the transition period of an EDP Epoch, the EDP parameters assigned to a non-AP MLD ~~STA~~ (#1163) during the preceding EDP Epoch, shall remain valid only for the following operations:

Retransmission of a frame.

Reception of a retransmitted frame.

Frame acknowledgement.

A transition period terminates at the end of a transition timeout interval or before the end of the transition timeout interval, after the completion of the successful transmissions or retransmissions initiated during the preceding EDP Epoch, whichever comes first.

CID 1320

Revised

A CPE AP MLD and CPE ~~STA~~ non-AP MLD (#1163) anonymizes selected OTA MAC ~~H~~header (#1320) fields of individually addressed frames of the CPE STA within EDP epochs.

CID 1321

Revised

~~EDP epoch operation requires MLO support. is an EDP feature that is valid when MLO is supported.~~

CID 1164

Revised

A CPE AP MLD signals support of the EDP epoch in beacons and probe responses (see 10.71.2.3 (EDP Groups)) (#1164).

CID 1108, 1324

Accepted

The AP MLD advertises the EDP epoch ~~(~~sequence parameters as defined in 10.71.2.3 (EDP Groups(#1113)).

CID 1109, 1166

Revised

EDP epoch operation allows the AP MLD (#1163) to ~~define an MLD specific(#Ed)~~ schedule ~~of anonymization~~ ~~events~~ sequences to anonymize MLDs’ (#1109) selected OTA fields (e.g., STA address, AID, PN, SN, etc.) of individually addressed frames.

CID 1325

Accepted

During the transition period of an EDP Epoch, the EDP parameters assigned to a non-AP MLD ~~STA~~ (#1163) during the preceding EDP ~~E~~epoch, shall remain valid only for the following operations:

Retransmission of a frame.

Reception of a retransmitted frame.

Frame acknowledgement.

A transition period terminates at the end of a transition timeout interval or before the end of the transition timeout interval, after the completion of the successful transmissions or retransmissions initiated during the preceding EDP ~~E~~epoch, whichever comes first.

Figure 10-167 (Example of EDP Epoch timeline) shows an example EDP ~~E~~epoch sequence of consecutive EDP ~~E~~epochs with their associated EDP ~~E~~epoch start times tn and transition period tpn.

CID 1326

Accepted

During the transition period of an EDP Epoch, the EDP parameters assigned to a non-AP MLD ~~STA~~ (#1163) during the preceding EDP ~~E~~epoch~~,~~ shall remain valid only for the following operations:

Retransmission of a frame.

Reception of a retransmitted frame.

Frame acknowledgement.

A transition period terminates at the end of a transition timeout interval or before the end of the transition timeout interval, after the completion of the successful transmissions or retransmissions initiated during the preceding EDP ~~E~~epoch, whichever comes first.

Figure 10-167 (Example of EDP Epoch timeline) shows an example EDP ~~E~~epoch sequence of consecutive EDP ~~E~~epochs with their associated EDP ~~E~~epoch start times tn and transition period tpn.

CID 1356

Revised

**10.71.2.5 Epoch boundaries**

(#1347, #1348)The next epoch boundary is derived (as described in 10.71.2.6 (EDP epoch(#Ed) start time(#1116))) from the value of the next epoch start time(#1349, #1095, #1116) defined in the EDP Epoch Setting field of the Group Enhanced Privacy element of the (Re)Association Response frame or the EDP epoch setting action response frame. The Epoch Interval Duration field of the same fields and frames defines the interval of the following Group EDP epochs sequence.

(#1096, #1353)

A CPE non-AP MLD belonging to an EDP group(#1096) and the CPE AP MLD may calculate the new OTA values to be used for the non-AP MLD in the next(#1354) group EDP epoch(#1030).

At the start of the new group(#1030) EDP epoch, the new anonymization parameters are used to anonymize the selected OTA fields of all new(#1175) individual frames transmitted during the epoch(#1355).

To account for clock drifts, the CPE non-AP MLD and CPE AP MLD shall begin to accept individually addressed frames that use the new anonymization parameters for a dot11EpochStartTimeMargin before the start of the (#1356) new epoch. The CPE non-AP MLD and CPE AP MLD shall accept individually addressed frames with the old anonymization parameters for dot11EpochTransitionTime after the start of the new epoch. The rules of 10.71.2.1 (Introduction) apply for frame retransmissions and acknowledgments.

The OTA values(#1358) of the individually addressed frames are obtained(#1358) as defined in 10.71.3 (Establishing frame anonymization parameter sets), 10.71.4 (MAC Header anonymization and transmitting functions) and 10.71.5 (MAC header anonymization and receiving functions).

CID 1342

Revised

**10.71.2.4 Group EDP epoch setup**

If a CPE AP MLD supports group EDP epoch and receives a (Re)Association Request frame with the Group EDP Epoch Supported field set, then the AP MLD shall assign the CPE non-AP MLD to the default group EDP Epoch if association succeeds.

The (Re)Association (#1342) Response frame provides the default group EDP information in the EDP element. (#1093, #1343, #1065, #1344)

After the affiliated STA of the non-AP MLD is associated, the CPE AP MLD sends to the CPE non-AP MLD one or more EDP Group Parameter frames, to signal the list of group EDP epochs supported in the BSS. An individual non-AP MLD may be less visible in a larger group than in a smaller group. Therefore, the number of STAs currently participating to a group may be useful information to a non-AP MLD. For each group, the EDP Epoch Settings field may optionally include the number of current participating non-AP MLDs by including the Number of Participating Affliated STAs field. (#1139)

The non-AP MLD may request to join another group EDP epoch, or provide EDP epoch settings, by sending a Non-AP MLD Specific Epoch Setting frame. (#1172, #1345, #1346)

CID 1506

Accepted

Annex C

dot11EpochTransitionTime OBJECT-TYPE

 SYNTAX Unsigned32 (1..1000)

 UNITS "~~1~~ TUs"

 MAX-ACCESS read-write

 STATUS current

 DESCRIPTION

 "This is a control variable.

 It is written by an external management entity or the SME. Changes take effect as soon as practical in the implementation.

 This attribute indicates the duration when the STA receives individually addressed frames that use previous epoch anonymization parameters after an epoch boundary."

 DEFVAL { 300 }

 ::= { dot11StationConfigEntry <ANA> }

CID 1235

Revised

**9.4.2.337 ~~Enhanced Data Privacy (~~EDP~~)~~ (#1235) element**

The ~~Enhanced Data Privacy (~~EDP~~)~~ element signals EDP epoch settings. (#1236, #1087)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EDP Epoch Settings |
| Octets: | 1 | 1 | 1 | variable |

**~~Enhanced Data Privacy (~~EDP~~)~~ element**

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

The EDP Epoch Settings field is defined in 9.4.1.76 (EDP Epoch Setting fields (#1070)).(#1070)

CID 1257

Revised

(in 9.4.1.76 p 37.52 in d0.6)

The Minimum Epoch Pacing field signals the minimum epoch duration value that the non-AP MLD can support. The format of the Minimum Epoch Pacing element is the same as the Epoch Interval field.

The Time Range(#Ed) field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining field indicates the number of EDP Epochs left in the sequence after the current epoch finishes, except 255, which means that the sequence duration is unlimited. ~~The length of the Epoch Sequence Duration field is 1 octet.~~ (#1257)

The Number of Participating Affiliated STAs field is optional. When present, the field signals an indication of the number of affiliated STAs currently participating to this group EDP epoch on the current link.

CID 1281

Revised

(in 9.4.1.76 p 36.38 in d0.6)

**9.4.1.76 EDP Epoch Setting fields** (#1070)

The EDP Epoch Settings field includes the information regarding the actual parameters of an Epoch.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | EDP Epoch Settings Control | Group ID | Epoch Interval | First Epoch Start Time | Time Range | Epochs Remaining | Minimum Epoch Pacing Parameters  | Number Of participating Affiliated STAs |
| Bits: | 8 | 0 or 8 | 16 | 0 or 64 | 0 or 16 | 0 or 8 | 0 or 16 | 0 or 8 or 16 or 24 |

**EDP Epoch Settings field format**(#Ed)

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD.

The Group ID field signals an identifier of the EDP group. The v~~V~~alue 0 indicates the default group. The v~~V~~alue 255 is reserved.

CID 1289

Revised

(in 9.4.2.338 p 48.47 in d0.6)

**OTA**(#1010) **MAC Collision Warning element**(#1284)

The OTA(#1010) MAC Collision Warning element is used when(#1286) an OTA(#1288) MAC address expected to be used by an EDP non-AP MLD(#Ed) 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 | Non-AP (#1289) MLD Specific Epoch Number Offset |
| Octets: | 1 | 1 | 1 | 1 | 1 | 1 |

**OTA**(#1010) **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)

CID 1290

Revised

(in 9.4.2.338 p 49.20 in d0.6)

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 ~~E~~epoch count that the non-AP MLD skips to mitigate the OTA(#1288) MAC address collision. The ~~V~~value 0 is reserved. (#1141)

*TGbi editor: Modify Clause 9.4.1.76 as follows (track changes on):*

**9.4.1.76 EDP Epoch Setting fields** (#1070)

The EDP Epoch Settings field includes the information regarding the actual parameters of an Epoch.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | EDP Epoch Settings Control | Group ID | Epoch Interval | First Epoch Start Time | Time Range | Epochs Remaining | Minimum Epoch Pacing Parameters  | Number Of participating Affiliated STAs |
| Bits: | 8 | 0 or 8 | 16 | 0 or 64 | 0 or 16 | 0 or 8 | 0 or 16 | 0 or 8 or 16 or 24 |

**EDP Epoch Settings field format**(#Ed)

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD.

The Group ID field signals an identifier of the EDP group. The value (#1170) 0 indicates the default group. The value (#1170) 255 is reserved.

…/…

The Minimum Epoch Pacing field signals the minimum epoch duration value that the non-AP MLD can support. The format of the Minimum Epoch Pacing element is the same as the Epoch Interval field.

The Time Range(#Ed) field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining field indicates the number of EDP Epochs left in the sequence after the current epoch finishes, except 255, which means that the sequence duration is unlimited. (#1257)

The Number of Participating Affiliated STAs field is optional. When present, the field signals an indication of the number of affiliated STAs currently participating to this group EDP epoch on the current link.

*TGbi editor: Modify Clause 9.4.2.240 as follows (track changes on):*

|  |  |  |
| --- | --- | --- |
| <ANA> | Group EDP Epoch Supported | A non-AP MLD sets the Group Epoch EDP Supported (#1232) field to 1 when dot11GroupEpochActivated is true and sets it to 0 otherwise.  |

*TGbi editor: Modify Clause 9.4.2.337 as follows (track changes on):*

**9.4.2.337 EDP (#1235) element**

The EDP element signals EDP epoch settings. (#1236, #1087)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EDP Epoch Settings |
| Octets: | 1 | 1 | 1 | variable |

**EDP element**

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

The EDP Epoch Settings field is defined in 9.4.1.76 (EDP Epoch Setting fields (#1070)).(#1070)

*TGbi editor: Modify Clause 9.4.2.338 as follows (track changes on):*

**9.4.2.338 OTA**(#1010) **MAC Collision Warning element**(#1284)

The OTA(#1010) MAC Collision Warning element is used when(#1286) an OTA(#1288) MAC address expected to be used by an EDP non-AP MLD(#Ed) 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 | Non-AP (#1289) MLD Specific Epoch Number Offset |
| Octets: | 1 | 1 | 1 | 1 | 1 | 1 |

**OTA**(#1010) **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)

…/…

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(#1288) MAC address collision. The value 0 is reserved. (#1141)

*TGbi editor: Modify Clause 10.71.2.1 as follows (track changes on):*

**10.71.2.1 Introduction**

A CPE AP MLD and CPE non-AP MLD (#1163) anonymizes selected OTA MAC header (#1320) fields of individually addressed frames of the CPE STA within EDP epochs.

EDP epoch operation requires MLO support. (#1321)

A CPE AP MLD signals support of the EDP epoch in beacons and probe responses (see 10.71.2.3 (EDP Groups) (#1108). A CPE AP MLD advertises at least a default EDP group and associated EDP epoch sequence parameters, and possibly other EDP groups and associated EDP epoch sequence parameters. A group EDP epoch has zero or more STAs as its members. All CPE non-AP MLDs (#1163) joining the BSS may be placed in the default group EDP epoch by default upon association (see 10.71.2.2 (EDP epoch request)). If a CPE non-AP MLD (#1163) chooses not to join any existing group EDP epochs, it may send an EDP Epoch Sequence Request frame to the CPE AP MLD (#1163) to create a new group EDP epoch. A CPE non-AP MLD (#1163) can request to leave any group and/or join a different group at any time.

The AP MLD advertises the EDP epoch (sequence parameters as defined in 10.71.2.3 (EDP Groups(#1113)). Each non-AP MLD applies the group EDP epoch sequence parameters of the group EDP epoch to determine the EDP epoch sequence of one or more EDP epoch start times.

EDP epoch operation allows the AP MLD (#1163) to schedule sequences (#1109) to anonymize MLDs’ (#1109) selected OTA fields (e.g., STA address, AID, PN, SN, etc.) of individually addressed frames.

At any given time, an AP MLD has at most one EDP epoch assigned to a given associated non-AP MLD.

A non-AP MLD has at most one EDP epoch.

Each EDP Epoch starts with a transition period.

During the transition period of an EDP Epoch, the EDP parameters assigned to a non-AP MLD (#1163) during the preceding EDP epoch shall remain valid only for the following operations:

Retransmission of a frame.

Reception of a retransmitted frame.

Frame acknowledgement.

A transition period terminates at the end of a transition timeout interval or before the end of the transition timeout interval, after the completion of the successful transmissions or retransmissions initiated during the preceding EDP epoch, whichever comes first.

Figure 10-167 (Example of EDP Epoch timeline) shows an example EDP epoch sequence of consecutive EDP epochs with their associated EDP epoch start times tn and transition period tpn.

*TGbi editor: Modify Clause 10.71.2.4 as follows (track changes on):*

**10.71.2.4 Group EDP epoch setup**

If a CPE AP MLD supports group EDP epoch and receives a (Re)Association Request frame with the Group EDP Epoch Supported field set, then the AP MLD shall assign the CPE non-AP MLD to the default group EDP Epoch if association succeeds.

The (re)association (#1342) Response frame provides the default group EDP information in the EDP element. (#1093, #1343, #1065, #1344)

After the affiliated STA of the non-AP MLD is associated, the CPE AP MLD sends to the CPE non-AP MLD one or more EDP Group Parameter frames, to signal the list of group EDP epochs supported in the BSS. An individual non-AP MLD may be less visible in a larger group than in a smaller group. Therefore, the number of STAs currently participating to a group may be useful information to a non-AP MLD. For each group, the EDP Epoch Settings field may optionally include the number of current participating non-AP MLDs by including the Number of Participating Affliated STAs field. (#1139)

The non-AP MLD may request to join another group EDP epoch, or provide EDP epoch settings, by sending a Non-AP MLD Specific Epoch Setting frame. (#1172, #1345, #1346)

*TGbi editor: Modify Clause 10.71.2.5 as follows (track changes on):*

**10.71.2.5 Epoch boundaries**

(#1347, #1348)The next epoch boundary is derived (as described in 10.71.2.6 (EDP epoch(#Ed) start time(#1116))) from the value of the next epoch start time(#1349, #1095, #1116) defined in the EDP Epoch Setting field of the Group Enhanced Privacy element of the (Re)Association Response frame or the EDP epoch setting action response frame. The Epoch Interval Duration field of the same fields and frames defines the interval of the following Group EDP epochs sequence.

(#1096, #1353)

A CPE non-AP MLD belonging to an EDP group(#1096) and the CPE AP MLD may calculate the new OTA values to be used for the non-AP MLD in the next(#1354) group EDP epoch(#1030).

At the start of the new group(#1030) EDP epoch, the new anonymization parameters are used to anonymize the selected OTA fields of all new(#1175) individual frames transmitted during the epoch(#1355).

To account for clock drifts, the CPE non-AP MLD and CPE AP MLD shall begin to accept individually addressed frames that use the new anonymization parameters for a dot11EpochStartTimeMargin before the start of the (#1356) new epoch. The CPE non-AP MLD and CPE AP MLD shall accept individually addressed frames with the old anonymization parameters for dot11EpochTransitionTime after the start of the new epoch. The rules of 10.71.2.1 (Introduction) apply for frame retransmissions and acknowledgments.

The OTA values(#1358) of the individually addressed frames are obtained(#1358) as defined in 10.71.3 (Establishing frame anonymization parameter sets), 10.71.4 (MAC Header anonymization and transmitting functions) and 10.71.5 (MAC header anonymization and receiving functions).

*TGbi editor: Modify Annex C as follows (track changes on):*

dot11EpochTransitionTime OBJECT-TYPE

 SYNTAX Unsigned32 (1..1000)

 UNITS "TUs" (#1506)

 MAX-ACCESS read-write

 STATUS current

 DESCRIPTION

 "This is a control variable.

 It is written by an external management entity or the SME. Changes take effect as soon as practical in the implementation.

 This attribute indicates the duration when the STA receives individually addressed frames that use previous epoch anonymization parameters after an epoch boundary."

 DEFVAL { 300 }

 ::= { dot11StationConfigEntry <ANA> }