IEEE P802.11
Wireless LANs

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| 11bi D0.4 CR for 9.4.2.339 |
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Abstract

This submission proposes resolutions for the following CIDs:

1276, 1055, 1057, 1016, 1158, 1137, 1275, 1272, 1277, 1278, 1279, 1138, 1161, 1280, 1017, 1088, 1139, 1140, 1282, 1283, 1273, 1274, 1107.

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** |
| 1276 | Mark RISON | 9.4.2.339 | 42.58 | "Enhanced Group Privacy Availability (EGPA) element" -- elements have just one name | As it says in the comment | REVISEDThe element is merged with the EDP element as per #1057 below |
| 1055 | Antonio DeLaOlivaDelgado | 9.4.2.339 | 42.59 | Enhanced Group Privacy Availability name makes you think of a completely different thing | When you read this element name it makes you think it is defining something regarding the security of group addressed frames. I suggest to rename it to something different, for example EDP Group Epoch Availability | REVISEDThe element is merged with the EDP element as per #1057 below |
| 1057 | Antonio DeLaOlivaDelgado | 9.4.2.339 | 42.59 | EGPA element can be unified with EDP element. The EDP element only provides information on the default group, but you can create one single element with Group ID optional (in case it is the default group), number of STAs optional and you will get exactly the same as in the EDP element. I can provide a contribution for that. | If we agree on merging this, I can provide a contribution | REVISEDThe element is merged with the EDP element  |
| 1016 | Chaoming Luo | 9.4.2.339 | 43.01 | Figure 9-1001dj--Enhanced Group Privacy Availability element does not define a good element format. | Make the tuple Group ID, Length, EDP Epoch Settings and Number of Participating MLDs fields as a Group Epoch field, and then the element contains m \* Group Epoch field. | REVISEDModified as part of #1057 |
| 1158 | Patrice Nezou | 9.4.2.339 | 43.01 | Group ID , length fields should be moved to the EDP Epoch Settings field for clarification to minimize reduncdant information in multiple fields | As in comment | REVISEDImplemented (length was already tehre, skipped) |
| 1137 | Po-Kai Huang | 9.4.2.339 | 43.02 | Consider changing the format by having "Group ID, Length, EDP Epoch Settings, and Number of Participating Affiliated STAs" together and repeat m times. This will be easier for client to find information of relevant group and reuse existing element parser. | As in comment | REVISEDClubbed together into the EDP element |
| 1275 | Mark RISON | 9.4.2.339 | 43.02 | There are two Length fields | As it says in the comment | REVISEDSecond Length element removed as the element was merged into EDP element with #1057. |
| 1272 | Mark RISON | 9.4.2.339 | 43.06 | Don't use \*, use the multiplication glyph | As it says in the comment | REVISEDRemoved when merging the data into the EDP element (#1057) |
| 1277 | Mark RISON | 9.4.2.339 | 43.16 | Is m the value in the Group Count field? | Say so if so, else clarify how it is determined | REVISEDDescriptive text added to the frame description (9.6.xxx) |
| 1278 | Mark RISON | 9.4.2.339 | 43.16 | Can the Group Count be 0? | If not, say 0 is reserved | REVISEDSaid that there is at least one group (and thus that 0 is reserved). |
| 1279 | Mark RISON | 9.4.2.339 | 43.20 | "The Group ID field signals an identifier of the group EDP Epoch. Value 0 indicates the default group. " but the starting blurb said "signals the list of EDP epoch groups supported in the BSS, in addition to the default group", so the default should not be in the element | As it says in the comment | REVISEDIssue fixed as the EPGA element was merged into the EDP element (this sentence was no longer needed) |
| 1138 | Po-Kai Huang | 9.4.2.339 | 43.21 | The Length field after Group ID field does not have a descriptioin. Also, to avoid naming confusiong with length field of element, probably should call the field "Group Length". | As in comment | REVISEDThe duplicate length field was removed as the EPGA was merged in the EDP element. |
| 1161 | Patrice Nezou | 9.4.2.339 | 43.24 | The name of "EDP Epoch settings" field (Figure 9-1001dj) is confusing with the "EDP Epoch Settings" field of the EDP element of Figure 9-1001df. The EDP Epoch setting field should be teh same field as described in the Figure 9-1001dg | Please clarify and define different wording for fields | REVISEDBoth elements are the same, the issue disappears as the EGPA element is merged with the EDP element. |
| 1280 | Mark RISON | 9.4.2.339 | 43.24 | "The EDP Epoch Settings field defines the parameter of this group EDP Epoch, as described in 9.4.2.337 (Enhanced Data Privacy (EDP) element). " should be just "The EDP Epoch Settings field is defined in <xref>. " | As it says in the comment | REVISEDThe issue disappears as the EGPA is merged with the EDP element (the EDP element does not have this issue) |
| 1017 | Chaoming Luo | 9.4.2.339 | 43.28 | Why a non-AP MLD needs to know numberof affiliated STAs currently participating to this group EDP epoch on the current link? It may introduce new privacy concern. | Remove the Participating Affiliated STAs field. | REJECTEDThe reason for this field was discussed at length in this group. It is also unclear how the “privacy concern” applies to this field being there. |
| 1088 | Julien Sevin | 9.4.2.339 | 43.28 | Modify the name of the field "The Participating Affiliated STAs field" to "Number ofParticipating Affiliated STAs" to be in line with figure Figure 9-1001dj | As in comment | ACCEPTED |
| 1139 | Po-Kai Huang | 9.4.2.339 | 43.28 | Should we describe when "Participating Affiliated STAs field" is present? Can not find it in the psec. Maybe just make it always present? | As in comment | REVISEDAdded the rationale, but to clause 10.71.2.4, as clause 9 describes the elements, not why they are there. |
| 1140 | Po-Kai Huang | 9.4.2.339 | 43.28 | Should the field name be "Number of Participating Affiliated STAs" rather than "Participating Affilited STAs"? If not, then the figure at the beginning of page 43 needs some revisions. | As in comment | REVISEDFixed with # 1057 above |
| 1282 | Mark RISON | 9.4.2.339 | 43.28 | "the field signals an indication of the num-ber of affiliated STAs" -- is someone being paid by the word? | "the field contains the num-ber of affiliated STAs" | ACCEPTED |
| 1283 | Mark RISON | 9.4.2.339 | 43.44 | "The first two octets of the Participating Affiliated STAs Count field represent an indication of the number of affiliated STAs participating in the signaled group on the link. The third octet values" don't identify fields by positions, identify them by name. And anyway I think this was trying to say "first two octets of the Number of Participating Affiliated STAs field" | As it says in the comment | REVISEDAs we have individual fields, fixed the description in the text. |
| 1273 | Mark RISON | 9.4.2.339 | 0.00 | The text and the figure disagree. The text says it's a sequence of tuples. The figure says it's all the group IDs first, then all the lengths, etc. | As it says in the comment | REVISEDThis is likely for line 41.12 This was addressed by reoving the sentence when merging the element with the EDP element with #1088 |
| 1274 | Mark RISON | 9.4.2.339 | 0.00 | Is it Number of Participating MLDs or is it Number of Participating Affiliated STAs or is it Participating Affiliated STAs? In any case "of" should be "Of" | As it says in the comment | REVISEDAffiliated STAs is what we decided, as this is what the group voted. The text clearly says ‘on the link’ to avoid ambiguity. Capitalized the O |
| 1107 | stephane baron | 9.4.2.339 | 43.20 | Please use term EDP group consistency (instead of group EDP Epoch). | as in comment | ACCEPTED |

**Discussion**

**Starting state for the clause**

**Enhanced Group Privacy Availability (EGPA) element**(#604r11)

The Enhanced Group Privacy Availability Element signals the list of EDP epoch groups supported in the BSS, in addition to the default group.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Group Count | Group ID | Length | EDP Epoch Settings | Number of Participating Affiliated STAs |
| Octets: | 1 | 1 | 1 | 1 | m\*1 | m\*1 | m\*12 | 0 or m\*3 |

**Enhanced Group Privacy Availability element**

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

The Group Count field indicates the number of groups signaled in the EGPA element, each group described with a tuple Group ID, EDP Epoch Settings and Number of Participating MLDs fields. The AP MLD advertises some or all of the configured groups.

The EPGA element contains m ( m = 1 or more) tuples of Group ID field, EDP Epoch Settings field and Number of Participating MLDs field.

The Group ID field signals an identifier of the group EDP Epoch. Value 0 indicates the default group. Value 255 is reserved.

The EDP Epoch Settings field defines the parameter of this group EDP Epoch, as described in 9.4.2.337 (Enhanced Data Privacy (EDP) element).

The 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.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The first two octets of the Participating Affiliated STAs Count field represent an indication of the number of affiliated STAs participating in the signaled group on the link. The third octet values, in the range of 0 to 100, represent an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved.

CID1057

Revised

Comparison between the EGPA and the EDP element:

EGPA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Group Count | Group ID | Length | EDP Epoch Settings | Number of Participating Affiliated STAs |
| Octets: | 1 | 1 | 1 | 1 | m\*1 | m\*1 | m\*12 | 0 or m\*3 |

EDP element

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EDP Epoch Settings |
| Octets: | 1 | 1 | 1 | 0 or 12 |

Both carry the EDP Epoch settings element, EGPA adds the group ID (this is because the EDP element ONLY carries the default group information) and the number of participating STAs.

However, another CID suggests to add the group ID to the EDP Epoch Settings element (because the CID suggests that the STA should be assigned to the best group, the one that best matches the STA minimum pacing element values, not just the default group).

In that case, the EDP element would just miss the participating STAs… but this information may be useful for the STA to decide if it stays in the default group or not.

Then (in that case) the EDP elements carries one group, and then a frame can be built to carry the list of other groups.

In that scenario, the EDP element clause (9.4.2.337), which was as follows (after 24/1418)

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) |
| Bits: | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The 9.4.2.337 clause would become as follows:

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Length | Group ID | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) | Number of participating Affiliated STAs |
| Bits: | 8 | 8 (#1057) | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 | 0 or 24 (#1057) |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Group ID field signals an identifier of the group EDP Epoch. Value 0 indicates the default group. Value 255 is reserved. (#1057)

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The 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.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The first two octets of the Participating Affiliated STAs Count field represent an indication of the number of affiliated STAs participating in the signaled group on the link. The third octet values, in the range of 0 to 100, represent an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved. (#1057)

In that scenario, there needs to be a frame to carry the older EGPA (now a set of EDP settings for m groups)

**9.6.xxx EDP Group parameter frame (#1057)**

The EDP Group Parameter frame is used to carry the EDP Epoch Settings for one or more group using the procedures defined in 10.71.2.3 and 10.71.2.4. The EDP Group Parameter frame contains the information shown in Figure 9-xxx.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Category  | Robust Action | Group Count | EDP Element List |
| Octets: | 1 | 1 | 1 | variable |

Figure 9-XXX EDP Group Parameter frame format

The Category field is defined in 9.4.1.11.

The Robust Action field is defined in 9.6.18.1.

The Group Count field specifies the number of EDP elements that are in the EDP Element List field. Value 0 is reserved. (#1278)

The EDP Element List field contains one or more EDP elements indicating the parameters of EDP groups that the AP MLD wants to convey to the non-AP MLD.

Clause 10.71.2.3 then becomes as follows:

**10.71.2.3 EDP Groups (#1113)**

A CPE AP MLD advertises EDP group (#1113) support in the Extended RSN Capabilities field of (#1333) Beacon and Probe Response frames by setting the Group EDP Epoch Supported field to 1 (#1333).

A CPE non-AP MLD advertises EDP group (#1113) support in the RSNXE (#1334) of (Re)Association Request frames by setting the Group EDP Epoch Supported field to 1 (#1333).

EDP group (#1113) support is optional (#1335).

A CPE AP MLD advertises EDP groups and their parameters (#1113) by sending an individually addressed EDP Group Paramaters (#1336, 1019, 1074) frame containing an ~~Enhanced Group Privacy Availability~~ EDP (#1057) element for each supported (#1075, 1171) EDP group (#1113) in the BSS. A CPE AP MLD shall advertise one or more (#1082) EDP groups (#1113) to each non-AP MLD that joins the BSS and may advertise EDP groups and their parameters (#1113) when (#1076) changes have affected one or more groups.

NOTE – When the AP sends an updated Enhanced EDP Group Parameters frame is implementation-dependent and outside the scope of this standard. (#1076).

A CPE non-AP MLD shall (#1337) be a member of only one group EDP epoch at a time.

A CPE non-AP MLD may request to join an EDP group (#1113) by sending an EDP Epoch Setting Request (#1338) frame, containing the group ID that the non-AP MLD wishes to join.

NOTE - Some CPE non-AP MLDs, for example in IoT devices, might choose a group with longer epochs, to limit parameter changes computation costs, while other CPE non-AP MLDs, for example in personal general devices, might choose a group with short epochs, to increase privacy protection. (#1513)

The AP MLD responds with an EDP Epoch Setting Response (#1338) frame, accepting or rejecting the request.

A CPE non-AP MLD may leave the EDP group (#1113) by sending an EDP Epoch Setting Request (#1338) frame.

If a CPE non-AP MLD is a member of an EDP group (#1113), the non-AP MLD and the AP MLD shall anonymize (#1339) the selected OTA fields of (#1339) individually addressed frames according to group epoch settings as defined in 10.71.3 (Establishing frame anonymization parameter sets), 10.71.4 (MAC Header anonymization and transmitting functions), 10.71.5 (MAC header anonymization and receiving functions) and 10.71.6 (Frame anonymization and AID).

CID1088

Revised

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Length | Group ID | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) | Number of participating Affiliated STAs |
| Bits: | 8 | 8 (#1057) | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 | 0 or 24 (#1057) |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Group ID field signals an identifier of the group EDP Epoch. Value 0 indicates the default group. Value 255 is reserved. (#1057)

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The Number of (#1088) 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.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The first two octets of the Participating Affiliated STAs Count field represent an indication of the number of affiliated STAs participating in the signaled group on the link. The third octet values, in the range of 0 to 100, represent an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved. (#1057)

CID1139

Revised

**10.71.2.4 Group EDP epoch setup**

A CPE (#1079) non-AP MLD may include in its (Re)Association Request frame the Minimum (#1328, 1011, 1077) Epoch Pacing element. (#1026)

If a CPE AP MLD supports group EDP epoch and receives a (Re)Association Request frame with the Group EDP Epoch Supported field set and no Epoch Pacing element, or a (Re)Association Request frame with the Group EDP Epoch Supported field set and If the value of the Group Epoch Interval Duration field (#1328) in the Minimum Epoch Pacing element is equal or larger than the value of the Group Epoch Interval Duration field (#1328) for the default EDP Epoch group (group 0), then the CPE non-AP MLD shall be assigned to the default group EDP epoch, with a Group (#1012, 1081) ID of 0. If the value of the Group Epoch Interval Duration field is less than the value of the Group Epoch Interval Duration field for the default EDP Epoch group (group 0), then (#1063) the non-AP MLD is not assigned to (#1020) any group EDP epoch (#1063) at (re)association. (#1026)

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

After the affiliated STA of the non-AP MLD is (#1172) associated, the CPE AP MLD sends to the CPE non-AP MLD one or more EDP Group Parameter frames (#1345) to signal the list of group EDP epochs supported in the BSS.

Note: 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)

A CPE non-AP MLD may subsequently send an EDP Epoch Request (#1332) to join a specific group EDP epoch or the CPE non-AP MLD can request the AP MLD to start a new group EDP epoch that matches specified EDP epoch settings by sending an EDP Epoch Setting Request (#1332) frame.

The AP MLD shall respond with an EDP Epoch Setting Response (#1332) frame, accepting or rejecting the request.

A CPE non-AP MLD may leave the group EDP epoch by sending an EDP Epoch Setting Request (#1332) frame. (#1026)

CID1282

Accepted

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Length | Group ID | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) | Number of participating Affiliated STAs |
| Bits: | 8 | 8 (#1057) | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 | 0 or 24 (#1057) |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Group ID field signals an identifier of the group EDP Epoch. Value 0 indicates the default group. Value 255 is reserved. (#1057)

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The Number of (#1088) Participating Affiliated STAs field is optional. When present, the field contains ~~signals an indication of~~ (#1282) the number of affiliated STAs currently participating to this group EDP epoch on the current link.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The first two octets of the Participating Affiliated STAs Count field represent an indication of the number of affiliated STAs participating in the signaled group on the link. The third octet values, in the range of 0 to 100, represent an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved. (#1057)

CID1283

Accepted

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Length | Group ID | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) | Number of participating Affiliated STAs |
| Bits: | 8 | 8 (#1057) | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 | 0 or 24 (#1057) |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Group ID field signals an identifier of the group EDP Epoch. Value 0 indicates the default group. Value 255 is reserved. (#1057)

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The Number of (#1088) Participating Affiliated STAs field is optional. When present, the field contains ~~signals an indication of~~ (#1282) the number of affiliated STAs currently participating to this group EDP epoch on the current link.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The ~~first two octets of the~~ (#1283) Participating Affiliated STAs Count field represents an indication of the number of affiliated STAs participating in the signaled group on the link. The Participating Affiliated STAs Percentage field (#1283) ~~third octet values~~, with values in the range of 0 to 100, represents an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved. (#1057)

CID1274, 1107

Accepted

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Length | Group ID | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) | Number Of participating Affiliated STAs |
| Bits: | 8 | 8 (#1057) | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 | 0 or 24 (#1057) |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Group ID field signals an identifier of the ~~group EDP Epoch~~ EDP group (#1107). Value 0 indicates the default group. Value 255 is reserved. (#1057)

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The Number Of (#1088) Participating Affiliated STAs field is optional. When present, the field contains ~~signals an indication of~~ (#1282) the number of affiliated STAs currently participating to this group EDP epoch on the current link.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The ~~first two octets of the~~ (#1283) Participating Affiliated STAs Count field represents an indication of the number of affiliated STAs participating in the signaled group on the link. The Participating Affiliated STAs Percentage field (#1283) ~~third octet values~~, with values in the range of 0 to 100, represents an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved. (#1057)

*TGbi editor: Delete clause 9.4.2.339. Modify Clauses 9.4.2.337 as follows (track changes on):*

**Enhanced Data Privacy (EDP) 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 | 13 (#1053, #1056) |

**Enhanced Data Privacy (EDP) element**

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Length | Group ID | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Reserved | Next Epoch Start Time | TimeRange | Epochs Remaining (#1027) | Number Of participating Affiliated STAs |
| Bits: | 8 | 8 (#1057) | 3 (#1240) | 11 (#1240) | 2 (#1056, #1240) | 64 | 16 | 8 | 0 or 24 (#1057) |

**EDP Epoch Settings field**

The EDP Epoch Settings field contains the EDP epoch parameters of an EDP epoch sequence for the non-AP MLD (#1100, #1237, #1072).

The Group ID field signals an identifier of the EDP group (#1107). Value 0 indicates the default group. Value 255 is reserved. (#1057)

The Epoch Interval Length (#1241) field contains the length of the EDP epoch, expressed in Epoch Interval Units (#1241), shown in Table 9-401af (Epoch Interval Units and epoch durations) (#1241). Epoch Interval Length value 0 is reserved (#1262).

|  |  |  |
| --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | 23 d 16 h 36 min 40 s |
| 1 | 1 s | 34 min 7 s |
| 2 | Reserved | N/A |
| 3 | Reserved | N/A |
| 4 | Reserved | N/A |
| 5 | Reserved | N/A |
| 6 | Reserved | N/A |
| 7 | Reserved | N/A |

**Epoch Interval Units and epoch durations**

(#1116)The time range field is the range used by the stations to determine a random delay added to the EDP Epoch reference start time.

The Epochs Remaining (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 255, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

The Number Of (#1088) Participating Affiliated STAs field is optional. When present, the field contains (#1282) the number of affiliated STAs currently participating to this group EDP epoch on the current link.

|  |  |  |
| --- | --- | --- |
|  | Participating Affiliated STAs Count | Participating Affiliated STAs Percentage |
| Octets: | 2 | 1 |

**Number of Participating Affiliated STAs field**

The (#1283) Participating Affiliated STAs Count field represents an indication of the number of affiliated STAs participating in the signaled group on the link. The Participating Affiliated STAs Percentage field, with values (#1283) in the range of 0 to 100, represents an indication of the percentage of the associated affiliated STAs participating to the signaled group on the link. Values 101-255 are reserved. (#1057)

*TGbi editor: Please insert the following new clause at the end of clause 9.6 (track changes on):*

9.6.31## EPB Robust Action Frames

**9.6.xxx EDP Group parameter frame (#1057)**

The EDP Group Parameter frame is used to carry the EDP Epoch Settings for one or more group using the procedures defined in 10.71.2.3 and 10.71.2.4. The EDP Group Parameter frame contains the information shown in Figure 9-xxx.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Category  | Robust Action | Group Count | EDP Element List |
| Octets: | 1 | 1 | 1 | variable |

Figure 9-XXX EDP Group Parameter frame format

The Category field is defined in 9.4.1.11.

The Robust Action field is defined in 9.6.18.1.

The Group Count field specifies the number of EDP elements that are in the EDP Element List field. Value 0 is reserved. (#1278)

The EDP Element List field contains one or more EDP elements indicating the parameters of EDP groups that the AP MLD wants to convey to the non-AP MLD.

*TGbi editor: Please remove the Enhanced Group Privacy Availability (EGPA) element from table 9-130:*

***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>~~ |  |  |
| otaMAC Collision Warning element(#Ed) | 255 | <ANA> |  |  |
| EDP Epoch Setting element(#Ed) | 255 | <ANA> |  |  |
| ... |  |  |  |  |
| NOTE—See 10.28.6 (Element parsing) on the parsing of elements. |  |  |  |  |

**Element IDs**

**RSNE**

*TGbi editor: Please modify clause 10.71.2.3 as follows (track changes on):*

**10.71.2.3 EDP Groups (#1113)**

A CPE AP MLD advertises EDP group (#1113) support in the Extended RSN Capabilities field of (#1333) Beacon and Probe Response frames by setting the Group EDP Epoch Supported field to 1 (#1333).

A CPE non-AP MLD advertises EDP group (#1113) support in the RSNXE (#1334) of (Re)Association Request frames by setting the Group EDP Epoch Supported field to 1 (#1333).

EDP group (#1113) support is optional (#1335).

A CPE AP MLD advertises EDP groups and their parameters (#1113) by sending an individually addressed EDP Group Paramaters (#1336, 1019, 1074) frame containing an EDP (#1057) element for each supported (#1075, 1171) EDP group (#1113) in the BSS. A CPE AP MLD shall advertise one or more (#1082) EDP groups (#1113) to each non-AP MLD that joins the BSS and may advertise EDP groups and their parameters (#1113) when (#1076) changes have affected one or more groups.

NOTE – When the AP sends an updated Enhanced EDP Group Parameters frame is implementation-dependent and outside the scope of this standard. (#1076).

A CPE non-AP MLD shall (#1337) be a member of only one group EDP epoch at a time.

A CPE non-AP MLD may request to join an EDP group (#1113) by sending an EDP Epoch Setting Request (#1338) frame, containing the group ID that the non-AP MLD wishes to join.

NOTE - Some CPE non-AP MLDs, for example in IoT devices, might choose a group with longer epochs, to limit parameter changes computation costs, while other CPE non-AP MLDs, for example in personal general devices, might choose a group with short epochs, to increase privacy protection. (#1513)

The AP MLD responds with an EDP Epoch Setting Response (#1338) frame, accepting or rejecting the request.

A CPE non-AP MLD may leave the EDP group (#1113) by sending an EDP Epoch Setting Request (#1338) frame.

If a CPE non-AP MLD is a member of an EDP group (#1113), the non-AP MLD and the AP MLD shall anonymize (#1339) the selected OTA fields of (#1339) individually addressed frames according to group epoch settings as defined in 10.71.3 (Establishing frame anonymization parameter sets), 10.71.4 (MAC Header anonymization and transmitting functions), 10.71.5 (MAC header anonymization and receiving functions) and 10.71.6 (Frame anonymization and AID).

*TGbi editor: Please modify clause 10.71.2.4 as follows (track changes on):*

**10.71.2.4 Group EDP epoch setup**

A CPE (#1079) non-AP MLD may include in its (Re)Association Request frame the Minimum (#1328, 1011, 1077) Epoch Pacing element. (#1026)

If a CPE AP MLD supports group EDP epoch and receives a (Re)Association Request frame with the Group EDP Epoch Supported field set and no Epoch Pacing element, or a (Re)Association Request frame with the Group EDP Epoch Supported field set and If the value of the Group Epoch Interval Duration field (#1328) in the Minimum Epoch Pacing element is equal or larger than the value of the Group Epoch Interval Duration field (#1328) for the default EDP Epoch group (group 0), then the CPE non-AP MLD shall be assigned to the default group EDP epoch, with a Group (#1012, 1081) ID of 0. If the value of the Group Epoch Interval Duration field is less than the value of the Group Epoch Interval Duration field for the default EDP Epoch group (group 0), then (#1063) the non-AP MLD is not assigned to (#1020) any group EDP epoch (#1063) at (re)association. (#1026)

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

After the affiliated STA of the non-AP MLD is (#1172) associated, the CPE AP MLD sends to the CPE non-AP MLD one or more EDP Group Parameter frames (#1345) 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)

A CPE non-AP MLD may subsequently send an EDP Epoch Request (#1332) to join a specific group EDP epoch or the CPE non-AP MLD can request the AP MLD to start a new group EDP epoch that matches specified EDP epoch settings by sending an EDP Epoch Setting Request (#1332) frame.

The AP MLD shall respond with an EDP Epoch Setting Response (#1332) frame, accepting or rejecting the request.

A CPE non-AP MLD may leave the group EDP epoch by sending an EDP Epoch Setting Request (#1332) frame. (#1026)