IEEE P802.11
Wireless LANs

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| 11bi D0.4 CR for 9.4.2.1 |
| Date: 2024-08-13 |
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Abstract

This submission proposes resolutions for the following CIDs:

1236, 1087, 1099, 1053, 1056, 1159, 1238, 1239, 1100, 1237, 1072, 1240, 1241, 1262, 1261, 1098, 1102, 1048, 1123, 1243, 1101, 1263, 1264, 1000, 1258, 1027.

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** |
| 1236 | Mark RISON | 9.4.2.337 | 40.09 | "The Enhanced Data Privacy (EDP) element signals epoch parameters in protected action frames. The EDP element signals the default privacy epoch parameters in the protected Association Response frame. The EDP element signals specific EDP epoch settings in non-AP MLD Specific Setting Epoch action frames." -- we should not say where it's used (that's in the frame descriptions) just what it's used for. Also "protected action frames" dubious | As it says in the comment | REVISEDRemoved the extraneous parts. |
| 1087 | Julien Sevin | 9.4.2.337 | 40.10 | "The Enhanced Data Privacy (EDP) element signals epoch parameters in protected action frames. The EDP element signals the default privacy epoch parameters in the protected Association Response frame. The EDP element signals specific EDP epoch settings in non-AP MLD Specific Setting Epoch action frames." What it the difference between "epoch parameters" and "EDP epoch settings" ? | Please clarify the difference between "epoch parameters" and "EDP epoch settings" | REVISEDThey were initially different (for groups and STA requests), then got merged, removed the difference (and consolidated, with comment 1236) |
| 1099 | stephane baron | 9.4.2.337 | 40.10 | use the term EDP epoch parameters in this chapter instead of epoch parameter, or EDP epoch settings | The Enhanced Data Privacy (EDP) element signals EDP epoch parameters in protected action frames. The EDP element signals the default privacy EDP epoch parameters in the protected Association Response frame. The EDP element signals specific EDP epoch parameters in non-AP MLD Specific Setting Epoch action frames. | REVISEDProposed EDP Epoch settings, as this is what the element carries  |
| 1053 | Antonio DeLaOlivaDelgado | 9.4.2.337 | 40.17 | Figure 9-1001df indicates the EDP Epoch Settings 0 or 12, but if no Settings element is sent, why to send the element? | EDP Epoch Settings length should be 12, not 0 or 12 | ACCEPTED |
| 1056 | Antonio DeLaOlivaDelgado | 9.4.2.337 | 40.19 | EDP Epoch Settings field length is 176 bits, not 12 bytes | Extend the EDP Epoch Settings to at least 13 bytes and remove all reserved bits of the field, or extend to 22 bytes | REVISEDThe first 11+11 bits were used for smallest AID and AID range, but this is postponed. The last Reserved values (48 bits) were for the epoch index (postponed). The intermediate 4 bits were reserved to get a full octet count. For now, we can remove the unused Reserved values (and reintegrate them if/when needed). |
| *1159* | Patrice Nezou | 9.4.2.337 | 40.31 | The field "EDP Epoch Setting" contains multiple reserved field. Please clarify | As in comment | REVISEDAs per #1056, deleted extraneous reserved fields |
| *1238* | Mark RISON | 9.4.2.337 | 40.38 | Figure 9-1001dg--EDP Epoch Settings field seems to say the field is 22 octets long, but Figure 9-1001df--Enhanced Data Privacy (EDP) element says it's 0 or 12 octets long | As it says in the comment | REVISEDAs per #1056, deleted extraneous fields |
| *1239* | Mark RISON | 9.4.2.337 | 40.38 | The EDP Epoch Settings field seems to consist mostly of reserved fields | Have no more than 7 bits that are reserved | ACCEPTEDPer #1056, down to 2 bits |
| 1100 | stephane baron | 9.4.2.337 | 40.41 | anonymization mode is not defined, please use defined terms instead. | replace the sentence: "The EDP Epoch Settings field defines the anonymization mode of the non-AP STAs" by "The EDP Epoch Settings field contains the EDP epoch parameters of a EDP epoch sequnce for the non-AP STAs" | REVISED(accepted, but also replaced non-AP STA with non-AP MLD. |
| 1237 | Mark RISON | 9.4.2.337 | 40.40 | "The EDP Epoch Settings field defines the anonymization mode of the non-AP STAs." -- OK, but where is it defined? And when can it be omitted? | As it says in the comment | REVISED“defines” was reworded (it contains the parameters, it does not define them), in #1100. |
| 1072 | Julien Sevin | 9.4.2.337 | 40.41 | What is the anonymization mode" of a non-AP STA ? | Please clarify the term "anonymization mode" | REVISEDAnonymization mode was replaced by a clearer text with #1100. |
| 1240 | Mark RISON | 9.4.2.337 | 40.52 | It is not clear why the Epoch Interval Duration field is subdivided | Just show its two constituents directly in Figure 9-1001dg--EDP Epoch Settings field | ACCEPTED |
| 1241 | Mark RISON | 9.4.2.337 | 40.55 | "The 3 MSBs signal the Epoch Interval Unit, as shown in Table 9-401af (Epoch Interval Units and epoch durations). The 11 LSBs signalthe Length of each epoch, in units specified on the Epoch Interval Units. " -- duplicates the figure. In fact, I'm not sure it's even consistent with the figure (isn't the field to the left in the LSBs?) | Do not duplicate material | REVISED  |
| 1262 | Mark RISON | 9.4.2.337 | 40.56 | I suspect zero is not a valid value for the Epoch Interval Length field, but this is not stated | Make 0 reserved | ACCEPTED |
| 1261 | Mark RISON | 9.4.2.337 | 40.57 | "the Length of each epoch" should be lowercase | As it says in the comment | ACCEPTEDFixed in #1241 |
| 1098 | stephane baron | 9.4.2.337 | 40.58 | For sake of clarity and consistency, use the terms defined in the introduction (EDP epoch reference interval, EDP epoch sequence). | The Epoch Interval Duration field contains the value of the EDP epoch reference interval the EDP epoch sequence. The 3 MSBs signal the Epoch Interval Unit, as shown in Table 9-401af (Epoch Interval Units and epoch durations). The 11 LSBs signal the Length of each epoch, in units specified on the Epoch Interval Units. | REVISEDReworded along the same philosophic lines with #1241. |
| 1102 | stephane baron | 9.4.2.337 | 40.60 | move the table above its title (Table 9-401af--Epoch Interval Units and epoch durations) | as in comment | ACCEPTEDAlready fixed in draft 0.5 |
| 1048 | Antonio DeLaOlivaDelgado | 9.4.2.337 | 40.61 | The caption of table 9-401af is not in the same position as the table | Move the caption to the top of the table | ACCEPTEDAlready fixed in draft 0.5 |
| 1123 | stephane baron | 9.4.2.336 | 40.63 | Chapter 9 is dedicated to frame format description. Epoch start time computation should be put in chapter 10 | Move Epoch boundaries computation to the Epoch boundaries chapters 10.71.2.5 | REVISEDMoved to 10.71.2.6 with #1116 and already integrated in d0.5 |
| 1243 | Mark RISON | 9.4.2.337 | 40.63 | " EDP Epoch" should be " EDP epoch". Also line 64. Also next page. In fact all over the place, including sometimes with "EDP" missing | As it says in the comment | REVISEDThis is now (in d.05) in 10.71.2.6 |
| 1101 | stephane baron | 9.4.2.337 | 0.00 | Please use defined terms | replace "iteration number n in the sequence" by "iteration number n in an EDP Epoch sequence" | ACCEPTEDThis is now (in d0.5) in 10.71.2.6 |
| 1263 | Mark RISON | 9.4.2.337 | 41.01 | The Min Epoch Duration column in Table 9-401af--Epoch Interval Units and epoch durations is duplicating the Epoch Interval Unit column | Delete that Min Epoch Duration column | ACCEPTED  |
| 1264 | Mark RISON | 9.4.2.337 | 41.01 | The Max Epoch Duration (approx.) column in Table 9-401af--Epoch Interval Units and epoch durations duplicates the first column and the fact that the field is 13 bits | Delete that Max Epoch Duration (approx.) column | REJECTEDThe goal of the column is to avoid that implementers should compute the max value by hand, it is also expressed in human readable units |
| 1000 | Thomas Handte | 9.4.2.337 | 41.08 | Table contains a TBD | Please add the correct value as a multiple of 1s | REVISEDThe column was deleted |
| 1258 | Mark RISON | 9.4.2.337 | 42.16 | "The Epoch Sequence Duration field indicates the number of EDP Epochs, in the sequence, left to run, after the current epoch finishes." is not consistent with "Table 9-401ag--Epoch Sequence Duration field values" | Delete Table 9-401ag--Epoch Sequence Duration field values. Change the text to "The Epoch Sequence Duration field indicates the number of EDP epochs in the sequence after the current epoch finishes, except that 0 means the duration is unlimited." | REVISEDAlso deleted table supporting text. |
| 1027 | Chaoming Luo | 9.4.2.337 | 42.17 | The name of the field "Epoch Sequence Duration" is vague and hard to infer its meaning. | Change the field name to "Sequence Number of Next Epoch".And change the text to: The Sequence Number of Next Epoch field indicates the sequence number of the succeeding EDP Epoch, in the sequence, after the current epoch finishes. | REVISED |

**Discussion:**

CID1236, 1087

Revised

The Enhanced Data Privacy (EDP) element signals ~~epoch parameters in protected Action(#Ed) frames The EDP element signals the default privacy epoch parameters in the protected Association Response frame. The EDP element signals specific~~ EDP epoch settings (#1236, 1087~~). in non-AP MLD Specific Setting Epoch action frames.~~

CID1053

Accepted

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EDP Epoch Settings |
| Octets: | 1 | 1 | 1 | ~~0 or~~ 12 (#1053) |

Figure 9-1001df – Enhanced Data Privacy (EDP) Element

CID1056, 1159, 1238, 1239 (in figure, 1056 only is mentioned for compacity)

Revised

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | EDP Epoch Settings |
| Octets: | 1 | 1 | 1 | ~~0 or~~ 1~~2~~3 (#1053) (#1056) |

Figure 9-1001df – Enhanced Data Privacy (EDP) Element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ~~Reserved~~ | ~~Reserved~~ | Epoch Interval Duration | Next Epoch Start Time | TimeRange | Reserved | EpochSequenceDuration | ~~Reserved~~ |
| Bits: | ~~11~~ (#1056) | ~~11~~ (#1056) | 14 | 64 | 16 | ~~4~~ 2 (#1056) | 8 | ~~48~~ (#1056) |

Figure 9-1001dg – EDP Epoch Settings field

CID 1100, 1237, 1072

Accepted

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

CID 1240

ACCEPTED

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ~~Reserved~~ | ~~Reserved~~ | Epoch Interval ~~Duration~~ Unit (#1240) | Epoch interval Length (#1240) | Next Epoch Start Time | TimeRange | Reserved | EpochSequenceDuration | ~~Reserved~~ |
| Bits: | ~~11 (#1056)~~ | ~~11 (#1056)~~ | ~~14~~ 3 (#1240) | 11 (#1240) | 64 | 16 | ~~4~~ 2 ~~(#1056)~~ | 8 | ~~48 (#1056)~~ |

Figure 9-1001dg – EDP Epoch Settings field

|  |  |  |
| --- | --- | --- |
|  | ~~Epoch~~~~Interval~~~~Unit~~ | ~~Epoch Interval~~~~Length~~ |
| ~~Bits:~~ | ~~3~~ | ~~11~~ |

**~~Epoch Interval Duration field~~ (#1240)**

CID 1241, 1261

Revised

The Epoch Interval Length ~~Duration~~ (#1241) field contains the length of the EDP epoch, expressed in ~~. The 3 MSBs signal the~~ Epoch Interval Units, ~~as~~ shown in Table 9-401af (Epoch Interval Units and epoch durations). ~~The 11 LSBs signal the Length of each epoch, in units specified on the Epoch Interval Units.~~ (#1241)

CID 1262

Revised

The Epoch Interval Length ~~Duration~~ (#1241) field contains the length of the EDP epoch, expressed in ~~. The 3 MSBs signal the~~ Epoch Interval Units, ~~as~~ shown in Table 9-401af (Epoch Interval Units and epoch durations). ~~The 11 LSBs signal the Length of each epoch, in units specified on the Epoch Interval Units.~~ (#1241). Epoch Interval Length value 0 is reserved. (#1262)

CID 1243

Revised

**10.71.2.6 EDP epoch**(#Ed) **start time**(#1116)

At any point of time, for the current EDP epoch (#1243) of iteration number n in the sequence, the start time GETn+1 of the next EDP epoch (#1243) of the sequence, is computed according to the formula:

GETn+1 = GTn+1 + ΔIT

ΔIT = PRF-128\64(PGTK, "ERCM", GTn+1) mod (RandTR)

With:

GTn+1 =GTn+ GEI

Or

n = ⌊(TSF - GT0) / GEI⌋

GTn+1 =GT0+ (n+1) x GEI

and where:

 n is the current iteration of the EDP epoch (#1243) sequence.

 GT is the reference start time of the EDP epoch(#1243).

 GEI is the value indicated in the Epoch Interval Duration of the EDP Epoch Settings

 field

 TSF is the current value of the internal TSF counter of the receiving link.

 PRF-Length is the pseudorandom function defined in 12.7.1.2

 GT0 is the value indicated in the Next Epoch Start Time field of EDP Epoch Settings

 field

 RandTR is the value indicated in the Time Range field of the EDP Epoch Settings field

PGTK (for Privacy GTK) is the cryptographic key assigned by an EDP AP MLD that is used to manage the group EDP epoch(#1243), distributed to the EDP non-AP MLDs associated with the EDP AP MLD.

The generation and the distribution of the PGTK is TBD.

If the effective start time GET of an EDP epoch (#1243) occurs during an ongoing TXOP, the EDP epoch (#1243) starts at the end of this TXOP.

CID 1101

Accepted

**10.71.2.6 EDP epoch**(#Ed) **start time**(#1116)

At any point of time, for the current EDP epoch (#1243) of iteration number n in an EDP epoch ~~the~~ (#1101) sequence, the start time GETn+1 of the next EDP epoch (#1243) of the sequence, is computed according to the formula:

GETn+1 = GTn+1 + ΔIT

ΔIT = PRF-128\64(PGTK, "ERCM", GTn+1) mod (RandTR)

With:

GTn+1 =GTn+ GEI

Or

n = ⌊(TSF - GT0) / GEI⌋

GTn+1 =GT0+ (n+1) x GEI

and where:

 n is the current iteration of the EDP epoch (#1243) sequence.

 GT is the reference start time of the EDP epoch(#1243).

 GEI is the value indicated in the Epoch Interval Duration of the EDP Epoch Settings

 field

 TSF is the current value of the internal TSF counter of the receiving link.

 PRF-Length is the pseudorandom function defined in 12.7.1.2

 GT0 is the value indicated in the Next Epoch Start Time field of EDP Epoch Settings

 field

 RandTR is the value indicated in the Time Range field of the EDP Epoch Settings field

PGTK (for Privacy GTK) is the cryptographic key assigned by an EDP AP MLD that is used to manage the group EDP epoch(#1243), distributed to the EDP non-AP MLDs associated with the EDP AP MLD.

The generation and the distribution of the PGTK is TBD.

If the effective start time GET of an EDP epoch (#1243) occurs during an ongoing TXOP, the EDP epoch (#1243) starts at the end of this TXOP.

CID 1263

Accepted

|  |  |  |  |
| --- | --- | --- | --- |
| **Epoch Interval Unit field value** | **Epoch Interval Unit** | **~~Min Epoch Duration~~** | **Max Epoch Duration (approx.)** |
| 0 | 1000 s | ~~16 min 40 s~~ | 23 d 16 h 36 min 40 s |
| 1 | 1 s | ~~TBD, but not shorter than 1s~~ | 34 min 7 s |
| 2 | Reserved | ~~N/A~~ | N/A |
| 3 | Reserved | ~~N/A~~ | N/A |
| 4 | Reserved | ~~N/A~~ | N/A |
| 5 | Reserved | ~~N/A~~ | N/A |
| 6 | Reserved | ~~N/A~~ | N/A |
| 7 | Reserved | ~~N/A~~ (#1263~~)~~ | N/A |

**Epoch Interval Units and epoch durations**

CID 1258

Revised

The Epoch Sequence Duration field indicates the number of EDP Epochs~~,~~ left in the sequence~~, left to run,~~ (#1258) after the current epoch finishes, except 0, which means that the sequence duration is unlimited. (#1258). The length of the Epoch Sequence Duration field is 1 octet. ~~The settings of the value in the Epoch Sequence Duration field are defined in Table 9-401ag (Epoch Sequence Duration field values).~~

|  |  |
| --- | --- |
| ~~Value~~ | ~~Meaning~~ |
| ~~0~~ | ~~Undetermined (unlimited) duration~~ |
| ~~1~~ | ~~The duration corresponds to one more iteration~~  |
| ~~N~~ | ~~The duration corresponds to N more iterations between [1..255]~~ |

~~Epoch Sequence Duration field values (#~~1258~~)~~

CID 1027

Revised

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Reserved | Reserved | Epoch Interval Duration | Next Epoch Start Time | TimeRange | Reserved | ~~Epoch~~SequenceEpochs Count ~~Duration~~ (#1027) | Reserved |
| Bits: | 11 | 11 | 14 | 64 | 16 | 4 | 8 | 48 |

Figure 9-1001dg - EDP Epoch Settings field

…./…

The Sequence Epochs Count ~~Epoch Sequence Duration~~ (#1027) field indicates the number of EDP Epochs~~,~~ left in the sequence~~, left to run,~~ (#1258) after the current epoch finishes, except 0, which means that the sequence duration is unlimited. (#1258). The length of the Epoch Sequence Duration field is 1 octet. ~~The settings of the value in the Epoch Sequence Duration field are defined in Table 9-401ag (Epoch Sequence Duration field values).~~

**Proposal:**

*TGbi editor: Modify clause 9.4.2.337 as follows (track change 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).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Epoch Interval Unit (#1240) | Epoch Interval Length (#1240) | Next Epoch Start Time | TimeRange | Reserved | Sequence EpochsCount (#1027) |
| Bits: | 3 (#1240) | 11 (#1240) | 64 | 16 | 2 (#1056) | 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). The 11 LSBs signal the Length of each epoch, in units specified on the Epoch Interval Units. 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.

|  |  |
| --- | --- |
|  |  |
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|  |  |
|  |  |

The Sequence Epochs Count (#1027) field indicates the number of EDP Epochs left in the sequence (#1258) after the current epoch finishes, except 0, which means that the sequence duration is unlimited (#1258). The length of the Epoch Sequence Duration field is 1 octet.

*TGbi editor: Move following section of 9.4.2.337 to new clause 10.71.2.6 (inserted after current clause 10.71.2.5, Epoch Boundaries, and before Clause OTA address collision avoidance (to be renumbered 10.71.2.7), -note the mode is already accomplished in draft 0.5 - and modify as follows (track change on):*

**10.71.2.6 EDP epoch**(#Ed) **start time**(#1116)

At any point of time, for the current EDP epoch (#1243) of iteration number n in an EDP epoch (#1101) sequence, the start time GETn+1 of the next EDP epoch (#1243) of the sequence, is computed according to the formula:

GETn+1 = GTn+1 + ΔIT

ΔIT = PRF-128\64(PGTK, "ERCM", GTn+1) mod (RandTR)

With:

GTn+1 =GTn+ GEI

Or

n = ⌊(TSF - GT0) / GEI⌋

GTn+1 =GT0+ (n+1) x GEI

and where:

 n is the current iteration of the EDP epoch (#1243) sequence.

 GT is the reference start time of the EDP epoch (#1243).

 GEI is the value indicated in the Epoch Interval Duration of the EDP Epoch Settings

 field

 TSF is the current value of the internal TSF counter of the receiving link.

 PRF-Length is the pseudorandom function defined in 12.7.1.2

 GT0 is the value indicated in the Next Epoch Start Time field of EDP Epoch Settings

 field

 RandTR is the value indicated in the Time Range field of the EDP Epoch Settings field

PGTK (for Privacy GTK) is the cryptographic key assigned by an EDP AP MLD that is used to manage the group EDP epoch (#1243), distributed to the EDP non-AP MLDs associated with the EDP AP MLD.

The generation and the distribution of the PGTK is TBD.

If the effective start time GET of an EDP epoch (#1243) occurs during an ongoing TXOP, the epoch (#1243) starts at the end of this TXOP.