IEEE P802.11
Wireless LANs

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| CR for EDP Epoch Start Time |
| Date: 2025-06-30 |
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Abstract

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This submission proposes resolutions and discussions for 20 CIDs number:

84, 85, 86, 89,108,109,120,150,197, 345,

437,554,854,870,954,996,1051,1053, 1054, 1058

Revisions:

* Rev 0: Initial version of the document.

1. Introduction

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 Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

The baseline for this text is 802.11 REVme D7.0, and 802.11 TGbi draft D1.2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Clause | Pg, Ln | Comment | Proposed Change | Resolution |
| 84 | Graham Smith | 10.71.2.4. | 80, 01 | "Store the First planned epoch start time, the epoch interval,.." Needs tidying iup also omits TSF from the field name. | Replace cited text with "Store the values of the First Planned Epoch TSF Start Time and Epoch Interval fields, | Revised - Agree in principle.Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 84 |
| 85 | Graham Smith | 10.71.2.4 | 80, 02 | "to the value of the received Epoch number offset for that link" Value of the field! | Replace cited text with "to the value of the received Epoch Number Offset field." | AcceptedModification already incorporated to the D1.2 |
| 86 | Graham Smith | 10.71.2.4 | 80, 04 | "Constructs the corresponding First planned epoch start time of its other links according to the formula:" Value of.. | Replace cited text with "Constructs the value of the corresponding First Planned Epoch TSF Start Time of its other links according to the formula: | Revised - Agree in principle.Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 86 |
| 89 | Graham Smith | 10.71.2.4 | 80, 21 | "with" should be "where" | At cited location replace "with" with "where" | AcceptedInstruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 89 |
| 108 | Chaoming Luo | 10.71.2.3 | 79, 28 | The "Epoch Interval Duration field" is not defined, assume it should be "Epoch Interval field" | Define it or use the correct field name. | AcceptedModification already incorporated to the D1.2 |
| 109 | Chaoming Luo | 10.71.2.4 | 80, 40 | The "Epoch Interval Duration field" is not defined, assume it should be "Epoch Interval field" | Define it or use the correct field name. | AcceptedModification already incorporated to the D1.2 |
| 120 | Chaoming Luo | 10.71.2.4 | 80, 64 | When to apply the FA parameters is described in P79, so it's better to move this sentence to P79. | Move this sentence to P79L40. | AcceptedInstruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 120 |
| 150 | Stephen McCann | 10.71.2.3 | 78, 10 | Outside of the definitions in clause 3.2, this is the only use of "EDP parameters". What are "the EDP parameters" referring to, as they have not been mentioned before? | Replace "the EDP parameters" with "the privacy parameters" and also at P21L43, P22L6 and P22L12. | Revised - Agree in principle.“EDP parameters” is replaced by “FA parameters”Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 150 |
| 197 | Jarkko Kneckt | 9.4.1.83 | 49, 05 | Capital letters and unclear sentence | Change to :"The Epoch Number Offset field indicates the offset between the AP MLD and the non-AP MLD epoch numbers." | AcceptedModification already incorporated to the D1.2 |
| 345 | Carol Ansley | 10.71.2.4 | 79, 52 | Clarify sentence, it's overly wordy :To avoid an easy determination of the epoch start time by an eavesdropper in a link, the start time of eachEDP epoch in a link is determined by introducing a pseudo random variation around a planned start timeoccurring at a regular interval. " | Change sentence to: To avoid an easy determination of the epoch start time on a specific link by an eavesdropper, a pseudo random variation is introduced to vary the regularly scheduled start time of eachEDP epoch. | Revised - Agree in principle. New sentence is proposed.Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 345 |
| 437 | Mark RISON | 9.4.1.83 | 48, 53 | "Epoch number offset field value" should be uppercase field name and not have value | Change to "Epoch Number Offset field" | AcceptedModification already incorporated to the D1.2 |
| 554 | Mark RISON | 10.71.2.3 | 79, 57 | " the AP may send in response to the requesting non-AP STA, an EDP element" -- it should be mandatory to respond, and also it should be clear in which frame the element is sent | As it says in the comment |  Revised - Agree in principle. It is proposed to replace “may” with “shall”.Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 554 |
| 854 | Patrice Nezou | 9.4.1.83 | 47, 50 | The "Time Range" field is always required for an EDP Epoch. I think the "present" bit is useless. | Please clarify or remove this bit | RejectTime Range field is not always present, this field is for instance absent from EDP request “join” frame.  |
| 870 | Patrice Nezou | 10.71.2.3 | 79, 26 | What is a "Group Enhanced Privacy" element ? It seems that it does not exist. | Please clarify | Revised - Agree in principle. Replace “Group Enhanced Privacy element” by “EDP element”.Modification already applied in the draft D1.2. No action required for the TGbi editor. |
| 954 | Robert Stacey | 10.71.2.4 | 79, 52 | Clumsy wording. The fact that the adjustment is pseudo random as opposed to random is not important in describing the principle. | Change "To avoid an easy determination of the epoch start time by an eavesdropper in a link, the start time of eachEDP epoch in a link is determined by introducing a pseudo random variation around a planned start timeoccurring at a regular interval." to"To prevent an eavesdropper from easily predicting the epoch start times, each epoch start time is adjusted by a random amount." | Revised - Agree in principle. New sentence is proposed.Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 954 |
| 996 | Philip Hawkes | 9.4.1.83 | 47, 09 | "Time Range" is ambiguous. This is more accurately a maximum delay. Time Range is also used in p47.46 (Figure 9-207l), p48.61, p80.26 and p80.54 | Replace "Time Range" with "Maximum Random Epoch Delay" throughout document. |  RejectedI think that the wording is clear and short. And name of the filed have been changed. |
| 1051 | Philip Hawkes | 10.71.2.3 | 79, 24 | This sentece is complex for an overview. Only the first phrase is needed. | Compress sentence to"The next epoch boundary is derived as described in 10.71.2.4 (EDP Epoch Start Time Computation)." | Revised - Agree in principle. The last sentence of the paragraph is removed for clarification.Instruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 1051 |
| 1053 | Philip Hawkes | 10.71.2.4 | 79, 57 | This sentence is not quite correct | Replace"At the start of the new group EDP epoch, the new anonymization parameters are ...",with"From the start of one EDP epoch until the start of the next EDP epoch for that EDP group, the frame anonymization parameters for that EDP epoch are ... |  AcceptedInstruct TGbi editor to make the changes shown in the latest version of 11-25/1113r0 under all headings that include CID 1053 |
| 1054 | Philip Hawkes | 10.71.2.4 | 79, 59 | "the AP may send in response to the requesting non-AP STA, an EDP element" is awkward to read | Replace identified text with "an EDP element in the corresponding response," |  Rejected The sentence seems sufficiently clear |
| 1058 | Philip Hawkes | 10.71.2.4 | 80, 26 | the function "int ()" is not defined. | Define the function "int ()" |  Rejected Function int() is defined in clause 1.5 (Terminology for mathematical, logical, and bit operations) |

**TGbi Editor: *Instruction: Modify 9.41.84 as follows***

* EDP Epoch Settings field

The EDP Epoch Settings field format is shown in Figure 9-207n (EDP Epoch Settings field format).(#23)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | EDP Epoch Settings Control | EDP(#1012) Group ID | Epoch Interval | First Epoch TSF Start Time | Epoch Number Offset | Time Range | Epochs Remaining | Minimum Epoch Pacing(#106)  |
| Bits: | 16 | 0 or 8 | 16 | 0 or 64 | 0 or 8 | 0 or 16 | 0 or 16 | 0 or 16 |
|  | Number Of Participating Affiliated STAs | AID Storage Size |
| Bits: | 0 or 8 or 16 or 24 | 0 or 16 |

* EDP Epoch Settings field format

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

The EDP Epoch Settings(#193) Control field format is shown in Figure 9-207o (EDP Epoch Settings Control field format).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | EDP(#1012) Group ID Present | First Epoch TSF Start TimePresent | Time RangePresent | Epochs RemainingPresent | Participating Affiliated STAs Count Present | Participating Affiliated STAs Percentage Present | Minimum Epoch Pacing Present(#106)  | AID Storage Size Present |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|  | Reserved |
| Bits: | 8 |

* EDP Epoch Settings Control field format

Each field in the EDP Epoch Settings Control field indicates the presence of the corresponding field in the EDP Epoch Settings field when set to 1 and its absence when set to 0.(#195)

The EDP(#1012) Group ID field contains(#425) an identifier of the EDP group. The value 0 indicates the default EDP(#1012) group. The value 255 is reserved.(#194)

The EDP Epoch Interval field format is shown in Figure 9-207p (Epoch Interval field format).(#25)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Epoch Interval Unit | Epoch Interval Length | Reserved |
| Bits: | 3 | 11 | 2 |

* Epoch Interval field format

The Epoch Interval Unit field indicates the units for the Epoch Interval Length field, and the Epoch Interval Length field contains the length of the EDP epoch as shown in Table 9-129s (Epoch Interval Units and epoch durations).(#430, #Ed)

Epoch Interval Length field(#433) value 0 is reserved.

|  |  |  |
| --- | --- | --- |
| 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 |
| 2-7 | Reserved | N/A |

* Epoch Interval Units and epoch durations

The First Epoch TSF Start Time field(#27) contains the first epoch TSF start time presented as the TSF timer value of the link in which this field was sent (see 10.71.2.4 (EDP Epoch Start Time Computation)).(#81, #Ed, #196)

The Epoch Number Offset field value the epoch number offset between the AP MLD(#1001) epoch number and the non-AP MLD(#1001) epoch number (see 10.71.2.4 (EDP Epoch Start Time Computation)).

The Time Range field contains the range of values, expressed in epoch interval units as defined in Table 9-129s (Epoch Interval Units and epoch durations), used by the AP MLD and each non-AP MLDs member of the EDP group to determine a random delay added to the EDP epoch planned start time (PlannedTSFStartTime) as defined in 10.71.2.4 (EDP Epoch Start Time Computation).(#439, #430, #1001)

The Epochs Remaining field value indicates the number of EDP epochs left in the sequence after the current epoch finishes, except the value of 255 indicates that the epoch sequence duration is unlimited.(#439, #442, #202, #32, #Ed)

The Minimum Epoch Pacing field indicates the minimum epoch duration the non-AP MLD can support.(#196) The format of the Minimum Epoch Pacing field(#106) is the same as the Epoch Interval field.

The Number of Participating Affiliated STAs field is optional. When present, the field signals an indication of the number of affiliated non-AP MLD(#1001) currently participating in(#447) 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 format

The Participating Affiliated STAs Count field represents an indication of the number of affiliated non-AP MLDs(#1001) participating in the signaled EDP(#1012) group on the link. The Participating Affiliated STAs Percentage field, with values in the range of 0 to 100, represents an indication of the percentage of the associated affiliated non-AP MLDs(#1001) participating to the signalled EDP(#1012) group on the link. Values 101-255 are reserved.

When transmitted by a CPE AP MLD(#1001), the AID Storage Size field indicates the minimum number of AID values required by a CPE non-AP MLD to be allowed to join in the EDP group.

When transmitted by a CPE non-AP MLD, the AID Storage Size field indicates the number of AID values that the non-AP MLD can store.

**TGbi Editor: *Instruction: Modify 10.71.2.3 as follows***

* EDP epoch transition(#552) operations

Each EDP epoch(#535) starts with a transition period.

During the transition period of an EDP epoch(#535), the FA[#150] parameters assigned to a non-AP MLD during the preceding EDP epoch(#536) 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.



* Example of EDP epoch(#535) timeline

Figure 10-166a (Example of EDP epoch(#535) timeline) shows an example EDP epoch sequence of consecutive EDP epochs with their associated EDP epoch start times tn and transition period tpn.

An overview of the group EDP epoch is shown in Figure 10-166b (Overview of group EDP epoch).



* Overview of group EDP epoch

The next epoch boundary is derived (as described in 10.71.2.4 (EDP Epoch Start Time Computation)) from the value of the first epoch TSF start time defined in the EDP Epoch Settings field of the EDP(#117) element of the (Re)Association Response frame or the EDP Response(#118) frame. [#1051]

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

From the start of one EDP epoch until the start of the next EDP epoch for that EDP group,, the new frame anonymization parameters are used to anonymize the selected OTA fields of all new individual frames transmitted during the epoch.[#1053]

 [#120]

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 dot11EDPEpochStartTimeMargin before the start of the new epoch. The CPE non-AP MLD and CPE AP MLD shall accept individually addressed frames with the old anonymization parameters for dot11EDPEpochTransitionTime after the start of the new epoch. The rules of 10.71.2.1 (General) apply for frame retransmissions and acknowledgments.

**TGbi Editor: *Instruction: Modify 10.71.2.4 as follows***

* EDP Epoch Start Time Computation

To prevent an eavesdropper from easily predicting the EDP Epoch start time, a pseudo random variation is applied around a planned EDP Epoch start time to determine the start time of each EDP Epoch on each link.[#345, 954]

Upon reception on a link of an EDP Epoch Request frame or a(#553) (Re)Association Request frame, the AP shall[#554] send in response to the requesting non-AP STA, an EDP element including the first epoch TSF start time(#81) based on the TSF of the link, the epoch interval, and the Epoch Number Offset field(#80) set to the next epoch number of the EDP epoch sequence of the EDP group assigned to the non-AP STA.

Upon reception of an EDP Epoch Response frame, or of a (Re)Association Response frame containing an EDP element on a link, the non-AP STA of a non-AP MLD shall:

* Store the value of the first epoch TSF start time[#84], the epoch interval, and set its epoch number for this epoch(#80) to the value of the received epoch number offset for that link.
* Construct(#330) the value of the corresponding first epoch TSF[#86] start time of its other links according to the formula:

First(#81) epoch TSF start time of another link= First epoch TSF start time of the receiving link + TSF Offset value between the other link and the receiving link

NOTE 1—the TSF Offset value is the value received in the latest Basic Multi-Link element exchange.

At any point of time, for a given link, for any EDP epoch number *n* (*n* > 0) in an EDP epoch sequence, the link TSF timer value corresponding to the start time of the EDP epoch number *n* is called EpochTSFStartTime(*n*) and is computed according to the formula:

EpochTSFStartTime(*n*) = PlannedTSFStartTime(*n*) for the link + ΔIT

where [#89]

PlannedTSFStartTime(*n*) = FirstPlannedEpochTSFStartTime + (*n* – EpochNumberOffset) × EpochInterval

ΔIT = int (KDF-*Hash*-*Length*(PGTK, "ERCM", *n*)) mod TimeRange

and where

 *n* is a 2 bytes value in little endian order of the current number of

 the EDP epoch in the EDP epoch sequence.

 PlannedTSFStartTime(*n*) is the TSF timer value of the link corresponding to the start

 time of the EDP epoch number n in the EDP epoch sequence.

 EpochNumberOffset is the value indicated in the Epoch Number Offset field of the

 EDP Epoch Settings field.(#80, #764)

 EpochInterval is the value in TU corresponding to the Epoch Interval

 field(#871) of the EDP Epoch Settings field .

 KDF-*Hash*-*Length* is the key derivation function as defined in

 12.7.1.6.2 (Key derivation function (KDF)) using the

 hash algorithm identified by the AKM suite selector

 (see 9-190 (AKM suite selectors)).

 *Length* is the number of bits to derive. 16 bits are derived for ΔIT.

 FirstPlannedEpochTSFStartTime is the value of the first epoch TSF start time,

 computed upon reception of an EDP element by the STA based

 on the First Epoch TSF Start Time value of the EDP element of

 the received EDP Epoch Settings field.(#764)

 TimeRange is the value in TU corresponding to the Time Range field of

 the EDP Epoch Settings field.(#549, #764)

 PGTK(#550) is the cryptographic key assigned by an EDP AP MLD that is

 used to manage the group EDP epoch, distributed to the EDP

 non-AP MLDs associated with the EDP AP MLD.(#764)

 [#120]