IEEE P802.11  
Wireless LANs

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| CR for EDP Epoch Start Time Part2 | | | | |
| Date: 2025-07-30 | | | | |
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Abstract

Abstract

This submission proposes resolutions and discussions for 69 CIDs number:

29, 30, 113, 329, 435, 74, 877, 75, 76, 77,

87, 88, 114, 119, 125, 177, 200, 201, 996, 235,

236, 237, 238, 239, 240, 241, 242, 243, 244, 245,

246, 247, 287, 445, 537, 539, 540, 541, 542, 545,

548, 803, 804, 805, 806, 808, 809, 810, 869, 872,

873, 884, 885, 886, 906, 286, 1000, 1052, 1055, 1056,

1057, 1059, 1060, 1062, 1063, 1071, 344, 887, 973

on 802.11bi D1.0:

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: CID 996 transferred from document 1113 (related to CID201), CIDs 78,79,82,83 moved to document 1112 (dealing with similar comments)
  + Modification after first presentation: CID 201, 246, 996 resolutions updated,
* Rev 2: only CID803, 884, 885, 886, 1071, need further discussion. CIDs
  + CID 201 resolution update during last presentation.
* Rev3: CID1071 : resolution updated : Collision offset only used for CPE parameters computation once the colliding epoch number is reached.
  + Addition of two CIDs : 887, and 963
* Rev4: editorial update during presentation

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

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| --- | --- | --- | --- | --- | --- |
| CID | Commenter | Page, line | Comment | Proposed Change | Resolution |
| 29 | Graham Smith | 48,51 | "(EDP epoch number = Epoch number Offset)". Not clear what this is trying to say. Is this the definitionn of the start of the first EDP epoch of the sequence? If so then should be" (i.e., EDP epoch number = Epoch number Offset)"? | At cited location insert "i.e.,to read "( i.e., EDP epoch number = Epoch number Offset)" | **Revised**  Sentence has been reworded in TGbi draft D1.2(see CID#196 resolution from Doc 11-25/0924r3)  Instruction to editor: No change needed, CID already addressed by CID#196 |
| 30 | Graham Smith | 48, 54 | "...field value contains the offset between..." No the field contains the value of the offset. Also capitals required | At cited location rewrite as "The Epoch Number Offset field contains the value of the offset between the.." | Revised - Agree in principle.  ***Instructions to the editor:***  **Please make the changes as shown under CID 30 in doc 11-25/1112r4** |
| 113 | Chaoming Luo | 48,51 | The text "EDP epoch number = Epoch number Offset" is confusing. | Change to: The First Epoch TSF Start Time filed contains the value of the TSF timer of the receiving link at the start time of the first EDP epoch of the sequence for the receiving STA. | **Revised**  Sentence has been reworded reworded in TGbi draft D1.2 (see CID#196 resolution from Doc 11-25/0924r3)  Instruction to editor: No change needed, CID already addressed by CID#196 |
| 329 | Carol Ansley | 48,51 | What does the parenthetical mean? (EDP epoch number = Epoch number Offset) | If the prenthetical is a requirement, then make it a sentence, if it is not a requirement, make it a note or delete it. | **Revised**  Sentence has been reworded reworded in TGbi draft D1.2 (see CID#196 resolution from Doc 11-25/0924r3)  Instruction to editor: No change needed, CID already addressed by CID#196 |
| 435 | Mark RISON | 48,51 | It is not clear what "(EDP epoch number = Epoch number Offset)" means and the capitalisation is wonky too | Delete the cited text | **Revised**  Sentence has been reworded reworded in TGbi draft D1.2 (see CID#196 resolution from Doc 11-25/0924r3)  Instruction to editor: No change needed, CID already addressed by CID#196 |
|  |  |  |  |  |  |
| 74 | Graham Smith | 78,12 | "...shall remain valid only for the following operations:" What about TXOPs and frame exchange sequences? Then do not need the ACK. | At cited location add following to the list. - completion of a frame exchange sequence - completion of a TXOP AND delete "- Frame acknowledgent" | **Accept** |
| 877 | Carol Ansley | 78,11 | The current text isn't specific about how some complex frame interchange sequences might be affected by a transition between epochs. | Add additional text explaining how an epoch transition is handled for more complex operations. | Revised  Agree in principle with the commenter:  A sub clause dedicated to the transition period operation already exists (10.71.2.3 (EDP epoch transition operations)). Transition rules have been updated to indicate “completion of a frame exchange sequence, and completion of a TXOP “  See also resolution of CID 74.  ***Instructions to the editor:***  **Please make the changes as shown under CID 74 in doc 11-25/1112r4** |
| 247 | Jarkko Kneckt | 83,18 | The retransmissions and TXOP rules to take new anonymization parameters into use should be explained in own paragraph. | Please add a new clause to clarify when the new anonymization parameters may be taken into use. For instance, a CPE AP may take the new parameters into use during a TXOP, but CPE non-AP STA should not do the same. | Revised  Agree in principle with the commenter:  A sub clause dedicated to the transition period operation already exists (10.71.2.3 (EDP epoch transition operations)). Transition rules have been updated to indicate “completion of a frame exchange sequence, and completion of a TXOP “  See also resolution of CID 74.  ***Instructions to the editor:***  **Please make the changes as shown under CID 74 in doc 11-25/1112r4** |
|  |  |  |  |  |  |
| 75 | Graham Smith | 78,50 | "An overview of the group EDP epoch.." I can't see the distuinction between an EDP epoch and a group EDP epoch. If EDP epoch is the timeslice what's the difference? For me, you could delte "group" form this cited area. | Either somewhere make clear what is the difference or else delete "group" at cited location and also at 79.22. | **Revised:**  Removed “group” at cited location  ***Instructions to the editor:***  **Please make the changes as shown under CID 75 in doc 11-25/1112r4** |
| 76 | Graham Smith | 79,24 | "The next epoch boundary is derived (as described in 10.71.2.4 (EDP Epoch Start Time Computation))..." Normally we use (see 110.71.2.4) Hence need to rewrite this sentence. But, on another point, if it is described in 10.71.2.4, why are you describing it here, that is duplication? Suggest can be an outline here and keep the details in 10.71.2.4. | Delete paragraph at cited location and insert : "The next epoch boundary is derived from the value of the first epoch TSF start time (see 10.71.2.4 (EDP Epoch Start Time Computation))." | **Revised:**  Agree in principle with the commenter. Use “see 10.71.2.4” and remove mention of the whole field hierarchy. However, the end of the paragraph about Epoch interval is kept.  ***Instructions to the editor:***  **Please make the changes as shown under CID 76 in doc 11-25/1112r4** |
| 77 | Graham Smith | 79,44 | "...parameters for a dot11EDPEpochStartTimeMargin..." Should be for a period or duration equal to dot11EDPEpochStartTimeMargin | At 79.44 after "parameters for a " period equal to" Also at 79.46 after "parameters for" insert "a period of" | **Revised:**  Agree in principle with the commenter. “for a duration equal to” added before the name of the variable. Anonymization parameters is replaced by FA parameters.  ***Instructions to the editor:***  **Please make the changes as shown under CID 77 in doc 11-25/1112r4** |
| 87 | Graham Smith | 80,08 | "First planned epoch TSF start time of another link = First epoch TSF start time of the receiving link + TSFOffset value between the other link and the receiving link" Field values and caps. | Reword cited text as follows:"Value of First Planned Epoch TSF Start Time field of another link = value of First Epoch TSF Start Time field of the receiving link + TSFOffset value between the other link and the receiving link" | **Revised**:  Agree in principle with the commenter. The correction has been applied to the new text related to “first epoch TSF start time” rather than “First Planned Epoch TSF Start Time field”  ***Instructions to the editor:***  **Please make the changes as shown under CID 87 in doc 11-25/1112r4** |
| 88 | Graham Smith | 80,13 | "At any point of time, for a given link," At any point in time is dangerous, not needed, delete it. | At cited location change "At any point of time, for a given link," to "For a given link," | **Accept**: |
| 114 | Chaoming Luo | 48,54 | It's better to change "Epoch number offset" to "Non-AP MLD Specific Epoch Number offset", since it is indeed applies to specific non-AP MLD. For different non-AP MLDs, the AP maintains different epoch numbers for the same epoch. | Change "Epoch number offset" to "Non-AP MLD Specific Epoch Number offset" | **Reject**:  At the time of transmission to a given non-AP MLD, this value is the same for all non AP MLD since this is the current value  This comment also applies to the First Epoch TSF Start Time, and Epochs remaining |
| 119 | Chaoming Luo | 80,14 | The definitions of EpochTSFStartTime(n) and PlannedTSFStartTime(n) are confusing. P80L14 says "the link TSF timer value corresponding to the start time of the EDP epoch number n is called EpochTSFStartTime(n)", while P80L34 says "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." These two definitions sounds like they are the same thing. Similar issue on "First Epoch TSF Start Time value" and "FirstPlannedEpochTSFStartTime". | Correct the definitions. | **Revised**  Agree in principle with the commenter.  Definition of the PlannedEpochTSF Start Time (n) has been upgraded to “is the TSF timer value of the link corresponding to the nominal start time of the EDP epoch number n in the EDP epoch sequence. This planned start time occurs at a regular time interval equal to the epoch interval.  See also resolution of the CID 810  ***Instructions to the editor:***  **Please make the changes as shown under CID 810 in doc 11-25/1112r4** |
| 125 | Chaoming Luo | 82,16 | EDP FA block is data specific to a non-AP MLD, so the variable n should be the corresponding Non-AP MLD specific epoch number, instead of the current number of the EDP epoch in the EDP epoch sequence. | Change to: n is the corresponding Non-AP MLD specific epoch number of the EDP epoch in the EDP epoch sequence. | **Reject:**  “n” is the number of the Epoch in the sequence and has same value for all non-AP station belonging to an EDP group. Using a value specific to the non AP MLD would mandate the AP MLD to remember the offset for each non AP MLD. |
| 177 | Po-Kai Huang | 47,11 | Not clear when Epoch Number Offset field is present. Clarify that it is present when First Epoch TSF Start Time Present so we reuse the same present bit. | As in comment | **Revised:**  Agree in principle with the commenter. A line indicating that “The Epoch Number Offset field is present only if the First Epoch TSF Start Time field is present” has been added.  ***Instructions to the editor:***  **Please make the changes as shown under CID 177 in doc 11-25/1112r4** |
| 200 | Jarkko Kneckt | 49,05 | There is no Minimum Epoch Pacing field in the Figure 9-207k--EDP Epoch Settings field format. Please correct. | Please modify the Time Range field transmitted by a non-AP STA to include the Minimum Epoch Pacing information. | **Revised:**  Already solved by Cid#106: Field name corrected  ***Instructions to the editor:***  No need to change |
| 996 | Philip Hawkes | 47, 09 | "TimeRange" 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. | **Revised**  Agree in principle with the commenter. Field name has been renamed “Epoch Start Time Variation Range”.  ***Instructions to the editor:***  **Please make the changes as shown under CID 996 in doc 11-25/1112r4** |
| 201 | Jarkko Kneckt | 49,12 | A time range is poor name for the field that defines maximum random time duration of the epoch start time durations. The random time range should be much shorter than the epoch interval. If epoch has 1 second long epoch interval, the current random start time allows the minimum randomness to be +/-1 second. This randomness may cause very short or very long epoch durations and uncontrollable behaviour. | Please rename the field. Please signal the maximum start time randomness as percentage of the Epoch Interval duration and limit the maximum randomness to be 20% of the epoch interval duration to ensure reliable and deterministic operation. | **Revised**  Agree in principle with the commenter. Field name has been renamed “Epoch Start Time Variation Range” (See CID996 resolution). A sentence indicated a limit of 20% of the Epoch Interval Length has been added.  ***Instructions to the editor:***  **Please make the changes as shown under CID 201 in doc 11-25/1112r4** |
| 235 | Jarkko Kneckt | 80,27 | The figures 10-166a and Figure 10-166b are very different, but they should define the same operation. This mismatch causes complications and confuses the descripton of the epochs operation. | Please delete figure 10-166a and explain group EDP epoch operation by using figure 10-166b only. | **Reject:**  Fig166a show a generic sequence of several consecutive EDP Epochs while figure 166b provide an example of the EDP epoch 1 with more details. |
| 236 | Jarkko Kneckt | 80,15 | The receiver should be capable to receive any frame transmitted during the transition period. A transmitter may not get a TXOP in time and may send a non-re-transmitted frame during a transition period. | Delete word:" retransmitted" on line 15, p.80. | Revised:  Agree in principle with the commenter. This CID is resolved by the CID 74 resolution  ***Instructions to the editor:***  **Please make the changes as shown under CID 74 in doc 11-25/1112r4** |
| 237 | Jarkko Kneckt | 80,16 | The RTS/CTS and ICF/ICR frames transmission should have the same STA address as the frames transmitted during the transition period. Control frames transmissions are important and should not be limited during transition period. | Please allow control frames transmissions during the transition period. Change The line 15, P 80 to read: Control frames, including acknowledgements. | Revised:  Agree in principle with the commenter. This CID is resolved by the CID 74 resolution  ***Instructions to the editor:***  **Please make the changes as shown under CID 74 in doc 11-25/1112r4** |
|  |  |  |  |  |  |
| 238 | Jarkko Kneckt | 81,08 | The OTA AID shall be changed per EDP epoch. | Please change the AID to change per EDP epoch. | **Revised**  Figure update to indicate respectively OTA\_AID 0, OTA\_AID1 and OTA\_AID2  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 344 | Carol Ansley | 79,8 | Figure 10-166b - AID labels should increment the same as the MAC header | Increment the AID labels to show that they change with the Epoch boundaries | **Revised**  Figure update to indicate respectively OTA\_AID 0, OTA\_AID1 and OTA\_AID2  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 537 | Mark RISON | 79,18 | "Receive with AID" is not clear | Change to "Receive with OTA\_AID 0" | **Revised**  Agree with the commenter. Figure updated to indicate respectively OTA\_AID 0, OTA\_AID1 and OTA\_AID2. Same resolution as CID 238  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 869 | Patrice Nezou | 79,01 | The figure 10-166b seems erroneous with the OTA\_AID number. | Please clarify | **Revised**  Agree with the commenter. Figure update to indicate respectively OTA\_AID 0, OTA\_AID1 and OTA\_AID2  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 542 | Mark RISON | 79,43 | dot11EDPEpochStartTimeMargin is not shown in the figure above | Add to figure, like dot11EDPEpochTransitionTime | Revised  Agree with the commenter. Transition period has been added to the figure with the indication of its end time = boundary + dot11EDPEpochTransitionTime. Margin period definition also added in the text.  ***Instructions to the editor:***  **Please make the changes as shown under CID 542 in doc 11-25/1112r4** |
|  |  |  |  |  |  |
| 239 | Jarkko Kneckt | 81,01 | Please add CPE Epoch Number and Common Epoch Number to the figure | Please add CPE Epoch Number and Common Epoch Number to the figure. The CPE Epoch number and common epoch number values are increased by 1 for each epoch. | **Revised**  Figure update to indicate Epoch numbers. Please note that this figure is valid for both CPE and BPE  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 240 | Jarkko Kneckt | 81,01 | Please add Epoch Interval to the figure. | Show that Epoch boundary repeats between epoch interval + possible random offset time. | **Revised**  Figure update to indicate Epoch interval + random offset  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 241 | Jarkko Kneckt | 81,09 | The OTA\_Individual MAC Address is not precise in the figure. The FA\_Offset values should be mentioned and shown in more details. | Please change OTA\_Individual MAC Header\_0 to epoch specific FA parameters. | **Revised**  Figure update to indicate “epoch specific FA parameters”  ***Instructions to the editor:***  **Please make the changes as shown under CID 238 in doc 11-25/1112r4** |
| 804 | John Wullert | 79,08 | Figure 10-166b illustrates the start and end of the pre-transition period (to account for clock drift), but it does not show that the receptions during this period could be with either the old or the new parameters. (The behavior is correctly described during the transition period) | Revise the figure to indicate that STAs should be able to receive with both old and new AID/MAC during the time just before the epoch boundaries. | Revised  Agree with the commenter. Figure has been updated to indicate reception with both old and new AID/MAC while only old AID/MAC is allowed for transmission  ***Instructions to the editor:***  **Please make the changes as shown under CID 804 in doc 11-25/1112r4** |
|  |  |  |  |  |  |
| 242 | Jarkko Kneckt | 81,28 | Unclear and incorrect sentence. | Please delete the sentence:"The Epoch Interval Duration field of the same fields and frames defines the interval of the following Group EDP epochs sequence." Please reference to clause 10.71.2.4(Epoch Start Time computation) to defining the epoch start times/end times. | **Revised**  Agree in principle with the commenter, sentence removed.  See also resolution of CID 76 for the addition of the reference to clause 10.71.2.4.  ***Instructions to the editor:***  **Please make the changes as shown under CID 242 in doc 11-25/1112r4** |
| 243 | Jarkko Kneckt | 81,52 | The Epoch start time is on MLD level. The spec text specifies the start time to be link specific. | Write the epoch start time to be the same for all anonymized links in MLD, not just per link. | **Revised**  Agree in principle with the commenter, mention “in a link” are removed and a sentence has been added to indicate that “The start time of an epoch is occurring at the same time on each link of an MLD”.  ***Instructions to the editor:***  **Please make the changes as shown under CID 243 in doc 11-25/1112r4** |
| 244 | Jarkko Kneckt | 82,52 | The first epoch start time value is not clear. Please clarify, does this field value include the Epoch start time offset? | Please correct the spec. The first epoch start time shall include the offset delta IT. | Revised  Agree in principle with the commenter. The definition of the field has been clarified by the resolution of previous CID243 and the additional indication of the fact that the “First epoch TSF start time contains the first planned epoch TSF start time presented as the TSF timer value of the link in which this field was sent”  ***Instructions to the editor:***  **Please make the changes as shown under CID 244 in doc 11-25/1112r4** |
| 245 | Jarkko Kneckt | 82,52 | The delta IT should be part of the EDP\_BPE\_FA\_block, so that a single hash calculation creates all AP MLD specific common parameters. A single calculation for all parameters is simple and efficient. | Please add Delta IT calculation to the EDP\_BPE\_FA\_block. | Reject:  BPE feature includes CPE features and especially the EDP start time computation. Including the delta IT in the BPE FA block would require a separation of the EDP computation start time for CPE and BPE and then handle 2 different computations for the same thing. In addition, including the start time computation in the BPE FA block mandate the computation of all the FA parameters to determine the EDP epoch start time and then store them until their effective usage, just to allow the trigger of an epoch timer. |
| 246 | Jarkko Kneckt | 82,25 | The delta IT should be marked as epoch(n) specific. | Add (n) after Delta IT.--> Delta IT(n) | **Revised**  Agree with the commenter, but the page number is incorrect: page 80 line 25. Addition on (n) after Delta IT  ***Instructions to the editor:***  **Please make the changes as shown under CID 246 in doc 11-25/1112r4** |
| 287 | Liwen Chu | 80,07 | the text "...... = ......" should be a "shall" behavior. | As in comment | **Revised**  Agree with the commenter, sentence updated to be a shall statement.  ***Instructions to the editor:***  **Please make the changes as shown under CID 287 in doc 11-25/1112r4** |
| 445 | Mark RISON | 47,10 | Epoch Number Offset field is shown as optional but has no Present field | Add a Presence field at line 46 | Revised  Agree in principle with the commenter. A line indicating that “The Epoch Number Offset field is present only if the First Epoch TSF Start Time field is present” has been added. Same resolution as CID 177  ***Instructions to the editor:***  **Please make the changes as shown under CID 177 in doc 11-25/1112r4** |
| 539 | Mark RISON | 79,28 | "The Epoch Interval Duration field of the same fields and frames" -- I have absolutely no idea what this means | As it says in the comment | Revised  The sentence has been removed as resolution of CID242  ***Instructions to the editor:***  **Please make the changes as shown under CID 242 in doc 11-25/1112r4** |
| 540 | Mark RISON | 79,28 | "following Group EDP epochs sequence" should be lowercase "group" but still makes no sense | Lowercase "Group" and delete "sequence" | Revised  The sentence has been removed as resolution of CID242  ***Instructions to the editor:***  **Please make the changes as shown under CID 242 in doc 11-25/1112r4** |
| 541 | Mark RISON | 79,34 | "may calculate the new OTA values" is too wishy-washy | Change to "shall calculate the new OTA values" | Revised  The sentence has been removed as resolution of CID1072  ***Instructions to the editor:***  **Please make the changes as shown under CID 1072 in doc 11-25/1112r4** |
| 545 | Mark RISON | 80,23 | "is a 2 bytes value in little endian order" -- we say octets not bytes but anyway this makes no sense since n is a number not a field | Delete "a 2 bytes value in little endian order of " | **Accept** |
| 548 | Mark RISON | 80,50 | "he value of the First planned epoch TSF start time, computed " computed how, and also case horror | As it says in the comment | Revised  Agree with the commenter. Computation is clarified (initialized with the value of the First Epoch TSF Start Time field), and case corrected.  ***Instructions to the editor:***  **Please make the changes as shown under CID 548 in doc 11-25/1112r4** |
| 803 | John Wullert | 78,19 | The text here indicates that there are multiple conditions that could end the transition period, but the requirement in 10.71.2.3 on page 79, line 4 indicates only a single condition - the expiration of the timer. | Revise the text to indicate that the transition period runs for a specific amount of time. The text above already indicates that the transmitter shall only use the old EDP parameters during the transmission period for the specified operations. (Note: this will also make text consistent with Figure 10-166a, which shows the transition period as a fixed time.) | Revised:  Agree in principle with the commenter. Second part of the sentence related to other conditions has been revised to indicate that the transition period cannot last beyond the next epoch margin, and setting of the transition period duration is clarified (value provided by the AP during the EDP setup)  ***Instructions to the editor:***  **Please make the changes as shown under CID 803 in doc 11-25/1112r4** |
| 805 | John Wullert | 79,34 | The text describing the calculation of OTA values is confusing. It says the AP-MLD and non-AP MLD "may" calculate them. Do they have any other choice? | Expand text to indicate the alternative to calculating them or to describe how they calculate them. Otherwise, remove the text. | Revised  Agree with the commenter, the sentence is removed.  ***Instructions to the editor:***  **Please make the changes as shown under CID 805 in doc 11-25/1112r4** |
| 806 | John Wullert | 79,38 | This text describing the use of the new parameters should be stated as a requirement on transmitting devices. | Revise text to say that "At the start of the new group EDP epoch, CPE AP MLDs and CPE non-AP MLD shall begin using the new anonymization parameters to anonymize select OTA field when transmitting new individual frames. CPE AP MLDs and CPE non-AP MLD shall continue using these anonymization parameters for the duration of the epoch." | Revised  Agree in principle with the commenter, sentence reworded according to the proposal except typos and grammar fixes.  ***Instructions to the editor:***  **Please make the changes as shown under CID 806 in doc 11-25/1112r4** |
| 808 | John Wullert | 80,07 | Formulas where the variables are written out in long strings of words are hard to follow and references like "another link" are not clear. Also, subsequent text defines variables and writes equations in a clearer fashion | Revise the text to clearly define a set of variables and use those variables to write the equation in a manner consistent with susequent equations, such as:  FirstPlannedEpochTSFStartTimei = FirstPlannedEpochTSFStartTimeR + TSFOffsetR-I  where FirstPlannedEpochTSFStartTimei is the first planned epoch TSF start time for link i. FirstPlannedEpochTSFStartTimeR is the first planned epoch TSF start time for the link on which the EDP Epoch Response frame or (Re)Association Response frame was received. TSFOffsetR-i is the TSF offset between the receiving link and link I.  Note: "R" and "i" are used as subscripts in variable names. | **Reject**:  Previous revision of the document used a set of variables and received comments on the non-clarity of the variable names. Group decide to go with a more “explicit” wording for the calculation |
| 809 | John Wullert | 80,10 | The TSF offsets reported in the multi-link element are between the reporting AP and the reported AP. Is the assumption here that the link on which the EDP Epoch Response frame is received corresponds to the reporting link? If not, the relative offsets between two arbitrary links will need to be calculated from their offsets with respect to the reporting link. | Add note to state assumption or add text to describe calculation of relative TSF offsets | Revised  Agree in principle with the commenter. The note has been clarified to indicate that the TSF offsets used to compute the TSF offset value between the other link and the receiving link is based on a computation using TSF Offset fields values of the latest Basic Multi-Link element exchange indicating TSF offsets between the reporting AP and reported APs received on any enabled link  ***Instructions to the editor:***  **Please make the changes as shown under CID 809 in doc 11-25/1112r4** |
| 810 | John Wullert | 80,33 | The definition of PlannedTSFStartTime(n) indicates that this corresponds to the start time, but the earlier calculation shows that the start time is a randomized offset from this value. | Revise to say "is the TSF timer value of the link corresponding to the nominal start time of the EDP epoch number n in the EDP epoch sequence | Revised  Agree in principle with the commenter. Sentence have been revised according to the proposal and an additional sentence is added indicating that this nominal start time occurs at a regular time interval equal to the epoch interval.  ***Instructions to the editor:***  **Please make the changes as shown under CID 810 in doc 11-25/1112r4** |
| 872 | Patrice Nezou | 79,28 | Could you clarify the sentence "The Epoch Interval Duration field of the same fields and frames defines the interval of the following Group EDP epochs sequence." ? | Please clarify | **Revised**  Agree in principle with the commenter, sentence removed.  ***Instructions to the editor:***  **Please make the changes as shown under CID 872 in doc 11-25/1112r4** |
| 873 | Patrice Nezou | 79,34 | Could you clarify the sentence "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). " ? | Please clarify | Revised  Agree with the commenter, the sentence is removed.  ***Instructions to the editor:***  **Please make the changes as shown under CID 873 in doc 11-25/1112r4** |
|  |  |  |  |  |  |
| 884 | stephane baron | 80,26 | Using "n" counter as a seed for the pseudo random generation is too weak and breaks privacy (generating same predictable sequence of epoch start time) | Guaranty the use of a changing seed sequence for each new Epoch sequence. Commenter will bring a contribution to solve this issue | Revised  Agree in principle with the commenter. “n” has been replaced with a value guarantying a new sequence of generated parameters for each EDP epoch across the sequences.  “n” has been replaced by Sequence Seed + (n x epoch interval). Where the sequence seed is set upon EDP epoch sequence creation.  ***Instructions to the editor:***  **Please make the changes as shown under CID 884 in doc 11-25/1112r4** |
| 885 | stephane baron | 82,04 | Using "n" counter as a seed for the pseudo random generation is too weak and breaks privacy (generating same predictable sequence of MAC addresses and other parameters) | Guaranty the use of a changing seed sequence for each new Epoch sequence. Commenter will bring a contribution to solve this issue | Revised  Agree in principle with the commenter. “n” has been replaced with a value guarantying a new sequence of generated parameters for each EDP epoch across the sequences.  See also resolution of CID 884  ***Instructions to the editor:***  **Please make the changes as shown under CID 885 in doc 11-25/1112r4** |
| 886 | stephane baron | 84,62 | Using "n" counter as a seed for the pseudo random generation is too weak and breaks privacy (generating same predictable sequence of MAC addresses and other parameters) | Guaranty the use of a changing seed sequence for each new Epoch sequence. Commenter will bring a contribution to solve this issue | Revised  Agree in principle with the commenter. “n” has been replaced with a value guarantying a new sequence of generated parameters for each EDP epoch across the sequences.  See also resolution of CID 884  ***Instructions to the editor:***  **Please make the changes as shown under CID 886 in doc 11-25/1112r4** |
| 906 | Jing Guo | 79,60 | the text of "set to the next epoch number" is not in line with the definition of the field. | change one of them to make them consistant | Revised  Agree in principle with the commenter. Sentence has been clarified to indicate that the Epoch Number Offset is the value of the epoch number “n” for the Epoch starting at the First Epoch TSF Start time.  ***Instructions to the editor:***  **Please make the changes as shown under CID 906 in doc 11-25/1112r4** |
| 286 | Liwen Chu | 79, 60 | the text of "set to the next epoch number" is not in line with the definition of the field. | change one of them to make them consistant | Revised –  Agree in principle with the commenter. Sentence has been clarified to indicate that the Epoch Number Offset is the value of the epoch number “n” for the Epoch starting at the First Epoch TSF Start time. Resolution identical to CID906.  ***Instructions to the editor:***  **Please make the changes as shown under CID 906 in doc 11-25/1112r4** |
| 1000 | Philip Hawkes | 48,54 | This description does not align with use of the term "epoch number offset" in 10.71.2.4. For example, the terms "AP epoch number" and "non-AP STA epoch number" occur only here. | Update description to align with 10.71.2.4 | Revised  Agree in principle with the commenter. Sentence has been clarified to indicate that the Epoch Number Offset is the value of the epoch number “n” for the Epoch starting at the First Epoch TSF Start time.  ***Instructions to the editor:***  **Please make the changes as shown under CID 1000 in doc 11-25/1112r4** |
| 1052 | Philip Hawkes | 79,34 | This sentence idoes not provide much value. If this sentence was not here, the non-AP MLD and AP MLD may do this anyway. | Either delete the sentence or provide an explanation for why the non-AP MLD and AP MLD would do this. | Revised  Agree with the commenter, the sentence is removed.  ***Instructions to the editor:***  **Please make the changes as shown under CID 1052 in doc 11-25/1112r4** |
| 1055 | Philip Hawkes | 80,8 | This formula is not indented, so it is unclear that the formula is associated with the preceding bullet. | Indent this line so it is clear that it is a formula associated with the preceding bullet. | Accept |
| 1056 | Philip Hawkes | 80,18 | The PlannedTSFStartTime(n) name has nothing to indicate that it has anything to do with EDP or EDP epochs. | Here, and elsewhere in this clause, replace "PlannedTSFStartTime(n)" with "PlannedEpochTSFStartTime(n)" or "PlannedEDPEpochTSFStartTime(n)" | Revised  Agree in principle, name changed at different places to “PlannedEpochTSFStartTime”  ***Instructions to the editor:***  **Please make the changes as shown under CID 1056 in doc 11-25/1112r4** |
| 1057 | Philip Hawkes | 80,23 | It is unclear what to do if the computed value exceeds the maximum TSF | Clarify what to do if the computed value exceeds the maximum TSF | Revised  Agree in principle with the commenter. Baseline indicate that the TSF couter in maintained modulus mod 264 , so “ mod 264” has been added to the formula.  ***Instructions to the editor:***  **Please make the changes as shown under CID 1057 in doc 11-25/1112r4** |
| 1059 | Philip Hawkes | 80,26 | There is a strange interplay between the maximum number of bits in the KDF output (16 bits) and the reduction modulo TimeRange. If Epoch Interval Units is 1000s, then the 16 bits of KDF is always smaller than the minimum TimeRange value (which is approx 2\*20 TU) so Time Range field has no impact. If Epoch Interval Units is 1s, then for Time Range field >= 2\*6, the 16 bits of KDF is always smaller than TimeRange. Noe also comment on p47 line 9 recommending replacing "Time Range" with "Maximum Random Epoch Delay" | Update this function so that the value of Time Range field always impacts $\Delta IT$ | Revised  Agree in principle with the commenter. Time Range field now called Epoch Start Time Variation Range filed is now an 8-bit value. See also CID 201 resolution (range limited to 20% of the Epoch interval). So, the TimeRangeTU variable is never larger than the 16 bits KDF output.  ***Instructions to the editor:***  **Please make the changes as shown under CID 201 in doc 11-25/1112r4** |
| 1060 | Philip Hawkes | 80,31 | Is 16-bit n sufficiently large to prevent roll-over? | Increase size of n if necessary | **Reject**  16 bit guarantees to avoid roll over after 18 hours with minimum epoch interval of 1s |
| 1062 | Philip Hawkes | 80,54 | TimeRange can be confused with the value of the Time Range field, but they are different because the formar is in TU, whilst the second is in Epoch Interval Units | Replace "TimeRange" with "TimeRangeTU" | **Accept** |
| 1063 | Philip Hawkes | 80,54 | "corresponding to the Time Range field" is ambiguous | Clarify that this is the value of the Time Range field multiped by the number of TU in an Epoch Interval Unit. | **Revised**  Agree in principle with the commenter. “Multiped by the number of TU in an Epoch Interval Unit.” Is now added to the definition of the TimeRangeTU.  ***Instructions to the editor:***  **Please make the changes as shown under CID 1063 in doc 11-25/1112r4** |
| 1071 | Philip Hawkes | 82,16 | It is unclear if "n" is the value of the current epoch, or the number after adding the non-AP MLD Specific Epoch Number Offset as described in 10.71.2.5 | Clarify | **Revised**  Renamed the variable to ‘p’, to avoid confusion with ‘n’ for the epoch count in the previous formula. Also renamed the collision offset to avoid confusion with the Epoch Number Offset. ‘p’ is now used during CPE computation to avoid MAC address collision.  ***Instructions to the editor:***  **Please make the changes as shown under CID 1071 in doc 11-25/1112r4** |
| 887 | stephane baron | 87,52 | Changing the BPE parameters of the beacon frames without altering the beacon TBTT is useless since it is easy for an eavesdropper to correlate beacons using old and new BPE parameters sent at a predictable time | Provide a mechanism to obfuscate TBTTaround epoch start time. Commenter will bring a contribution. | **Reject**  The comment fails to identify changes in sufficient detail so that the specific wording of the changes that will satisfy the commenter can be determined. |
| 973 | Manish Kumar | 87,52 | Modifying the BPE parameters of the beacon frames without changing the beacon TBTT is useless since it is easy for an eavesdropper to correlate beacons using old and new BPE parameters sent at a predictable time | Provide a mechanism to obfuscate TBTT around epoch start time. Commenter will bring a contribution. | **Reject**  The comment fails to identify changes in sufficient detail so that the specific wording of the changes that will satisfy the commenter can be determined. |

***TGbi editor: Modify clause 9.4.1.84 as follow***

* 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 | Transition Period (#803) | First Epoch TSF Start Time | Group Epoch Seed (#884) | Epoch Number Offset | Epoch Start Time Variation(#996) Range | Epochs Remaining | Minimum Epoch Pacing(#106) |
| Bits: | 16 | 0 or 8 | 16 | 0 or 16 (#803) | 0 or 64 | 0 or 16 (#884) | 0 or 16 (#201) | 0 or 8 (#996) | 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).

|  |  |  |
| --- | --- | --- |
|  | Epoch Transition Period (#803) | Reserved (#803) |
| Bits: | 11 | 5 |

Figure 9-xxx Epoch Transition Period field format (#803)

The Epoch Transition Period field contains the duration of the transition period expressed in epoch interval units as defined in Table 9-129s (Epoch Interval Units and epoch durations)(#803).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | EDP(#1012) Group ID Present | First Epoch TSF Start Time  Present | Transition Period present (#803) | Epoch Start Time Variation (#996) Range  Present | Epochs Remaining  Present | Participating Affiliated STAs Count Present | Participating Affiliated STAs Percentage Present | Minimum Epoch Pacing Present(#106) | AID Storage Size Present |
| Bits: | 1 | 1 | 1(#803) | 1 | 1 | 1 | 1 | 1 | 1 |

(#24)

|  |  |
| --- | --- |
|  | Reserved |
| Bits: | 7(#803) |

* 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 Group Epoch Seed field contains a seed selected by the AP for pseudo random computation (see 10.71.2.4 (EDP Epoch Start Time Computation)) (#884).

The Group Epoch Seed field is present only if the First Epoch TSF Start Time field is present (#884).

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 planned (#244) 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(#80) field (#30)contains the epoch number n of the epoch with a planned epoch start time equal to the First Epoch TSF Start Time field value on the receiving link(#1000)(see 10.71.2.4 (EDP Epoch Start Time Computation)).

The Epoch Number Offset field is present only if the First Epoch TSF Start Time field is present (#177).

The Epoch Start Time Variation (#210)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 (PlannedEpochTSFStartTime(#1056)) 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: Modify clause 10.71.2.2 as follow***

* EDP group operations

[…]

Within the EDP element sent in (Re)Association Request frames, the CPE non-AP MLD shall include a Minimum Epoch Pacing Parameters field, indicating the minimum epoch interval length supported by the CPE non-AP MLD. If the value resulting of the multiplication of the Epoch Interval Length field by the Epoch Interval Unit field included in the Minimum Epoch Pacing field is greater than the value resulting of the multiplication of the Epoch Interval Length field by the Epoch Interval Unit field for the default EDP group (group 0) or of any other EDP group already created, then the CPE non-AP MLD is not assigned to any EDP group at (re)association.(#1012)

NOTE 1—The CPE non-AP MLD might remain associated without FA and might request the creation of a new EDP group (through the EDP Epoch Request frame).

Within the EDP element (#201):

* If the Epoch Start Time Variation Range field is present, the Epoch Start Time Variation Range field value shall not exceed 20% of the Epoch Interval Length subfield value. (#201)
* If the Group Epoch Seed field is present, the Group Epoch Seed field value shall be the same for each transmission to any member of an EDP group for a given EDP Epoch sequence. An EDP AP shall select a new random Group Epoch Seed value for each EDP Epoch sequence. (#884)

***TGbi editor: Modify clause 10.71.2.3 as follow***

* EDP epoch transition(#552) operations

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

During the transition period of an EDP epoch(#535), the EDP parameters assigned to a non-AP MLD during the preceding EDP epoch(#536) shall remain valid only for the following operations:

* Completion of a frame exchange sequence (see Annex G)
* Completion of a TXOP.

(#74)

A transition period terminates at the end of a transition timeout interval or at the beginning of the next epoch margin(#803), 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 (#75)EDP epoch is shown in Figure 10-166b (Overview of (#75)EDP epoch).

 (#238,#804,#542)

* Overview of (#75)EDP epoch

The next epoch boundary is derived from the value of the first epoch TSF start time (see 10.71.2.4 (EDP Epoch Start Time Computation)).(#76). (#242, #805, #872)

Note : The ΔIT(n) is a positive offset delaying the effective start of an EDP epoch boundary by a pseudo random value, so start times of EDP epochs (boundaries n) of a sequence are not occurring at a regular epoch interval. The time between two consecutives planed start time is constant and equal to Epoch Interval, while the duration of two consecutive epochs (time between Boundaries) may be different.(#246)

(#1052,#873)At the start of the new group EDP epoch, CPE AP MLD and CPE non-AP MLDs shall begin using the new FA parameters to anonymize selected OTA fields when transmitting new individual frames. CPE AP MLD and CPE non-AP MLDs shall continue using these anonymization parameters for the duration of the epoch.(“806).

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 FA (#77)parameters during a margin period (#542)for a duration equal to (#77) 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 FA (#77)parameters for a duration equal to (#77) dot11EDPEpochTransitionTime after the start of the new epoch. The rules of 10.71.2.1 (General) apply for frame retransmissions and acknowledgments.

***TGbi editor: Modify clause 10.71.2.4 as follow***

* EDP Epoch Start Time Computation

To avoid an easy determination of the epoch start time by an eavesdropper(#243), the start time of each EDP epoch (#243)is determined by introducing a pseudo random variation around a planned start time occurring at a regular interval.

The start time of an epoch is occurring at the same time on each link of an MLD (#243).

Upon reception on a link of an EDP Epoch Request frame or a(#553) (Re)Association Request frame, the AP may 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 epoch number n of the epoch starting at the value of the First TSF Start Time field, (#906) 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 first epoch TSF start time (#81), the epoch interval, and set its epoch number n (#1071) for this epoch (#80) to the value of the received epoch(#80) number offset for that link.
* Construct (#330) the corresponding first epoch TSF(#81) start time of its other links according to the formula:

(#1055)The value of the first(#81)(#87) epoch TSF start time of another link shall be equal to the (#287)value of the first (#87)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 between the receiving link and the other links can be computed based on TSF Offset fields (#809) values of the latest Basic Multi-Link element exchange indicating TSF offsets between the reporting AP and reported APs received on any enabled link.(#809).

For a given link(#88), 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*) = PlannedEpoch(#1056)TSFStartTime(*n*) for the link + ΔIT(n) (#246)

PlannedEpoch(#1056)TSFStartTime(*n*) = FirstPlannedEpochTSFStartTime + (*n* – EpochNumberOffset) × EpochInterval mod 264 (#1057)

ΔIT(n)(#246) = int (KDF-*Hash*-*Length*(PGTK, "ERCM", Seed + (*n* × EpochInterval)(#884))) mod TimeRangeTU(#1062)

and where

*n* is (#545) the current number of

the EDP epoch in the EDP epoch sequence.

PlannedEpoch(#1056)TSFStartTime(*n*) is the TSF timer value of the link corresponding to the nominal (#810) start

time of the EDP epoch number n in the EDP epoch sequence. This planned start time occurs at a regular time interval equal to the epoch interval (#810).

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,

initialized, upon reception of an EDP element by the STA with (#548)the First Epoch TSF Start Time value of the EDP element of

the received EDP Epoch Settings field.(#764)

TimeRangeTU(#1062) is the value in TU corresponding to the value of the Epoch Start Time Variation Range(#996) field multiplied by the number of TU in the Epoch Interval Unit field (#1063)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)

Seed is the Group Epoch Seed field value of the received EDP Epoch Settings field(#884)

If the start time of an EDP epoch occurs during an ongoing TXOP, the FA parameters corresponding to the new EDP epoch(#535) apply(#90) at the end of that(#1065) TXOP.

[…]

***TGbi editor: Modify clause 10.71.3 as follow***

**10.71.3 Establishing frame anonymization parameter sets**

This subclause describes how an AP MLD and associated non-AP MLD establish the CPE FA parameter set for each EDP epoch for the CPE non-AP MLD. The creation of the BPE FA parameter sets is described in 10.71.4 (Establishing BPE frame anonymization parameter sets).

The non-AP MLD and AP MLD establish the EDP epochs used for frame anonymization as described in 10.71.2 (EDP epoch operation).

The EDP CPE frame anonymization parameters for a given EDP epoch shall be generated (by the CPE non-AP MLD and CPE AP MLD) by computing a single pseudorandom EDP FA block that is partitioned into the set of EDP CPE frame anonymization parameters as follows:

* EDP\_PN\_offset values shall be extracted from EDP FA block according to Table 10-40a (Extracting EDP\_PN\_offset values from EDP FA Block).
* EDP\_STA\_address values shall be extracted from EDP FA block according to Table 10-40b (Extracting EDP\_STA\_address values from EDP FA Block).
* EDP\_SN\_offset values for SNS1 and SNS10 shall be extracted from EDP FA block according to Table 10-40c (Extracting EDP\_SN\_offset values for SNS1 and SNS 10 from EDP FA Block).
* EDP\_SN\_offset values for SNS3 shall be extracted from EDP FA block according to Table 10-40d (Extracting EDP\_SN\_offset values for SNS3 from EDP FA Block).
* EDP\_SN\_offset values for SNS9 shall be extracted from EDP FA block according to Table 10-40e (Extracting EDP\_SN\_offset values for SNS9 from EDP FA Block).
* EDP\_SN\_offset values for SNS12 shall be extracted from EDP FA block according to Table 10-40f (Extracting EDP\_SN\_offset values for SNS12 from EDP FA Block).

For a given EDP epoch, the EDP FA block shall be generated as:

EDP FA block =*KDF*-*Hash*-*Length*( KDK, "EDP CPE frame anonymization", Seed + ((*n*  + *p*)(#1071) × EpochInterval)(#885))

where

EDP FA block is the block of bits which is partitioned into the sets of all possible

values for each EDP frame anonymization parameter

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 Table 9-190 (AKM suite selectors))

KDK is the Key Derivation Key

n is the current number of the EDP epoch in the EDP epoch sequence as

defined in 10.71.2.4 (EDP Epoch Start Time Computation)

*Length* is the total number of bits to derive. A total of 1728 bits are derived for a

EDP FA block.

*p* is the value of the latest exchanged non-AP MLD Specific Collision Epoch Offset field if received and if n is greater or equal to colliding epoch number *c* (see 10.71.2.5 OTA MAC address collision avoidance); otherwise, *p* equals 0. (#1071).

Seed is the value of the Group Epoch Seed field of the received EDP Epoch Settings field(#885)

***TGbi editor: Modify clause 10.71.4 as follow***

* Establishing BPE frame anonymization parameter sets

All associated BPE non-AP MLDs and the BPE AP MLD shall generate EDP BPE frame anonymization parameters for a given EDP epoch by computing a single pseudorandom EDP BPE FA block which is partitioned into a set of EDP BP frame anonymization parameters according to the following tables.

For a given EDP epoch, the EDP FA block shall be generated as:

EDP\_BPE\_FA\_block = KDF-*Hash*-*Length* (PGTK, "EDP BPE frame anonymization", Seed + (*n* × EpochInterval) (#886)),

where

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 Table 9-190 (AKM suite selectors))

PGTK is the Privacy Group Transient Key

n is the current number of the EDP epoch in the EDP epoch sequence as

defined in 10.71.2.4 (EDP Epoch Start Time Computation)

Seed is the value of the Group Epoch Seed field of the received EDP Epoch Settings field(#886)

***TGbi editor: Modify clause 10.71.2.5 as follow***

**10.71.2.5 OTA MAC address collision avoidance**

A CPE AP MLD and a CPE non-AP MLD anonymize selected OTA MAC header fields of individually addressed frames of the CPE affiliated STAs within EDP epochs.

A CPE AP MLD may calculate that the OTA MAC address that a CPE non-AP MLD is anticipated to use in a subsequent epoch may cause a collision with the OTA MAC address of another CPE non-AP MLD(s) or another STA in the ESS. When such a collision is detected, the CPE AP MLD shall send to the CPE non-AP MLD an OTA MAC Collision Notification(#123) frame before the epoch where the collision is anticipated to risk occurring and indicated in the Colliding Epoch field, instructing the non-AP MLD to apply the non-AP MLD specific epoch offset signaled in the AP MLD OTA MAC Collision Notification(#123, #Ed) frame to avoid address collision.(#557)

Thus, if the Colliding Epoch value is m, indicating that the collision is expected to occur m epochs after the current epoch (colliding epoch number c = n + m), and if the non-AP MLD Specific Collision Epoch Offset is q (#1071), then for the epoch occurring m epochs later, the CPE AP MLD is requesting the CPE non-AP MLD to use the CPE non-AP MLD OTA MAC address that the CPE non-AP MLD had planned to use for the epoch occurring m + q(#1071) epochs later. In the subsequent epoch, the CPE non-AP MLD is expected to use the CPE non-AP MLD OTA MAC address that the CPE non-AP MLD had planned to use m+q+1 (#1071) epochs later, unless the CPE AP MLD also signals a collision warning for that epoch. The CPE non-AP MLD shall respond with an OTA MAC Collision Response(#123) frame acknowledging the CPE AP MLD warning, and either accepting the CPE AP MLD proposed remediation, thus applying the offset requested by the CPE AP MLD, or rejecting the CPE AP MLD proposed remediation, and thus using the CPE non-AP MLD OTA MAC address that the CPE non-AP MLD had planned to use for that epoch before receiving the CPE AP MLD OTA MAC Collision Notification(#123) frame.(#557)

***TGbi editor: Modify clause 9.4.2.350 as follow***

**9.4.2.350 OTA MAC Collision Warning element**

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID  Extension | Collision Status | Colliding Epoch | Non-AP MLD Specific Collision (#1071) Epoch Offset |
| Octets: | 1 | 1 | 1 | 1 | 1 | 1 |

**OTA MAC Collision Warning element**

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

The Collision Status field indicates the intent of the OTA MAC Collision Warning element. The field takes value 0 when sent by the AP MLD in an OTA MAC Collision Notification frame(#123), and values 1 or 2 when sent by the EDP non-AP MLD in an OTA MAC Collision Response frame(#123). Table 9-401h lists the possible values and their meaning.(#557)

**OTA MAC Collision Warning values**

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

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.

The non-AP MLD Specific Collision (#1071) Epoch Offset field indicates the epoch count that the non-AP MLD skips to mitigate the OTA MAC address collision. The value 0 is reserved.

The sum of the Colliding Epoch field value and the non-AP MLD Specific Epoch Number Offset value cannot be larger than the Epoch Sequence Duration field.