IEEE P802.11
Wireless LANs

|  |
| --- |
| 802.11bi – Clause 10.71.2.1 |
| Date: May 12, 2025 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Antonio de la Oliva | Interdigital Ltd, UC3M |  |  | aoliva@it.uc3m.es |
| Joseph Levy | Interdigital Ltd. |  |  |  |

 Abstract

This submission addresses the comments with CID: 799, 68, 337, 955, 69, 70, 71, 72, 73, 107, 227, 228, 229, 230, 232, 338, 339, 342, 520, 523, 524, 530, 533, 534, 758, 800, 801, 802, 862, 863, 864, 866, 867

**Comment Resolution**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Clause** | **Page** | **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 799 | 10.71.2 | 76 | 33 | The sentence "EDP epoch operation allows the AP MLD to schedule sequences to anonymize MLDs' selected..." is not clear. What are the sequences that is being referred to? The term is not used anywhere else in the spec, so its meaning in this context is not clear | Revise sentence to clarify the behavior of an AP MLD during EDP epoch operation. | REVISEDEditor please implement changes tagged as [799] in 25/1114r1 |
| 68 | 10.71.2.1 | 76 | 42 | "A non-AP MLD that is a member of an EDP group and its associated AP MLD shall anonymize..." Needs commas in order to parse correctly | "At cited location ieditas shown: "A non-AP MLD that is a member of an EDP group, and its associated AP MLD, shall both anonymize..." | ACCEPT |
| 337 | 10.71.2.1 | 76 | 33 | awkward wording: "to anonymize MLDs' selected OTA fields (e.g., STA address, AID, PN, SN, etc.) of individually addressed frames" | Change to "to anonymize selected OTA fields (e.g., STA address, AID, PN, SN, etc.) in MLDs' individually addressed frames" | ACCEPT |
| 955 | 10.71.2.1 | 76 | 30 | Use "may" to identify optionality. Clearly describe early on how to identify support. | Change the sentence to something along the following lines: "A CPE AP MLD may support EDP epoch operation. A CPE AP MLD indicates that it supports EDP epoch operation by including the EDP element in ...""A CPE non-AP MLD may support EDP epoch operation. A CPE non-AP MLD indicates that it supports EDP epoch operation by including the EDP element in the YYY frames it transmits." | REJECTEDThe CPE MLD AP and CEP MLD non-AP indicate the support through the Extender RSN Capabilities field, it does not declare its support adding and EDP element to any frame. |
| 69 | 10.71.2.2 | 76 | 62 | "If no EDP element is included in the encrypted (Re)Association Request frame, or if the EDP element does not include information defining the parameters for the EDP group." First this should be part of the previous paragraph. Secondly, why should the non-AP MLD include it if not to provide parameters. Are you refering to the minimum epoch spacing? But that is a parameter. Then the next statement that it is put in default epoch may not be true. I think the easiest is to delete the "does not incude''" bit. | Make cited text part of the previous paragraph. AND delete "or if the EDP element does not include information defining the parameters for the EDP group," | ACCEPT |
| 70 | 10.71.2.2 | 77 | 29 | "The CPE AP MLD may create the new EDP group with the received parameters." This paragraph should be part of theh previous one. Delete the paragraph seperation | Delete paragraaph seperation at 77.26. | ACCEPT |
| 71 | 10.71.2.2 | 77 | 49 | "If the CPE AP MLD can fulfill the request, it will include the CPE.." This para should be part of the previous. Delete the para break | Delete paragraaph seperation at 77.46. | ACCEPT |
| 72 | 10.71.2.2 | 77 | 55 | "At any point in time..." Dangerous and is it needed? I suggest delete. | At cited location delete "At any point in time," (and capitalize "The") | ACCEPT |
| 73 | 10.71.2.2 | 78 | 1 | "at any time", Possibly dangerous and not required, suggest delete. | At cited location, delete "at any time" | ACCEPT |
| 107 | 10.71.2.2 | 77 | 3 | There is no such a "Group Epoch Interval Duration field" in a "Minimum Epoch Pacing field" according to clause 9. | Change to "If the duration indicated by the Minimum Epoch Pacing field included in the (Re)Association Request frame is greater than the duration indicated by the Epoch Interval 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." | REJECTEDThis text is no longer in D1.2 of the spec. |
| 227 | 10.71.2.2 | 79 | 20 | EDP element signals the status of the request. Why AP is allowed to not response with any EDP element? It is unclear whether STA request is still ongong. | Change the spec to read: Association response shall include EDP element, if the STA has included EDP element to asosciation request.If the AP MLD implementation really needs a lot of processing time, then the EDP element in the association response shall signal that request is pending. | REVISEDEditor please implement changes tagged as [227] in 25/1114r1. |
| 228 | 10.71.2.2 | 79 | 20 | A STA may not have any idea whether AP MLD has already suitable EDP group ongoing or whether it needs to create a new epoch. | Allow STA to sigmal that new epoch group creation of joining to existing group epoch is desired and allow AP to decide the group in which the STA joins. | REVISEDEditor please implement changes tagged as [228] in 25/1114r1. |
| 229 | 10.71.2.2 | 78 | 65 | The CPE Epoch Number and Common Epoch Number should be explained in details. Currently the specification does specifies the epoch numbers .- The CPE epoch number is used for individual address anonymization. CPE epoch number is STA specific and set to 0 for the first epoch.- The Common epoch number is common for all STAs that operate in the same group epoch in AP MLD. CPE MLDs use Common Epoch number to calcualte the epoch start time variations. BPE MLDs use the Common Epoch number to calculate AP BSSID and group address anonymization parameters. The Common epoch number shall be signaled to all MLDs in the association/epoch setup. | Please clarify the 1) CPE Epoch Number and 2) Common epoch numbers. The CPE Epoch Number shall be 0 for the first epoch of the STA. The Common Epoch Number is signaled to all members in the group epoch. | REJECTEDThere is no such text in D1.2. The EDP epoch number is defined in section 9. |
| 230 | 10.71.2.2 | 79 | 20 | The CPE STA should use short epoch durations for better privacy. | Please add a should statement that non-AP MLD should request short epoch interval for better privacy. | REJECTEDThe shortest duration of an epoch is 1 sec, the STA can request any epoch duration within the range defined in the epoch duration field. |
| 232 | 10.71.2.2 | 79 | 43 | An MLD should request an epoch interval according to its privacy needs. There is no benefit to signal the ongoing group epochs to associated STAs. This signaling creates a lot of overhead and allows an evil attacker to easily monitor all group epochs of the AP MLD. | Remove periodical and erquest based reporting of the ongoing epoch groups. | REJECT - discussThe periodic advertisement of epochs is done encrypted. An STA should know available epoch to select a different one. |
| 338 | 10.71.2.2 | 76 | 51 | Clarify wording: "A CPE AP MLD advertises the support of EDP groups in ..." | Change to "A CPE AP MLD advertises support for EDP group operations in..." | ACCEPT |
| 339 | 10.71.2.2 | 76 | 55 | Clarify wording: "A non-AP MLD advertises the support of EDP epoch group in ..." | Change to "A non-AP MLD advertises support for EDP group operations in ..."" | ACCEPT |
| 342 | 10.71.2.2 | 77 | 14 | the phrase "In all cases" is superfluous, remove it | remove "in all cases" and correct capitalization to compensate. | ACCEPT |
| 520 | 10.71.2.2 | 76 | 55 | "the support of EDP epoch group" not clear | Change to "support for EDP groups". In the para above change "support of" to "support for" | ACCEPT |
| 523 | 10.71.2.2 | 76 | 65 | "The first EDP epoch of an EDP epoch sequence is EDP epoch number 0. " seems to have nothing to do with the rest of the para | Make into new para | ACCEPT |
| 524 | 10.71.2.2 | 77 | 3 | "If the value of the Group Epoch Interval Duration field included in the Minimum Epoch Pacing field is greater than the value of the Group Epoch Interval Duration 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." -- how does the non-AP MLD find out? | Ah, it's clarified a few paras down. Give some kind of forward ref | REJECTED |
| 530 | 10.71.2.2 | 77 | 36 | This note defines "similar parameters" and hence is normative | Delete "NOTE---" and use the usual convention for special terms, i.e. italics on definition | ACCEPT |
| 533 | 10.71.2.2 | 77 | 45 | "sends" should be "shall send" | As it says in the comment | ACCEPT |
| 534 | 10.71.2.2 | 77 | 58 | " The CPE non-AP MLD may report the status of the operation by responding with an EDP Response frame." is too wishy-washy | Change "may" to "shall" | ACCEPT |
| 758 | 10.71.2.2 | 79 | 46 | The STA should not need to provide the parameters of the group it wants to join, it should be allowed to only mention the group ID (the group ID may be a parameter, but parameters is plural in the sentence) | change to "indicating the parameters or the ID of the EDP group..." | REJECTThis is allowed in the EDP element. Also, the group ID is a parameter |
| 800 | 10.71.2.2 | 76 | 51 | The text of the sentence would be clearer with a more explicit indication of what supports the groups. Also, for consistency with next sentence, add "epoch" to describe groups. | Revise sentence to "A CPE AP MLD advertises its support of EDP epoch groups..." | REVISEEditor please implement changes tagged as [520] in 25/1114r1 |
| 801 | 10.71.2.2 | 76 | 55 | The text of the sentence would be clearer with a more explicit indication of what supports the groups | Revise sentence to "A non-AP MLD advertises its support of EDP epoch groups..." | REVISEEditor please implement changes tagged as [520] in 25/1114r1 |
| 802 | 10.71.2.2 | 77 | 24 | The text indicates "The CPE non-AP MLD may request creation of a new EDP group...". This does not make clear whether the non-AP MLD must be associated to request creation. | Clarify whether CPE non-AP MLD must be associated to make this request. | REVISEDEditor please implement change tagged as [802] in 25/1114r1 |
| 862 | 10.71.2.2 | 76 | 62 | Why an EDP element should not include enough parameters ? | Please clarify or "or if the EDP element does not include information defining the parameters for the EDP group" | REVISEDEditor please implement the changes tagged as [69] in 25/1114r1 |
| 863 | 10.71.2.2 | 76 | 62 | It is written: "If no EDP element is included in the encrypted (Re)Association Request frame" . The parameters of the default EDP Epoch group should be included in the association response frame. | Please clarify | REVISEDEditor please implement changes tagged as [69] and [227] in 25/1114r1 |
| 864 | 10.71.2.2 | 77 | 5 | What is a default EDP Epoch group ? The settings associated to the default EDP Epoch group shall be included at least in the association response frame. | Please clarify | REJECTEDText has been clarified in D1.2 of the spec. Now it is specifically said that if no EDP element is included in Association response, the STA is not assigned to any group. Therefore if the STA is assigned to the default group, its parameters need to be included in the (Re)Association Response frame |
| 866 | 10.71.2.2 | 77 | 13 | The parameters of the assigned EDP group can be also returned through an EDP Epoch Response Action frame, not only an association response frame. | Please clarify | REJECTEDThis is not the purpose of the EDP Epoch Response frame, which requires of a Request frame. |
| 867 | 10.71.2.2 | 77 | 24 | Please refer the related subclause for the description of the EDP Epoch Request frame everywhere in the subclause 10.71.2.2 | Please add : as defined in the subclause 9.6.42.5 | ACCEPT |

**10.71.2 Proposed resolution**

**10.71.2 EDP epoch operation**

**10.71.2.1 General**

Support of EDP epoch operation is optional for a CPE AP MLD and a CPE non-AP MLD.

EDP epoch operation enables the AP MLD to schedule groups of CPE MLD non-AP STAs (EDP groups) during time period sequences (EDP epochs) [799] to anonymize MLDs’ selected OTA fields (e.g., STA address, AID, PN, SN, etc.) in MLD’s [337] individually addressed frames.

At any given time, an AP MLD shall not assign an associated non-AP MLD to more than one EDP group. A non-AP MLD belongs to at most one EDP group at a time. [519]

A non-AP MLD, [68]that is a member of an EDP group,[68] and its associated AP MLD,[68] shall both [68] anonymize the selected fields of the individually addressed frames according to the group EDP(#1012) epoch settings as defined in 10.71.3 (Establishing frame anonymization parameter sets), 10.71.5 (MAC header anonymization and transmitting functions), 10.71.6 (MAC header anonymization and receiving functions) and 10.71.7 (Frame anonymization and AID).

**10.71.2.2 EDP group operations**

A CPE AP MLD advertises the support for [520] EDP group operations [338] in Beacon and Probe Response frames by setting the Group EDP Epoch Supported field of the Extended RSN Capabilities field of the RSNXE element to 1.A non-AP MLD advertises the support for [520] EDP epoch group operations [339] in (Re)Association Request frames by setting the Group EDP Epoch Supported field of the Extended RSN Capabilities field of the RSNXE element to 1.

The non-AP MLD may include in an encrypted (Re)Association Request frame an EDP element indicating the parameters for the EDP group it requests to join. [69] If no EDP element is included in the encrypted (Re)Association Request frame, [69] the CPE non-AP MLD is assigned to the default EDP(#1012) group.

[523]The first EDP epoch of an EDP epoch sequence is EDP epoch number 0.

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, see 9.6.42.5[867]).

The CPE AP MLD, upon reception of the EDP element in an encrypted (Re)Association Request frame shall assign the CPE non-AP MLD to the EDP group with parameters that best match the parameters requested by including an EDP element in the encrypted (Re) Association Response frame [227], creating a new EDP group or assigning the CPE non-AP MLD to an already existing EDP group [228]. [342] The assigned EDP epoch interval length shall not be shorter than indicated in the Minimum Epoch Pacing Parameters field.

The parameters of the assigned EDP group are returned to the CPE non-AP MLD through an EDP element in the (Re)Association Response frame. If no EDP element is included in the (Re)Association Response frame, the CPE non-AP MLD is not assigned to any EDP group.

The associated [802] CPE non-AP MLD may request creation of a new EDP group by sending an EDP Epoch(#859) Request frame (see 9.6.42.5) [867] with Epoch Request field indicating "Create" and indicating the parameters for the EDP group to be created in the EDP Epoch Settings field. [70] The CPE AP MLD may create the new EDP group with the received parameters. Alternatively, the CPE AP MLD may allocate the CPE non-AP MLD to an already existing EDP group with *similar* [530] parameters. This may be signalled to the CPE non-AP MLD in an EDP Epoch(#859) Response frame indicating in the Status field, SUCCESS\_SIMILAR\_EPOCH, and providing the EDP Epoch Settings field with the parameters of the EDP group. [530] In this context, an EDP group with "similar parameters" refers to an existing EDP group whose epoch duration is equal or smaller than the one requested by the CPE non-AP MLD (i.e., most privacy-preserving). This choice is made while ensuring adherence to any pacing limits indicated in the Minimum Epoch Pacing Parameters field that the CPE non-AP MLD has specified in (Re)Association Request frame.

Once the CPE non-AP MLD is associated and has been assigned an EDP group, it may request to join a different EDP group. Information on the available EDP group(s) may be distributed periodically by the CPE AP MLD transmitting EDP Groups(#1011, #Ed) Parameter frames. To join a different EDP group, the CPE non-AP MLD shall send [533] an EDP Epoch Request frame (see 9.6.42.5)[867], indicating "Join" in the Epoch Request field and providing the EDP Epoch Settings field indicating the parameters of the EDP group it requests to join. [71] If the CPE AP MLD can fulfill the request, it will include the CPE non-AP MLD in the new EDP group and remove it from the previous EDP group. The result of the operation is indicated to the CPE non-AP MLD through an EDP Epoch(#859) Response frame. This frame includes a Status field, "SUCCESS", indicating the operation result and an optional EDP Epoch Settings field to indicate the parameters of the newly joined EDP(#1012) group.

[72] The CPE AP MLD may request the associated CPE non-AP MLD to transition to a different EDP group, by sending an EDP Epoch Assignment(#859) frame to the associated CPE non-AP MLD(#859) including the EDP Epoch Settings field with the parameters of the suggested EDP group. The CPE non-AP MLD shall [534] report the status of the operation by responding with an EDP Epoch(#859) Response frame. This operation allows the CPE AP MLD to reorganize the EDP groups in use. Following this reorganization, the resulting EDP groups should maintain the same level of restrictiveness or be even more restrictive, i.e., shorter epoch durations, while also respecting any pacing limits indicated in the Minimum Epoch Pacing Parameters field that the CPE non-AP MLD has specified in (Re)Association (see 9.6.42.5)[867].

A CPE non-AP MLD may leave an EDP group at any time by sending an EDP Epoch(#859) Request frame (see 9.6.42.5)[867] indicating "Leave" in the Epoch Request field. Upon reception of this message, the CPE AP MLD shall remove the CPE non-AP MLD from the EDP group.