IEEE P802.11
Wireless LANs

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| CC36 Comment Resolution Clause EMLSR and Misc. |
| Date: 2022-3-17 |
| Author(s): |
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Abstract

This submission proposes comment resolution(s) for the following 54 CID(s) received in CC36 on TGbe D1.0 related to 35.3.17 EMLSR operation and other subclauses:

CIDs:

4700, 4701, 5357, 6345, 5932, 7497, 7612, 7613, 6939, 4332,

4306, 6170, 5346, 6348, 4371, 4029, 6219, 5342, 4333, 7565,

4334, 4335, 4336, 5912, 7580, 6349, 5747, 5905, 5138, 5760,

6502, 4389, 6247, 6248, 4749, 5149, 5762, 6885, 7418, 7822,

6984, 5773, 4932, 6586, 7825, 7867, 7866, 6326, 4757, 7422,

8049, 6962, 5934, 7423

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: added missing CID tags
* Rev 2: Revised during the MAC call and had offline discussions. 5 CIDs: 6345, 5747, 5905, 5773, 4932 (highlighted in green) are ready for a SP.
* Rev 3: Revised resolution for CID 5747 and 5905 (TSF offset) based on Yongho Seok’s comment. TSF offset is now 2 usec unit. Revised resolution for CID 5773 and 4932 by adding the link to the task group’s email thread on the debate.
* Rev 4: resolved comment from Li-Hsiang on the deferred CID 5932. Added back for a SP on 6 CIDs: 6345, 5747, 5905, 5773, 4932, 5932.
* Rev 5: updated resolution for CID 5773 and 4932 based on Yunbo’s comment.

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 4700 | Chien-Fang Hsu | 35.3.15 | 281.17 | It is not clear how the EMLSR non AP MLD supports PS-poll | Adding rules to support PS-poll. | Revised.Added a note describing that a STA affiliated with a non-AP MLD follows the rules defined in 11.2.3.7 (Receive operation for STAs in PS mode).TGbe editor to make the changes with the CID tag (#4700) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 4701 | Chien-Fang Hsu | 35.3.15 | 281.17 | It is not clear how the the EMLSR non-AP MLD supports the U-APSD. | Adding rules to support U-APSD | Revised.Added a note describing that a STA affiliated with a non-AP MLD follows the rules defined in 11.2.3.8 (Receive operation using APSD).TGbe editor to make the changes with the CID tag (#4701) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**TGbe Editor to make the following changes in Subclause 35.3.17 (Enhanced multi-link single radio operation) in TGbe D1.4**

(#6964)NOTE 3—When an AP affiliated with the AP MLD transmits an initial Control frame that initiates frame
exchanges with more than one non-AP MLD operating in the EMLSR mode, the AP ensures that the padding duration of
the Padding field of the initial Control frame is greater than or equal to the maximum of the values indicated in the
EMLSR Padding Delay subfield of the Basic Multi-Link element received from the non-AP MLDs with which the frame
exchanges are initiated.

(#4700, 4701)NOTE 4 – A STA affiliated with the non-AP MLD follows the rules defined in 11.2.3.7 (Receive operation for STAs in PS mode) and 11.2.3.8 (Receive operation using APSD).

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 5357 | Jarkko Kneckt | 35.3.15 | 281.17 | It is not clear which frames the EMLSR STA needs to receive in order to maintain NAV. For instance, does EMLSR STAs receive HE and EHT preambles that contains TXOP field. Also it would be good to clarify how ongoing tranmissiosn are protected, if a frame is not received. | The EMLSR STAs should maintain basic NAV similarly as all other STAs. The EMLSR STAs shall not cause more transmission collisions to other BSSs transmissions. | Revised.In D1.5, a note was added to clarify that a STA affiliated with a non-AP MLD that is in EMLSR mode uses the same rules for NAV setting and EDCA channel access. Clarified this in a note.To editor: no changes needed. |
| 6345 | Minyoung Park | 35.3.15 | 281.19 | It is unclear whether a non-AP MLD can operate in both the EMLSR mode and the dynamic SM power save mode. Since when a non-AP MLD is operating in the EMLSR mode, it listens on multiple links simultaenously using one Rx chain on each link until it receives MU-RTS or BSRP and then exchange data/ack frames using multiple RF chains, whereas the dynamic SM power save is used per link/STA of the AP MLD and cannot be used for multiple links for a single radio MLD. When a non-AP MLD is operating in the EMLSR mode, which is operating at the MLD level, it cannot operate in the dynamic SM power save at the link/STA level. | Add a sentence in after the 1st paragraph of the 35.3.15 (Enhanced multi-link single radio operation) as follows: "When a non-AP MLD is operating in EMLSR mode, the non-AP MLD shall not be in static SM power save mode nor dynamic SM power save mode." | Revised.Agree to the comment. Since the EMLSR operation requires the initial control frame to be MU-RTS or BSRP with certain limitations in data rates and PPDU type, when a non-AP MLD is operating in EMLSR mode cannot support SM power save mode, which doesn’t have such constraints.TGbe editor to make the changes with the CID tag (#6345) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**TGbe Editor to make the following changes in Subclause 35.3.17 (Enhanced multi-link single radio operation) in TGbe D1.4**

(#2143)(#3206)An MLD with dot11EHTEMLSROptionImplemented equal to true shall set the EML Capabilities Present subfield to 1 and shall set the EMLSR Support subfield of the Common Info field of the (#6700)Basic Multi-Link element (9.4.2.312.2 (Basic Multi-Link element(#6700))) to 1(#2915)(#5058) in all Management frames that include the Basic Multi-Link element except Authentication frames. (#6741)An MLD with dot11EHTEMLSROptionImplemented equal to false and dot11EHTEMLMROptionImplemented equal to true (see 35.3.18 (Enhanced multi-link multi-radio operation)) shall set the EML Capabilities Present subfield to 1 and shall set the EMLSR Support subfield of the EML Capabilities subfield to 0. (#6741)An MLD with dot11EHTEMLSROptionImplemented equal to false and dot11EHTEMLMROptionImplemented equal to false shall set the EML Capabilities Present subfield to 0.

(#6345)When a non-AP MLD is operating in EMLSR mode on the EMLSR links, the non-AP MLD shall not operate in dynamic SM power save mode (11.2.6 (SM power save)) on the EMLSR links.

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 5932 | Li-Hsiang Sun | 35.3.1.5 | 281.39 | The CS required for the BSRP should be set to 1 regardless the length of BSR | as in comment | Rejected.Invalid comment. The comment failed to identify an issue.  |
| 7497 | Tomoko Adachi | 3.4 | 0.00 | "EML" Not sure why it is enhanced than normal multi-link operation. It is rather restricted. | Change "EML", "EMLMR", and "EMLSR" to more sensuous terms. | Rejected.Disagree with the commenter. It is ‘enhanced’ in the sense that performance is enhanced in term of throughput and latency. Please refer to 11-20/562r7. |
| 7612 | Tomoko Adachi | 35.3.15 | 0.00 | Explanations on Fig.s 35-13 to 35-15 are needed, such as what is expected at the beamformee operating in EMLSR mode and what are the differences the figures are trying to explain. | As in comment. | Rejected.The captions of the figures explain the differences between the three figures: (Figure 35-16—An example of EHT non-TB sounding in the EMLSR operation), (Figure 35-17—An example of EHT TB sounding in the EMLSR operation (beamformee 1 is in the EMLSR mode, the other beamformees are not in the EMLSR mode)), (Figure 35-18—An example of EHT TB sounding in the EMLSR operation (BSRP is used as the initial Control frame)) and “NOTE 2—A sounding sequence also follows the rules above,” explains that the sounding sequence also follows the rules defined in this subclause. |
| 7613 | Tomoko Adachi | 35.3.15 | 0.00 | For Fig.s 35-13 and 35-14, it seems as though the MU-RTSs can be RTSs. Explanation is needed why an MU-RTS is used, or change the MU-RTS to an RTS in these figures. | As in comment. | Rejected.The following note: “NOTE 2—A sounding sequence also follows the rules above,” explains that the sounding sequence also follows the rules defined in this subclause, which requires one of the initial control frames and therefore RTS cannot be used. |
| 6939 | Saju Palayur |   | 0.00 | Does EMLSR station can update its power save via PM bit ? If it is allowed to send PM=1, what are its alternatives to wakeup? Can it initiate frame transmission with PM=1 ? | please indicate if it is allowed and which frames it can initiate PM=1/0 | Revised.A STA affiliated with a non-AP MLD that operates in the EMLSR mode can update its power management mode. For clarification, the following note was added in TGbe D1.4 P392L54:“NOTE 1—Each of the STAs on the other links of the EMLSR links can transmit a frame with the Power Management subfield set to 1 and transition to power save mode immediately after successful transmission of the frame. (see 11.2.3.2 (Non-AP STA power management modes)).”Note to the editor: no change is needed. |
| 4332 | Arik Klein | 9.4.1.67e | 118.46 | It is unclear why do we need the EMLSR Mode subfield - it is part of EML control field which is used only in the EMLOperating Mode Notification frame (i.e. only in EMLMR case) - there is no usage in this field in section 35.3.15 or 35.3.16. | If there is a usage with this field - please add the corresponding text in chapter 35.3.15. Otherwise - please remove this redundant subfield. | Revised.In TGbe D1.4, the usage of the EMLSR Mode subfield was added and the subfield is used to enable and disable the EMLSR mode. Please see TGbe D1.4 P392.Note to the editor: no change is needed. |

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 4306 | Alfred Asterjadhi | 11.2.3.5.1 | 0.00 | Also this sentence is out of place. The reqiurement needs to be added to MLO subclauses rather than here. | As in comment. | Revised.Agree with the commenter. The requirement is moved to 35.3.12.2 (Basic BSS operation) under 35.3.12 (Multi-link power management).TGbe editor to make the changes with the CID tag (#4306) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 6170 | Michael Montemurro | 11.2.3.5.1 | 183.62 | The clause of the sentence references the affiliated STA, but the requirement references the non-AP MLD. I think this sentence intends to require the power-save state across all affiliated STAs. I'm not sure what setup links refers to.Also, this text seems to conflict with the text in 35.3.10.1 which staes that each STA of an non-AP MLD that is operating on an enabled link shall maintain its own power state.I think this text seems to say that all STAs affiliated with the non-AP MLD have the U-APSD flags configured the same way. | Change "If a STA is affiliated with a non-AP MLD, the non-AP MLD shall have the same U-APSD Flag value for each AC across all setup links (see 35.3.5 (Multi-link (re)setup))."to"For MLO, all STAs affiliated with the non-AP MLD shall set the U-APSD flags field in the QoS Info field to the same value for each AC across all setup links (see 35.3.5 (Multi-link (re)setup)).It would be more appropriate to include this text after the second paragraph of 11.2.3.5.1. | Revised.Agree with the commenter. The sentence is revised as follows and moved to subclause 35.3.12.2 (Basic BSS operation):. “All STAs affiliated with a non-AP MLD shall set each of the ACs U-APSD Flag subfields in the QoS Info field to the same value across all setup links (see 35.3.5 (Multi-link (re)setup)).”TGbe editor to make the changes with the CID tag (#6170) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 5346 | Jarkko Kneckt | 11.2.3.5.1 | 184.01 | The roles of STA and MLD are not clear in the sentence | Please clarify that all STAs affiliated with the AP MLD shall have the same values in U-APSD Flag. Please change to:" All STAs affilaited with the same non-AP MLD, shall have the same U-APSD Flag value for each AC across all setup links (see 35.3.5 (Multi-link (re)setup))." | Revised.Agree with the commenter. The sentence is revised as follows and moved to subclause 35.3.12.2 (Basic BSS operation):. “All STAs affiliated with a non-AP MLD shall set each of the ACs U-APSD Flag subfields in the QoS Info field to the same value across all setup links (see 35.3.5 (Multi-link (re)setup)).”TGbe editor to make the changes with the CID tag (#5346) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 6348 | Minyoung Park | 11.2.3.5.1 | 184.01 | The sentence "If a STA is affiliated with a non-AP MLD, the non-AP MLD shall have the same U-APSD Flag value for each AC across all setup links (see 35.3.5 (Multi-link (re)setup))." is not clear in terms of the U-APSD operation in the multi-link setup. | Clarify whether this means a cross-link power save signaling is required or not and how U-APSD works in the multi-link setup. Since the same U-APSD Flag value for each AC is applied to all setup links, this is relavent when the cross-link power save signaling is enabled. | Revised.Agree with the commenter. The sentence is revised as follows and moved to subclause 35.3.12.2 (Basic BSS operation):. “All STAs affiliated with a non-AP MLD shall set each of the ACs U-APSD Flag subfields in the QoS Info field to the same value across all setup links (see 35.3.5 (Multi-link (re)setup)).”TGbe editor to make the changes with the CID tag (#6348) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 4371 | Arik Klein | 11.2.3.5.1 | 184.03 | The requirement to have the U-APSD flag value for each AC across all setup links implies that APSD must be used by all STAs affiliated with non-AP MLD for specific AC. Need to add explicit clarification/ note that for the context of 11.2.3.5.1, STA means either non-AP STA not affiliated with non-AP MLD or non-AP STA affiliated with non-AP MLD. | As in comment | Revised.Agree with the commenter. The sentence is revised as follows and moved to subclause 35.3.12.2 (Basic BSS operation):. “All STAs affiliated with a non-AP MLD shall set each of the ACs U-APSD Flag subfields in the QoS Info field to the same value across all setup links (see 35.3.5 (Multi-link (re)setup)).”TGbe editor to make the changes with the CID tag (#4371) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 4029 | Abhishek Patil | 11.2.3.15 | 184.54 | How does multi-link traffic indication work when the MLDs have negotiated TID-to-link mapping and a STA of a non-AP MLD operating on an enabled link has negotiated broadcast TIM operation. | As in comment | Rejected.This is invalid comment. The comment is asking a question. It is not proposing a change that can in any sense be interpreted as “specific wording”. |

**TGbe Editor to make the following changes in 11.2.3.5.1 (Power management with APSD procedures) and in 35.3.12.2 (Basic BSS operation) in TGbe D1.5:**

**11.2.3.5 Power management with APSD**

**11.2.3.5.1 Power management with APSD procedures**

***(#4306)***(#4306)

**35.3.12.2 Basic BSS operation**

(#1167)(#4467)A non-AP MLD shall be able to perform basic operations (such as receiving a traffic indication, time synchronization, receiving BSS parameter updates) by monitoring Beacon frames on one or more enabled links. This is in addition to mechanisms such as individual TWT agreement(#2601). (#7415)(#7416)With these mechanisms, a non-AP MLD can receive basic information about the AP MLD and all the APs affiliated with the AP MLD on a single link while the other STA(s) affiliated with the nonAP MLD are in doze state.

(#1695)(#3031)(#1168)(#2252)(#3032)(#4066)(#4392)The traffic indication for a non-AP MLD shall be consistent across the Beacon frames transmitted by APs affiliated with an AP MLD, that are operating on the links that are part of the multi-link setup.

(#1695)(#3031)(#2295)NOTE—Each AP affiliated with an MLD provides a critical updates indication when there is an
update to the BSS parameters for another AP affiliated with the AP MLD (see 35.3.10 (BSS parameter critical update
procedure)).

(#4306, 6170, 5346, 6348, 4371)All sset each of the ACs subfields in the QoS Info field to the same

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| 6219 | Mikael Lorgeoux | 9.4.1.67e | 118.33 | Currently, the EML Control field contains in the EML OMN frame sent by the non-AP MLD doesn't permit to enable/disable the EMLMR mode for a given set of EMLMR links, it only permits to enable/disable the EMLMR mode for all sets of EMLMR links. | Add a subfield in the EML control field to indicate the set(s) of EMLMR links for which the EMLMR mode is enable/disable. The added subfield must permit to address a given set or all sets. | Revised.In TGbe D1.5, subclause 9.4.1.74 (EML Control field), the EMLMR Link Bitmap subfield has been added. To editor: no changes needed. |
| 5342 | Jarkko Kneckt | 9.4.167e | 118.36 | It is not clear can non-AP MLD configure specific STR/NSTR/EMLSR, etc. modes into use and how STA can transition between STR/NSTR/EMLSR/EMLMR modes? | Please clarify how non-AP STA may change its multi-link transmission mode that it uses. Please clarify are there any changes to TWT flows, TXOP synchronization, etc. | Rejected.This is invalid comment. The comment is asking a question. It is not proposing a change that can in any sense be interpreted as “specific wording”. |

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| 4333 | Arik Klein | 9.4.2.5.1 | 119.46 | The bufferred traffic is not delivered by the AP MLD, but by one or more APs affiliated with the AP MLD to which the non-AP MLD is associated. Therfore, need to revise the following sentence "Each bit in the traffic indication virtual bitmap corresponds to traffic buffered... or for a non-AP MLD that the AP MLD with which the AP is affiliated is prepared to deliver at the time the Beacon frame is transmitted" | Consider revising as follows:"Each bit in the traffic indication virtual bitmap corresponds to traffic buffered... or for a non-AP MLD that \*is associated with\* the AP MLD, which one or more APs affiliated with it are prepared to deliver at the time the Beacon frame is transmitted" | Revised.Agree with the commenter. An AP affiliated with an AP MLD delivers buffered traffic not the AP MLD.TGbe editor to make the changes with the CID tag (#4333) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 7565 | Tomoko Adachi | 9.4.2.5.1 | 119.49 | It is said here that when it is a non-AP MLD, the TID element carries the AID of the non-AP MLD. But in 9.4.1.8 AID field, there is no description added for how the AID field will be for a non-AP MLD. | Add a description in 9.4.1.8 AID field that a single AID is assigned to a non-AP MLD. | Revised.Agree with the commenter. In TGbe D1.5, subclause 9.4.1.8 (AID field) has been updated as follows:“In infrastructure BSS operation, the AID field contains a value assigned by (#4390)an AP, or PCP or an AP MLD during association. The field represents the 16-bit ID of a STA when assigned by an AP or PCP. Thefield represents the 16-bit ID of a non-AP MLD when assigned by an AP MLD.”To editor: no changes needed. |

**9.4.2.5 TIM element
9.4.2.5.1 General**

When the TIM is carried in a non-S1G PPDU, the traffic indication virtual bitmap, maintained by (#6254)the AP, or the mesh STA or the AP MLD that generates a TIM, consists of 2008 bits, and it is organized into 251 octets such that bit number *N* (0 ≤ *N* ≤ 2007) in the bitmap corresponds to bit number (*N* mod 8) in octet number ⎣*N* / 8⎦ where the low order bit of each octet is bit number 0, and the high order bit is bit number 7. When the TIM is carried in an S1G PPDU, the traffic-indication virtual bitmap has the hierarchical structure shown in Figure 9-152 (Hierarchical structure of traffic-indication virtual bitmap carried in an S1G PPDU). Each bit in the traffic indication virtual bitmap corresponds to traffic buffered for a specific neighbor peer mesh STA within the MBSS that the mesh STA is prepared to deliver1, or for a STA that is not affiliated with an MLD within the BSS that the AP is prepared to deliver at the time the Beacon frame is transmitted, or for a non-AP MLD that (#4333) APs affiliated with the AP MLD are prepared to deliver at the time the Beacon frame is transmitted. …

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| 4334 | Arik Klein | 9.4.2.5.1 | 119.52 | The sentence needs to set the exact requirements when the bit number N in the traffic virtual bitmap is set to 1 for the MLD case | consider adding the following sentence after the existing sentence: "If none of STAs affiliated with non-AP MLD are using APSD, and any individually addressed MSDUs/MMPDUs for that non-AP MLD are buffered and any of the APs affiliated with AP MLD associated with the non-AP MLD is prepared to deliver them, then bit number N in the traffic indication virtual bitmap is 1" | Rejected.The requirements when the bit number N in the traffic virtual bitmap is set to 1 in an AP MLD are defined in TGbe D1.5, subclause 35.3.12.4 (Traffic Indication) as follows: “(#2302)An AP MLD shall buffer a BU with a TID at the AP MLD if the TID is not mapped to any link onwhich the corresponding STA of a non-AP MLD is in active mode, and it shall set the bit in the partialvirtual bitmap of the TIM element that corresponds to the AID of the non-AP MLD to 1.”“(#2302)An AP MLD (#8238)shall buffer an MMPDU that is not a Measurement MMPDU and intended forreceipt by a STA affiliated with a non-AP MLD in the AP MLD when all STAs affiliated with the non-APMLD are in power save mode. In this case, the bit in the partial virtual bitmap of the TIM element thatcorresponds to the AID of the non-AP MLD shall be set to 1. (#5761)An AP MLD shall not buffer aMeasurement MMPDU.” |
| 4335 | Arik Klein | 9.4.2.5.1 | 119.55 | The sentence needs to set the exact requirements when the bit number N in the traffic virtual bitmap is set to 1 for the MLD case | consider adding the following sentence after the existing sentence: "If all STAs affiliated with non-AP MLD are using APSD, and any individually addressed MSDUs/MMPDUs for that non-AP MLD are buffered in at least one nondelivery-enabled AC (if there exists at least one nondelivery-enabled AC), then bit number N in the traffic indication virtual bitmap is 1" | Rejected.The requirements when the bit number N in the traffic virtual bitmap is set to 1 in an AP MLD are defined in TGbe D1.5, subclause 35.3.12.4 (Traffic Indication) as follows: “(#2302)An AP MLD shall buffer a BU with a TID at the AP MLD if the TID is not mapped to any link onwhich the corresponding STA of a non-AP MLD is in active mode, and it shall set the bit in the partialvirtual bitmap of the TIM element that corresponds to the AID of the non-AP MLD to 1.”“(#2302)An AP MLD (#8238)shall buffer an MMPDU that is not a Measurement MMPDU and intended forreceipt by a STA affiliated with a non-AP MLD in the AP MLD when all STAs affiliated with the non-APMLD are in power save mode. In this case, the bit in the partial virtual bitmap of the TIM element thatcorresponds to the AID of the non-AP MLD shall be set to 1. (#5761)An AP MLD shall not buffer aMeasurement MMPDU.” |
| 4336 | Arik Klein | 9.4.2.5.1 | 119.61 | The sentence needs to set the exact requirements when the bit number N in the traffic virtual bitmap is set to 1 for the MLD case | consider adding the following sentence after the existing sentence: "If all STAs affiliated with non-AP MLD are using APSD, all ACs are delivery-enabled, and any individually addressed MSDUs/MMPDUs for that non-AP MLD are buffered in any AC, then bit number N in the traffic indication virtual bitmap is 1" | Rejected.The requirements when the bit number N in the traffic virtual bitmap is set to 1 in an AP MLD are defined in TGbe D1.5, subclause 35.3.12.4 (Traffic Indication) as follows: “(#2302)An AP MLD shall buffer a BU with a TID at the AP MLD if the TID is not mapped to any link onwhich the corresponding STA of a non-AP MLD is in active mode, and it shall set the bit in the partialvirtual bitmap of the TIM element that corresponds to the AID of the non-AP MLD to 1.”“(#2302)An AP MLD (#8238)shall buffer an MMPDU that is not a Measurement MMPDU and intended forreceipt by a STA affiliated with a non-AP MLD in the AP MLD when all STAs affiliated with the non-APMLD are in power save mode. In this case, the bit in the partial virtual bitmap of the TIM element thatcorresponds to the AID of the non-AP MLD shall be set to 1. (#5761)An AP MLD shall not buffer aMeasurement MMPDU.” |

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 5912 | Li-Hsiang Sun | 9.4.2.295b.2 | 131.23 | In EML Capability subfield sent by AP, the values of EMLSR delay EMLMR delay, EMLMR Rx NSS, EMLMR Tx NSS should be reserved so they can be reused for other purpose later | AP set these fields to 0 | Revised.Agree with the commenter.In TGbe D1.5, “(#1773)(#2603)(#3206)(#2745)(#2917)(#7335)The EMLSR Padding Delay subfield indicates the minimumMAC padding duration of the Padding field of the initial Control frame requested by the non-AP MLD as defined in 35.3.17 (Enhanced multi-link single radio operation). (#8168)When the EMLSR Padding Delay subfield is included in a frame sent by an AP affiliated with an AP MLD, the EMLSR Padding Delay subfield is set to 0.” And “When the EMLMR Delay subfield is included in a frame sent by an AP affiliated with an AP MLD, the EMLMR Delay subfield is set to 0.” To editor: no changes needed. |
| 7580 | Tomoko Adachi | 9.4.2.295b.2 | 131.37 | When the EMLSR Support subfield and the EMLMR Support subfield are exclusive, it seems only one field is enough to indicate the delay, i.e., no need to define both the EMLSR Delay subfield and the EMLMR Delay subfield but a single delay subfield. Verify if these two subfields are needed. | As in comment. | Rejected.Since the two features are independent features, it is better to separate information of subfields in the EML Capabilities subfield for a simpler implementation. Also, the EMLSR Padding Delay subfield and the EMLMR Delay subfield are each 3 bit and combining those two fields doesn’t save any overhead since the EML Capabilities subfield will be still 2 octets. |

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 6349 | Minyoung Park | 35.3 | 246.15 | The spec does not clearly define whether APs in an AP MLD synchronize their clocks (TSF) to a reference clock so that the clocks of the APs don't drift away from each other. The clocks of the APs need to be synchronized to a reference clock and drifts need to be compensated so that a non-AP MLD can simply rely on a beacon on one link and doesn't need to receive beacons from the other links and know the correct TSF of the other links. | Define a requirement in the spec that requires APs in an AP MLD synchronize their clocks to a reference clock (the clock of one of the APs) and compensate potential clock drifts. | Revised.Agree with the commenter. In D1.5, a sentence is added to require an AP MLD to correct the clock drift as follows.“(#6967)An AP MLD or an NSTR mobile AP MLD shall correct the clock drift to be within ±30 µs betweenTSF timers of any two APs affiliated with the AP MLD or the NSTR mobile AP MLD.”To editor: no changes needed. |
| 5747 | Laurent Cariou | 9.4.2.295b.2 | 133.49 | non-AP MLD needs to know TSF offset of the different APs. We should have a field to convey that information | as in comment | Revised.Agree with the commenter. The TSF Offset subfield is added to the STA Info field of Basic Multi-Link element.TGbe editor to make the changes with the CID tag (#5747) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 5905 | Li-Hsiang Sun | 35.3.2.2 | 248.25 | How does a non-AP MLD get the TSF of another link if timestamp is not included? | Add a requirement that the non-AP MLD has to listen to beacon or probe response on the reported link at least once after setup | Revised.Instead requiring a non-AP MLD to keep switching links to receive beacon/probe response frames, the TSF Offset subfield is added to the STA Info field of Basic Multi-Link element so that a non-AP MLD can stay on one link and still get the TSF of another link.TGbe editor to make the changes with the CID tag (#5905) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**TGbe Editor to make the following changes in Subclause 9.4.2.312.2.3 (Link Info field of the Basic Multi-Link element):**

**9.4.2.312.2.3 Link Info field of the Basic Multi-Link element(#7567)**

**…**

The format of the STA Control field is defined in Figure 9-1002n (STA Control field format (#5784)(#1906)(#1907) (#1078) (#1475) (#2981)(#4453)(#4457)).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 | B6 | B7 | B8 | B8 | B10 | B11 | B12 B15 |
|  | Link ID | Complete Profile | MACAddress Present | Beacon Interval Present | TSF Offset Present | DTIM Info Present | NSTRLink Pair Present | NSTRBitmap Size | BSS Parameters Change Count Present | Reserved |
| Bits: | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |

**Figure 9-1002n—STA Control field format(#5784)(#1906)(#1907)(#1078)(#1475)(#2981)(#4453)(#4457) (#5747, 5905)**

**…**

The Beacon Interval Present subfield indicates the presence of the Beacon Interval subfield in the STA Info field and is set to 1 if the Beacon Interval subfield is present in the STA Info field; otherwise set to 0. (#8286)A non-AP STA sets the Beacon Interval Present subfield to 0 in the transmitted (#6700)Basic MultiLink element. An AP sets this subfield to 1 when the element carries complete profile. (#6965)An AP affiliated with an NSTR mobile AP MLD and that is operating on the nonprimary link set this subfield to 0.

(#5747, 5905)The TSF Offset Present subfield indicates the presence of the TSF Offset subfield in the STA Info field and is set to 1 if the TSF Offset subfield is present in the STA Info field; otherwise set to 0. A non-AP STA sets the TSF Offset Present subfield to 0 in the transmitted Basic Multi-Link element. An AP sets this subfield to 1 when the element carries complete profile.

…

(#8288)(#6366)The format of the STA Info field is defined in Figure 9-1002o (STA Info field format(#5044)(#6366)(#4453)(#4457)).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| STA Info Length | STA MACAddress | Beacon Interval | TSF Offset | DTIM Info | NSTRIndication Bitmap | BSS Parameters Change Count |

 Octets: 1 0 or 6 0 or 2 0 or 8 0 or 2 0 or 1 or 2 0 or 1

**Figure 9-1002o—STA Info field format(#5044)(#6366)(#4453)(#4457) (#5747, 5905)**

(#6366)(#1035)The Beacon Interval subfield of the STA Info field is defined in 9.4.1.3 (Beacon Interval
field) and carries the value of beacon interval for the reported AP.

(#5747, 5905)The TSF Offset subfield of the STA Info field indicates the offset (*T*offset) in 2 µsec unit between the TSF timer of the reported AP (*T*A) and the TSF timer of the reporting AP (*T*B) and represented in 2s complement signed integer. *T*offset is calculated as *T*offset = Floor((*T*A-*T*B)/2).

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 5138 | Geonjung Ko | 9.4.2.295e | 154.38 | When all TIDs are mapped to downlink of all links (regardless of whether all TIDs are mapped to all uplink), it would be beneficial to indicate the recommended link for retrieving BU. | Change "a non-AP MLD that is in the default mapping mode" to "a non-AP MLD that is in the TID-to-link mapping where all TIDs are mapped to downlink of all links". | Revised.Agree with the commenter. For the link recommendation, added a sentence for the case that all TIDs are mapped to all the enabled links.TGbe editor to make the changes with the CID tag (#5138) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**9.4.2.315 Multi-Link Traffic Indication element(#4107)(#2341)**

**…**

Each bit in the Per-Link Traffic Indication Bitmap subfield corresponds to a link on which a STA affiliated with a non-AP MLD is operating, with the bit position *i* of the bitmap, B*i*, corresponding to a link with link ID equal to *i*. When the Per-Link Traffic Indication Bitmap subfield corresponds to a non-AP MLD that has successfully negotiated TID-to-link mapping (#5138)and not all TIDs are mapped to all the enabled links, a value of 1 in the bit position *i* in the bitmap indicates that there is buffered BU(s) with TID(s) mapped to the link with the link ID equal to *i* or MMPDU(s); a value of 0 in a bit position in the bitmap indicates that there is no buffered BU(s) with TID(s) mapped to the corresponding link nor MMPDU(s). When the Per-Link Traffic Indication Bitmap subfield corresponds to a non-AP MLD that is in the default mapping mode (#5138)or has negotiated a TID-to-link mapping with an AP MLD and all TIDs are mapped to all the enabled links, a value of 1 in the bit position *i* in the bitmap indicates that the link with the link ID equal to *i* is recommended for retrieving buffered BU(s).

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 5760 | Laurent Cariou | 35.3.10.4 | 267.07 | Check if changes are needed in baseline power management subclause 11.2. Likely we need to say that a STA affiliated to an AP MLD shall follow the rules defined in 11.2 except for some exceptions (for instance mentioning where the BUs are buffered,...) | as in comment | Rejected.This is invalid comment. It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined. |
| 6502 | Pascal VIGER | 35.3.10.4 | 267.08 | The chapter 35.3.10.4 only relates to indication of traffic at AP, and that is adapted to support multiple links.There is also a need for a STA to report pending UL traffic and the expected link as preference (typically STA is content producer). | Similar to '10.30.4 Unscheduled PSMP' forU-APSD STAs, STAs can signal the queue size or TXOP duration along with a LinkID required to transmit its queued data to the AP in the QoS Control field of the U-APSD trigger frame.This information might be used by the AP to estimate the triggered PPDU's duration and the appropriate link to use so that the STA can transmit the queued data. | Rejected.BSRP/BSR enables delivery of buffer status report to an AP MLD to assist allocation of UL MU resources. |
| 4389 | Arik Klein | 35.3.10.4 | 267.09 | If the AID is assigned per non-AP MLD as a mandatory - it shall be reflected in the corresponding normative operation of both AP affiliated with AP MLD and non-AP STA affiliated with non-AP MLD in PS mode, as described in the sections 11.2.3.6 (AP operation) and 11.2.3.7 (Receive operation for STAs in PS mode).Currently these section are not included in the 802.11 TGbe D1.0 | Add the "AP MLD" / "non-AP MLD" terms to the relevant normative behavior for AP affiliated with AP MLD / non-AP STA affiliated with non-AP MLD in 11.2.3.6 and 11.2.3.7 | Rejected.Normative behaviors related to multi-link power management (i.e. MLD) is defined in subclause 35.3.12 (Multi-link power management).  |
| 6247 | Ming Gan | 35.3.10.4 | 267.17 | The bit setting in partial virtual bitmap of TIM element is related to individual addressed BU, including MSDU and MMPDU, please combine this with the following paragraph. | as in the comment | Rejected.This is invalid comment. It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined. |
| 6248 | Ming Gan | 35.3.10.4 | 267.29 | The bit setting in partial virtual bitmap of TIM element is related to individual addressed BU, including MSDU and MMPDU, please combine this with the above paragraph. | as in the comment | Rejected.This is invalid comment. It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined. |
| 4749 | Chunyu Hu | 35.3.10.4 | 267.46 | The description from "If a non-AP MLD has successfully negotiated ..." and "If a non-AP MLD is in the default mapping mode ..." describes the the per-link TIM bitmap setting in the default and negotiated TID-to-link mapping cases. However, first, we should mention that the AP MLD shalll make sure at least one bit of the per-link bitmap for that AID is set to 1; and if one agrees, secondly, we can unify these two cases -- even in the case of negotiated TID-to-link mapping, AP should be allowed to indicate preferred link as in the default TID-to-link mapping. | As commented | Revised.In D1.5, the following case is added to indicate recommended link for the TID-to-link mapping when all TIDs are mapped to all links:“(#8264)An AP MLD shall set dot11MultiLinkTIMActivated to true if dot11TIDtoLinkMappingActivated istrue and if any of the following conditions is met and otherwise shall set to false:…— The AP MLD intends to provide link recommendations to at least one of the associated non-APMLD(s) that has successfully negotiated a TID-to-link mapping with the AP MLD and all TIDs aremapped to all the enabled links and the AP MLD has buffered BU(s) for that non-AP MLD…”To editor: no changes needed. |
| 5149 | Geonjung Ko | 35.3.10.4 | 267.52 | Following the current spec, if all TIDs are mapped to downlink of all links and a BU of a TID is buffered, all bits that correspond to the TID in the Per-Link Traffic Indication Bitmap subfield are set 1. That is, the Per-Link Traffic Indication Bitmap subfield in the Multi-Link Traffic element does not have much information.In that case, it would be helpful to indicate the recommended link for retrieving BU. | The Per-Link Traffic Indication Bitmap subfield can indicate the recommended link for retrieving BU, if all TIDs are mapped to downlink of all links. | Revised.In D1.5, the following case is added to indicate recommended link for the TID-to-link mapping when all TIDs are mapped to all links:“(#8264)An AP MLD shall set dot11MultiLinkTIMActivated to true if dot11TIDtoLinkMappingActivated istrue and if any of the following conditions is met and otherwise shall set to false:…— The AP MLD intends to provide link recommendations to at least one of the associated non-APMLD(s) that has successfully negotiated a TID-to-link mapping with the AP MLD and all TIDs aremapped to all the enabled links and the AP MLD has buffered BU(s) for that non-AP MLD…”To editor: no changes needed. |
| 5762 | Laurent Cariou | 35.3.10.4 | 267.53 | I assume we need to also add description for TWT | as in comment | Rejected.This is invalid comment. It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined.The procedure defined in this subclause is related to TIM and multi-link traffic indication and how to retrieve when a non-AP MLD knows there is buffered BU at the AP MLD. TWT is not related to this procedure. |
| 6885 | Rubayet Shafin | 35.3.10.4 | 268.31 | In this page, discussion have been provided for traffic indication for U-APSD. How about for other power management mechanism such as TWT? | Corresponding rules/description should be provided for other power management mechanism including TWT operation. | Rejected.This is invalid comment. It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined.The procedure defined in this subclause is related to TIM and multi-link traffic indication and how to retrieve when a non-AP MLD knows there is buffered BU at the AP MLD. TWT is not related to this procedure. |
| 7418 | SunHee Baek | 35.3.10.4 | 268.32 | The first paragraph and the second paragraph have similar condition. The second paragaph shows the case there is present the Multi-Link Traffic element in a Beacon frame, which means the first paragraph shows the opposite case that there is not present the element? | Please add "and the Multi-Link Traffic element is not present in a Beacon frame," | Rejected.The first paragraph is the baseline behavior for a non-AP MLD in the default mapping mode that also covers all the cases that are not covered in the second paragraph (e.g., when the multi-link traffic indication element is present but the Per-Link Traffic Indication Bitmap for the non-AP MLD is not included in the element).The second paragraph is describing a recommendation when the Multi-link Traffic Indication element is included in a beacon.  |

**Discussion (#7418)**:

…

(first paragraph)

When a non-AP MLD that is in the default mapping mode (see 35.3.7.1.2 (Default mapping mode)) detects
that the bit corresponding to its AID is 1 in the TIM element, any STA affiliated with the non-AP MLD may
issue a PS-Poll frame, or a U-APSD trigger frame if the STA is using U-APSD and all ACs are delivery
enabled, to retrieve buffered BU(s) (#8239)from the AP MLD.

(second paragraph)
When a non-AP MLD that is in the default mapping mode (see 35.3.7.1.2 (Default mapping mode)) detects
that the bit corresponding to its AID is 1 in the TIM element and the Multi-Link Traffic element is present in
a Beacon frame (#8181)and the Multi-Link Traffic Indication element includes a per-link traffic indication
bitmap that corresponds to the non-AP MLD, any STA affiliated with the non-AP MLD that operates on the
link(s) indicated as 1 in the per-link traffic indication bitmap should issue a PS-Poll frame, or a U-APSD
trigger frame if the STA is using U-APSD and all ACs are delivery enabled, to retrieve buffered BU(s)
(#8239)from the AP MLD.

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | Resolution |
| 7822 | Yiqing Li | 35.3.10.4 | 267.41 | Please clarify how to select k. | As commented. | Revised.Clarified the selection of k.TGbe editor to make the changes with the CID tag (#7822) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 6984 | Sanghyun Kim | 35.3.10.4 | 268.21 | It is unclear how the Bitmap Size subfield value is determined.Please define rules to set Bitmap size subfield value. | As in the comment | Revised.Clarified the selection of the Bitmap Size subfield.TGbe editor to make the changes with the CID tag (#6984) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**35.3.12.4 Traffic indication**

**…**

(#1432)(#1697)(#2136)(#2153)(#2341)(#2342)(#3149)An AP affiliated with an AP MLD shall include the (#4107)Multi-Link Traffic Indication element (see 9.4.2.315 (Multi-Link Traffic Indication element(#4107)(#2341))) in a Beacon frame it transmits if at least one of the associated non-AP MLD has successfully negotiated a TID-to-link mapping (see 35.3.7.1.3 (Negotiation of TID-to-link mapping)) with the AP MLD (#8037)for DL or bidirectional traffic and the AP MLD has buffered BU(s) for the non-AP MLD. The (#4107)Multi-Link Traffic Indication element includes Per-Link Traffic Indication Bitmap subfield(s) (#4469)in the Per-Link Traffic Indication Bitmap List field. The Per-Link Traffic Indication Bitmap subfield(s) corresponds to the AID(s) of the non-AP MLD(s) (#6733)(#5148)or STA(s), starting from the bit number *k* of the traffic indication virtual bitmap(#4469). The AID Offset subfield of the (#4107)Multi-Link Traffic Indication Control field of the (#4107)Multi-Link Traffic Indication element contains the value *k*. (#7822)The value k is set to the value of the AID of the non-AP MLD that corresponds to the first Per-Link Traffic Indication Bitmap subfield in the Per-Link Traffic Indication List field. The order of the Per-Link Traffic Indication Bitmap subfield(s) follows the order of the bits that are set to 1 in the Partial Virtual Bitmap subfield of the TIM element that corresponds to the AID(s) of the non-AP MLD(s) (#6733)(#5148)or STA(s). (#6984)The Bitmap Size subfield is set to the largest value of the Link IDs of the non-AP MLD(s) that are set to 1 in the corresponding bits in the Per-Link Traffic Indication Bitmap subfield(s) that are included in the Multi-Link Traffic Indication element. If a non-AP MLD has successfully negotiated a TID-to-link mapping with an AP MLD with a nondefault mapping, the bit position *i* of the Per-Link Traffic Indication Bitmap subfield that corresponds to the link with the link ID equals to *i* on which a STA of the non-AP MLD is operating shall be set to 1 if the AP MLD has buffered BU(s) with TID(s) that are mapped to that link or MMPDU(s) for that non-AP MLD, otherwise the bit shall be set to 0. If a non-AP MLD is in the default mapping mode (see 35.3.7.1.2 (Default mapping mode)), the bit position *i* of the Per-Link Traffic Indication Bitmap subfield that corresponds to the link with the link ID (#7821)equals to *i* on which a STA affiliated with the non-AP MLD is operating may be set to 1 to indicate to the non-AP MLD a link on which buffered BU(s) should be retrieved. An example of the construction of the (#4107)Multi-Link Traffic Indication element is shown in Figure 35-11 (Example of Multi-Link Traffic Indication element construction(#8180)(#4107)). (#5041)A non-AP MLD that successfully negotiated a TID-to-link mapping with an AP MLD with a nondefault mapping shall determine which AP has buffered BU(s) with TID(s) or MMPDU(s) by interpreting a Multi-Link Traffic Indication element.

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 5773 | Laurent Cariou | 35.3.15 | 281.17 | eMLSR has been introduced a bit late compared to other modes like NSTR and has therefore been introduced as optional. However, support for operation with non-AP MLD with the other main modes is mandatory at the AP MLD side (NSTR, STR). It would make sense that all the main modes are actually mandatory supported on all AP MLDs. On top of that, eMLSR has shown significant gains and is clearly a very important features for MLO in 11be. Also complexity to support eMLSR for an AP MLD that already supports operation for NSTR or STR non-AP MLD is relatively minor. | Make eMLSR support mandatory on AP MLD side. | Rejected.~~Although the EMLSR operation shows benefits in terms of throughput and latency by enabling multi-link operation with similar complexity compared to 802.11ax,~~ The task group’s consensus has not been reached to make this feature mandatory. The debate on doc 11-22/349r2 can be found in the task group email thread at: https://www.ieee802.org/11/email/stds-802-11-tgbe/msg06974.html |
| 4932 | Eldad Perahia | 35.3.15 | 281.19 | "A non-AP MLD may operate in the EMLSR mode on the enabled links between the non-AP MLD and its associated AP MLD". Make this operation default and mandatory | as in comment | Rejected.~~Although the EMLSR operation shows benefits in terms of throughput and latency by enabling multi-link operation with similar complexity compared to 802.11ax,~~ The task group’s consensus has not been reached to make this feature mandatory. The debate on doc 11-22/349r2 can be found in the task group email thread at: https://www.ieee802.org/11/email/stds-802-11-tgbe/msg06974.html |
| 6586 | Payam Torab Jahromi | 35.3.15 | 281.17 | The eMLMR/MLSR definnitions do not allow a valid realization of an MLD in the form of a shared baseband/radio for different sets of links and dedicated baseband/radios for others. For example, a 3-STA MLD with one radio used for 2.4/5 and another for 6GHz (or one for 2.4/5 and another for 6). Generally text and concepts around eMLSR and eMLMR operation in current draft stay valid or slightly modified, but the relationship and operation should be viewed as link-level instead of device level. | Develop text along the following lines,- Consider renaming eMLSR to enhanced multi-link shared radio (many single-radio instances chnaged to shared radio)- Shared radio is a realtionship between two links (it is roughly NSTT + NSRR if borrowing from STR/NSTR acronyms)- eMLSR/eMLMR operatiuon definitions unchanged- changes to capabilities (MLD, EML) and similar definitions | Revised.In D1.4/1.5, the EMLSR defined the EMLSR links that indicate a subset of the enabled links of a non-AP MLD that operates in the EMLSR mode.In D1.5, the EMLMR also defined the EMLMR links that indicate a subset of the enabled links of a non-AP MLD that operates in the EMLMR mode.To editor: no changes needed. |
| 7825 | Yiqing Li | 35.3.14.8 | 281.17 | It is unclear how to receive the management frame under the EMLSR mode for non-AP MLD. Suggest to describe the details for receiving beacon and other management frames. | As commented. | Revised.A non-AP MLD that is operating in the EMLSR mode follows the same rules for beacon reception as a non-AP MLD that is not in the EMLSR mode. Added a note clarifying that a STA affiliated with a non-AP MLD that is operating in the EMLSR mode receives beacon frames at scheduled beacon transmission times.TGbe editor to make the changes with the CID tag (#7825) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**35.3.17 Enhanced multi-link single radio operation**

**…**

(#6964)NOTE 5—When an AP affiliated with the AP MLD transmits an initial Control frame that initiates frame
exchanges with more than one non-AP MLD operating in the EMLSR mode, the AP ensures that the padding duration of
the Padding field of the initial Control frame is greater than or equal to the maximum of the values indicated in the
EMLSR Padding Delay subfield of the Basic Multi-Link element received from the non-AP MLDs with which the frame
exchanges are initiated.

(#7825)NOTE – A STA affiliated with a non-AP MLD that is operating in the EMLSR mode can receive Beacon frames at scheduled beacon transmission times (i.e., TBTT).

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 7867 | Yongho Kim | 35.3.15 | 281.17 | Depending on the number of spatial streams that a STA of a non-AP MLD uses to transmit BA, switching time to a listening is different. If BA is transmitted using one spatial stream, right after the last data reception (in case of multiple data transmission in a procedure), the other links can be switched back to a listening mode. | Define a procedure for a non-AP MLD to go back to a listening mode depending on the spatial streams a STA uses for BA transmission. | Rejected.In D1.4, the following rule requires a STA of a non-AP MLD that is exchanging frame exchanges with an AP of an AP MLD to wait for a time interval (SIFS+SlotTime+RxPHYStartDelay) and see if there is any frame following the most recently transmitted BA (i.e. immediate response). Therefore, the procedure to switching back to the listening operation does not depend on the number of spatial streams:“The MAC of the STA affiliated with the non-AP MLD that received the initial Control frame does not receive a PHY-RXSTART.indication primitive during a timeout interval of aSIFSTime + aSlotTime + aRxPHYStartDelay starting at the end of the PPDU transmitted by the STA of the non-AP MLD as a response to the most recently received frame from the AP affiliated with the AP MLD or starting at the end of the reception of the PPDU containing a frame for the STA fromthe AP affiliated with the AP MLD that does not require immediate acknowledgement.” |
| 7866 | Yongho Kim | 35.3.15 | 281.29 | For short data frames, it is a lengthy procedure to deliver short data frames starting from transmitting MU-RTS trigger frame. Just transmitting short data frames would be more efficient than using multiple spatial streams with lengthy procedure. For this purpose, a non-AP MLD shall be allowed to operate as a normal single STA, which is able to receive normal data frame without starting a frame exchange sequence by receiving the initial control frame, on one link. For this, one of the enabled links may be designated as a primary link on which a STA of a non-AP MLD can start a frame exchange sequence either by receiving a data frame or by receiving MU-RTS trigger frame. | Define a procedure for a STA of non-AP MLD to receive normal data frames using one spatial stream on a link. | Rejected.Making a STA on one of the EMLSR links to receive and decode any data frame assumes a certain implementation architecture and this would put unnecessary constraints to implementers. This also adds unnecessary complexity to the EMLSR operation: signaling of a primary link, maintaining the primary link of each non-AP MLD in the EMLSR mode, etc. |
| 6326 | Ming Gan | 35.3.15 | 281.51 | It seems DL transmission always starts with initial control frame exchange, this is not efficient way. For single radio MLD, could there is primary link such that the AP MLD could start DL transmission without initial control frame exchange. |  | Rejected.Making a STA on one of the EMLSR links to receive and decode any data frame assumes a certain implementation architecture and this would put unnecessary constraints to implementers. This also adds unnecessary complexity to the EMLSR operation: signaling of a primary link, maintaining the primary link of each non-AP MLD in the EMLSR mode, etc. |
| 4757 | Chunyu Hu | 35.3.15 | 281.44 | The corresponding paragraph describes the EML capability subfield, and it's best to group this paragraph to be after the 2nd paragraph in this subclause -- a common place to describe the setting of parameters for this operation. | As commented | Revised.Agree with the commenter on reorganizing the subbullet points.TGbe editor to make the changes with the CID tag (#4757) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |
| 7422 | SunHee Baek | 35.3.15 | 281.47 | How about moving fifth subpart to first because the AP MLD initiate the frame exchange under EMLSR operation? And then the sentence is modified as "specified below." | Please move the subpart to the first supart and modify the last part of the sentence like "specified below." | Revised.Agree with the commenter on reorganizing the subbullet points.TGbe editor to make the changes with the CID tag (#7422) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**35.3.17 Enhanced multi-link single radio operation**

**…**

When a non-AP MLD is operating in the EMLSR mode with an AP MLD supporting the EMLSR
mode(#8047), the following applies:
— (#4759)(#5766)(#6342)The non-AP MLD shall be able to listen on the EMLSR links, by having its
affiliated STA(s) corresponding to those links in awake state. The listening operation includes CCA
and receiving the initial Control frame of (#4758)frame exchanges that is initiated by the AP MLD.

(#7422)below:

• The initial Control frame of (#4758)frame exchanges shall be sent in the OFDM PPDU or non-HT
duplicate PPDU format using a rate of 6 Mbps, 12 Mbps, or 24 Mbps.

• (#4757)
• The initial Control frame shall be an MU-RTS Trigger frame or a BSRP Trigger frame.
(#1582)Reception of MU-RTS and BSRP Trigger frames is mandatory for a non-AP MLD that is in
the EMLSR mode. The number of spatial streams for the response to the BSRP Trigger frame shall
be limited to one.
(#4757)

(#7422)

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 8049 | Yuchen Guo | 35.3.15 | 281.44 | The non-AP MLD may need different delay time durations after receiving the initial control frame of MU-RTS or the BSRP, because the control response frames are non-HT (duplicate) PPDU and TB PPDU, respectively. | non-AP MLD can indicate two padding durations, one for MU-RTS, the other for BSRP. | Rejected.The current assessment is that MU-RTS and BSRP don’t need different minimum MAC padding duration. In case there is difference in the minimum MAC padding duration between MU-RTS and BSRP, a non-AP MLD can indicate a larger value to the AP MLD. |
| 6962 | Sanghyun Kim | 35.3.15 | 281.58 | The sentence says that the AP MLD shall not transmit frames to the non-AP MLD on the other link(s). But there is no rule to defer frame transmission of the AP MLD."During the frame exchange sequence, the AP MLD shall not transmit frames to the non-AP MLDs on the other links(s)." | Please provide channel access procedure for the AP of the other link deferring the frame Tx initiation. | Rejected.During the frame exchanges on one of the EMLSR links, the APs on the other EMLSR links follow the same channel access rules defined in TGbe D1.5 and baseline spec to access the wireless medium to transmit frames to the STAs of the other non-AP MLDs.  |
| 5934 | Li-Hsiang Sun | 35.3.1.5 | 281.60 | There should be a requirement of applying mediumsyncdelay after switching back to the listening operation on the enabled links | as in comment | Revised.In TGbe D1.5, the procedure has been added in 35.3.16.8 (Medium access recovery procedure) P420L8.To editor: no changes needed. |
| 7423 | SunHee Baek | 35.3.15 | 283.15 | A citation is needed about EML Operating Mode Notification frame. | Add a citation, (see 9.6.34.3 (EML Operating Mode Notification frame format)). | Revised.Added a reference to the EML Operation Mode Notification frame format to the first appearance of the EML Operating Mode Notification frame in the subclause.TGbe editor to make the changes with the CID tag (#7423) in doc.: IEEE 802.11-22/306r5[https://mentor.ieee.org/802.11/dcn/22/11-22-0306-05-00be-cc36-cr-emlsr-misc.docx] |

**35.3.18 Enhanced multi-link multi-radio operation**A non-AP MLD may operate in the EMLMR mode on a specified set of the enabled links between the non-AP MLD and its associated AP MLD. The specified set of the enabled links in which the EMLMR mode is applied is called EMLMR links. (#4425)The EMLMR links shall be indicated in the EMLMR Link Bitmap subfield of the EML Control field of the EML Operating Mode Notification frame (#7423)(see 9.6.34.3 (EML Operating Mode Notification frame format)) by setting the bit positions of the EMLMR Link Bitmap subfield to 1.