IEEE P802.11
Wireless LANs

|  |
| --- |
| LB266 Comment Resolution Clause 35.3.17 EMLSR Part3 |
| Date: 2022-8-26 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Minyoung Park | Intel Corporation |  |  | Minyoung.park@intel.com |
|  |  |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes comment resolution(s) for the following 39 CID(s) received in LB266 on TGbe D2.0 related to 35.3.17 EMLSR Operation:

CIDs:

11162, 13644, 13645, 12274, 13648, 10155, 13411, 13416, 14000, 11454

11455, 10088, 13593, 10869, 11459, 12814, 13815, 10100, 12680, 11461

12681, 12682, 13705, 13590, 13591, 11758, 13006, 10169, 12449, 12450

12522, 13861, 10164, 13421, 11615, 10926, 13592, 10361, 10928

Revisions:

* Rev 0: Initial version of the document. (CID 10869 moved from document 11-22/1129 to this document)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 11162 | Boon Loong Ng | 35.3.17 | 461.55 | The EMLSR operation procedure for P2P/TDLS communication is currently missing and needs to be described in the spec. | As in comment. | Rejected.In TGbe D2.1.1, TDLS between two non-AP MLDs are defined for a single link whereas EMLSR operation is used for better channel access across multiple links. Please see below in D2.1.1 in clause 35.3.21 (TDLS procedure in multi-link operation) “A TDLSSTA affiliated with a non-AP MLD that has dot11EHTBaseLineFeaturesImplementedOnly equal to true shall only negotiate TDLS over a single link.” |
| 13644 | Rubayet Shafin | 35.3.17 | 461.55 | While a non-AP MLD is communicating with its associated AP MLD and is operating under the EMLSR mode, how it is possible for the non-AP MLD to establish one or multiple peer-to-peer links with another peer non-AP MLD is not clear based on the latest IEEE 802.11be specification. Also, the P2P setup procedure, while operating in the EMLSR mode, is currently missing in the spec. | Please provide text on the procedures to transition into P2P mode when the non-AP MLD has been in EMLSR mode with its associated AP MLD. | Rejected.TDLS direct link setup is transparent to an AP MLD and can be setup between two non-AP MLDs in EMLSR mode. |
| 13645 | Rubayet Shafin | 35.3.17 | 461.55 | Assuming two non-AP MLDs have already set up peer-to-peer link(s) over one or multiple links between the two non-AP MLDs, the procedure for turning on the EMLSR mode for the P2P communication between the two non-AP MLDs is not defined. Moreover, the procedure for EMLSR operation for P2P communication between two non-AP MLDs is currently missing in the spec. | Procedures for turning on EMLSR mode and EMLSR operation between two non-AP MLDs communicating over the P2P links needs to be described in the spec. | Rejected.In TGbe D2.1.1, TDLS between two non-AP MLDs are defined for a single link whereas EMLSR operation is used for better channel access across multiple links. Please see below in D2.1.1 in clause 35.3.21 (TDLS procedure in multi-link operation) “A TDLSSTA affiliated with a non-AP MLD that has dot11EHTBaseLineFeaturesImplementedOnly equal to true shall only negotiate TDLS over a single link.” |
| 12274 | Rajat Pushkarna | 35.3.17 | 463.18 | Will there be changes required in case when STA affiliated with an NSTR non-AP MLD or an EMLSR non-AP MLD performs transmission on a TDLS link with a legacy device? | Procedure needs to be described for the scenario described in comment. | Rejected.This is invalid comment as the comment is asking a question. There are no changes required for the described scenario. |
| 13648 | Rubayet Shafin | 35.3.17 | 461.55 | For the scenario where multiple TWT agreements/schdules or restricted TWT schedules are established on multiple links between an AP MLD and a non-AP MLD, and if those links are also included in the EMLSR links and if the TWT service periods (SPs) on those links are overlapping in time or nearly overlapping in time, then, due to the nature of EMLSR operation, the r-TWT frame exchanges on either of the links may not be successful. | The spec needs to provide text to address the issue EMLSR operation with multiple overlapping r-TWT SPs on multiple links. | Rejected.When rTWT SPs are overlapped across multiple links, during the rTWT SPs, the STAs operating on those links are in awake state and waits for an initial control frame from the AP MLD. When an initial control frame is received on one of the rTWT SPs, the AP MLD and the non-AP MLD exchange frames on that link and frames are not exchanged on the other rTWT SPs. |
| 10155 | Julien Sevin | 35.3.17 | 462.33 | An AP MLD has not the possibility to refuse an EML Operating Mode Notification frame and shall accept that the non-AP MLD operates in EMLSR Mode which is not necessarly possible if the the AP MLD is a NSTR mobile AP MLD. | Specify a procedure allowing an AP to refuse an EML Operating Mode Notification frame transmitted by the non-AP MLD initiating an EMLSR mode | Rejected.The EMLSR operation in TGbe D2.1.1 is defined between an AP MLD and a non-AP MLD and is not defined for a NSTR mobile AP. |
| 13411 | Liwen Chu | 35.3.17 | 462.44 | This is not in line with unicast management frame Tx rule where any link can be used for the unicast management frame transmission with some exceptions. | Fix the issues mentioned in the comment | Revised.Updated the text to cover the case when the EML OMN frame is transmitted by any STA affiliated with a non-AP MLD.TGbe editor to make the changes with the CID tag (#13411) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13416 | Liwen Chu | 35.3.17 | 463.09 | This is not in line with unicast management frame Tx rule where any link can be used for the unicast management frame transmission with some exceptions. | As in comment. | Revised.Updated the text to cover the case when the EML OMN frame is transmitted by any STA affiliated with a non-AP MLD.TGbe editor to make the changes with the CID tag (#13411) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 14000 | Geonjung Ko | 35.3.17 | 462.45 | According to the above description, the EML Operating Mode Notification frame can be sent on any link including both EMLSR links and non-EMLSR links. However, the behavior in lines 45-51 is only for the case the EML Operating Mode Notification frame was sent on one of EMLSR links. | Specify the STA behavior when the EML Operating Mode Notification frame was sent on a link that is not one of EMLSR links. | Revised.Updated the text to cover the case when the EML OMN frame is transmitted by any STA affiliated with a non-AP MLD.TGbe editor to make the changes with the CID tag (#14000) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 11454 | Gaurang Naik | 35.3.17 | 462.34 | The text is not consistent on which links the EML OMN frame is sent by the non-AP MLD and AP MLD. The first half of the paragraph states EML OMN may be sent on any link between the AP MLD and non-AP MLD. The second half of the paragraph implies the frame is sent on one of the EMLSR links. Make this consistent. It makes sense to perform exchanges of EML OMN frame only on the EMLSR links. | On L35, replace '...a STA affiliated with the non-AP MLD shall transmit an EML...' with ...'a STA affiliated with the non-AP MLD \*operating on one of the EMLSR links\* shall transmit an EML...'.On L40, replace '...should transmit an EML Operating Mode Notification frame to one of the STAs affiliated with the non-AP MLD...' with '...should transmit an EML Operating Mode Notification frame to one of the STAs affiliated with the non-AP MLD \*operating on the EMLSR links\*...' | Revised.CID 13411 commented that a unicast management frame can be transmitted on any enabled link. Instead of limiting to a STA operating on the EMLSR links, updated the text to cover the case when the EML OMN frame is transmitted by any STA affiliated with a non-AP MLD.For example, for the three-link example (2.4, 5, and 6GHz links), when 5 and 6 GHz links are selected as the EMLSR links. It is possible that a STA on 2.4 link that is in PS mode and in awake state can transmit the EML OMN frame and enable the EMLSR mode and after the timeout expires or receiving EML OMN frame, the EMLSR mode is enabled and the STAs on 5 and 6 links transition to active mode.TGbe editor to make the changes with the CID tag (#11454) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 11455 | Gaurang Naik | 35.3.17 | 462.56 | The text is not consistent on which links the EML OMN frame is sent by the non-AP MLD and AP MLD. The first half of the paragraph states EML OMN may be sent on any link between the AP MLD and non-AP MLD. The second half of the paragraph implies the frame is sent on one of the EMLSR links. Make this consistent. It makes sense to perform exchanges of EML OMN frame only on the EMLSR links. | On L57, replace '...a STA affiliated with the non-AP MLD shall transmit an EML...' with ...'a STA affiliated with the non-AP MLD \*operating on one of the EMLSR links\* shall transmit an EML...'.On L62, replace '...should transmit an EML Operating Mode Notification frame to one of the STAs affiliated with the non-AP MLD...' with '...should transmit an EML Operating Mode Notification frame to one of the STAs affiliated with the non-AP MLD \*operating on the EMLSR links\*...' | Revised.CID 13411 commented that a unicast management frame can be transmitted on any enabled link. Instead of limiting to a STA operating on the EMLSR links, updated the text to cover the case when the EML OMN frame is transmitted by any STA affiliated with a non-AP MLD.For example, for the three-link example (2.4, 5, and 6GHz links), when 5 and 6 GHz links are selected as the EMLSR links. It is possible that a STA on 2.4 link that is in awake state can transmit the EML OMN frame and disable the EMLSR mode and after the timeout expires or receiving EML OMN frame, the EMLSR mode is disabled and the STAs on 5 and 6 links are in PS mode/doze state.TGbe editor to make the changes with the CID tag (#11455) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |

***TGbe editor: Please modify the following paragraphs in TGbe D2.2 (prerelease-0401), P477L34:***

When a non-AP MLD with dot11EHTEMLSROptionImplemented equal to true intends to (#12675)enable
the EMLSR mode on the EMLSR links, a STA affiliated with the non-AP MLD shall transmit an EML
Operating Mode Notification frame with the EMLSR Mode subfield of the EML Control field of the frame
set to 1 to an AP affiliated with an AP MLD with dot11EHTEMLSROptionImplemented equal to true. An
AP affiliated with the AP MLD that received the EML Operating Mode Notification frame from the STA
affiliated with the non-AP MLD should transmit an EML Operating Mode Notification frame (#11456)with
the EML Control field set to the same value as the EML Control field in the received EML Operation Mode
Notification frame, after the AP MLD is ready to serve the non-AP MLD in the EMLSR mode operation, to
one of the STAs affiliated with the non-AP MLD within the timeout interval indicated in the Transition
Timeout subfield in the EML Capabilities subfield of the Basic Multi-Link element starting at the end of the
PPDU transmitted by the AP affiliated with the AP MLD (#11582)carrying the immediate
acknowledgement to the EML Operating Mode Notification frame transmitted by the STA affiliated with the
non-AP MLD. (#13411, 11454, 14000)After the successful transmission of the EML Operating Mode Notification frame by the STA affiliated with the non-AP MLD, the non-AP MLD shall operate in the
EMLSR mode and the other STAs operating on the corresponding EMLSR links shall transition to active mode after the transition delay indicated in the Transition Timeout subfield in the EML Capabilities subfield of the Basic
Multi-Link element or immediately after receiving an EML Operating Mode Notification frame from one of
the APs operating on the EMLSR links and affiliated with the AP MLD. One of the other STAs operating on the corresponding EMLSR link shall not transmit a frame with the Power Management subfield set to 1 before receiving the EML Operating Mode Notification frame from (#13415)one of the APs operating on the EMLSR links and affiliated with the AP MLD or before the end of the timeout interval.

When a non-AP MLD with dot11EHTEMLSROptionImplemented equal to true intends to disable the
EMLSR mode, a STA affiliated with the non-AP MLD shall transmit an EML Operating Mode Notification
frame with the EMLSR Mode subfield of the EML Control field of the frame set to 0 to an AP affiliated with
an AP MLD with dot11EHTEMLSROptionImplemented equal to true. An AP affiliated with the AP MLD
that received the EML Operating Mode Notification frame from the STA affiliated with the non-AP MLD
should transmit an EML Operating Mode Notification frame (#11456)with the EML Control field set to the
same value as the EML Control field in the received EML Operation Mode Notification frame, after the AP
MLD is no longer serving the non-AP MLD in the EMLSR mode operation, to one of the STAs affiliated
with the non-AP MLD within the timeout interval indicated in the Transition Timeout subfield in the EML
Capabilities subfield of the Basic Multi-Link element starting at the end of the PPDU transmitted by the AP
affiliated with the AP MLD (#11582)carrying the immediate acknowledgement to the EML Operating Mode
Notification frame transmitted by the STA affiliated with the non-AP MLD. (#13416, 11455, 14000)After the successful
transmission of the EML Operating Mode Notification frame by the STA
affiliated with the non-AP MLD, the non-AP MLD shall disable the EMLSR mode and the other STAs operating on the corresponding EMLSR links shall transition to power save mode after the transition delay indicated in the Transition Timeout subfield in the EML Capabilities subfield of the Basic Multi-Link element or
immediately after receiving an EML Operating Mode Notification frame from one of the APs operating on
the EMLSR links and affiliated with the AP MLD. One of the other STAs operating on the corresponding EMLSR link shall not transmit a frame with the Power Management subfield set to 0 before receiving the EML Operating Mode Notification frame from (#13415)one of the APs operating on the EMLSR links and affiliated with the AP MLD or before the end of the timeout interval.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 10088 | Xiangxin Gu | 35.3.17 | 463.52 | what is "link switch delay"? Please clarify it | As in the comment | Revised.Replaced with the minimum MAC padding duration.TGbe editor to make the changes with the CID tag (#10088) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13593 | Yongho Seok | 35.3.17 | 463.53 | "...the STA affiliated with the non-AP MLD shall be capable of receiving a PPDU that is sent using more than one spatial stream on the link in which the initial Control frame was received..."Please specify how many spatial stream shall be supported in the EMLSR mode.Especially, when the STAs affiliated with the non-AP MLD declare different supported spatial streams for each link, just saying more than one spatial stream is too general. | As in the comment. | Revised.Clarified that it is per-link capability indicated in the EHT Capabilities element.TGbe editor to make the changes with the CID tag (#13593) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 10869 | Yousi Lin | 9.4.1.74 | 190.45 | A non-AP MLD that is in EMLSR mode also has different per-link capabilities. And AP MLD needs to be informed about the capabilities. So EMLMR Supported MCS And NSS Set should be extended for both EMLMR and EMLSR. | as in comment | Revised.Each STA’s capabilities are indicated in each STA’s Per-STA Profile during the association process and when a non-AP MLD is operating in the EMLSR mode each STA’s capabilities are used. Clarified that each STA’s per-link capability is indicated in the EHT Capabilities element.TGbe editor to make the changes with the CID tag (#10869) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 11459 | Gaurang Naik | 35.3.17 | 463.54 | subject to its spatial stream capabilities, operating mode, ... shall be capable of receiving a PPDU that is sent using more than one spatial stream' The operating mode could be with just one spatial stream, in which case, the statement would not be true. | Chane 'more than one spatial stream' to 'one or more spatial stream'. | Revised.Clarified that the supported number of spatial streams is up to the value indicated in the EHT Capabilities element that corresponds to a STA affiliated with a non-AP MLD.TGbe editor to make the changes with the CID tag (#11459) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 12814 | Laurent Cariou | 35.3.17 | 463.59 | When a non-AP MLD that is in EMLSR mode receives the initial control frame (e.g., MU-RTS) that includes multiple users and during the TXOP when the non-AP MLD is not included in the frame exchanges anymore and the AP affiliated with the AP MLD only transmits data/management frames to the other non-AP MLDs, the non-AP MLD switches back to the listening operation by identifying that the frames in the PPDU is not addressed to the non-AP MLD. However relying on the address information in the MAC frames in the PPDU is problematic because the PPDU that is only destined for the other STAs could be using higher MCS than the one that the non-AP MLD can decode and also decoding time of the address information could vary depending on the type of frame and implementations (might need to wait for the FCS). This problem can be solved by limiting the type of PPDU when transmitting data/management frames to HE MU PPDU or EHT PPDU so that the non-AP MLD can just decode the PHY preamble and know whether the PPDU is for the non-AP MLD or not and decide to switch to the listening operation. | Add a sentence to limit the data/management frames to be transmitted in the HE MU PPDU or EHT PPDU during frame exchanges after successful initial control frame transmission by an AP affiliated with an AP MLD to a STA affiliated with a non-AP MLD in EMLSR mode. | Revised.Agree with the comment.The PPDU format of a Data/Management frame transmitted by an AP affiliated with an AP MLD to a STA affiliated with a non-AP MLD in EMLSR mode is limited to EHT MU PPDU or HE MU PPDU.TGbe editor to make the changes with the CID tag (#12814) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13815 | Yuchen Guo | 35.3.17 | 463.59 | "be switched back" should be "switch back" because the non-AP MLD switches back on its own, not be switched back by other entity | As in the comment | Rejected.This was the change based on CC36 (CID# 5222). The change “be switched back” was made to clarify that the non-AP MLD is in the listening operation rather than starting to switch back to the listening operation.  |
| 10100 | Minyoung Park | 35.3.17 | 463.61 | The spec needs to clarify that the EMLSR Transition Delay subfield is indicated by the non-AP MLD. | Revise the paragraph by inserting 'by the non-AP MLD' as follows:"The non-AP MLD shall be switched back to the listening operation on the EMLSR links after the time indicated by the non-AP MLD ..." | Accepted. |
| 12680 | Arik Klein | 35.3.17 | 464.01 | Need to use a unified terminology along the TGbe spec, and replace "of" with "affiliated with" in the following sentence: "The MAC of the STA affiliated with the non-AP MLD that received .... 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..." | Please correct the sentence as follows: "The MAC of the STA affiliated with the non-AP MLD that received .... at the end of the PPDU transmitted by the STA \*affiliated with\* the non-AP MLD as a response to the most recently received frame from the..." | Revised.Replaced ‘of’ with ‘affiliated with’.TGbe editor to make the changes with the CID tag (#12680) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 11461 | Gaurang Naik | 35.3.17 | 464.04 | Replace 'STAs of the non-AP MLD' with 'STAs affiliated with the non-AP MLD'. Same change on P464L11, P464L39. | As in comment | Revised.Replaced ‘of’ with ‘affiliated with’.TGbe editor to make the changes with the CID tag (#11461) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 12681 | Arik Klein | 35.3.17 | 464.08 | Need to use a unified terminology along the TGbe spec, and replace "of" with "affiliated with" in the following sentence: "The MAC of the STA affiliated with the non-AP MLD that received the initial Control frame receives 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 ..." | Please correct the sentence as follows: "The MAC of the STA affiliated with the non-AP MLD that received the initial Control frame receives a PHY-RXSTART.indication primitive ...starting at the end of the PPDU transmitted by the STA \*affiliated with\* the non-AP MLD as a response to the ...." | Revised.Replaced ‘of’ with ‘affiliated with’.TGbe editor to make the changes with the CID tag (#12681) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 12682 | Arik Klein | 35.3.17 | 464.39 | Need to use a unified terminology along the TGbe spec, and replace "of" with "affiliated with" in the following sentence: "When a STA of the non-AP MLD initiates a TXOP..." | Please correct the sentence as follows: "When a STA \*affiliated with\* the non-AP MLD initiates a TXOP..." | Revised.Replaced ‘of’ with ‘affiliated with’.TGbe editor to make the changes with the CID tag (#12682) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13705 | Yunbo Li | 35.3.17 | 464.08 | the switch back rules don't cover NDP frame. A NDP frame doesn't belong to any of following frames in the subbullets. So after a NDP frame is received, the non-AP MLD will switch back to listen mode. | add a bullet to cover NDP frames | Revised.Added ‘sounding NDP’ next to the NDP Announcement frame.TGbe editor to make the changes with the CID tag (#13705) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13590 | Yongho Seok | 35.3.17 | 464.28 | Sounding NDP is missing. | As in the comment. | Revised.Added ‘sounding NDP’ next to the NDP Announcement frame.TGbe editor to make the changes with the CID tag (#13590) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13591 | Yongho Seok | 35.3.17 | 464.39 | "When a STA of the non-AP MLD initiates a TXOP the following applies:"When a STA of the non-AP MLD initiates a TXOP on one of the ELMSR links, the AP MLD shall not send any frame to the non-AP MLD on the other EMLSR link.Please add the missing rules when the non-AP MLD operating in the EMLSR mode is a TXOP holder. | As in the comment. | Revised.Agree with the comment. Added a similar sentence suggested by the commenter.TGbe editor to make the changes with the CID tag (#13591) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 11758 | Gaurav Patwardhan | 35.3.17 | 464.40 | Add the word "all" to better define the EMLSR links to which the listening operation refers to. | Change "operation on the EMLSR links after" to "operation on all the EMLSR links after". | Rejected.Adding “all” is not correct since it depends on each STA’s power state. In TGbe D2.2, the clarification was made as follows:“The non-AP MLD shall be able to listen on the (#11457)EMLSR link(s), by having its affiliatedSTA(s) corresponding to those links in awake state.” With this sentence it is clear that the STAs operating on the EMLSR links that are in awake state returns to the listening operation. |
| 13006 | Chunyu Hu | 35.3.17 | 464.40 | After the transition delay, the non-AP MLD should be already switched back to the listening operation, rather than \*start\* to switch back. The current description is not accurate. | Change to "shall have been switched back". | Revised.Updated to “shall be switched”.TGbe editor to make the changes with the CID tag (#13006) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 10169 | Julien Sevin | 35.3.17 | 464.43 | The sentence "Only one STA affiliated with the non-AP MLD that is operating on one of the EMLSR links may initiate frame exchanges with the AP MLD" is not clear. what is the purpose of this sentence? | Please clarify or delete the sentence. | Rejected.This is invalid comment. The commenter is asking a question.The purpose is to clarify that only one STA affiliated with a non-AP MLD that operates on one of the EMLSR links can initiate TXOP. |
| 12449 | Ryuichi Hirata | 35.3.17 | 464.43 | If an STA affiliated with non-AP MLD in EMLSR mode uses non-EHT PHY, the STA may have constraints in CCA such as BW. In that case, the non-AP MLD may have constraints in transmission such as BW. | Solve the issue. | Rejected.A STA affiliated with a non-AP MLD in EMLSR mode follows the same CCA rules as a STA affiliated with a non-AP MLD not in EMLSR mode. |
| 12450 | Ryuichi Hirata | 35.3.17 | 464.43 | Non-AP MLD operating on the EMLSR links may have constraints on EMLSR operation due to PHY capability if an STA affiliated with the non-AP MLD is operating with non-EHT PHY. Non-AP MLD should inform PHY capability of STAs on the EMLSR links. | as in the comment | Rejected.Each STA’s PHY capabilities are indicated during the association process. |
| 12522 | Yusuke Tanaka | 35.3.17 | 464.43 | Description of non-AP MLD-driven transmissions operating in EMLSR mode is insufficient . For example, a non-AP operating in EMLSR mode cannot use the device capabilities (spatial streams, frequency band, etc.) assigned to other links when transmitting on one link, so it results in low communication performance. | Please description about non-AP MLD-driven transmissions operating in EMLSR mode. The description may include switching device capabilities after or during CCA in EMLSR mode to enable more spatial stream utilization and CCA of wider band. | Rejected.Each STA’s PHY capabilities are indicated during the association process or through operation mode indication. |
| 13861 | Sanghyun Kim | 35.3.17 | 464.43 | The described operation of the non-AP MLD is unclear. Two different interpretations are possible:1. Only one predefined STA may initiate frame exchange.2. Only one STA may initiate frame exchange at any one time. | Please clarify the non-AP MLD's operation. | Revised.‘Only one STA…’ is changed to ‘Only one of the STAs…’TGbe editor to make the changes with the CID tag (#13861) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 10164 | Julien Sevin | 35.3.17 | 464.46 | When a non-AP MLD operates in EMLSR mode, it is not specified how a non-AP MLD initiates a frame exchange for untriggered UL transmission. In particular, the backoff procedure is not clearly specified. | Specify clearly the use of the backoff procedure when an non-AP MLD operates in EMLSR mode and intends to operate an untriggered UL transmission. | Rejected.A STA affiliated with a non-AP MLD operating in the EMLSR mode can initiate a TXOP following the baseline rules. |
| 13421 | Liwen Chu | 35.3.17 | 464.53 | This should be a normative behavior with "shall" requirement. | Fix the issues mentioned in the comment | Revised.Regarding the following note, “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.”The following sentence was added in D2.2:“(#13418)The AP affiliated with the AP MLD shall set the MAC padding duration of the Padding field of the initial Control frame to be greater than or equal tothe MAC padding duration in the EMLSR Padding Delay subfield.”To TGbe editor: no changes are needed. |

***TGbe editor: Please modify the following paragraph in TGbe D2.2 (prerelease-0401),*** P485L12:

— After receiving the initial Control frame of frame exchanges and transmitting an immediate response frame as a response to the initial Control frame, a STA affiliated with the non-AP MLD that was listening on the corresponding link shall be able to transmit or receive frames on the link (#13814)on which the initial Control frame was received and shall not transmit or receive on the other EMLSR link(s) until the end of the frame exchanges, and subject to its (#13593, 10869, 11459) per-link spatial stream capabilities that is indicated in the Supported EHT-MCS and NSS Set field in the EHT Capabilities element (9.4.2.313) that corresponds to the STA affiliated with the non-AP MLD, operation mode indication (35.10 Operating mode indication), and (#10088)the minimum MAC padding duration of the Padding field of the initial Control frame, the STA affiliated with the non-AP MLD shall be capable of receiving a PPDU that is sent using (#13593, 10869, 11459)the number of spatial streams up to the value indicated in the per-link spatial stream capabilities or the operation mode indication on the link (#13814)on which the initial Control frame was received a SIFS after the end of its response frame transmission solicited by the initial Control frame. During the frame exchanges, the other AP(s) affiliated with the AP MLD shall not transmit frames to the other STA(s) affiliated with the non-AP MLD on the other EMLSR link(s). (#12814)During the frame exchanges, the PPDU format of a Data frame or a Management frame that is transmitted by the AP affiliated with the AP MLD that initiated the frame exchanges shall be the EHT MU PPDU format or the HE MU PPDU format.

***TGbe editor: Please modify the following paragraph in TGbe D2.2 (prerelease-0401),*** P463L59:

— The non-AP MLD shall be switched back to the listening operation on the EMLSR links after the
time indicated (#10100)by the non-AP MLD in the EMLSR Transition Delay subfield of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element if any of the following conditions is met and this
is defined as the end of the frame exchanges:

• 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 (#12680, 11461)affiliated with 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 from the AP affiliated with the AP MLD that does not require immediate acknowledgement.
• The MAC of the STA affiliated with the non-AP MLD that received the initial Control frame receives a PHY-RXSTART.indication primitive during a timeout interval of aSIFSTime + aSlotTime + aRxPHYStartDelay starting at the end of the PPDU transmitted by the STA (#12681, 11461)affiliated with the nonAP 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 from the AP affiliated with the AP MLD that does not require immediate acknowledgement and the STA affiliated with the non-AP MLD does not detect, within the PPDU corresponding to the PHYRXSTART.indication any of the following frames:

- an individually addressed frame with the RA equal to the MAC address of the STA affiliated with the non-AP MLD
- a Trigger frame that has one of the User Info fields addressed to the STA affiliated with the non-AP MLD
- a CTS-to-self frame with the RA equal to the MAC address of the AP affiliated with the AP MLD
- a Multi-STA BlockAck frame that has one of the Per AID TID Info fields addressed to the STA affiliated with the non-AP MLD
- a NDP Announcement frame that has one of the STA Info fields addressed to the STA affiliated with the non-AP MLD (#13705, 13590)and a sounding NDP

• The STA affiliated with the non-AP MLD that received the initial Control frame does not
respond to the most recently received frame from the AP affiliated with the AP MLD that
requires immediate response after a SIFS.

— The AP affiliated with the AP MLD should transmit before the TXNAV timer expires another initial
Control frame addressed to the STA affiliated with the non-AP MLD if the AP intends to continue
the frame exchanges with the STA and did not receive the response frame from this STA for the most
recently transmitted frame that requires an immediate response after a SIFS.

— When a STA (#12682)affiliated with the non-AP MLD initiates a TXOP (#13591)on one of the EMLSR links the following applies:

(#13591)• During frame exchanges in the TXOP, a STA affiliated with the non-AP MLD that operates on one of the other EMLSR links shall not transmit to the AP affiliated with the AP MLD that operates on that link and the AP affiliated with the AP MLD shall not transmit to the STA affiliated with the non-AP MLD.

• The non-AP MLD shall (#13006)be switched back to the listening operation on the EMLSR links after the time duration indicated in the EMLSR Transition Delay subfield after the end of the TXOP.

— (#13861)Only one of the STAs affiliated with the non-AP MLD that is operating on one of the EMLSR links may
initiate frame exchanges with the AP MLD.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 11615 | Lei Wang | 35.3.17 | 465.06 | Are the n STAs the same STA or different STAs? Note that in Figure 35-22 the n STAs are all named as "STA 1". If the n STAs are different STAs, they should be named differently. | Suggest changing the name "STA1" in Figure 35-22 to different names, e.g., "STA 11", "STA 21", ...., "STA n1" | Revised.For clarification, changed ‘n STAs’ to ‘n different STAs’TGbe editor to make the changes with the CID tag (#11615) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 10926 | Thomas Handte | 35.3.17 | 465.21 | Figures 35-21 to 35-25 (except 35-24) show a regular frame exchange on a single link. EMLSR properties are not illustrated. | Suggest to indicate the padding of MU-RTS or BSRP Trigger at least. | Revised.The clarifications are added to the captions of the figures that MU-RTS/BSRP Trigger frames are used as the initial Control frame of each frame exchange sequences.TGbe editor to make the changes with the CID tag (#10926) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 13592 | Yongho Seok | 35.3.17 | 465.21 | Comparing with Figure 35-22, Figure 35-21 shows that an MU-RTS frame is addressed to single STA.But, the spec does not have any normative requirement that an MU-RTS frame shall be addressed to single STA when the MU-RTS frame is used as the initial Control frame.Also, based on Figure 35-24, an MU-RTS frame can be addressed to multiple STAs (including EMLSR STA).Please change the Figure 35-21 like Figure 35-22. Or add a NOTE that an MU-RTS frame can be addressed to multiple STAs. | As in the comment. | Revised.In TGbe D2.2, the following note was added.“(#12679)NOTE 9—The MU-RTS Trigger frame can be used to initiate frame exchanges with one or more STAs affiliated with non-AP MLDs in the EMLSR mode.”To TGbe editor: no changes are needed. |
| 10361 | Tomoko Adachi | 35.3.17 | 465.55 | Comparing Figure 35-25 with Figure 35-24, whether all the beamformees need to be operating in the EMLSR mode is not clear. I think that at least one of the beamformees just needs to be operating in the EMLSR mode, but the beamformer (an AP affiliated with an AP MLD) wanted to also get the BSR from other beamformees that are not operating in the EMLSR mode in this case. | As in comment. | Revised.Changed ‘beamformees’ to ‘one or more beamformees’ so that it clarifies that there could be one or more beamformees in the EMLSR mode.TGbe editor to make the changes with the CID tag (#10361) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |
| 10928 | Thomas Handte | 35.3.17 | 465.55 | Figure 35-24 shows a very specific example in which there is just one responder STA to the MU-RTS. Suggest to add: "NOTE - In the example shown in Figgure 35-24, the MU-RTS may also address any of the beamformees 2, ..., n in which case they may respond with CTS" | as in comment | Revised.Added a note for the clarification suggested in the comment.TGbe editor to make the changes with the CID tag (#10928) in doc.: IEEE 802.11-22/1434r0[https://mentor.ieee.org/802.11/dcn/22/11-22-1434-00-00be-lb266-cr-cl35-emlsr-part3.docx] |

***TGbe editor: Please modify the following paragraph in TGbe D2.2 (prerelease-0401),*** P486L43:

An example of a frame exchange sequence that starts with the MU-RTS Trigger frame between an AP
affiliated with an AP MLD and a STA affiliated with a non-AP MLD that is in the EMLSR mode is shown in
Figure 35-22 (An example of a frame exchange sequence between an AP affiliated with an AP MLD and a
STA affiliated with a non-AP MLD that is in the EMLSR mode). An example of a frame exchange sequence
that starts with the BSRP Trigger frame between an AP (AP 1) affiliated with an AP MLD and *n* (#11615) different STAs
affiliated with *n* different non-AP MLDs that are in the EMLSR mode is shown in Figure 35-23 (An
example of a frame exchange sequence between an AP (AP 1) affiliated with an AP MLD and n STAs
affiliated with n different non-AP MLDs that are in the EMLSR mode).

***TGbe editor: Please modify the following paragraph in TGbe D2.2 (prerelease-0401),*** P487L25:

An example of an EHT non-TB sounding sequence with a single beamformee in the EMLSR operation is
shown in Figure 35-24 (An example of EHT non-TB sounding in the EMLSR operation). An example of an
EHT TB sounding sequence with a beamformee operating in the EMLSR mode (beamformee 1) and the
other beamformees (beaformees 2, …, *n*) not operating in the EMLSR mode is shown in Figure 35-25 (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)). An example of an EHT TB sounding sequence with
(#10361)one or more beamformees operating in the EMLSR mode is shown in Figure 35-26 (An example of EHT TB sounding in
the EMLSR operation (BSRP is used as the initial Control frame)).

***TGbe editor: Please modify the following paragraph in TGbe D2.2 (prerelease-0401),***P486 to P488:

**Figure 35-22—An example of a frame exchange sequence (#10926)starting with the MU-RTS Trigger frame as the initial Control frame between an AP affiliated with an AP MLD and a STA affiliated with a non-AP MLD that is in the EMLSR mode**

**Figure 35-23—An example of a frame exchange sequence (#10926)starting with the BSRP Trigger frame as the initial Control frame between an AP (AP 1) affiliated with an AP MLD and *n*** (#11615)**differentSTAs affiliated with *n* different non-AP MLDs that are in the EMLSR mode**

**Figure 35-24—An example of EHT non-TB sounding in the EMLSR operation (#10926) (the sounding sequence starts with the MU-RTS Trigger frame as the initial Control frame)**

(#10928)NOTE — In the example shown in Figure 35-25, the MU-RTS might also address any of the beamformees 2, ..., n in which case they respond with CTS.

**Figure 35-25—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 (#10926)and the sounding sequence starts with the MU-RTS Trigger frame as the initial Control frame)**

**Figure 35-26—An example of EHT TB sounding in the EMLSR operation ((#10926)the BSRP Trigger frame is used as the initial Control frame)**