IEEE P802.11
Wireless LANs

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| 11be D2.0 Cooment Resolution 35.4 Part 3 |
| Date: October 2022 |
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Abstract

Proposed draft text for enhancements to TID mapping.

The submission proposes text changes to resolve the following CIDs

 10041, 10089, 13816, 10044, 10045, 11467, 14080, 13817, 11157, 12725,

 13647, 11163, 13649

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# Revision History

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| --- | --- | --- |
| **Date** | **Revision** | **Changes** |
| 2022-08-25 | 0 | Initial draft |

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Page** | **Line** | **Comment** | **Proposed Change** | **Proposed Resolution** |
| 10041 | 468 | 5 | After the frame exchange in EMLMR mode, the non-AP MLD in EMLMR mode should go back to it's per link operation mode and capability. The determination of the end time of the EMLMR frame exchange is missing in the current text. Please add text for this. | as in comment | RevisedTGbe editor to make changes in THIS DOCUMENT with CID tag 10041 |
| 10089 | 468 | 9 | What is the definition of "the end of frame exchange"? | Define "the end of frame exchange", similar to EMLSR | RevisedTGbe editor to make changes in THIS DOCUMENT with CID tag 10089 |
| 13816 | 468 | 19 | There is no definition of "end of frame exchanges" for emlmr | add the conditions for end of frame excahgens similar as the emlsr case | RevisedTGbe editor to make changes in THIS DOCUMENT with CID tag 13816 |
|  |  |  |  |  |  |
| 10044 | 468 | 5 | The medium sync recovery after the EMLMR frame exchange is missing; please add text to cover that. Also consider the AP assisted medium sync recovery for the EMLMR. | as in comment | RevisedDiscussion: the medium sync recovery after the TXOP with an EMMR STA is added. TGbe editor to make changes in THIS DOCUMENT with CID tag 10044 |
|  |  |  |  |  |  |
| 10045 | 468 | 5 | How the beacon reception and groupcast frame delivery happens in EMLMR mode over EMLMR links? | as in comment | RevisedDiscussion: each EMLMR STA can receive PPDU per the STA’s various MCS (EHT-MCS, HE- MCS etc.), Nss capabilities. The restriction at AP MLD side is that at one link’s TBTT and group-address frame transmission, another link’s AP shouldn’t do frame exchange with the EMLMR STA of an non-AP MLD.TGbe editor to make changes in THIS DOCUMENT with CID tag 10045 |
|  |  |  |  |  |  |
| 11467 | 468 | 19 | Replace 'each STA of the non-AP MLD' with 'each STA affiliated with the non-AP MLD'. | As in comment | **Accepted** |
| 14080 | 468 | 22 | per-link spatial stream capabilities are also defined in Per STA Profile of ML element | add " Per STA Profile subfield of basic Multi-Link element" | RevisedDiscussion: the MCS, Nss capabilities of each EMLMR link is defined by EHT Capabilities element in Per STA Profile or carried in the related management frame as element, OM Control, Operating Mode Notification frame.TGbe editor to make changes in THIS DOCUMENT with CID tag 14080 |
| 13817 | 468 | 23 | There is no switching delay indicated by the non-AP MLD for operating from the "more streams state on one link" to the "less streams state on two or more links" | please clarify | RejectedDiscussion: the EML Capabilities subfield in Basic Multi-Link element indicates the the minimum padding duration required for a non-AP MLD for EMLMR link switch in subclause 9.4.2.312.2. |
| ~~13818~~ | ~~468~~ | ~~53~~ | ~~"is the same" should be "are the same"~~ | ~~Change "is the same" to "are the same"~~ |  |
|  |  |  |  |  |  |
| 11157 | 466 | 55 | How TWT/bTWT/rTWT operation will coexist with EMLSR is not clear. | Please provide procedures and rules to enable TWT operation with EMLSR | RevisedDiscussion: in motion 439 in 11-22/1038r19, 11be TG agree the resolution of 13436 to address the coexisting of EMLSR and R-TWT. There is no additional requirement for the coexistence of TWT/BTWT with EMLSR. When the TWT/BTWT SP exists in one link only, the frame exchange initiated by the AP will be done in the link after the initial control frame exchange with the specific requirement. After the backoff in the link, the STA can do the frame exchanges within the TWT/BTWT SP. When multiple links have overlapped TWT/BTWT SPs in time domain, the frame exchange initiated by any AP in the links will be done in any of the links after the initial control frame exchange with the specific requirement.TGbe editor: make changes in 35.9.4.1 the same as the changes tagged by 13646NOTE to editor: no additional change is required. |
| 12725 | 467 | 55 | EMLMR STAs may want to take profit of TWT/rTWT mechanisms, but there is missing specific rules for this operation.Some contributions already discuss about avoiding IC frame obligation inside the TWT/rTWT SP, but this is not specified in the draft. | Please provide rules for EMLMR STAs operating TWT, with avoiding IC frame overhead | RevisedDiscussion: in motion 439 in 11-22/1038r19, 11be TG agree the resolution of 13436 to address the coexisting of EMLMR and R-TWT. There is no additional requirement for the coexistence of TWT/BTWT with EMLMR. When the TWT/BTWT SP exists in one link only, the frame exchange initiated by the AP will be done in the link after the initial control frame exchange with the specific requirement. After the backoff in the link, the STA can do the frame exchanges within the TWT/BTWT SP. When multiple links have overlapped TWT/BTWT SPs in time domain, the frame exchange initiated by any AP in the links will be done in any of the links after the initial control frame exchange with the specific requirement.TGbe editor: make changes in 35.9.4.1 the same as the changes tagged by 13646NOTE to editor: no additional change is required. |
| 13647 | 466 | 55 | How the restricted TWT operation can co-exist with EMLMR mode of operation is not clear. For example, when a restricted TWT schedule is set up on a link between an AP MLD and a non-AP MLD, the STA affiliated with the non-AP MLD and operating on that link should be able to receive and transmit latency-sensitive traffic during the corresponding restricted TWT SP on that link. However, during the EMLMR mode of operation, only one link among the EMLMR links is able to carry out frame transmission. | The rules and mechanism for r-TWT operation in conjunction with EMLMR operation needs to be defined. | RevisedDiscussion: in motion 439 in 11-22/1038r19, 11be TG agree the resolution of 13436 to address the coexisting of EMLMR and R-TWT. There is no additional requirement for the coexistence of TWT/BTWT with EMLMR. TGbe editor: make changes in 35.9.4.1 the same as the changes tagged by 13646NOTE to editor: no additional change is required. |
| 11163 | 466 | 55 | The EMLMR operation procedure for P2P/TDLS communication is currently missing and needs to be described in the spec. | As in comment. |  |
| 13649 | 466 | 55 | Currently EMLMR operation is only defined for communication between an AP MLD and a non-AP MLD. The EMLMR operation for peer-to-peer (P2P) communication (for example, tunneled direct link setup (TDLS)) is would be an important feature that is currently missing in the IEEE 802.11be specification. How to set up P2P links while a non-AP MLD is operating in EMLMR mode or how to utilize EMLMR mode of operations while two non-AP MLDs are communicating over the P2P or TDLS direct link needs to be described. Moreover, the operational procedure for EMLMR for P2P communication is also missing in the current 802.11be specification. | Mechanisms, frameworks, and rules for enabling EMLMR operation for P2P communication needs to be described in the spec. |  |

**35.3.18 Enhanced multi-link multi-radio operation**

*TGbe editor:make the following changes in subclause 35.3.18:*

**……**

(#10041, 10089, 13816) Within a TXOP initiated by an AP affiliated with AP MLD with an EMMR STA affiliated with a non-AP MLD as the TXOP responder, the non-AP MLD shall switch back to perform CCA on the EMLMR links after the time indicated in the EMLMR 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 exchange sequence:

* The MAC of the STA affiliated with the non-AP MLD that received the initial 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 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 frame receives a PHY-RXSTART.indication primitive during a timeout interval of aSIFSTime + aSlot- Time + aRxPHYStartDelay starting 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 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 PHY- RXSTART.indication any of the following frames:
	+ an individually addressed frame with the RA equal to the MAC address of the STA affili- ated 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 affil- iated with the non-AP MLD
* The STA affiliated with the non-AP MLD that received the initial 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.

When a non-AP MLD operates in the EMLMR mode, after initial frame exchange subject to its per-link spatial stream capabilities and operating mode defined by the exchanged Operating Mode Notification frame, (EHT) OM control on one of the EMLMR links, the non-AP MLD shall be able to support the following until the end of the frame exchange sequence initiated by the initial frame exchange:

—Receive PPDUs with the number of spatial streams up to the value as indicated in the EMLMR Supported MCS And NSS Set subfield of the EML Control field of the EML Operating Mode Notification frame at a time on the link for which the initial frame exchange was made.

—Transmit PPDUs with the number of spatial streams up to the value as indicated in the EMLMR Supported MCS And NSS Set subfield of the EML Control field of the EML Operating Mode Notification frame at a time on the link for which the initial frame exchange was made.

(#14080)After the end of the frame exchange sequence, each STA of the non-AP MLD in the EMLMR mode shall be able to transmit or receive PPDU, subject to its per-link spatial stream capabilities and operating mode defined by EHT Capabilities element, the exchanged Operating Mode Notification frame, (EHT) OM control and subject to any switching delay indicated by the non-AP MLD.

(#10045) At the TBTT of the first AP affiliated with an AP MLD in the first link where the first EMLMR STA of a non-AP MLD is working, the second AP affiliated with the AP MLD should not do the frame exchanges with the second EMLMR STA of the non-AP MLD. When the first AP affiliated with an AP MLD in the first link where the first EMLMR STA of a non-AP MLD is working is transmitting the group-addressed frame, the second AP affiliated with the AP MLD should not do the frame exchanges with the second EMLMR STA of the non-AP MLD.

**35.3.16.8 Medium access recovery procedure**

**35.3.16.8.1 General**

*TGbe editor:make the following changes in subclause 35.3.16.8.1:*

**……**

(#10044) When a non-AP MLD is operating in the EMLMR mode, a non-AP STA affiliated with a non-AP MLD that is operating on one of the EMLMR links is considered to have lost medium synchronization if it is not able to perform CCA during frame exchanges that includes the link switch delays between an AP affiliated with an AP MLD and one of the other STAs operating on the other EMLMR links, which are affiliated with the same non-AP MLD. The STA that has lost medium synchronization shall start a MediumSyncDelay timer and begin counting down immediately after returning to the listening operation if the duration of the loss of medium synchronization is longer than aMediumSyncThreshold; otherwise, the STA may not start the MediumSyncDelay timer.

NOTE 2—The link switch delays include the delay switching from the listening operation to the frame exchanges and the delay switching from the frame exchanges to the listening operation.

(#11137)A STA shall not start a MediumSyncDelay timer unless the STA is one of the following:

—a non-AP STA affiliated with a non-AP MLD operating on an NSTR link pair or

—a non-AP STA affiliated with a non-AP MLD operating on an EMLSR link or

—a non-AP STA affiliated with a non-AP MLD operating on an EMLMR link or

—an AP affiliated with an NSTR mobile AP MLD operating on the nonprimary link of an NSTR link pair.

……

If a STA that operates on an EMLMR link has lost medium synchronization, due to transmission or reception that includes the link switch delays by another STA that is affiliated with the same MLD and operates on another EMLMR link, and its previous MediumSyncDelay timer has not expired, then at the end of that transmission it shall continue the previous MediumSyncDelay timer except that the STA shall update the timer value as described above if that transmission is longer than aMediumSyncThreshold.