IEEE P802.11
Wireless LANs

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| LB271 CR 35.3.18 remaining comments |
| Date: 2023-06-28 |
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Abstract

This submission proposes resolutions for multiple comments related to TGbe D3.0 with the following CIDs:

 15128, 15923, 16430, 17988, 15924, 16431, 16439, 16656, 18214, 18216,

18217, 18232, 16057

 16303

16000

Revisions:

* Rev 0: Initial version of the document.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbe Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

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| --- | --- | --- | --- | --- | --- |
| **CID** | **PP** | **LL** | **Comment** | **Proposed Change** | Resolution |
| 15128 | 569 | 62 | I believe the first paragraph in 35.3.18 is trying to explain what EMLMR operation is. But it is still not clear. It does not show a clear difference between EMLSR. From saying "multi-radio", I am expecting that this mode of operation allows operation at another link even after the initial frame exchange at one of the links, but with limited capabilities. | Describe the operation how it is different from EMLSR. | RejectedDiscussion: As mentioned in the first paragraph, in EMLMR mode, the first frame in the TXOP tranmistted by an AP to an EMLMR STA doesn’t need to be MU-RTS, BSRP Trigger. The PPDU that is used doesn’t need to be non-HT duplicate PPDU. |
| 15923 | 569 | 60 | How the beacon reception and groupcast frame delivery happens in EMLMR mode over EMLMR links? Please add the necessary text to clarify this case. | As in comment | Option 1:RevisedDiscussion: when an AP affiliated with an AP MLD is doing frame exchanges with an EMLMR STA affiliated with a non-AP MLD in another link’s TBTT (link2’s TBTT), the EMLMR STA affiliated with the non-AP MLD in link2 may not be able to receive the Beacon. So one AP affiliated with an AP MLD should not do the frame exchanges at the TBTT of another AP that is affiliated with the same AP MLD.TGbe editor to make the changes in THIS DOCUMENT with CID tag 15923Option 2:RejectedDiscussion: it is up to the non-AP MLD to decide the link for receiving the Beacon and group-addressed frames. |
| 16430 | 569 | 60 | How the beacon reception and groupcast frame delivery happens in EMLMR mode over EMLMR links? Please add the necessary text to clarify this case. | As in comment | Option 1:RevisedDiscussion: when an AP affiliated with an AP MLD is doing frame exchanges with an EMLMR STA affiliated with a non-AP MLD in another link’s TBTT (link2’s TBTT), the EMLMR STA affiliated with the non-AP MLD in link2 may not be able to receive the Beacon. So one AP affiliated with an AP MLD should not do the frame exchanges at the TBTT of another AP that is affiliated with the same AP MLD. For the similar reason, one AP affiliated with an AP MLD should not do the frame exchanges while another AP affiliated with the same AP MLD is trnamissting group-addressed frames.TGbe editor to make the changes in THIS DOCUMENT with CID tag 16430Option 2:RejectedDiscussion: it is up to the non-AP MLD to decide the link for receiving the Beacon and group-addressed frames. |
| 17988 | 569 | 62 | Clarification on how an EMLMR device receives group addressed frames is required. | As in comment. | Option 1:RevisedDiscussion: when an AP affiliated with an AP MLD is doing frame exchanges with an EMLMR STA affiliated with a non-AP MLD while another AP affiliated with the same AP MLD is trnamissting group-addressed frames, the EMLMR STA affiliated with the non-AP MLD in link2 may not be able to receive the Beacon. So one AP affiliated with an AP MLD should not do the frame exchanges while another AP affiliated with the same AP MLD is trnamissting group-addressed frames.TGbe editor to make the changes in THIS DOCUMENT with CID tag 17988Option 2:RejectedDiscussion: it is up to the non-AP MLD to decide the link for receiving the group-addressed frames. |
| 15924 | 569 | 60 | The medium sync recovery for the EMLMR mode of operation is missing; please add text to cover that. | As in comment | RevisedGenerally agree with the commenter.TGbe editor to make the changes in THIS DOCUMENT with CID tag 15924 |
| 16431 | 569 | 60 | The medium sync recovery for the EMLMR mode of operation is missing; please add text to cover that. | As in comment | RevisedGenerally agree with the commenter.TGbe editor to make the changes in THIS DOCUMENT with CID tag 16431 |
| 16439 | 569 | 60 | The current text considers only one set of EMLMR links, it is restrictive.Even if it goes beyond current implementations, the support of the activation/desactivation of EMLMR mode on several EMLMR links sets could be added with the effort of only few additional text. | Add text for the support of non-AP MLD implementations with several set of radios supporting the EMLMR mode independently. | RejectedDiscussion: what the commenter asked for makes the implementation complicated with very limited benefits. |
| 16656 | 569 | 60 | The operating mode update (BW, Nss) in EMLMR mode is missing. Please add it. | As in comment | RevisedDscussion: The current text mentioned that a non-AP MLD can enable, disable EMLMR mode through EML Operating Mode Notification frame. It is better to carify that the Nss update can be done through EML Operating Mode Notification frame by a non-AP MLD with EMLMR links.TGbe editor to make the changes in THIS DOCUMENT with CID tag 16656 |
| 16303 | 572 | 4 | The current EMLMR operation consumes more power when non-AP STAs affiliated with a non-AP MLD are in power management mode. When a non-AP STA transmits a PS-poll frame to the AP MLD to receive BU, it must use multiple RF chains of the MLD after receiving the initial frame. To improve power efficiency in the non-AP MLD, a method that allows the MLD to choose its NSS for power management is needed. For example, the non-AP MLD can preset its NSS and MCS for power management, or the non-AP MLD can include signaling in its response frame that contains information about its preferred NSS and MCS. | As in comment. | Revised Discussion: The current text mentioned that a non-AP MLD can enable, disable EMLMR mode through EML Operating Mode Notification frame. It is better to carify that the Nss update can be done through EML Operating Mode Notification frame by a non-AP MLD with EMLMR links.TGbe editor to make the changes in THIS DOCUMENT with CID tag 16303 |
| 18214 | 569 | 60 | The AP MLD may not have same capability to operate with the maximum TX/RX streams on all the links included in the EMLMR links as indicated by the non-AP MLD. In such cases, it would be necessary for the AP MLD to suggest or negotiate an alternative link set for EMLMR Links. Currently, no mechanism is defined in the spec that would enable a negotiation of EMLMR links between an AP MLD and a non-AP MLD before operating in the EMLMR mode. | Please provide mechanisms and frameworks for EMLMR Links negotiation between an AP MLD and a non-AP MLD supporting EMLMR mode of operation. | RejectedDiscussion: the AP MLD can suggest the links to the non-AP MLD already by using BTM.  |
| 18216 | 569 | 60 | While a non-AP MLD is communicating with its associated AP MLD and is operating under the EMLMR 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 EMLMR 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 EMLMR mode with its associated AP MLD. | RejectedDiscussion: 11be spec allows the TDLS link establishment without MLO for TDLS link. There is no additional requirement for the TDLS link where at least one side is in EMLR mode with the AP MLD.  |
| 18217 | 569 | 60 | 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 EMLMR mode for the P2P communication between the two non-AP MLDs is not defined. Moreover, the procedure for EMLMR operation for P2P communication between two non-AP MLDs is currently missing in the spec. | Procedures for turning on EMLMR mode and EMLMR operation between two non-AP MLDs communicating over the P2P links needs to be described in the spec. | RejectedDiscussion: 11be doesn’t allow the peer-to-peer MLD setup. |
| 18232 | 569 | 60 | 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. | RejectedDiscussion: 11be doesn’t allow the peer-to-peer MLD setup. |
| 16057 | 569 | 60 | Clarify EMLMR operation when only a single EMLMR link remains for a non-AP MLD e.g. after an AP was removed or a link was disabled by the AP MLD. | Clarify single link EMLMR operation if supported and associated rules. | RevisedDiscussion: If EMLMR operation is enabled at a non-AP MLD with single enabled link, the spec allows a non-AP MLD to support more Nss when the associated AP MLD disables its affiliated APs without through reassociation. The following is an example EMLMR non-AP MLD with two EMLMR links with each link supportting 2 SS and with the EMLMR mode supportting 4SS. If a link is disabled by the AP MLD and the single-link EMLMR link is not enabled at a non-AP MLD, the non-AP MLD can’t use the 4 SS for the frame exchange unless it does a reassociation. TGbe editor to make the changes in THIS DOCUMENT with CID tag 16057 |
| 16000 | 35.3.6.2.2 | 513.19 | Specify behavior for the non-AP MLD and the AP MLD when an affiliated AP is removed and that results in a single EMLMR link remaining for that non-AP MLD. Does the non-AP MLD and AP MLD continue to operate in EMLMR mode on the single remaining link? | Capture behavior when a single EMLMR link is remaining for a non-AP MLD after an AP removal. | RevisedDiscussion: If EMLMR operation is enabled at a non-AP MLD with single enabled link, the spec allows a non-AP MLD to support more Nss when the associated AP MLD disables its affiliated APs without through reassociation. The following is an example EMLMR non-AP MLD with two EMLMR links with each link supportting 2 SS and with the EMLMR mode supportting 4SS. If a link is disabled by the AP MLD and the single-link EMLMR link is not enabled at a non-AP MLD, the non-AP MLD can’t use the 4 SS for the frame exchange unless it does a reassociation. TGbe editor to make the changes in THIS DOCUMENT with CID tag 16000 |

**35.3.16.8 Medium access recovery procedure**

**35.3.16.8.1 General**

*TGbe editor: Please change 35.3.16.8.1 as follows☹#* 15924, 16431*)*

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When a non-AP MLD is operating in the EMLSR/EMLMR mode, a non-AP STA affiliated with a non-AP MLD that is operating on one of the EMLSR/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 non-AP STAs operating on the other EMLSR links, which are affiliated with the same non-AP MLD. The non-AP 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 (#16897)greater than aMediumSyncThreshold; otherwise, the non-AP 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 (see 35.3.17 (Enhanced multi-link single radio operation) and 35.3.18 (Enhanced multi-link multi-radio operation)).

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.

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

*TGbe editor: Please change the following paragraph in 35.3.18:*

(#16656, 16303)When a non-AP MLD with dot11EHTEMLMROptionActivated equal to true (re)associates with an AP MLD, the EMLMR mode is disabled by default. If a non-AP MLD with dot11EHTEMLMROptionActivated equal to true intends to enable EMLMR mode, disable EMLMR mode, or update the Nss in enabled EMLMR mode after association with an AP MLD that sets its EMLMR Support subfield to 1, then a non-AP STA affiliated with the non-AP MLD shall transmit an EML Operating Mode Notification frame with EMLMR Mode subfield equal to 1 or 0, respectively.

(#16656, 16303) NOTE----A non-AP MLD with the affiliated EMLMR STA(s) uses the EML Operating Mode Notification frame with EMLMR Mode subfield equal to 1 to update its Nss in the enabled EMLMR mode.

*TGbe editor: Please add the following text before the last paragraph in 35.3.18:*

(#15923, 16430)The first AP affiliated with an AP MLD should not perform the frame exchanges with an EMLMR STA affiliated with a non-AP MLD at the TBTT of second AP affiliated with the AP MLD if the link where the second AP works is an EMLMR link of the non-AP MLD.

(#16430, 17988) The first AP affiliated with an AP MLD should not perform the frame exchanges with an EMLMR STA affiliated with a non-AP MLD if the second AP affiliated with the AP MLD in a link which is an EMLMR link of the non-AP MLD is transmit group-addressed frames.

9.4.1.70 EML Control field

*TGbe editor: Please change 9.4.1.70 as follows:*

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*(#16057, 16000)*The EMLMR Link Bitmap subfield indicates the subset of the enabled links that is used by the non-AP MLD in the EMLMR mode. The bit position *i* of the EMLMR Link Bitmap subfield corresponds to the link with the Link ID equal to *i* and is set to 1 to indicate that the link is used by the non-AP MLD for the EMLMR mode and is a member of the EMLMR link(s); otherwise the bit position is set to 0. The EMLMR Link Bitmap subfield is present if the EMLMR Mode subfield is equal to 1 and is not present otherwise.

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

*TGbe editor: Please change links to link(s) through 35.3.18 except the first paragraph(#16057, 16000)*