IEEE P802.11
Wireless LANs

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| CC34 Comment Resolution for EMLSR – Part 3 |
| Date: 2021-2-19 |
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Abstract

This submission proposes comment resolutions for the following CIDs related to sounding procedure in the EMLSR mode and other miscellaneous comments received in CC34:

* 1436
* 1440
* 1933
* 2102
* 2103
* 2332
* 2346
* 2347
* 2915
* 2918
* 2935
* 3324
* 3400

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revised based 802.11be D0.4 EHT sounding protocol (Alfred’s comments).
* Rev 2: Marking 1933 for more discussion (Jeongki’s comment)
* Rev 3: Revised based on comments during the MAC call on March 29 (see highlighted part in cyan). Deferred two CIDs: 1933 and 2347. Removed CID 2143 from this CR doc and added it to 11-21/319r3.

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 1436 | Chien-Fang Hsu | 35.3.14 | 144.51 | Can a non-AP MLD support eMLSR and single radio operation at the same time? | Clarify it | Rejected.This is an invalid comment based on doc.11-13/230r5: the commenter is asking a question.Response: a non-AP MLD enables/disables the EMLSR mode and when the non-AP MLD enables the EMLSR mode, it is operating in that mode. |
| 1440 | Chien-Fang Hsu | 35.3.14 | 145.07 | It would be helpful to add an indication in the initial Control frame so that the receiving non-AP MLD can decide whether to switch radio or not. | Add indication and protocol to enable eMLSR STA reporting if radio switch will happen or not | Rejected.This is an invalid comment based on doc. 11-13/230r5: it fails to identify a technical issue.Response: when a non-AP MLD is operating under the EMLSR mode, the non-AP MLD listens to the enabled links and when an initial control frame is received on one of the links, the non-AP MLD exchanges frames on that link with its capability announced during the association process or the latest operation mode indication. |
| 1933 | Jeongki Kim | 35.3.14 | 145.21 | The AP MLD shall initiate a frame exchange sequence with the non-AP MLD on one of the enabled links by transmitting an initial Control frame to the non-AP MLD with the limitations specified above.When both links are available(i.e., idle) and the channel conditions of both links are same in AP MLD, AP MLD selects one link among multiple links based on AP's implementation's value. But each environment of each link might be different in non-AP MLD side. Therefore, non-AP MLD can inform AP MLD of its prefered links information for AP MLD to select the better link. | Define the mechanism that non-AP MLD informs AP MLD of its prefered links. | Rejected.The EMLSR operation shows gain when there are neighboring OBSSs with medium to busy traffic. In this case, there is a small chance of having two links idle. Moreover, the channel condition or idle/busy states at the non-AP MLD can change rapidly and providing the latest information to the AP MLD would add overhead to the EMLSR operation. Therefore, the preferred link information from the non-AP MLD would have little gain (if any).  |
| 2102 | kaiying Lu | 35.3.14 | 144.29 | For EMLSR mode, please specify the spatial stream capabilities to transmit or receive frames on the link in which the initial Control frame was received. | as in comment | Rejected.After responding to the initial control frame received on one link, the STA of a non-AP MLD on that link may transmit or receive frames based on its spatial stream capabilities it announced during the association process or the latest operation mode indication. This is also described in the current draft as follows in P145L29 “ … andsubject to its spatial stream capabilities, operation mode, and link switch delay, the non-AP MLD shall be capable of receiving a PPDU that is sent using more than one spatial stream a SIFS after the end of its response frame transmission solicited by the initial Control frame.” |
| 2103 | kaiying Lu | 35.3.14 | 144.28 | For EMLSR mode, "After receiving the initial Control frame of a frame exchange sequence, the non-AP MLD ...shall not transmit or receive on the other link(s) until the end of the frame exchange sequence". Please specify that the spatial stream is 0 on the other link. | as in comment | Rejected.The sentence already defines that the non-AP MLD shall not transmit or receive frames on the other link(s) during frame exchanges on the link where the initial control frame was received. There is no need to say that the spatial stream is 0 on the other link. |
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| 2332 | Minyoung Park | 35.3.14 | 144.55 | The name of the EMLSR mode is now accepted by the task group. The editor's note saying that the name is TBD can be removed. | Remove the Editor's Note. | Accepted. |
| 2346 | Minyoung Park | 35.3.14 | 144.49 | It is unclear how the sounding procedure works when a non-AP MLD operates in the EMLSR mode. The spec needs to define a clear procedure. | Add a procedure that describes that the sounding frame exchange sequence follows one of the initial control frames and its response frame: MU-RTS/CTS/(HE beamforming seqeunce) or BSRP/BSR/(HE beamforming sequence), where (HE beamforming sequence) is defined in Annex G of 11ax D8.0 | Revised.A sounding frame sequence needs to be preceeded by an initial control frame and a response to the initial control frame.TGbe editor to make the changes with the CID tag (#2346) in doc.: IEEE 802.11-20/288r3[https://mentor.ieee.org/802.11/dcn/21/11-21-0288-03-00be-cc34-cr-emlsr-part3.docx] |
| 3400 | Zhou Lan | 35.3.14 | 144.49 | Please clarify how to do sounding. Does a MU-RTS or BSRP needs to be sent before the NDPA frame? Please clarify. | As stated in the comment | Revised.A sounding frame sequence needs to be preceeded by an initial control frame and a response to the initial control frame.TGbe editor to make the changes with the CID tag (#3400) in doc.: IEEE 802.11-20/288r3[https://mentor.ieee.org/802.11/dcn/21/11-21-0288-03-00be-cc34-cr-emlsr-part3.docx] |
| 2347 | Minyoung Park | 35.3.14 | 144.52 | 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 P144L54 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." | Accepted. |
| 2915 | SunHee Baek | 35.3.14 | 144.59 | A citation is needed to explain about the Basic variant Multi-Link element (9.4.2.295b.2). | change "the Basic variant Multi-Link element to 1" to "the Basic variant Multi-Link element (see 9.4.2.295b.2 (Basic variant Multi-Link element)) to 1" | Accepted. |
| 2918 | SunHee Baek | 35.3.14 | 145.30 | There is a missing preposition between "one spatial stream" and "a SIFS". Either "starting" or "within" should be needed. | Add a preposition "within". So change "more than one spatial stream a SIFS after" to "more than one spatial stream within a SIFS after". | Rejected.I don’t see an issue with the sentence. The sentence is saying ‘…receive a PPDU a SIFS after the end of …” as highlighted below.“the non-AP MLDshall be capable of receiving a PPDU that is sent using more than one spatial stream a SIFS after the end of its response frame transmission solicited by the initial Control frame.” |
| 2935 | Thomas Handte | 35.3.14 | 145.27 | "... and shall not transmit or receive on other link(s) until the end of the frame exchange sequence" doesn't need to be specified. For example, if a STA can transmit or receive on a other link, we should not exclude it to participate in EMLSR mode. | At least the "receive" has no impact to device compatibility and can't be certified either. Therefore, I suggest to delete. | Rejected.The EMLSR mode is used by a single-radio MLD and the single-radio MLD can only transmit or receive on one link at a time. Therefore, the current text is aligned with the definition of the single-radio MLD. If an MLD can transmit or receive on multiple links simultaneously, the MLD is not a single-radio MLD and it is not in the EMLSR mode. It may be operating in the EMLMR mode as a multi-radio MLD. |
| 3324 | Yunbo Li | 35.3.14 | 145.05 | changes "OFDM PPDU" to "non-HT PPDU" to match the baseline in REVmd | as in comment. | Rejected.Based on the following two definitions, OFDM PPDU correctly defines the limitation for the initial control frame that has limited PHY rate of 6, 12, and 24 Mbps.The following is **the definition of the non-HT PPDU** in 11md D8.0:non-high-throughput (non-HT) physical layer (PHY) protocol data unit (PPDU): A PPDU that is transmitted by (#1455)a Clause 15 (DSSS PHY specification for the 2.4 GHz band designated for ISM applications), Clause 16 (High rate direct sequence spread spectrum (HR/DSSS) PHY specification),Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification), or Clause 18 (Extended Rate PHY (ERP) specification) PHY, or not using a TXVECTOR FORMAT parameter equal toHT\_MF, HT\_GF or VHT.The following is **the definition of the OFDM PPDU** in 11md D8.0:orthogonal frequency division multiplexing (OFDM) physical layer (PHY) protocol data unit (PPDU): A Clause 17 (Orthogonal frequency division multiplexing (OFDM) PHY specification) PPDU. |

**TGbe Editor to make the following changes in Subclause 35.3.14:**

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

A non-AP MLD may operate in the EMLSR mode on the enabled links between the non-AP MLD and its associated AP MLD.

***(#2332)***

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**TGbe Editor to insert the following paragraphs and figure 35-x, 35-y, and 35-z at the end of Subclause 35.3.14: (#2346, 3400)**

— An AP affiliated with the AP MLD that intends to initiate a sounding sequence to a STA in the listening operation and affiliated with the non-AP MLD shall begin frame exchanges by transmitting an initial Control frame to the STA affiliated with the non-AP MLD.

An example of an EHT non-TB sounding sequence with a single beamformee in the EMLSR operation is shown in Figure 35-x (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 (beamformees 2, …, n) not operating in the EMLSR mode is shown in Figure 35-y (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 beamformees operating in the EMLSR mode is shown in Figure 35-z (An example of EHT TB sounding in the EMLSR operation (BSRP is used as the initial Control frame)). (#2346, 3400)



Figure 35-x An example of EHT non-TB sounding in the EMLSR operation



Figure 35-y 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-z An example of EHT TB sounding in the EMLSR operation (BSRP is used as the initial Control frame)