IEEE P802.11  
Wireless LANs

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| LB271 Comment Resolution Clause 35 EMLSR  (Part 2) | | | | |
| Date: 2023-3-17 | | | | |
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Abstract

This submission proposes comment resolution(s) for the following 37 CID(s) received in LB271 on TGbe D3.0 related to 35.3.17 EMLS Operation (part 2):

CIDs:

16923 16924 16927 15886 16929 16930 16931 17857 16926 15026

16308 15619 15658 16680 16620 16679 16621 16932 15105 16925

18058 16333 16334 16340 15622 15230 15618 15730 16922 15621

15061 16309 15451 15611 16933 16934 15564

Revisions:

* Rev 0: Initial version of the document.

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 16923 | Mark RISON | 35.3.17 | 565.17 | "frame exchanges that is initiated" -- wrong conjugation | Change "is" to "are" | Accepted. |
| 16924 | Mark RISON | 35.3.17 | 565.43 | "when the frame exchanges initiated by the initial Control frame on one of the EMLSR links overlaps" -- wrong conjugation | Change "overlaps" to "overlap" | Accepted. |
| 16927 | Mark RISON | 35.3.17 | 566.07 | "the EMLSR Link Bitmap subfield of the EML Control field shall contain a different value than the EMLSR Link Bitmap value contained in a previous EML Operating Mode Notification frame successfully transmitted by the non-AP MLD." sounds as if you can never go back to a previous config, however old it was | Change "a previous" to "the last" | Accepted. |
| 15886 | Chunyu Hu | 35.3.17 | 566.35 | To improve readability, "the non-AP STA affiliated with the non-AP MLD does not detect" can be simplified as "this non-AP STA does not detect". | As in comment. | Accepted. |
| 16929 | Mark RISON | 35.3.17 | 566.47 | "a NDP" should be "an NDP" | As it says in the comment. Also at 571.55 | Accepted. |
| 16930 | Mark RISON | 35.3.17 | 566.52 | "requires immediate response" missing article | Add "an" after "requires" | Accepted. |
| 16931 | Mark RISON | 35.3.17 | 567.11 | "NOTE 5--A sounding sequence also follows the rules above." is not clear. I initially read it as "there is a sounding sequence after the rules above" | Change to "NOTE 5--The rules above also apply to a sounding sequence." | Accepted. |
| 17857 | Gaurang Naik | 35.3.17 | 565.12 | The ordering of the statements needs to be improved. The bullets are arbitrarily ordered. | Move the bullet starting P566L1 as the second bullet (i.e., after NOTE 2). Move the bullet starting P566L59 as the third bullet. Clearly indicate that the current second (P565L22), third (P565L52), fifth (P566L12) and sixth (P566L54) bullets apply to AP-initiated frame exchange sequences. Move the last bullet (P567L4) one level up (i.e., before the bullet on P566L62) to improve logical flow of non-AP-initiated frame exchanges. | Revised.  Agree in principle.  TGbe editor to make the changes with the CID tag (#17857) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16926 | Mark RISON | 35.3.17 | 566.01 | "The non-AP MLD shall indicate its EMLSR padding delay and EMLSR transition delay in their respective EMLSR Padding Delay and EMLSR Transition Delay subfields of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element." -- weird grammar | Change to "The non-AP MLD shall indicate its EMLSR padding delay and EMLSR transition delay in the EMLSR Padding Delay and EMLSR Transition Delay subfields, respectively, of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element." | Revised.  The sentence has been revised to describe the EMLSR transition delay and deleted the EMLSR padding delay.  TGbe editor to make the changes with the CID tag (#16926) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 15026 | Chien-Fang Hsu | 35.3.17 | 565.23 | "An AP affiliated with the AP MLD that initiates frame exchanges that are not group addressed Data or Management frames ..." It may be misunderstood as group addressed Data frame and any Management frame. | Change to group addressed Data frame and group addressed Management frame. | Revised.  Agree with the commenter.  TGbe editor to make the changes with the CID tag (#15026) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16308 | Juseong Moon | 35.3.17 | 565.27 | When a non-AP STA affiliated with an EMLSR non-AP MLD performs a TXS operation as defined in 35.2.1.2, clear description is needed whether MU-RTS TXS trigger frame can be used as initial control frame of EMLSR. | As in comment. | Revised.  MU-RTS Trigger frame in 35.3.17 is MU-RTS Trigger frame with TXOP Sharing Mode subfield equal to 0. Therefore, the MU-RTS TXS Trigger frame is not used as an initial Control frame.  For clarification, added a note.  TGbe editor to make the changes with the CID tag (#16308) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 15619 | Sanghyun Kim | 35.3.17 | 593.39 | It may be necessary to verify if the MU-RTS TXS frame, when received by a non-AP STA operating on an EMLSR link, would not be confused with the Initial Control frame. | As in comment | Revised.  MU-RTS Trigger frame in 35.3.17 is MU-RTS Trigger frame with TXOP Sharing Mode subfield equal to 0. Therefore, the MU-RTS TXS Trigger frame is not used as an initial Control frame.  For clarification, added a note.  TGbe editor to make the changes with the CID tag (#16308) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 15658 | Geonjung Ko | 35.3.17 | 565.39 | Following this text, an MU-RTS TXS Trigger frame can be the initial Control frame. However, when a STA in the EMLSR link received the MU-RTS TXS Trigger frame, it is unclear which sequence the STA should follow. After the CTS frame, the transmitter is the AP and the non-AP STA in the EMLSR operation and the triggered TXOP sharing procedure, respectively. | Please clarify the operation when a STA receives the MU-RTS TXS Trigger frame on the EMLSR link. | Revised.  MU-RTS Trigger frame in 35.3.17 is MU-RTS Trigger frame with TXOP Sharing Mode subfield equal to 0. Therefore, the MU-RTS TXS Trigger frame is not used as an initial Control frame.  For clarification, added a note.  TGbe editor to make the changes with the CID tag (#16308) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16680 | Qi Wang | 35.3.17 | 565.35 | EMLSR padding delay used in 35.3.17: "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 to the MAC padding duration in the EMLSR Padding Delay subfield." is different from that specified in 35.5.2.2.3 "the number of bits in the PSDU following the last bit of the User Info field addressed to the non-AP MLD" | Modify the EMLSR padding delay requirement in 35.3.17 to be consistent with that in 35.5.2.2.3 | Revised.  Agree in principle.  Revised the text to be consistent with 35.5.2.2.3 (Padding for a triggering frame).  TGbe editor to make the changes with the CID tag (#16680) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16620 | Sindhu Verma | 35.3.17 | 565.37 | The definition of how the AP MLD must provide for the EMLSR padding delay requested by a non-AP MLD is not consistent with the padding delay definition in "35.5.2.2.3 Padding for a triggering frame" for EMLSR. | The definition of how the AP MLD provides for the EMLSR padding delay requested by a non-AP MLD, should be as per "35.5.2.2.3 Padding for a triggering frame". This latter definition is what exists even in 11ax for padding and should be used. | Revised.  Agree in principle.  Revised the text to be consistent with 35.5.2.2.3 (Padding for a triggering frame).  TGbe editor to make the changes with the CID tag (#16680) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16679 | Qi Wang | 9.4.2.312.2.3 | 256.22 | EMLSR padding delay defined in 9.4.2.312.2.3: "The EMLSR Padding Delay subfield indicates the minimum MAC padding duration of the Padding field of the initial Control frame requested by the non-AP MLD" is different from that specified in 35.5.2.2.3 "the number of bits in the PSDU following the last bit of the User Info field addressed to the non-AP MLD" | Modify the EMLSR padding delay definition in 9.4.2.312.2.3 to be consistent with that in 35.5.2.2.3 | Revised.  Agree in principle.  Revised the text to be consistent with 35.5.2.2.3 (Padding for a triggering frame).  TGbe editor to make the changes with the CID tag (#16679) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16621 | Sindhu Verma | 35.3.17 | 567.14 | The definition of how the AP MLD must provide for the EMLSR padding delay requested by a non-AP MLD is not consistent with the padding delay definition in "35.5.2.2.3 Padding for a triggering frame" for EMLSR. | The definition of how the AP MLD provides for the EMLSR padding delay requested by a non-AP MLD, should be as per "35.5.2.2.3 Padding for a triggering frame". This latter definition is what exists even in 11ax for padding and should be used. | Revised.  Agree in principle.  TGbe editor to make the changes with the CID tag (#16621) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16932 | Mark RISON | 35.3.17 | 567.15 | "the padding duration of the Padding field of the initial Control frame" -- the field has a duration not a padding duration | Delete "padding". Also at 571.12 | Revised.  The sentence has been revised. “the padding duration” is revised to “the length”.  TGbe editor to make the changes with the CID tag (#16621) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 15105 | Xiaogang Chen | 35.3.17 | 565.46 | "The number of spatial streams for the response to the BSRP Trigger frame shall be limited to one." nSS is assigned by AP. In addition, why add this limitation? | either change to AP shall set the number of spatial stream to 1 in the BSRP or remove the limitation. | Revised.  Clarified that the AP shall set the number of the spatial stream to 1 for the response of the BSRP Trigger frame.  TGbe editor to make the changes with the CID tag (#15105) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 16925 | Mark RISON | 35.3.17 | 565.46 | "The number of spatial streams for the response to the BSRP Trigger frame shall be lim- ited to one." -- doesn't the AP specify the NSS in the Trigger frame? | Make this clearly an AP requirement | Revised.  Clarified that the AP shall set the number of the spatial stream to 1 for the response of the BSRP Trigger frame.  TGbe editor to make the changes with the CID tag (#15105) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |
| 18058 | Albert Petrick | 35.3.17 | 567.12 | Not sure which rules to follow for sounding sequence in NOTE 5. Be more specific - add subclause or additional text as reference. | As commented | Revised.  For clarity, rephrased the sentence.  TGbe editor to make the changes with the CID tag (#16931) in doc.: IEEE 802.11-23/0437r0  [https://mentor.ieee.org/802.11/dcn/22/11-23-0437-00-00be-lb271-cr-cl35-emlsr-part2.docx] |

**TGbe Editor to make the following changes in Subclause 35.3.17 (Enhanced multi-link single radio operation) in TGbe D3.0 P565L12:**

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

**…**

**TGbe Editor to change sub-bullet points ‘—' to ‘alphabet numbering a), b),…’ in Subclause 35.3.17 (Enhanced multi-link single radio operation) in TGbe D3.0 P565L12** (#17857)**:**

When a non-AP MLD is operating in the EMLSR mode with an AP MLD supporting the EMLSR mode, the following applies:

a) The non-AP MLD shall be able to listen on the EMLSR link(s), by having its affiliated non-AP

STA(s) corresponding to those links in awake state. The listening operation includes CCA and receiving the initial Control frame of frame exchanges that (#16923)are initiated by the AP MLD.

NOTE 2—A non-AP STA operating on one of the EMLSR links can change its power management mode and follows the procedure in 11.2 (Power management). A non-AP STA can listen on one of the EMLSR links in active mode or in PS mode when it is in awake state.

(#17857)b)

(#17857)The following items c) to h) apply to frame exchanges initiated by an AP affiliated with the AP MLD:

c) An AP affiliated with the AP MLD that initiates frame exchanges that are not group addressed Data

(#15026)nor group addressed Management frames with the non-AP MLD on one of the EMLSR links shall begin the frame exchanges by transmitting the initial Control frame to the non-AP MLD with the limitations specified below.

• The initial Control frame of frame exchanges shall be sent in the non-HT PPDU or non-HT

duplicate PPDU format using a rate of 6 Mb/s, 12 Mb/s, or 24 Mb/s.

• The non-AP MLD shall indicate(#17857) the EMLSR padding delay, which is the minimum MAC padding duration (#16680)of the initial Control frame, in the EMLSR Padding Delay subfield of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element carried in a (Re)Association Request frame that it transmits.

• The non-AP MLD may (#17857)update the EMLSR padding delay by including an updated EMLSR Padding Delay duration in the EMLSR Parameter Update field in the EML Operating Mode Notification frame.

• (#16680) The AP affiliated with the AP MLD shall set the length of the Padding field of the initial Control frame based on the rules defined in 35.5.2.2.3 (Padding for a triggering frame) to ensure that the MAC padding duration of the initial Control frame is greater than or equal to the EMLSR padding delay last indicated by the non-AP MLD either in the EMLSR Padding Delay subfield of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element or in the EMLSR Padding Delay subfield of the EMLSR Parameter Update field in the last successfully transmitted EML Operating Mode Notification frame.

• The initial Control frame shall be an MU-RTS Trigger frame or a BSRP Trigger frame. A non-AP STA affiliated with a non-AP MLD that is in the listening operation and that receives an MU-RTS Trigger frame or BSRP Trigger frame addressed to it shall respond as defined in 35.5.2.3

(Non-AP STA behavior for UL MU operation) except when the frame exchanges initiated by the initial Control frame on one of the EMLSR links (#16924)overlap with group addressed frame transmissions on the other EMLSR link where the non-AP STA intends to receive the group addressed frames. The number of spatial streams for the response to the BSRP Trigger frame shall be limited to one(#15105), which shall be indicated in the BSRP Trigger frame.

NOTE 3—Whether to use the MU-RTS Trigger frame or the BSRP Trigger frame as the initial Control frame to initiate the frame exchanges is implementation specific and out of scope of this standard.

(#16308)NOTE – The MU-RTS Trigger frame that is used as the initial Control frame is the MU-RTS Trigger frame with the Triggered TXOP Sharing Mode subfield value equal to 0.

d) After receiving the initial Control frame of frame exchanges and transmitting an immediate response

frame as a response to the initial Control frame, a non-AP 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 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 spatial stream capabilities, operation mode, and the minimum MAC padding duration of the Padding field of the initial Control frame, the non-AP 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 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 non-AP STA(s) affiliated with the non-AP MLD on the other EMLSR link(s).

e) (#16926)The non-AP MLD shall indicate its EMLSR transition delay in the EMLSR Transition Delay subfield of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element carried in a (Re)Association Request

frame that it transmits. The non-AP MLD may update its EMLSR transition delay by including the EMLSR Parameter Update field in an EML Operating Mode Notification frame.

f) When the EMLSR Parameter Update field is present in an EML Operating Mode Notification frame, the EMLSR Link Bitmap subfield of the EML Control field shall contain a different value than the EMLSR Link Bitmap value contained in (#16927)the last EML Operating Mode Notification frame successfully transmitted by the non-AP MLD.

g) The non-AP MLD shall be switched back to the listening operation on the EMLSR links after the

EMLSR transition delay time last indicated by the non-AP MLD either in the EMLSR Transition Delay subfield of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element or in the EMLSR Transition Delay subfield of the EMLSR Parameter Update field in the last successfully transmitted EML Operating Mode Notification frame, if any of the following conditions is met and this is defined as the end of the frame exchanges:

• The MAC of the non-AP 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

non-AP 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 non-AP STA from the AP affiliated with the AP MLD that does not

require immediate acknowledgement.

• The MAC of the non-AP 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 non-AP 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 non-AP STA from the AP affiliated with the AP MLD that does not require immediate acknowledgement and (#15886)this non-AP STA 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 non-AP STA

affiliated with the non-AP MLD

- a Trigger frame that has one of the User Info fields addressed to the non-AP 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

non-AP STA affiliated with the non-AP MLD

- (#16929)an NDP Announcement frame that has one of the STA Info fields addressed to the non-AP STA affiliated with the non-AP MLD and a sounding NDP

• The non-AP 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 (#16930)an immediate response after a SIFS.

h) The AP affiliated with the AP MLD should transmit before the TXNAV timer expires another initial

Control frame addressed to the non-AP 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.

(#17857)

(#17857)The following items i) to j) apply to frame exchanges initiated by a non-AP STA affiliated with the non-AP MLD:

i)

j) When a non-AP STA affiliated with the non-AP MLD initiates a TXOP, the following applies:

• The non-AP MLD shall 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.

(#17857)

NOTE 4—A non-AP STA affiliated with a non-AP MLD operating in the EMLSR mode does not need to transmit an initial Control frame to initiate frame exchanges with the AP MLD and follows the rules defined in 10.3.2.4 (Setting and resetting the NAV) and in 10.23.2 (HCF contention based channel access (EDCA)) to access the WM.

…

NOTE 5—(#16931)The rules above also apply to a sounding sequence.

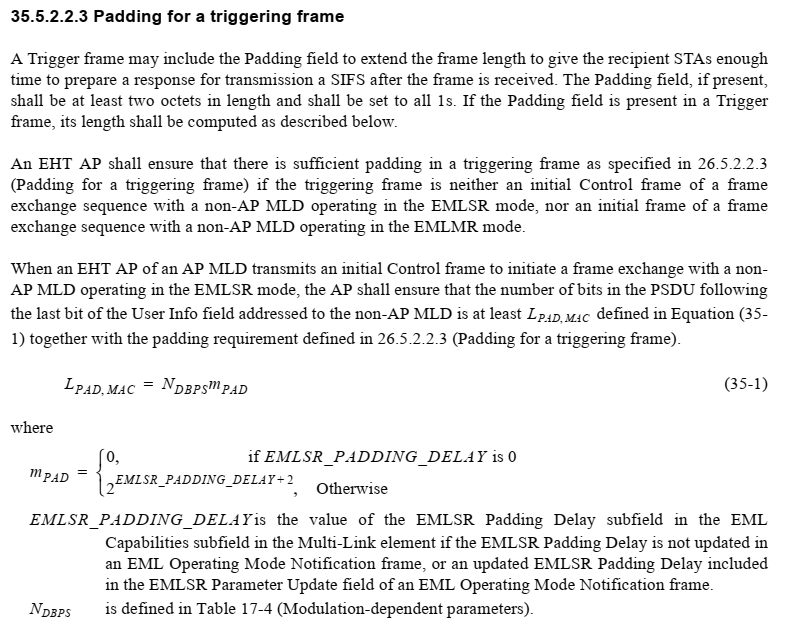
NOTE 6—When an AP affiliated with the AP MLD transmits an initial Control frame that initiates frame exchanges with more than one non-AP MLD operating in the EMLSR mode, the AP ensures that the length of the Padding field of the initial Control frame is (#16621)calculated based on the rules in 35.5.2.2.3 (Padding for a triggering frame) to ensure that the MAC padding duration 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.

**TGbe Editor to make the following changes in Subclause 9.4.2.312.2.3 (Common Info field of the Basic Multi-Link element) in TGbe D3.0 P256L22:**

**9.4.2.312.2.3 Common Info field of the Basic Multi-Link element**

**…**

The EMLSR Padding Delay subfield indicates the minimum MAC padding duration (#16679)of the initial Control frame requested by the non-AP MLD as defined in (#16679)35.5.2.2.3 (Padding for a triggering frame). 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 reserved. The EMLSR Padding Delay subfield includes 3 bits and is set as defined in Table 9-401e (Encoding of the EMLSR Padding Delay subfield).



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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 16333 | Yongho Kim | 35.3.17 | 565.12 | In a scenario where an EMLSR non-AP MLD receives a TIM and/or a multi-link traffic indication in a beacon frame from its associated MLD, the sequential transmission of a PS-poll frame by the non-AP MLD in the link in which the TIM is received and another PS-poll or UL data frame by the same non-AP MLD in another link can potentially cause interference with the receiving operation of the bufferable unit in the firstly notified link with PS-Poll. In order to prevent such situation, the transmission of another PS-poll frame or UL data frame should be restricted until the EMLSR non-AP MLD receives all of the BUs in the firstly notified link with PS-Poll. | As in comment. | Rejected.  When a STA affiliated with a non-AP MLD transmits a PS-Poll frame on the corresponding EMLSR link and receives a data frame after the initial control frame and its immediate response frame, the other AP affiliated with an AP MLD operating on the other EMLSR link shall not transmit a frame to the STA operating on the other EMLSR link based on the following rule:   “During the frame exchanges, the other AP(s) affiliated with the AP MLD shall not transmit frames to the other non-AP STA(s) affiliated with the non-AP MLD on the other EMLSR link(s).”  Therefore, there is no interference issue. |
| 16334 | Yongho Kim | 35.3.17 | 565.12 | In a scenario where an EMLSR non-AP MLD receives a TIM and a multi-link traffic indication in a beacon frame from its associated MLD, it can suffer from MediumSyncDelay or NAVSyncDelay when it has to send multiple PS-Poll frames. Therefore, PS-Poll frame which can indicate multiple links wake up status is needed to reduce delay caused by ediumSyncDelay or NAVSyncDelay. | As in comment, please define a PS-poll frame which can indicate wake-up status of multiple links. | Rejected.  In LB266, in doc 11-22/2045r1, a proposal to indicate cross-link power save status was discussed as a resolution to CID 12812 and CID 12412 but the group couldn’t reach consensus.  NAVSyncDelay value is not specified in the current baseline spec (defined as N/A) so a STA can potentially access the medium without a long delay. |
| 16340 | Yongho Kim | 35.3.17 | 565.12 | In an R-TWT SP, when an AP wants to transmit separate TXOPs (i.e., different AC data frames) to an EMLSR STA, every transmission shall start with an initial control frame. After the first reception of the ICF, the STAs of the EMLSR STA MLD can remain on the link without returning to the listening operation until the end of the R-TWT SP. Therefore, starting from the second data frame transmission, there is no need to transmit the ICF and it can mitigate delay in the R-TWT SP. Additionally, according to subclause 35.8.5.1 of 11be draft 3.0, the TXOP end time rule for EMLSR MLD is defined. Therefore, it's reasonable that EMLSR MLD is not to operate of listening opeation in the R-TWT SP. | As in comment, please add the method that EMLSR MLD is not to return to listening operation in R-TWT SP. | Rejected.  In LB266, a similar comment (CID 12416) asking to define a signaling method to indicate whether to return to listening operation was discussed and the resolution was as follows:  “REJECTED  A timer-based approach (staying on the link for a period of time) was discussed in the group in doc 11-21/287r0 (https://mentor.ieee.org/802.11/dcn/21/11-21-0287-00-00be-cc34-cr-emlsr-part2.docx) but the group decided to use the SIFS separation based approach to determine the end of frame exchanges for simplicity” |
| 15622 | Xiangxin Gu | 35.3.17 | 565.16 | To better exploit the EMLSR, it's better for an EMLSR non-AP MLD to indicate more than one STA awake over a single signaling on a link. | As the comment | Rejected.  In LB266, a similar comment (CID 12416) asking to define a signaling method to indicate whether to return to listening operation was discussed and the resolution was as follows:  “REJECTED  A timer-based approach (staying on the link for a period of time) was discussed in the group in doc 11-21/287r0 (https://mentor.ieee.org/802.11/dcn/21/11-21-0287-00-00be-cc34-cr-emlsr-part2.docx) but the group decided to use the SIFS separation based approach to determine the end of frame exchanges for simplicity” |
| 15230 | Akira Kishida | 35.3.17 | 565.14 | Whether affiliated STAs in EMLSR mode have multiple MAC addresses equal to the RF chains should be clarified. Suppose non-AP MLD has a single affiliated STA and multiple radio interfaces and listens to multiple links. How does the affiliated STA of non-AP MLD select or switch the links for operation? The architecture of the EMLSR mode is unclear in the draft; it should be clarified. | As in the comment. | Rejected.  In TGbe D3.0, in 4.9.6 (Reference model for multi-link operation (MLO)), in the following figure,  “Figure 4-30a—Example MLD and the affiliated STA communication system”  Each non-AP STA operating on the corresponding link has its own MAC address that is different from the other STAs affiliated with the same non-AP MLD. To transmit or receive on a link, a STA needs to have at least one RF chain. |
| 15618 | Sanghyun Kim | 35.3.17 | 565.14 | A non-AP MLD may support listening operation only for the enabled link(s) in awake state. There doesn't seem to be any reason to support listening on the disabled link. (according to the 35.3.7.1.5, non-AP STA operating on a disabled link may be in awake state if the link was disabled by an individually negotiated TID-to-Link mapping.) | As in comment | Rejected.  When a link is disabled, a frame cannot be delivered on that disabled link. The listening operation includes CCA and reception of MU-RTS and BSRP in non-HT PPDU format below or equal to 24 Mbps. |
| 15730 | KENGO NAGATA | 35.3.17 | 565.14 | "The non-AP MLD shall be able to listen on the EMLSR link(s), by having its affiliated non-AP STA(s) corresponding to those links in awake state. The listening operation includes CCA and receiving the initial Control frame of frame exchanges that is initiated by the AP MLD." Although a tipical EMLSR implementation might be not clear enough, this language, especially "affiliated non-AP STA(s)", can be read as multiple affiliated non-AP STAs would be affiliated with an AP MLD operating on EMLSR mode. This is confusing since what "single radio" actually means is not clear. Also, if "single radio" means that a non-AP MLD has only one affiliated non-AP STA, the affiliated non-AP STA should have multiple MAC addresses for each EMLSR links, and use and switch one of the MAC address corresponding to the EMLSR link on which an Initial Control frame was received. | What "single radio" actually means should be clear. Also, if an affiliated non-AP STA is supposed to have multiple MAC addresses and use and switch one of them corresponding to the EMLSR link on which an Initial Control frame was received, the following language should be added. "An affiliated non-AP STA shall have different MAC addresses for each EMLSR links. One of the MAC addresses is applied according to the EMLSR link on which an initial Control frame was received." | Rejected.  In TGbe D3.0, single-radio non-AP MLD is defined as follows: “**single radio non-access point (non-AP) multi-link device (MLD):** A non-AP MLD that supports operation on more than one link but receives or transmits frames only on one link at a time.”  Also, in 35.3.2 (Multi-link device addressing), the following is defined for MAC addresses of STAs affiliated with an MLD: “STAs affiliated with an MLD shall use different MAC addresses” |
| 16922 | Mark RISON | 35.3.17 | 565.14 | "The listening operation includes CCA and" -- it is not clear how listening involves CCA | Delete "CCA and" | Rejected.  A non-AP MLD listens on the EMLSR links and do CCA and it can decide to access the medium for uplink frame transmission. |
| 15621 | Xiangxin Gu | 35.3.17 | 565.16 | Active mode should not be excluded. | As the comment | Rejected.  In the following sentence, active mode is not excluded. When a STA is in active mode its power state is awake state. Active mode is a power management mode. “— The non-AP MLD shall be able to listen on the EMLSR link(s), by having its affiliated non-AP  STA(s) corresponding to those links in awake state. The listening operation includes CCA and receiving the initial Control frame of frame exchanges that is initiated by the AP MLD.” |
| 15061 | Michail Koundourakis | 35.3.17 | 565.22 | Initial Control frame might not be needed if there is only 1 EMLSR link in awake state. Add a capability for the non-AP MLD to tell the AP MLD if it shall or may not use the initial Control frame to initiate DL TXOP. | As per comment define a capability for the non-AP MLD to tell the AP MLD if it shall or may not use the initial Control frame to initiate DL TXOP. | Rejected.  In LB266, the same comment was discussed in CID 10777 but the group couldn’t reach consensus and had the following resolution:  “REJECTED  A proposed resolution for this CID was discussed as part of the comment resolutions in 11-22/1860r3 (https://mentor.ieee.org/802.11/dcn/22/11-22-1860-03), however the group could not reach consensus on a proposed change that would resolve the comment.  This CID is discussed on January 12, 2023 with 22/1860r3. The straw poll results are 14 Yes, 27 No, 19 Abstain.” |
| 16309 | Juseong Moon | 35.3.17 | 565.22 | In Draft 3.0, an AP affiliated with the AP MLD is allowed to begin the group addressed Data trasnsmission without transmitting the initial control frame. If the transmission of a group addressed BU is delayed for some reason, such as high channel load, it is unclear from the current specification whether the EMLSR STA MLD should go into listening operation or continue normal Tx/Rx operation. It is necessary to provide clarification on whether the EMLSR STA MLD should return to listening operation if group addressed BUs are not received or operate in normal Tx/Rx operation until the BUs are received. | As in comment. | Rejected.  In 35.3.17, how the group addressed frames are delivered to a non-AP MLD in EMLSR mode is defined as follows:  “— On the EMLSR link(s), the group addressed frame(s) that are expected to be received by the non-AP MLD shall be buffered and delivered following the rules defined in 35.3.15 (Multi-link operation group addressed frames).”  And in 35.3.15.2 (Non-AP MLD receive operation for group addressed frames) a non-AP MLD’s behavior is defined as follows:  “If an indication of buffered group addressed frames in the TIM element about an AP affiliated with an AP MLD is received by any non-AP STA affiliated with a non-AP MLD, the non-AP STA affiliated with the non-AP MLD that is associated with the AP and that stays awake to receive group addressed BUs shall elect to receive all group addressed frames that are scheduled for delivery on the link that the non-AP STA is operating on.” |
| 15451 | Julien Sevin | 35.3.17 | 567.07 | When a non-AP MLD operates in EMLSR mode, it is not specified for untriggered UL transmissions how it selects its affiliated non-AP STA which initiates the frame exchange | Specify how the affiliated non-AP STA which initiates the frame exchange is selected | Rejected.  As all the other multi-link operations do not specify how to choose a link to initiate a frame transmission, it is a non-AP MLD’s decision to select which link to initiate a frame transmission on EMLSR links. |
| 15611 | Sanghyun Kim | 35.3.17 | 566.12 | If a non-AP STA operating in the EMLSR mode intends to receive a Beacon frame whose TBTT is adjacent to the end of the frame exchange sequence, it can remain in a Rx mode instead of switching back to listening mode. | It seems necessary to consider whether an exception should be added for "shall be switched back to listening operation". | Rejected.  The following sentence clarifies that a non-AP MLD may not respond to the initial control frame on one of the EMLSR links, if it intends to receive group addressed frames on the other EMLSR link. This implies that the non-AP MLD is not in the listening operation on the link where the initial control frame is transmitted.  “…except when the frame exchanges initiated by the initial Control frame on one of the EMLSR links overlaps with group addressed frame transmissions on the other EMLSR link where the non-AP STA intends to receive the group addressed frames.” |
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| 16933 | Mark RISON | 35.3.17 | 567.14 | It's not clear this is stated normatively anywhere | Delete "NOTE---" and change "ensures" to "shall ensure" | Rejected.  There is the following normative text for each non-AP MLD:  “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 to the MAC padding duration in the EMLSR Padding Delay subfield.”  Since the AP affiliated with the AP MLD needs to meet this requirement for each non-AP MLD, this eventually makes the AP to transmit the initial Control frame with 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. |
| 16934 | Mark RISON | 35.3.17 | 567.42 | This para seems to duplicate the para at line 27 | Delete the para at line 27 | Rejected.  The paragraph at line27 is to highlight that the figures shown as examples of EMLSR operation are showing only one link on which the initial Control frame is sent:  “…show the frame exchanges on one link of the EMLSR links namely the link on which the initial control frame is sent.”  The paragraph at Line42 is describing each figure. |
| 15564 | Chaoming Luo | 35.3.17 | 568.06 | The figures 35-26 to 35-30 do not show the what makes EMLSR mode different from the normal mode. They provide little value and make the reader unhappy. | Either remove the examples or revise the figures to show the core of the EMLSR (e.g., mode switch frame exchange, and what happens to the other links when one of the EMLSR links is transmitting or receiving). | Rejected.  The figures show the examples of the EMLSR operation, starting with the initial Control frame (MU-RTS or BSRP), which is not required for non-EMLSR frame exchange sequences, and corresponding response frames and data frame exchanges or a sounding sequence. |