IEEE P802.11Wireless LANs

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| Proposed Resolutions to 11be LB266 CID on EMLSR Parameter Indication |
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Abstract

This submission proposes the resolution to 11be LB266 CID 11365.

The page and line numbers refer to those in 11be\_D2.3 [1].

**Introduction**

This submission proposes the resolution to 11be LB266 CID 11365.

The page and line numbers refer to those in 11be\_D2.3 [1].

**Comments:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Page.Line | Clause | Comment | Proposed change | Resolution |
| 11365 | Qi Wang | 217. 06 | 9.4.2.312.2.2 | "EMLSR Padding Delay" and "EMLSR Transition Delay" may be link-specific, and may depend on the specific links that operate in EMLSR mode. These parameters should be moved to the EML Operation Mode Notification frame transmitted when a non-AP MLD enters the EMLSR operation, and they should be made link-specific. As a result, these parameters can be updated post association. | As in comment. | Revised. Agree with the commenter in principle that these parameters may be link-pair specific. That is, these parameters for EMLSR operating on link 1 and link 2 may not be the same as those for EMLSR operating on link 2 and link 3. However, in some scenarios, it’s sufficient for a non-AP MLD to indicate the EMLSR Padding Delay and EMLSR Transition Delay during the association, without the need to update later. As result, it's better to keep these two parameters in the basic Multi-link element, but add an optional field in the EML OMN frame to allow these two parameters to be updated if needed. TGbe editors: please incorporate the proposed text changes tagged with #11365 in this submission.  |

1. **Discussion:**

None.

1. **Proposed resolution:**

**9.4.1.74 EML Control field**

The EML Control field is defined in Figure 9-144i (EML Control field format(#12774)).

***11be Editor: Please change Figure 9-144i in 11be\_D2.3[1] as shown below.***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 ~~B7~~ | B3 B7 |  |  |   |
|  | EMLSR Mode | EMLMR Mode | EMLSR Parameter Update Control | Reserved | EMLSR/EMLMR Link Bitmap | MCS Map Count Control | EMLMR Supported MCS And NSS Set |
| Bits | 1 | 1 | 1 | 5 | 0 or 16 | 0 or 8 | Variable |

**Figure 9-144i—EML Control field format(#12774) (#11365)**

**…**

***11be Editor: Please insert the following new text in 9.4.1.74 as shown below in the 11be spec.***

The EMLSR Parameter Update Control subfield indicates whether the EMLSR Parameter Update field is present in the EML Operating Mode Notification frame. The EMLSR Parameter Update Control subfield is set to 1 when the EMLSR Parameter Update field is present in the EML Operating Mode Notification frame, and set to 0 otherwise. When the EMLSR Parameter Update Control subfield is set to 1, the EMLSR Link Bitmap subfield of the EML Control field contains a different value than the EMLSR Link Bitmap value contained in a previous EML Operating Notification frame successfully transmitted by the non-AP MLD. When included in a frame sent by an AP affiliated with an AP MLD, the EMLSR Parameter Update Control subfield is set to 0. (#11365)

The EMLSR Link Bitmap subfield indicates the subset of the enabled links that is used by the non-AP MLD in the EMLSR mode. The bit position *i* of the EMLSR Link Bitmap subfield corresponds to the kink 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 EMLSR mode and is a member of the EMLSR links; otherwise the bit position is set to 0. (#11382)An AP MLD with dot11EHTEMLSROptionImplemented equal to true sets the EMLSR Link Bitmap subfield to the value obtained from the EMLSR Link Bitmap subfield of the received EML Operating Mode Notification frame. (#12774)The EMLSR Link Bitmap subfield is present if the EMLSR Mode subfield is equal to 1 and is not present otherwise.

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The MCS Map (BW≤80MHz), the MCS Map (BW=160MHz), and the MCS Map (BW=320 MHz) subfields follow the format shown in Figure 9-1002ai (EHT-MCS Map (BW ≤ 80 MHz, Except 20 MHz- Only Non-AP STA), EHT-MCS Map (BW = 160 MHz), and EHT-MCS Map (BW = 320 MHz) subfield format) defined in 9.4.2.313.4 (Supported EHT-MCS And NSS Set field), respectively.

***11be Editor: Please insert the new text for 9.4.1.75 in the 11be spec as shown below.***

**9.4.1.75 EMLSR Parameter Update field (#11365)**

The EMLSR Parameter Update field is defined in Figure 9-x (EMLSR Parameter Update field format **(#11365**).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B2 | B3 B5 | B6 B7 |
|  | EMLSR Padding Delay  | EMLSR Transition Delay | Reserved |
| Bits | 3 | 3 | 2 |

**Figure 9-x—EMLSR Parameter Update field format (#11365)**

The EMLSR Parameter Update field is optionally included in the EML Operating Mode Notification frame, and its presence is indicated by the EMLSR Parameter Update Control subfield of the EML Control field. It is present if at the time of the EML Operating Mode Notification frame transmission, the non-AP MLD intends to update the EMLSR Padding Delay or the EMLSR Transition Delay of the non-AP MLD or both from their respective last transmitted value included either in the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element in the (Re)association Request frame that the non-AP MLD transmits, or in the last successfully transmitted EML Operating Mode Notification frame. (311365)

The EMLSR Padding Delay subfield is set as defined in Table 9-401e (Encoding of the EMLSR Padding Delay subfield).

The EMLSR Transition Delay subfield is set as defined in Table 9-401f (Encoding of the EMLSR Transition Delay subfield).

The B6 and B7 of the EMLSR Parameter Update field are reserved.

**9.6.35.8 EML Operating Mode Notification frame details**

The EML Operating Mode Notification frame is used to indicate that a non-AP MLD with which the transmitting STA is affiliated is changing its EML operation.

The Action field of the EML Operating Mode Notification frame contains the information shown in Table 9-
623j (Protected EML Operating Mode Notification frame Action field format).

***11be Editor: Please change the text on P295 in 11be\_D2.3 [1] as shown below.***

**Table 9-623j—Protected EML Operating Mode Notification frame Action field format (#11365)**

|  |  |
| --- | --- |
| **Order**  | **Information** |
| 1  | Category |
| 2  | Protected EHT Action |
| 3  | Dialog Token |
| 4  | EML Control (see 9.4.1.74 (EML Control field)) |
| 5 | EMLSR Parameter Update (optional) (see 9.4.1.75 (EMLSR Parameter Update field)) |

The EMLSR Parameter Update field is optionally present in the EML Operating Mode Notification frame. It is present if the EMLSR Parameter Update Control subfield of the EML Control field is set to 1 and the Action frame is sent by a non-AP STA affiliated with a non-AP MLD. The EMLSR parameter Update field is defined in 9.4.1.75 (EMLSR Parameter Update field).(#11365)

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

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|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 B3 | B4 B6 | B7 | B8 B10 | B11 B14 | B15 |
|  | EMLSR Support | EMLSR Padding Delay | EMLSR Transition Delay | EMLMR Support | EMLMR Delay | Transition Timeout | Reserved |
| Bits | 1 | 3 | 3 | 1 | 3 | 4 | 1 |

**Figure 9-1002k—EML Capabilities subfield format**

The EMLSR Support subfield indicates support of the EMLSR operation for an MLD. The EMLSR Support subfield is set to 1 if the MLD supports the EMLSR operation; otherwise it is set to 0. For a non-AP MLD, the EMLSR Support subfield is set to 0 if the EMLMR Support subfield is set to 1.

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 as defined in 35.3.17 (Enhanced multi-link single radio operation). 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 (#13754)reserved. The EMLSR Padding Delay subfield includes 3 bits and is set as defined in Table 9-401e (Encoding of the EMLSR Padding Delay sub- field).

**Table 9-401e—Encoding of the EMLSR Padding Delay subfield**

|  |  |
| --- | --- |
| **EMLSR Padding Delay subfield value** | **EMLSR padding delay** |
| 0 | 0 us |
| 1 | 32 us |
| 2 | 64 us |
| 3 | 128 us |
| 4 | 256 us |
| 5-7 | Reserved |

The EMLSR Transition Delay subfield indicates the transition delay time needed by a non-AP MLD to switch from exchanging frames on one of the enabled links to the listening operation on enabled links (see 35.3.17 (Enhanced multi-link single radio operation). (#11122) When the EMLSR Transition Delay subfield is included in a frame sent by an AP affiliated with an AP MLD, the EMLSR Transition Delay sub- field is reserved. The EMLSR Transition Delay subfield (#11391)includes 3 bits and is set as defined in Table 9-401f (Encoding of the EMLSR Transition Delay subfield(#11391)).

**Table 9-401f—Encoding of the EMLSR Transition Delay subfield(#11391)**

|  |  |
| --- | --- |
| **EMLSR Transition Delay subfield value** | **EMLSR transition delay** |
| 0 | 0 us |
| 1 | 16 us |
| 2 | 32 us |
| 3 | 64 us |
| 4 | 128 us |
| 5 | 256 us |
| 6-7 | Reserved |

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

***11be Editor: Please modify the text on P519 of 11be\_D2.3 [1] as shown below.***

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

—  The non-AP MLD shall be able to listen on the (#11457)EMLSR link(s), by having its affiliated 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.

(#12677)NOTE 2—A STA operating on one of the EMLSR links can change its power management mode and follows the procedure in 11.2 (Power management). A STA can listen on one of the EMLSR links in active mode or in PS mode when it is in awake state.

—  An AP affiliated with the AP MLD that initiates frame exchanges (#10434)that are not group addressed Data or 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 (#10134)6 Mb/s, 12 Mb/s, or 24 Mb/s.
* The non-AP MLD shall indicate the minimum MAC padding duration of the Padding field 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 (#11458)carried in a (Re)Association Request frame that it transmits. The non-AP MLD may include an updated EMLSR Padding Delay duration in the EMLSR Parameter Update field in the EML Operating Mode Notification frame (#11365). (#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 to the MAC padding duration in the EMLSR Padding Delay subfield.
* The initial Control frame shall be an MU-RTS Trigger frame or a BSRP Trigger frame. A (#12242)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 (#13812)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 overlaps 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. .

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.

— After receiving the initial Control frame of frame exchanges and transmitting an immediate response frame as a response to the initial Control frame, a (#12242)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 (#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 spatial stream capabilities, operation mode, (#10088)and 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 more than one spatial stream 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 (#12242)non-AP STA(s) affiliated with the non-AP MLD on the other EMLSR link(s).

— The non-AP MLD shall indicate its EMLSR Padding Delay and EMLSR Transition Delay in their respective EMLSR Padding Delay and EMLSR Transition Delay subfield of the EML Capabilities subfield in the Common Info field of the Basic Multi-Link element. The non-AP MLD may update its EMLSR Padding Delay or EMLSR Transition Delay or both by including the EMLSR Parameter Update field in an EML Operating Mode Notification frame. 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 a previous EML Operating Notification frame successfully transmitted by the non-AP MLD.

— The non-AP MLD shall be switched back to the listening operation on the EMLSR links after the EMLSR Transition Delay time last indicated (#10100)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 (#11365), if any of the following conditions is met and this is defined as the end of the frame exchanges:

**35.5.2.2.3 Padding for a triggering frame**

***11be Editor: Please modify the text P519 of 11be\_D2.3 [1] as shown below.***

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*L* =*Nm PAD*,*MAC DBPS PAD*

where(#13852)(#14006)

*EMLSR*\_*PADDING*\_*DELAY* is the value of the EMLSR Padding Delay subfield in the EML Capabilities subfield in the Multi-Link element if the EMLSR Padding Delay is not updated in an EML Operating Mode Notification frame, or an updated EMLSR Padding Delay included in the EMLSR Parameter Update field of an EML Operating Mode Notification frame (#11365).

*NDBPS* is defined in Table 17-4 (Modulation-dependent parameters).

**References**

[1] IEEE P802.11be™/D2.3, Draft standard for information technology – Telecommunications and information exchange between systems local and metropolitan area networks – Specific requirements Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications, Amendment 9: Enhancements for extremely high throughput (EHT)

Amendment 4: Enhancements for positioning