IEEE P802.11  
Wireless LANs

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| LB271 Comment Resolution Clause 35 MLTI, Clause 3.2 Definitions, Misc.  (Part 2) | | | | |
| Date: 2023-5-1 | | | | |
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Abstract

This submission proposes comment resolutions for the following 29 CIDs received in LB271 on TGbe D3.0 related to

* 35.3.12.4 Traffic Indication and
* 9.4.2.315 Multi-Link Traffic Indication element
* 3.2 Definitions
* Misc.

CIDs:

15958 16041 17742 18099 17739 15090 15918 16425 17743 15662

15377 15472 15919 16426 16468 17010 15685 16220 16221 16384

16222 16258 16657 16658 16307 15659 16438 15060 16899

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: add 7 more CIDs (16657 16658 16307 15659 16438 15060 16899)
* Rev 2: included references to the CR documents that include changes in D3.2(pre-release)

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 15958 | Binita Gupta | 9.4.2.315 | 294.34 | There is no description on how AID Offset (k) is calculated for ML Traffic Indication element. Add text to specify this. | Specify rules for how AID Offset k is determined for ML Traffic Indication element by AP MLD. This is not specified in clause 35.3.12.4 . | Revised.  The same comment was discussed for CID 15376 in doc 11-23/504r2 and the cited sentence has been modified as follows:  “(#15376)The AID Offset subfield is set to the AID of the non-AP MLD that corresponds to the first Per-Link Traffic Indication Bitmap subfield in the Per-Link Traffic Indication List field when the Multi-Link Traffic Indication element is included in a Beacon frame. “  TGbe editor: No changes needed. |
| 16041 | Binita Gupta | 35.3.12.4 | 539.12 | How does AP MLD determine value k for AID Offset? Specify rules for this. | Specify rules for how AID Offset k is set by the AP MLD. | Revised.  The same comment was discussed for CID 15376 in doc 11-23/504r2 and the cited sentence has been modified as follows:  “(#15376)and the first Per-Link Traffic Indication Bitmap subfield corresponds to the AID of the non-AP MLD contained in the AID Offset subfield of the Multi-Link Traffic Indication Control field of the Multi-Link Traffic Indication element.”  TGbe editor: No changes needed. |
| 17742 | Brian Hart | 9.4.2.315 | 294.34 | "or the AID bitmap" is very unclear until we read ahead to P294L47 (merge L38-49 into a single sentence!?). As well, it is unclear if the first argument of the "or" at L40.5 is equal to just "traffic indication virtual bitmap" or "the AIDs of the non-AP MLDs and STAs starting from the bit numbered k of the traffic indication virtual bitmap" or the entire "subfields that correspond to the AIDs of the non-AP MLDs and STAs starting from the bit numbered k of the traffic indication virtual bitmap". I think it is the first option (use bullets to separate, just like at L44-49 ... so merge L38-49 into a single sentence!?). Finally "and set to 1" is misleading - needs something more like "are equal to 1" | Try creating a single sentence for L38-49, comprising: "The Per-Link Traffic Indication List field contains N Per-Link Traffic Indication Bitmap n subfields, 1 <= n <= N [or p and P, etc], followed by padding. The Per-Link Traffic Indication Bitmap n subfields correspond to the AIDs of the non-AP MLDs and STAs identified by bits equal to 1 starting from the bit numbered k in \*either\*: - the traffic indication virtual bitmap in the Partial Virtual Bitmap subfield of the TIM element that is included in a Beacon frame with the Multi-Link Traffic Indication element, \*or\* - the AID bitmap in the Partial AID Bitmap subfield of the AID Bitmap element that is included in a Link Recommendation frame with the Multi-Link Traffic Indication element." | Revised.  Clarified the paragraph.  TGbe editor to make the changes with the CID tag (#17742) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 18099 | Abhishek Patil | 9.4.2.315 | 294.44 | The two bullets describe what traffic indication virtual bitmap and AID bitmap refers to. However, these terms are being referred beforehand. Organize the description so that the terms are described before their usage. | As in comment | Revised.  Clarified the paragraph.  TGbe editor to make the changes with the CID tag (#17742) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 17739 | Brian Hart | 9.4.2.315 | 294.50 | "Per-Link Traffic Indication Bitmap subfield" omits the index shown in fig 9-12002as. As well, the final index is lowercase but most indices are the lowercase version of the uppercase final limit - e.g. 1 .. n .. N. Finally lowercase l (el) is a really poor choice since it looks a lot like an uppercase I (eye). | In fig 9-1002as, change "el" to "N" and at P294L40.5 and P294L41.5. At P294L29 and elsewhere such as P294L38, change fieldname to "Per-Link Traffic Indication Bitmap <i>n</i>" | Revised.  Changed ‘el’ to ‘N’.  TGbe editor to make the changes with the CID tag (#17742) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |

**TGbe Editor to make the following changes in in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.2(pre-release) P298L38 + doc.11-23/499r1:**

(#17742)(#15089)The Per-Link Traffic Indication List field is defined in Figure 9-1002as (Per-Link Traffic Indication List field format). The Per-Link Traffic Indication List field contains *N* Per-Link Traffic Indication Bitmap *n* subfield(s) followed by the Padding subfield, where 1 ≤ *n* ≤ *N*. The *N* Per-Link Traffic Indication Bitmap *n* subfield(s) correspond to the AID(s) of the non-AP MLD(s) or a (#16475)non-MLD non-AP STA(s) that are identified by the corresponding bit(s) that are equal to 1, where *N* is the number of bit(s) that are equal to 1, in either:

* the Partial Virtual Bitmap subfield of the TIM element in a Beacon frame with the Multi-Link Traffic Indication element, counting from the bit position that corresponds to the AID value in the AID Offset subfield of the Multi-Link Traffic Indication element, or
* the Partial AID Bitmap subfield of the AID Bitmap element in a Link Recommendation frame with the Multi-Link Traffic Indication element(#17909).

**(#17742)TGbe Editor to make the following changes in Figure 9-1002as in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.1 P295L50:**

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|  |  |  |  |  |  |  |
|  | Per-link Traffic Indication Bitmap 1 | … | Per-link Traffic Indication Bitmap *n* | … | Per-link Traffic Indication Bitmap *N* | Padding |
| Bits: | *m*+1 |  | *m*+1 |  | *m*+1 | variable (0-7) |

**Figure 9-1002as—Per-Link Traffic Indication List field format**

**(#17742)*TGbe editor to replace all occurrences of* ‘Per-Link Traffic Indication Bitmap subfield’ to ‘Per-Link Traffic Indication Bitmap *n* subfield’**

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 15090 | Minyoung Park | 9.4.2.315 | 294.59 |  |  | For better readability, revise the following paragraph in the sub-bullet format:"*The Per-Link Traffic Indication Bitmap subfield is defined in Figure 9-1002at (Per-Link Traffic Indication Bitmap subfield format). Each Per-Link Traffic Indication Bitmap subfield indicates per-link traffic indications for a non-AP MLD that has negotiated a TID-to-link mapping with an AP MLD and not all TIDs are mapped to all the enabled links or link recommendation for a non-AP MLD that has negotiated a TID-to-link mapping with an AP MLD and all TIDs are mapped to all the enabled links or link recommendation for a non-AP MLD that is in the default mapping mode.* ""The Per-Link Traffic Indication Bitmap subfield is defined in Figure 9-1002at (Per-Link Traffic Indication Bitmap subfield format). Each Per-Link Traffic Indication Bitmap subfield indicates one of the following: - per-link traffic indications for a non-AP MLD that has negotiated a TID-to-link mapping with an AP MLD and not all TIDs are mapped to all the enabled links - link recommendation for a non-AP MLD that has negotiated a TID-to-link mapping with an AP MLD and all TIDs are mapped to all the enabled links - link recommendation for a non-AP MLD that is in the default mapping mode. "Revised.  The paragraph is updated with bullet points.  TGbe editor to make the changes with the CID tag (#15090) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 15918 | Zhou Lan | 9.4.2.315 | 294.59 | This paragraph is missing the case for disabling a link through TID-to-link mapping; please add it. Or an alternative way is to simplify the text by removing the enumeration of every case like "negotiated a TID-to-link mapping" and "link recommendation"; this way the text is more clear and doesn't need to be changed/updated later when a new TID-to-link mapping case is added. | As in comment | Revised.  Deleted ‘negotiated a TID-to-link mapping’, ‘default mapping’ but differentiated with whether all TIDs are mapped to all enabled links or not.  TGbe editor to make the changes with the CID tag (#15918) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 16425 | Morteza Mehrnoush | 9.4.2.315 | 294.59 | This paragraph is missing the case for disabling a link through TID-to-link mapping; please add it. Or an alternative way is to simplify the text by removing the enumeration of every case like "negotiated a TID-to-link mapping" and "link recommendation"; this way the text is more clear and doesn't need to be changed/updated later when a new TID-to-link mapping case is added. | As in comment | Revised.  Deleted ‘negotiated a TID-to-link mapping’, ‘default mapping’ but differentiated with whether all TIDs are mapped to all enabled links or not.  TGbe editor to make the changes with the CID tag (#15918) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 17743 | Brian Hart | 9.4.2.315 | 294.60 | "indicates ... indications" is inelegant. Also plural "indications" is vague, and the arguments to the "or"s are unclear. Consider converting to subbullets with light rewording. | Starting at P294L59, try "Each Per-Link Traffic Indication Bitmap \*n\* subfield is defined in Figure 9-1002at (Per-Link Traffic Indication Bitmap subfield format) and \*indicates one of the following\*: - a traffic indication per link for a non-AP MLD that has negotiated a TID-to-link mapping with an AP MLD \*wherein\* not all TIDs are mapped to all the enabled links, or - a link recommendation for a non-AP MLD that has negotiated a TID-to-link mapping with an AP MLD \*wherein\* all TIDs are mapped to all the enabled links, or - a link recommendation for a non-AP MLD that is in the default mapping mode.” | Revised.  The paragraph is updated with bullet points.  TGbe editor to make the changes with the CID tag (#15090) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |

**TGbe Editor to make the following changes in in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.1 (P295L59):**

(#15090, 15918)The Per-Link Traffic Indication Bitmap *n* subfield is defined in Figure 9-1002at (Per-Link Traffic Indication Bitmap *n* subfield format). When a Multi-Link Traffic Indication element is in a Beacon frame, each Per-Link Traffic Indication Bitmap *n* subfield indicates either:

* Per-link traffic indication for a non-AP MLD that does not have all TIDs mapped to all the enabled links or
* Link recommendation for a non-AP MLD that has all TIDs mapped to all the enabled links.

When a Multi-Link Traffic Indication element is in a Link Recommendation frame, each Per-Link Traffic Indication Bitmap *n* subfield indicates link recommendation for a non-AP MLD.

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 15662 | Geonjung Ko | 9.4.2.315 | 295.15 | A bit that corresponds to a link not set up at a non-AP MLD side should be reserved. | As in comment | Revised.  Added a sentence to cover the case when a link is not set up between a non-AP MLD and an AP MLD.  TGbe editor to make the changes with the CID tag (#15662) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 15377 | John Wullert | 9.4.2.315 | 295.23 | When all TIDs are mapped to all links, setting the bit to one indicates two things: that there is one or more BUs buffered and that the selected link is recommended for retrieving them. | Revise sentence to say “In a Beacon frame when the Per-Link Traffic Indication Bitmap subfield corresponds to a non-AP MLD that is in the default mapping mode or has negotiated a TID-to-link mapping with an AP MLD and all TIDs are mapped to all the enabled links, a value of 1 in the bit position i in the bitmap indicates that there is one or more buffered BUs or one or more MMPDUs and that the link with the link ID equal to i is recommended for retrieving them.” | Rejected.  An AID bit position in the TIM element that corresponds to a non-AP MLD that have all TIDs mapped to all enabled links already indicates that there is one or more buffered BU(s) to retrieve from the AP MLD. |

**TGbe Editor to make the following changes in in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.1 (P296L15):**

Each bit in the Per-Link Traffic Indication Bitmap subfield corresponds to a link and the bit position *i* of the bitmap, B*i*, corresponds to a link with link ID equal to *i*. (#15662)A bit position that corresponds to a link that is not a setup link is reserved.

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 15472 | Xiangxin Gu | 35.3.12.4 | 540.17 | It is unnecessary for advertised tid-to-link mapping to have corresponding Per-Link Traffic Indication Bitmap subfield. | As the comment | Rejected.  Per the comment resolution guide (11-11/1625), this is invalid comment. The comment fails to identify changes in sufficient detail so that the specific wording of the changes can be determined. |
| 15919 | Zhou Lan | 35.3.12.4 | 541.18 | This paragraph is missing the case for the link disablement through TID-to-link mapping; please add it, or remove the case by case enumeration like "negotiated a TID-to-link mapping" and "link recommendation". | As in comment | Revised.  Deleted ‘negotiated a TID-to-link mapping’, ‘default mapping’ but differentiated with whether all TIDs are mapped to all enabled links or not.  TGbe editor to make the changes with the CID tag (#15919) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 16426 | Morteza Mehrnoush | 35.3.12.4 | 541.18 | This paragraph is missing the case for the link disablement through TID-to-link mapping; please add it, or remove the case by case enumeration like "negotiated a TID-to-link mapping" and "link recommendation". | As in comment | Revised.  Deleted ‘negotiated a TID-to-link mapping’, ‘default mapping’ but differentiated with whether all TIDs are mapped to all enabled links or not.  TGbe editor to make the changes with the CID tag (#15919) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |

**TGbe Editor to make the following changes in in Subclause 35.3.12.4 (Traffic Indication) in TGbe D3.1 (P546L47):**

(#15919)An AP MLD shall set dot11MultiLinkTrafficIndicationActivated to true if dot11TIDtoLinkMappingActivated is true and if any of the following conditions is met and otherwise shall set to false:

— At least one of the associated non-AP MLD(s) does not have all TIDs mapped to all the enabled links

and the AP MLD has buffered BU(s) with TID(s) that are not mapped to all enabled links for that non-AP MLD

— The AP MLD intends to provide link recommendations in a Beacon frame to retrieve individually

addressed buffered BUs to at least one of the associated non-AP MLD(s) that has all TIDs mapped to all the enabled links and the AP MLD has buffered BU(s) for that non-AP MLD.

**Subclause 3.2 and miscellaneous CIDs:**

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 16468 | Sidharth Thakur |  | 0.00 | There seem to several unanswered questions about the use of EMLSR and EMLMR that need to be resolved in future drafts. |  | Rejected.  This is invalid comment.  It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined. |
| 17010 | Mark RISON | 35 | 0.00 | Why is it EMLSR padding delay but EMLMR delay? | Change EMLMR delay to EMLMR padding delay throughout, ignoring case and underscore/space | Revised.  Agree with the commenter.  TGbe editor to find and replace ‘EMLMR delay’ to ‘EMLMR padding delay’, ignoring case and underscore/space in the TGbe D3.1 for the following instances:   1. P257L8: in the Figure 9-1002j (1 instance) 2. P258L35, L39, L40, L42, L43 (6 instances) 3. P258L46, Table 9-401g in that title, in the table (3 instances) 4. P577L2, L14 (2 instances) 5. P578L32 (1 instance) 6. P598L35, L37, L38 (4 instances) 7. P626L24 (2 instances) |
| 15685 | Oren Kedem | 9.4.1.74 | 226.01 | Oren Kedem | Figure 9-144j should include also the EMLSR Parameter Update field | Rejected.  This is invalid comment.  It fails to locate and identify the issue. Fails to identify changes in sufficient detail so that the specific wording of the changes can be determined.  Figure 9-144j is (MCS Map Count Control subfield format) and not related to EMLSR Parameter Update field. |
| 16220 | Stephen McCann | 3.2 | 61.12 | What does the term "enhanced" refer to in the EMLSR operation definition. The term multi-link is not used in the base line, so why should enhanced multi-link be defined in this draft? What is it an enhancement of? In addition, EMLSR appears to be a "restricted" mode of multi-link operation. | Change "enhanced to restricted" and "EMLSR" to "RMLSR" in the cited definition. Change all occurrences of EMLSR to RMLSR throughout the draft. | Rejected.  A single-radio non-AP MLD can setup more than one link with an AP MLD but can transmit and receive frames on one link a time as defined in Clause 3.2 “**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.”  ‘Enhanced’ in the EMLSR operation is used to highlight the ‘enhanced’ capability compared to a single-radio non-AP MLD that is not operating in EMLSR mode.  It is an ‘enhanced’ capability since a non-AP MLD that is in EMLSR mode can listen on multiple EMLSR links simultaneously and use any available link to exchange frames. |
| 16221 | Stephen McCann | 3.2 | 61.12 | There is no definition for EMLMR operation. This appears to be similar to EMLSR operation and should have a definition, although the term should equate to "Reduced MLMR operation". | Add the following definition to the clause in alphabetical order: reduced multi-link multiple radio (RMLMR) operation: A mode of operation that allows a non-access point (non-AP) multi-link device (MLD) with multiple receive chains to listen on a set of enabled links, and to perform a set of frame exchanges on one link of the set, while having limited ability to receive or transmit on the other links of the set. | Revised.  Added a definition similar to the one defined in the beginning of subclause 35.3.18 (Enhanced multi-link multi-radio operation).  Frame exchanges after the initial frame until the end of the frame exchanges can use a larger Nss compared to the Nss capability of the STA before or during the reception of the initial frame, thus ‘enhanced’. |
| 16384 | Massinissa Lalam | 3.2 | 61.12 | In the eMLSR definition, clarify that the initial control frame is sent by only one affiliated AP, e.g. " ... an initial Control frame sent by only one AP affiliated with an AP MLD operating in a non-high-throughput (non-HT) (duplicate) physical layer (PHY) protocol data unit (PPDU) with one spatial stream, followed by frame exchanges on the link on which the initial Control frame was received." | As in comment | Rejected.  The definition clearly states that an initial Control frame (singular) is sent by an AP (singular). |

**TGbe Editor to add the following definition in Subclause 3.2 in TGbe D3.1**

(#16221)**enhanced multi-link single radio (EMLMR) operation:** A mode of operation that allows a non-access point (non-AP) multi-link device (MLD) with multiple radios to listen on a set of enabled links, when the corresponding stations (STAs) affiliated with the non-AP MLD are in awake state, for an initial frame sent by an AP affiliated with an AP MLD in a physical layer (PHY) protocol data unit (PPDU) whose Nss satisfies the receiving STA’s receiving capabilities, followed by frame exchanges that satisfy the MCS and Nss capabilities in EMLMR mode on the link on which the initial frame was received.



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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 16222 | Stephen McCann | 3.2 | 61.13 | The term "enabled links" is not defined. I think this is the same as "setup links". | Change all occurrences of "enabled links" to "setup links" throughout the draft. | Revised.  As shown in 35.3.7.1.1(General) under 35.3.7.1 (TID-to-link mapping), an enabled link is a setup link to which at least one TID is mapped either in DL or in UL.  Added a definition for the term ‘enabled link’.  TGbe editor to make the changes with the CID tag (#16222) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 16258 | Stephen McCann | 3.2 | 61.14 | doze and awake states take articles (see the baseline). | If "awake state" is missing an article, change "awake state" to "the awake state" throughout the draft. | Revised.  Agree with the commenter.  TGbe editor to find and replace - “awake state” with missing article with “the awake state” and  - “doze state” with missing article with “the doze state” throughout the current TGbe draft. |

**Discussion:**

As shown below in 35.3.7.1.1, an enabled link is a setup link that has at least one TID mapped to that link either in DL or in UL.

**35.3.7 Link management**

**35.3.7.1 TID-to-link mapping**

**35.3.7.1.1 General**

**…**

A setup link is defined as enabled for a non-AP MLD if at least one TID is mapped to that link either in DL or in UL and is defined as disabled if no TIDs are mapped to that link both in DL and UL. At any point in time, a TID shall always be mapped to at least one setup link both in DL and UL, which means that a TID-to-link mapping change is only valid and successful if it will not result in having any TID for which the link set for DL or UL is made of zero setup links. By default, all setup links are enabled (see 35.3.7.1.2 (Default mapping mode)).

…

If a TID is mapped in UL to a set of enabled links for a non-AP MLD, then the non-AP MLD may use any link within this set of enabled links to transmit individually addressed MSDUs or A-MSDUs that are destined to the AP MLD and that correspond to that TID.

If a TID is mapped in DL to a set of enabled links for a non-AP MLD, then:

— The non-AP MLD may retrieve individually addressed buffered BUs available at the AP MLD that

are MSDUs or A-MSDUs corresponding to that TID on any link within this set of enabled links.

— The AP MLD may use any link within this set of enabled links to transmit individually addressed

MSDUs or A-MSDUs that are destined to the non-AP MLD and that correspond to that TID, subject to the power state of the non-AP STA affiliated with the non-AP MLD on each of these links.

NOTE 4—The non-AP MLD can retrieve BUs buffered by the AP MLD on any mapped link. In addition, the AP MLD can recommend link(s) as defined in 35.3.12.4 (Traffic indication).

A non-AP MLD may retrieve buffered BUs that are individually addressed MMPDUs available at the AP MLD on any enabled link. An AP MLD may use any enabled links to transmit individually addressed management frames (see Table 11-3 (Bufferable/nonbufferable classification of MMPDUs)) subject to the rules defined in 35.3.14 (Multi-link device individually addressed Management frame delivery) and subject to the power state of the non-AP STA on each of the links (see 35.3.12 (Multi-link power management)).

**Setup link:** Between the access point (AP) multi-link device (MLD) and the associated non-AP MLD, a link that is requested by the non-AP MLD in the (Re)Association Request frame and is accepted by the AP MLD in the (Re)Association Response frame (see 35.3.5 (Multi-link (re)setup)).

**(#**16222**)enabled link:** A setup link to which at least one TID is mapped either in downlink or in uplink for a non-AP MLD (see 35.3.7.1 (TID-to-link mapping)).

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| **CID** | **Commenter** | **Clause Number** | **Page.**  **Line** | **Comment** | **Proposed Change** | **Resolution** |
| 16657 | Liwen Chu | 35.3.17 | 571.21 | the frame exchange sequence is not complete: 1) the sequence of TXOP sharing is missing, 2) the NDP ranging sequence is missing, 3) the future 802.11 amendment may add the new sequence, e.g. 11bf | Please complete the allowed sequence. Another option is to generalize the text so that any vaild frame exchange sequence is included. | Revised.  The sentence related to NDP Announcement frame and NDP has been updated to support any type of NDP Announcement frame and the corresponding NDP that follows SIFS after the frame.  The TXOP sharing case is added as a separate item.    TGbe editor to make the changes with the CID tag (#16657) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 16658 | Liwen Chu | 35.3.17 | 565.12 | the frame exchange sequence is not complete: 1) the sequence of TXOP sharing is missing, 2) the NDP ranging sequence is missing, 3) the future 802.11 amendment may add the new sequence, e.g. 11bf | Please complete the allowed sequence. Another option is to generalize the text so that any vaild frame exchange sequence is included. | Revised.  The sentence related to NDP Announcement frame and NDP has been updated to support any type of NDP Announcement frame and the corresponding NDP that follows SIFS after the frame.  The TXOP sharing case is added as a separate item.    TGbe editor to make the changes with the CID tag (#16657) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 16307 | Juseong Moon | 35.3.17 | 566.12 | When a non-AP STA affiliated with an EMLSR non-AP MLD performs a TXS operation as defined in 35.2.1.2 and transmits a CTS response to a MU-RTS frame, since it shall switch back after the end of the frame exchanges as defined in 35.3.17 due to not receiving PHY-RXSTART.indication in shared TXOP, it can not perform TXS operation. Therefore, EMLSR non-AP STA MLD's transmission to the AP or to a peer STA is not possible. An additional definition of the end of the frame exchanges (defined in 35.3.17) is needed in order to properly perform the TXS operation for EMLSR MLD. For example, rules with PHY.TXSTART primitives can be used in TXS operation, or the approach described on line 63 of page 566 can be applied. (P566L63: 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. | As in comment. | Revised.  Agree in principle. When MU-RTS TXS Trigger frame is received, during the time allocated in the MU-RTS TXS Trigger frame, the non-AP STA initiates a frame transmission and the switch back to the listening operation should happen at the end of the allocated time in the MU-RTS TXS Trigger frame. Added item k) in D3.2 (pre-release).  TGbe editor to make the changes with the CID tag (#16307) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 15659 | Geonjung Ko | 35.3.17 | 566.20 | After a STA on the EMLSR link sends a frame during the allocated time by the triggered TXOP sharing procedure, the STA would not receive a PHY-RXSTART.indication primitive since the STA receives a response frame from the AP during the timeout interval. Then the MLD that the STA is affiliated with is switched back to the listening operation during the allocated time. | The STA on the EMLSR link should not be switched back to the listening operation during the allocated time. Also the condition for switching back in p.g. 566, line 20 should be applied only outside the allocated time. | Revised.  Agree in principle. When MU-RTS TXS Trigger frame is received, during the time allocated in the MU-RTS TXS Trigger frame, the non-AP STA initiates a frame transmission and the switch back to the listening operation should happen at the end of the allocated time in the MU-RTS TXS Trigger frame. Added item k) in D3.2 (pre-release).  TGbe editor to make the changes with the CID tag (#16307) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |
| 16438 | Mikael Lorgeoux | 35.3.17 | 567.14 | This Note 6 covers the case of an initial control frame that triggers frame exchange sequences with more than one non-AP MLD operating in EMLSR mode. A similar note should be added for the following case: An initial frame that triggers a frame exchange with non-AP MLDs in EMLSR mode and EMLMR mode. | Please add a note to cover the highlighted case. | Rejected.  Such a note is not necessary because an AP MLD has to meet each non-AP MLD’s minimum padding requirement and this naturally makes the largest minimum padding requirement to be used when constructing the initial Control frame. Also EMLMR can use any type of padding to meet the EMLMR padding requirement. |
| 15060 | Michail Koundourakis | 35.3.17 | 567.24 | The AP MLD may be transmitting to the non-AP STA MLD on another link, so that Beacon reception is not possible on other link(s). Add rules to stop the AP from transmitting unicast frames using an EMLSR link at least EMLSR Transition Delay before TBTT. | As per comment, the AP shall stop transmitting unicast frames on a link used in an EMLSR link pair, so that the non-AP MLD can switch to any EMLSR link it wishes to received the Beacon. | Rejected.  The following addresses the case by allowing a non-AP MLD not to respond to the initial Control frame if it intends to receive beacon or group addressed frames on another link:  “*A non-AP STA affiliated with a non-AP MLD that is in the listening operation and that receives an MURTS 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.”* |
| 16899 | Mark RISON | 35.3.16.8.1 | 560.23 | "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" is confusing both grammatically ("exchanges that includes") and technically (how do exchanges include link switch delays?) | As it says in the comment | Revised.  Clarified that text.  TGbe editor to make the changes with the CID tag (#16899) in doc.: IEEE 802.11-23/0662r2  [https://mentor.ieee.org/802.11/dcn/22/11-23-0662-02-00be-lb271-cr-cl35-mlti-part2.docx] |

**TGbe Editor to make the following changes in in Subclause 35.3.17 (Enhanced multi-link single radio operation) in TGbe D3.1 P572L51:**

**…**

- (#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 (#16657)the corresponding NDP that follows SIFS after the NDP Announcement frame

…

**TGbe Editor to add the item k) after NOTE 4 in Subclause 35.3.17 (Enhanced multi-link single radio operation) in TGbe D3.2(pre-release) + doc.11-23/437r3:**

(#16307) k) When a non-AP STA affiliated with the non-AP MLD is addressed in an MU-RTS TXS Trigger frame, the following applies:

• The non-AP MLD shall be switched back to the listening operation on the EMLSR links not later than the EMLSR transition delay time most recently indicated by the non-AP MLD, as measured immediately after the end of the allocated time specified in 35.2.1.2 (Triggered TXOP sharing procedure).

**TGbe Editor to make the following changes in Subclause 35.3.16.8.1 (General) in TGbe D3.1:P566L22**

**35.3.16.8 Medium access recovery procedure**

**35.3.16.8.1 General**

**…**

When a non-AP MLD is operating in the EMLSR mode, a non-AP STA affiliated with a non-AP MLD that is operating on one of the EMLSR links is considered to have lost medium synchronization if it is not able to perform CCA during frame exchanges (#16899)and during 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 longer 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)).