IEEE P802.11
Wireless LANs

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| LB271 Comment Resolution Clause 9 and Clause 35 MLTI related – editorial comments |
| Date: 2023-3-8 |
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Abstract

This submission proposes comment resolution(s) for the following 21 CID(s) received in LB271 on TGbe D3.0 related to 9.4.2.315 Multi-Link Traffic Indication element and 35.3.12.4 Traffic indication (editorial comments):

CIDs:

15089 16475 16476 17909 17744 15092 17746 16820 16599 16600

16601 16822 16823 18276 16530 16825 16826 15086 16602 15826

17293

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: added CID 15089, 16475, 16476, 16530, 17293

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| **CID** | **Commenter** | **Clause Number** | **Page.****Line** | **Comment** | **Proposed Change** | **Resolution** |
| 15089 | Minyoung Park | 9.4.2.315 | 294.39 | Since there could be one or more Per-Link Traffic Indication Bitmap subfields, the following sentence should be revised by changing "subfields" to "subfield(s)", AIDs to AID(s), and so on. | Revise the sentence as follows:"The Per-Link Traffic Indication List field contains Per-Link Traffic Indication Bitmap subfield(s) that correspond to the AID(s) of the non-AP MLD(s) and STA(s) starting from the bit numbered k of the traffic indication virtual bitmap or the AID bitmap. The Per-Link Traffic Indication List field contains l PerLink Traffic Indication Bitmap subfield(s), where l is the number of the bit(s) that correspond to the AID(s) of thenon-AP MLD(s) and STA(s) and set to 1, counting from the bit numbered k of:" | Accepted. |
| 16475 | Arik Klein | 9.4.2.315 | 294.39 | Need to clarify that "STAs" actually refers to "non-MLD non-AP STAs". Please modify the sentence, as suggested. | Please revise the sentence as follows: "The Per-Link Traffic Indication List field contains Per-Link Traffic Indication Bitmap subfields that correspond to the AIDs of the non-AP MLDs and \*non-MLD non-AP\* STAs starting from ..." | Revised.Changed STAs to non-MLD non-AP STAs.TGbe editor to make the changes with the CID tag (#16475) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16476 | Arik Klein | 9.4.2.315 | 294.43 | Need to clarify that "STAs" actually refers to "non-MLD non-AP STAs". Please modify the sentence, as suggested.In addition, for the clarity of the sentence replace the last "and" with "that are", as suggested. | Please revise the sentence as follows: "...where l is the number of the bits that correspond to the AIDs of the non-AP MLDs and \*non-MLD non-AP\* STAs \*that are\* set to 1" | Revised.Changed STAs to non-MLD non-AP STAs.TGbe editor to make the changes with the CID tag (#16476) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 17909 | Kazuto Yano | 9.4.2.315 | 294.48 | The comma at the end of this line should be a period. | As in comment. | Accepted. |
| 17744 | Brian Hart | 9.4.2.315 | 295.17 | Missing article; also "wherein" is better than "and" | "successfully negotiated \*a\* TID-to-link mapping wherein" | Revised.Agree with the commenter.TGbe editor to make the changes with the CID tag (#17744) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 15092 | Minyoung Park | 9.4.2.315 | 295.31 | Typo: "non- AP MLD" should be "non-AP MLD". There is extra space between - and AP. | As in the comment. | Accepted. |
| 17746 | Brian Hart | 9.4.2.315 | 295.31 | Spurious space in "non- AP" | "non-AP" | Accepted. |
| 16820 | Mark RISON | 35.3.12.4 | 538.42 | "An AP MLD may use Multi-Link Traffic Indication element and TIM element" missing articles | As it says in the comment | Revised.Agree with the commenter.TGbe editor to make the changes with the CID tag (#16820) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16599 | Arik Klein | 35.3.12.4 | 538.52 | Replace the term "when" with "at the time where" in order to clarify the meaning of the sentence that the Traffic Indication shall reflect the status of the traffic buffered for the non-AP MLD at the time that the AP affiliated with the AP MLD schedules the Beacon frame. | The sentence should be revised as follows: "The traffic indication for a non-AP MLD that is indicated by the bit in the partial virtual bitmap of the TIM element in a Beacon frame that matches the AID of the non-AP MLD shall be set to a value that reflects the buffer status of the BUs at the AP MLD for that non-AP MLD \*at the time where\* each AP affiliated with the AP MLD that is operating on a corresponding link that is part of the multi-link setup schedules the Beacon frame" | Revised.“at the time when” seems to be better than “at the time where”.TGbe editor to make the changes with the CID tag (#16599) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16600 | Arik Klein | 35.3.12.4 | 539.02 | replace "is 1" with "is equal to 1" or "equals 1" or "is set to 1" | As in comment | Revised.The location is at P540 not P539. Changed to ‘is equal to’.TGbe editor to make the changes with the CID tag (#16600) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16601 | Arik Klein | 35.3.12.4 | 539.08 | replace "is 1" with "is equal to 1" or "equals 1" or "is set to 1" | As in comment | Revised.The location is at P540 not P539. Changed to ‘is equal to’.TGbe editor to make the changes with the CID tag (#16601) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16822 | Mark RISON | 35.3.12.4 | 539.02 | "at least one of the associated non-AP MLD" should be "at least one of the associated non-AP MLDs" | As it says in the comment | Accepted. |
| 16823 | Mark RISON | 35.3.12.4 | 539.09 | "corresponds" should be "correspond(s)" | As it says in the comment | Revised.Made the suggested change and also changed ‘the order of the bits’ to ‘the order of the bit(s)’.TGbe editor to make the changes with the CID tag (#16823) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 18276 | Mark Hamilton | 35.3.12.4 | 539.18 | Poor wording, using "a STA of the non-AP MLD". | Replace "a non-AP STA of" with "a non-AP STA affiliated with". Same thing at P572.28, P572.37, P572.38, P572.39, and P577.36. | Revised.Made the change at P539L18. TGbe editor to make the changes with the CID tag (#18276) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16530 | Arik Klein | 35.3.12.4 | 539.18 | Replace "of" with "affiliated with" to keep uniform terminology across the 802.11be document, as suggested | The sentence should be revised as follows: "...the bit position i of the Per-Link Traffic Indication Bitmap subfield that corresponds to the link with the link ID that is equal to i on which a non-AP STA \*affiliated with\* the non-AP MLD is operating shall be set to 1 if the AP MLD has buffered BU(s) with TID(s) that are mapped to that link or MMPDU(s) for that non-AP MLD, ..." | Revised.Made the change at P539L18. TGbe editor to make the changes with the CID tag (#18276) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16825 | Mark RISON | 35.3.12.4 | 540.16 | "When a non-AP MLD that has successfully negotiated TID-to-link mapping (see 35.3.7.1.3 (Negotiation ofTID-to-link mapping)) and not all TIDs are mapped to all the enabled links" -- bad grammar | Change to "When a non-AP MLD that has successfully negotiated TID-to-link mapping (see 35.3.7.1.3 (Negotiation ofTID-to-link mapping)) and when not all TIDs are mapped to all the enabled links" (maybe could be misinterpreted as two possible separate conditions, so might need more work) | Revised.In CID 17744, “wherein” was suggested and that seems to be better than “and when”. Also added a missing article.TGbe editor to make the changes with the CID tag (#16825) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx] |
| 16826 | Mark RISON | 35.3.12.4 | 540.35 | "he" should be "the" | As it says in the comment | Revised.The location of the typo is in L36.TGbe editor to make the changes with the CID tag (#16826) in doc.: IEEE 802.11-23/0499r1[https://mentor.ieee.org/802.11/dcn/22/11-23-0499-01-00be-lb271-cr-cl9-cl35-mlti-editorial.docx]. |
| 15086 | Minyoung Park | 35.3.12.4 | 540.36 | Typo: "he" should be "the" | As in the comment. | Accepted. |
| 16602 | Arik Klein | 35.3.12.4 | 540.36 | typo: replace "he" with "the" in the following sentence:" ... following the procedure above, the MMPDU shall carry \*he\* MLO Link Information element to determine the intended destination non-AP STA affiliated with the non-AP MLD... " | As in comment | Accepted. |
| 15826 | Muhammad Kumail Haider | 35.3.12.4 | 540.46 | "carry he MLO Link" -> "carry the MLO Link" | as in comment | Accepted. |
| 17293 | Hanqing Lou | 35.3.12.4 | 540.36 | typo in the sentence "the MMPDU shall carry he MLO..." | Change "he" to "the" | Accepted |

**9.4.2.315 Multi-Link Traffic Indication element**

**…**

**TGbe Editor to make the following changes in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.0 (paragraph at P294L59):**

(#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 Per-Link Traffic Indication Bitmap subfield(s) that correspond to the AID(s) of the non-AP MLD(s) and (#16475)non-MLD non-AP STA(s) starting from the bit numbered *k* of the traffic indication virtual bitmap or the AID bitmap. The Per-Link Traffic Indication List field contains *l* Per-Link Traffic Indication Bitmap subfield(s), where *l* is the number of the bit(s) that correspond to the AID(s) of the non-AP MLD(s) and (#16476)non-MLD non-AP STA(s) and set to 1, counting from the bit numbered *k* of:

— 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

— 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(#17909).

**TGbe Editor to make the following changes in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.0 (paragraph at P295L15):**

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*. In a Beacon frame when the Per-Link Traffic Indication Bitmap subfield corresponds to a non-AP MLD that has successfully negotiated (#17744)a TID-to-link mapping (#17744)wherein not all TIDs are mapped to all the enabled links, …

**TGbe Editor to make the following changes in Subclause 9.4.2.315 (Multi-Link Traffic Indication element) in TGbe D3.0 (paragraph at P295L30):**

In a Link Recommendation frame, when the Per-Link Traffic Indication Bitmap subfield corresponds to a (#15092)non-AP MLD, a value of 1 in the bit position *i* in the bitmap indicates that the link with the link ID equal to *i* is recommended for frame exchanges both in DL and in UL, as defined in 35.3.12.4 (Traffic indication); a value of 0 in the bit position *i* in the bitmap indicates that the link with the link ID equal to *i* is not recommended for frame exchanges both in DL and in UL, as defined in 35.3.12.4 (Traffic indication).

**35.3.12.4 Traffic indication**

**…**

**TGbe Editor to make the following changes in Subclause 35.3.12.4 (Traffic indication) in TGbe D3.0 (paragraphs at P538L43 and P538L50):**

(#16820)An AP MLD may use the Multi-Link Traffic Indication element and the TIM element carried in a Beacon frame to recommend a non-AP MLD to use one or more enabled links to retrieve individually addressed buffered BU(s). An AP MLD may also use the Multi-Link Traffic Indication element and the AID Bitmap element in a Link Recommendation frame to recommend a non-AP MLD to use one or more enabled links for all exchanges both for DL and UL. The AP’s indication may be carried in a broadcast or a unicast frame.

An AP MLD shall buffer a BU with a TID at the AP MLD if the TID is not mapped to any link on which the corresponding non-AP STA affiliated with a non-AP MLD is in active mode, and it shall set the bit in the partial virtual bitmap of the TIM element that corresponds to the AID of the non-AP MLD to 1. The traffic indication for a non-AP MLD that is indicated by the bit in the partial virtual bitmap of the TIM element in a Beacon frame that matches the AID of the non-AP MLD shall be set to a value that reflects the buffer status of the BUs at the AP MLD for that non-AP MLD (#16599)at the time when each AP affiliated with the AP MLD that is operating on a corresponding link that is part of the multi-link setup schedules the Beacon frame.

**TGbe Editor to make the following changes in Subclause 35.3.12.4 (Traffic indication) in TGbe D3.0 (paragraph at P539L01):**

An AP affiliated with an AP MLD shall include the Multi-Link Traffic Indication element (see 9.4.2.315 (Multi-Link Traffic Indication element)) in a Beacon frame it transmits if at least one of (#16822)the associated non-AP MLDs has successfully negotiated a TID-to-link mapping (see 35.3.7.1.3 (Negotiation of TID-to-link mapping)) with the AP MLD for DL or bidirectional traffic and not all TIDs are mapped to all enabled links and the AP MLD has buffered BU(s) with TID(s) that are not mapped to all the enabled links for the non-AP MLD(s). The Multi-Link Traffic Indication element includes Per-Link Traffic Indication Bitmap subfield(s) in the Per-Link Traffic Indication Bitmap List field. The Per-Link Traffic Indication Bitmap subfield(s) corresponds to the AID(s) of the non-AP MLD(s) or STA(s), starting from the bit number *k* of the traffic indication virtual bitmap. The AID Offset subfield of the Multi-Link Traffic Indication Control field of the Multi-Link Traffic Indication element contains the value *k*. The order of the Per-Link Traffic Indication Bitmap subfield(s) follows the order of the (#16823)bit(s) that are set to 1 in the Partial Virtual Bitmap subfield of the TIM element that (#16823)correspond(s) to the AID(s) of the non-AP MLD(s) or STA(s). If a non-AP MLD has successfully negotiated a TID-to-link mapping with an AP MLD with a nondefault mapping, the bit position *i* of the Per-Link Traffic Indication Bitmap subfield that corresponds to the link with the link ID that is equal to *i* on which a non-AP STA (#18276)affiliated with the non-AP MLD is operating shall be set to 1 if the AP MLD has buffered BU(s) with TID(s) that are mapped to that link or MMPDU(s) for that non-AP MLD, otherwise the bit shall be set to 0. The Bitmap Size subfield of the Multi-Link Traffic Indication Control field should be set to *m*, where *m* is equal to the largest link ID value minus the smallest link ID value amongst the bits that are set to 1 in the Per-Link Traffic Indication Bitmap subfield(s).

**TGbe Editor to make the following changes in Subclause 35.3.12.4 (Traffic indication) in TGbe D3.0 (paragraph at P540L01):**

When a non-AP MLD that is in the default mapping mode (see 35.3.7.1.2 (Default mapping mode)) detects that the bit corresponding to its AID is (#16600)equal to 1 in the TIM element, any non-AP STA affiliated with the non-AP MLD may issue a PS-Poll frame, or a U-APSD trigger frame if the STA is using U-APSD and all ACs are delivery enabled, to retrieve buffered BU(s) from the AP MLD.

**TGbe Editor to make the following changes in Subclause 35.3.12.4 (Traffic indication) in TGbe D3.0 (paragraph at P540L07):**

When a non-AP MLD that is in the default mapping mode (see 35.3.7.1.2 (Default mapping mode)) detects that the bit corresponding to its AID is (#16601)equal to 1 in the TIM element and the Multi-Link Traffic Indication element is present in a Beacon frame and the Multi-Link Traffic Indication element includes a Per-Link Traffic Indication Bitmap subfield that corresponds to the non-AP MLD, any non-AP STA affiliated with the non-AP MLD that operates on the link(s) indicated as 1 in the Per-Link Traffic Indication Bitmap subfield may issue a PS-Poll frame, or a U-APSD trigger frame if the STA is using U-APSD and all ACs are delivery enabled, to retrieve buffered BU(s) from the AP MLD.

**TGbe Editor to make the following changes in Subclause 35.3.12.4 (Traffic indication) in TGbe D3.0 (paragraph at P540L16):**

When a non-AP MLD that has successfully negotiated (#16825)a TID-to-link mapping (see 35.3.7.1.3 (Negotiation of TID-to-link mapping)) (#16825)wherein not all TIDs are mapped to all the enabled links detects that the bit corresponding to its AID is equal to 1 in the TIM element and any bit of the Per-Link Traffic Indication Bitmap subfield that corresponds to a link on which a non-AP STA affiliated with the non-AP MLD is operating is equal to 1 in the Multi-Link Traffic element, the non-AP STA affiliated with the non-AP MLD that operates on that link may issue a PS-Poll frame, or a U-APSD trigger frame if the STA is using U-APSD and all ACs are delivery enabled, to retrieve buffered BU(s) from the AP MLD.

**TGbe Editor to make the following changes in Subclause 35.3.12.4 (Traffic indication) in TGbe D3.0 (paragraph at P540L32):**

If a buffered BU is an MMPDU that is intended for one non-AP STA affiliated with a non-AP MLD (see Table 11-3 (Bufferable/nonbufferable classification of MMPDUs)), and if it is transmitted on a link where another non-AP STA (other than the intended non-AP STA) affiliated with the same non-AP MLD is operating on, following the procedure above, the MMPDU shall carry (#16826)the MLO Link Information element to determine the intended destination non-AP STA affiliated with the non-AP MLD (see 35.3.14.2 (Identification of the Intended STA)).