IEEE P802.11
Wireless LANs

|  |
| --- |
| 11be D4.0 CR for 35.3.14 |
| Date: 2023-08-21 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel |  |  |  |

Abstract

This submission proposes resolutions for the following CIDs:

19064, 19284, 19640, 19641, 19642, 19643, 19644, 19285, 19286, 19287,

19857

Revisions:

* Rev 0: Initial version of the document.

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbe D4.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D4.0 Draft. (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 19064 | Po-Kai Huang | 35.3.14 | 549.09 | Aligned TWT Bitmap subfield has also been added to the TWT element. Excluding the case of using Aligned TWT Bitmap subfield in the subclause. | as described in the comments. Several instances in 34.3.14.1 and 35.14.3 | Revised –Agree in principle with the commenter. TGbe editor to make the changes shown in 11-23/1385r0 under all headings that include CID 19064 |
| 19284 | John Wullert | 35.3.14.1 | 549.27 | The condition about not being a TWT Setup frame is necessary and therefore should be set of with "that" rather than "which" | Rephrase as "Otherwise, an MLD shall not transmit an individually addressed MMPDU that is not a TWT Setup frame that includes a Link ID Bitmap subfield in its TWT element and is intended for one STA affiliated with the associated MLD operating on an enabled link to another STA..." | Revised – Agree in principle with the commenter. We also add parenthesis to help parsing of the sentences. We also change all the other relevant places.TGbe editor to make the changes shown in 11-23/1385r0 under all headings that include CID 19284 |
| 19640 | Duncan Ho | 35.3.14.1 | 549.05 | "sequence number from the same sequnece number" should be "sequence number from the same sequuence numebr space" | As in the comment. | Accepted - |
| 19641 | Duncan Ho | 35.3.14.1 | 549.36 | Insert a comma between "STA" and "is" for readability | As in the comment. | Revised – We insert parenthesis around the “that” description to help readability. TGbe editor to make the changes shown in 11-23/1385r0 under all headings that include CID 19284 |
| 19642 | Duncan Ho | 35.3.14.1 | 549.10 | This paragraph is very hard to parse. Could we move the "which is not a TWT Setup frame that includes a Link ID Bitmap subfield in its TWT element and is intended for one STA affiliated...' to under one of the conditions between lines 16 and 23? | As in the comment. | Revised – We insert parenthesis around the “that” description to help readability. The parenthesis will help to separate out the restriction on the individually addressed MMPDU.TGbe editor to make the changes shown in 11-23/1385r0 under all headings that include CID 19284 |
| 19643 | Duncan Ho | 35.3.14.1 | 549.28 | Not clear what the "Otherwise" refers to because there are so many conditions in Ilines 9-23 preceding it. | Line 9-38 mentions the TWT setup frame multiple times. Is there a way to factor that out and simplify the text? | Revised – TWT setup frame with the link ID bitmap in the TWT element is another legit way to do negotiation for multiple links using one enabled link. The operation is written separately and the exception in the paragraph make sure that the rule in this clause will not conflict with the rule of the link ID bitmap in the TWT element.We insert parenthesis around the “that” description to help readability. TGbe editor to make the changes shown in 11-23/1385r0 under all headings that include CID 19284 |
| 19644 | Duncan Ho | 35.3.14.1 | 549.13 | "on enabled" should be "on an eablerd". | As in the comment. | Accepted - |
| 19285 | John Wullert | 35.3.14.2 | 550.34 | The condition about not being a TWT Setup frame is necessary and therefore should be set of with "that" rather than "which" | Rephrase as "An individually addressed MMPDU that is not a TWT Setup frame that includes a Link ID Bitmap subfield in its TWT element and is transmitted by an MLD through an affiliated STA is intended for a STA affiliated with the peer MLD unless specified to be intended for an MLD." | Revised – We assume that the commenter refers to the sentence in 549.34. We insert parenthesis around the “that” clause to help readability. TGbe editor to make the changes shown in 11-23/1385r0 under all headings that include CID 19284 |
| 19286 | John Wullert | 35.3.14.2 | 550.52 | The phrase "through any of the affiliated non-AP STA" should be "through any of the affiliated non-AP STAs" | As in comment | Accepted - |
| 19287 | John Wullert | 35.3.14.2 | 551.15 | The phrase "QMF AP MLD and a QMF non-AP MLD follows" should be "QMF AP MLD and a QMF non-AP MLD follow" | As in comment | Accepted - |
| 19857 | Ming Gan | 35.3.14.3 | 551.32 | This following sentence is confusing, what are intended STA and another STA. | Try "If the individually addressed MMPDU intended to another STA (other than receiving STA) affiliated with the associated MLD operating on a setup link is transmitted through a STA affiliated with the MLD operating on the setup link" | Rejected –“Intended STA” is the STA that is supposed to eventually process the framebody of the management frame. “another STA” of “transmitted to another STA” is the STA that is different from the intended STA and is the STA that the frame is physically transimitted to on the wireless channel.  |

**Discussion:**

*TGbe editor: Change Clause 13.2.2 as follows (track change on):*

* + 1. **Multi-link device individually addressed Management frame delivery**
			1. **General**

This subclause describes rules for individually addressed management frame delivery by an MLD with the exception of the following frames:

* CSI frame
* Noncompressed Beamforming frame
* Compressed Beamforming frame
* VHT Compressed Beamforming frame
* HE Compressed Beamforming/CQI frame
* EHT Compressed Beamforming/CQI frame
* Probe Response frame
* Public Action LMR frame
* Public Action FTM frame
* Public Action FTM Request frame
* Protected Fine Timing frame

An MLD shall follow the rules described in 10.3.2.14.2 (Transmitter requirements) to determine the sequence number of an individually addressed Management frame (except the frames listed at the beginning of [35.3.14.1 (General)](#bookmark63)) that is delivered to the associated MLD.

An MLD shall follow the rules as described in 10.3.2.14.3 (Receiver requirements) to discard duplicate individually addressed Management frames (except the frames listed at the beginning of [35.3.14.1](#bookmark63) [(General)](#bookmark63)) that are delivered from the associated MLD.

An MLD shall maintain a transmit MMPDU timer for each MMPDU (except the frames listed at the beginning of [35.3.14.1 (General)](#bookmark63)). The transmit MMPDU timer shall be started when the MMPDU is passed to the MAC.

For an MLD, the frame retry counter and retry limit for each MMPDU that belongs to a TC that requires acknowledgment are implementation specific.

An MLD shall continue to deliver the failed individually addressed Management frame (except the frames listed at the beginning of [35.3.14.1 (General)](#bookmark63)) to an associated MLD on the setup links subject to additional constraints (see [35.3.7 (Link management)](#bookmark34))) until any of the following conditions occurs:

* The retry limit is met.
* The transmit MMPDU timer for the MMPDU exceeds dot11EDCATableMSDULifetime for a non- AP MLD or dot11QAPEDCATableMSDULifetime for an AP MLD.
* The individually addressed Management frame is successfully delivered.

Between an MLD and an associated peer MLD, a STA affiliated with the MLD shall not transmit other individually addressed Management frames (except the frames listed at the beginning of [35.3.14.1 (General)](#bookmark63)) over a setup link while the current individually addressed Management frame (except the frames listed at the beginning of [35.3.14.1 (General)](#bookmark63)) having been assigned its sequence number from the same sequence number space(#19640) and being transmitted by any STA affiliated with the same MLD over a setup link has not yet completed to the point of success, failed due to retry limit, or other MAC discard (e.g., lifetime expiration).

Between an AP MLD and an associated non-AP MLD subject to additional constraints (see [35.3.7 (Link](#bookmark34) [management)](#bookmark34)), an MLD may transmit an individually addressed MMPDU (that(#19284) is not a TWT Setup frame that includes a Link ID Bitmap subfield or Aligned TWT Bitmap subfield(#19064) in its TWT element and is intended for one STA affiliated with the associated MLD operating on an(#19644) enabled link) (#19284) to another STA (other than the intended STA) affiliated with the associated MLD operating on a setup link through a STA affiliated with the MLD operating on the setup link if the MMPDU satisfies all the following conditions:

* The MMPDU is a Class 3 frame
* The MMPDU is not a TPC Request frame, a TPC Report frame, a Link Measurement Request frame or a Link Measurement response frame
* The MMPDU is classified as a bufferable MMPDU
* The MMPDU is not one of the frames listed at the beginning of [35.3.14.1 (General)](#bookmark63).

NOTE—MMPDU only includes the Frame Body field of the Management frame and does not include a MAC header and a frame check sequence (FCS) of the Management frame (see 3.2 (Definitions specific to IEEE 802.11)).

Otherwise, an MLD shall not transmit an individually addressed MMPDU (that(#19284) is not a TWT Setup frame that includes a Link ID Bitmap subfield or Aligned TWT Bitmap subfield(#19064) in its TWT element and is intended for one STA affiliated with the associated MLD operating on an enabled link)(#19284) to another STA (other than the intended STA) affiliated with the associated MLD operating on a setup link through an STA affiliated with the MLD operating on the setup link subject to additional constraints (see [35.3.7 (Link management)](#bookmark34)).

An individually addressed MMPDU (that(#19284) is not a TWT Setup frame that includes a Link ID Bitmap subfield or Aligned TWT Bitmap subfield(#19064) in its TWT element and is transmitted by an MLD through an affiliated STA) (#19284) is intended for a STA affiliated with the peer MLD unless specified otherwise to be intended for an MLD.

Between an AP MLD and a non-AP MLD, the following individually addressed MMPDUs shall be intended for an MLD:

* Authentication frame that includes a Basic Multi-Link element
* (Re)Association Request/Response frame that includes a Basic Multi-Link element
* Deauthentication frame
* Disassociation frame
* Block Ack Action frame
* SA Query Action frame
* Multi-link probe request/response
* WNM Sleep Mode Request/Response frame
* TID-To-Link Mapping Request/Response/Teardown frame
* EPCS Priority Access Enable Request/Enable Response/Teardown frame
* EML Operating Mode Notification frame
* SCS Request/Response frame
* MSCS Request/Response frame
* BSS Transition Management Request/Response frame
* FT Action frame
* Link Recommendation frame
* Link Reconfiguration Notify/Request/Response frame
* QMF Policy Change frame and QMF Policy frame

A non-AP MLD may transmit an individually addressed MMPDU that is an Authentication frame that includes a Basic Multi-Link element or a (Re)Association Request frame that includes a Basic Multi-Link element or a multi-link probe request or a Deauthentication frame or a Disassociation frame to any AP affiliated with the AP MLD subject to additional constraints (see [35.3.7 (Link management)](#bookmark34)).

An AP MLD may transmit an individually addressed MMPDU that is a Deauthentication frame or a Disassociation frame to any non-AP STA affiliated with the non-AP MLD subject to additional constraints (see

[35.3.7 (Link management)](#bookmark34)).

An MLD may transmit an individually addressed MMPDU that is a Class 3 frame that is intended for an associated MLD to any STA affiliated with the associated MLD operating on a setup link through an STA affiliated with the MLD operating on the setup link subject to additional constraints (see [35.3.7 (Link](#bookmark34) [management)](#bookmark34)).

* + - 1. **QMF**

All affiliated STAs of an MLD shall set dot11QMFActivated to the same value.

All affiliated STAs of an MLD shall set dot11QMFReconfigurationActivated to the same value.

If all affiliated STAs of an MLD set dot11QMFActivated to true, then the MLD is a QMF MLD. Otherwise, the MLD is a non-QMF MLD.

An AP affiliated with a QMF AP MLD may set dot11QMFReconfigurationActivated to true or false.

A non-AP STA affiliated with an QMF non-AP MLD shall set dot11QMFReconfigurationActivated to true.

If one AP affiliated with a QMF AP MLD advertises the QMF policy for IQMFs, then all APs affiliated with the AP MLD shall advertise the QMF policy for IQMFs. Each AP affiliated with a QMF AP MLD shall advertise the same QMF policy for IQMFs.

Each AP affiliated with a QMF AP MLD shall set the same QMF policy for the transmission of IQMFs to each affiliated non-AP STA of associated non-AP MLD.

QMF non-AP MLDs acquire QMF policy configuration information for IQMF from QMF Policy elements received in Beacon, Association Response, Reassociation Response, Probe Response, and QMF Policy frames.

A QMF non-AP MLD shall not transmit a QMF Policy frame through its affiliated non-AP STA to an AP affiliated with the associated AP MLD.

The access category for an IQMF that is transmitted by a QMF non-AP MLD through any of the affiliated non- AP STAs(#19286) to an AP affiliated with the associated QMF AP MLD shall be determined from the IQMF policy received from any AP affiliated with the AP MLD if a QMF policy for IQMF has been received from any AP affiliated with the AP MLD. Otherwise, the default policy shall be used for an IQMF. The access category for IQMF that is transmitted by an AP affiliated with the QMF AP MLD is determined from the QMF policy for IQMF configured at that AP, which is the same for any AP affiliated with the AP MLD.

A QMF MLD shall not modify the access category of an IQMF frame after an initial transmission of the frame has been performed, regardless of any subsequent modification to the QMF policy under which the STA is operating.

An associated QMF non-AP MLD transmitting IQMFs through its affiliated non-AP STAs shall transmit those frames in accordance with the QMF policy for IQMF received from its associated QMF AP MLD in the following order of precedence, from highest to lowest:

* QMF policy defined in an unsolicited QMF Policy frame from the associated QMF AP MLD or the QMF Policy Change frame that resulted in a successful response QMF Policy frame from the associated AP MLD, whichever occurred most recently
* QMF policy defined in the QMF Policy element received in the successful (Re)Association Response frame

A QMF MLD shall transmit all individually addressed Management frames to non-QMF MLDs using access category AC\_VO.

A QMF AP MLD and a QMF non-AP MLD follow(#19287) the procedure to change QMF policy for IQMFs defined in 11.24.2.2 (QMF policy change in an infrastructure BSS or in an MBSS) between a QMF AP and a QMF non-AP STA except that support of QMF policy change for an MLD is indicated by the QMFReconfigurationActivated subfield in the Extended Capabilities element received from any STA affiliated with the MLD.

NOTE—Each STA affiliated with an QMF MLD follows the rules of GQMF defined in 11.24 (Quality-of-service Management frame (QMF)).

* + - 1. **Identification of the intended STA**

Between an AP MLD and a non-AP MLD associated with the AP MLD, an individually addressed MMPDU ((#19284) that is not a TWT Setup frame that includes a Link ID Bitmap subfield or Aligned TWT Bitmap subfield(#19064) in its TWT element and that is intended for one STA affiliated with the associated MLD operating on enabled link) (#19284) shall follow the below procedure:

* If the individually addressed MMPDU is transmitted to another STA (other than the intended STA) affiliated with the associated MLD operating on a setup link through a STA affiliated with the MLD operating on the setup link, then the individually addressed MMPDU shall include an MLO Link Information element that identifies the intended link of the MMPDU as the last element but before the Vendor Specific element(s) (if present).
* Otherwise, the individually addressed MMPDU may include an MLO Link Information element that identifies the intended link of the MMPDU as the last element if a Vendor Specific element is not present or as the element immediately before the Vendor Specific element(s) if one or more Vendor Specific elements are present.

NOTE—If the MLO Link Information element is not present in the individually addressed MMPDU, the individually addressed MMPDU cannot be retransmitted to different STA as described in the first bullet above.

Between an AP MLD and a non-AP MLD associated with the AP MLD, a TWT Setup frame that includes a Link ID Bitmap subfield or Aligned TWT Bitmap subfield(#19064) in its TWT element shall not include an MLO Link Information element.

Exactly one bit in the Link ID Bitmap subfield of the MLO Link Information element shall be set to 1.

Between an AP MLD and a non-AP MLD associated with the AP MLD, an individually addressed MMPDU that is intended for an associated MLD shall not include an MLO Link Information element.

Between an AP MLD and a non-AP MLD associated with the AP MLD, if an individually addressed MMPDU that carries an MLO Link Information element is received by a STA affiliated with the MLD, then the MLD shall discard the MMPDU if the MLO Link Information element indicates any link that is not an enabled link.