IEEE P802.11  
Wireless LANs

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| 11be D3.0 CR for Editorial CIDs | | | | |
| Date: 2023-03-06 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel |  |  |  |

Abstract

This submission proposes resolutions for the following CIDs:

15038, 15039, 15158, 15159, 15183, 15184, 15347, 15348, 17486, 15358,

15484, 15507, 15511, 15520, 15548, 15549, 16608, 17964, 16327, 16607,

16331, 16835, 16836, 16838, 16839, 16840, 15628, 15636, 15692, 15861,

15983, 16131, 16324, 16326, 16688, 16749, 16750, 17000, 17098, 17099,

17389, 17545, 17547, 17548, 17549, 17556, 18004, 17558, 17911, 17917

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 D3.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D3.0 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.***

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15038 | Yongjiang Yi | 35.3.5.1 | 506.08 | word "resetup" need to be changed. | (re)setup | Rejected –  The note refers to only the resetup case rather than both setup and resetup.  “NOTE 3—The links that are requested for resetup are independent of the existing setup links with an associated AP MLD.” |
| 15039 | Yongjiang Yi | 35.3.5.1 | 506.16 | Statement needs to be changed: "APs)) in which case the" | APs)). In which case, the | Revised –  We add comma in front of the “in which case”.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 15039 |
| 15158 | Po-Kai Huang | 3.1 | 57.38 | Use non-AP STAs affiliated with a non-AP MLD | Use non-AP STAs affiliated with a non-AP MLD | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 15158 |
| 15159 | Po-Kai Huang | 4.3.21.23 | 65.31 | Use non-AP STAs affiliated with a non-AP MLD | Use non-AP STAs affiliated with a non-AP MLD | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 15159 |
| 15183 | Henry Ptasinski | 4.5.3.2 | 65.62 | Changes not correctly identified. "or MLDs" should be underlined. | Underline added text. | Accepted - |
| 15184 | Henry Ptasinski | 4.5.3.2 | 66.07 | Inconsistent usage of "non-AP" | Change first bullet to "A non-AP STA ..." | Rejected –  This is a baseline issue. Change only this instance may imply change of all the other instances. |
| 15347 | John Wullert | 3.2 | 59.41 | Missing article in definition of multi-link probe request | Change "carrying Probe Request Multi-Link element" to "carrying a Probe Request Multi-Link element" | Accepted - |
| 15348 | John Wullert | 3.2 | 59.47 | Missing article in definition of multi-link probe response | Change "carrying Basic Multi-Link element" to "carrying a Basic Multi-Link element" | Accepted - |
| 17486 | Brian Hart | 9.4.1.6 | 206.05 | "whose all affiliated STAs" is not grammatical | Try "by a non-AP MLD for which each of its affiliated STAs never enters power save mode." | Revised –  “whose” is basically “of which”. We revise as "of which".  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17486 |
| 15358 | John Wullert | 9.4.1.6 | 206.04 | The order of words in the phrase "a non-AP MLD whose all affiliated STAs" make the text confusing. | Rephrase as "a non-AP MLD none of whose affiliated STAs enters power save mode." | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17486 |
| 15484 | Xiandong Dong | 35.3.24.3 | 586.29 | "TWT informatiion frame" should be "TWT Information frame". | As in comment | Revised –  Revise as suggested for all instances  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 15484 |
| 15507 | Chaoming Luo | 11.1.4.3.9 | 359.31 | The "except that ..." should be put at the end of the paragraph, because it talks about non-FILS case. | Move "except that ..." to the end of the paragraph, | Rejected –  There is no exception for the second case since it is already broadcast address.  *A FILS STA that transmits a Probe Response frame shall either set the Address 1 field to the address of the STA that generated the probe request, except that a non-FILS EHT AP affiliated with an AP MLD may respond with a multi-link probe response with the Address 1 field of the Probe Response frame set to the broadcast address (see 35.3.4.2 (Use of multi-link probe request and response)) or to the broadcast address if the STA that generated the probe request indicated FILS Capability.* |
| 15511 | Chaoming Luo | 11.20.6.5.1 | 388.23 | Change "A wideband TDLS off-channel TDLS direct link" to "A wideband off-channel TDLS direct link" | As in comment | Accepted - |
| 15520 | Chaoming Luo | 35.3.5.1 | 506.65 | "As a result, an AP affiliated with an AP MLD does not assign" sounds like a behaviour of AP but not AP MLD, whilst the the previous paragraph "An AP MLD shall assign" indicates it's a behaviour of AP MLD. | Change to "As a result, an AP MLD does not assign" | Accepted - |
| 15548 | Chaoming Luo | 35.3.14.1 | 545.23 | "(except the frames that are excluded above)" sounds like a double negative, a better wording is needed. | Replace all appearances of "(except the frames that are excluded above)" in this subclause with "(except the frames listed at the beginning of 35.3.14.1 (General))" | Accepted - |
| 15549 | Chaoming Luo | 35.3.14.1 | 545.62 | "which is intended for one or more STA(s) affiliated with the associated MLD operating on an enabled link", the sentence is confusing, since multiple affiliated STAs could not operate on the same link. | Change to: which is intended for one or more STA(s) affiliated with the associated MLD operating on enabled link(s) | Accepted - |
| 16608 | Arik Klein | 35.3.14.2 | 547.06 | The "one or more intended STA(s) affiliated with the associated MLD" are operating on "one or more enabled links" but not on an enabled link. Please correct the sentence as suggested. | The sentence should be revised as follows: " ..and that is intended for one or more STA(s) affiliated with the associated MLD operating on \*one or more enabled link(s)\* shall follow the below procedure.." | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 16608 |
| 17964 | yan li | 35.3.14 | 545.51 | a typo "a MLD" should be an MLD | as the comment | Accepted - |
| 16327 | Juseong Moon | 35.3.14.1 | 545.05 | "a MLD" is not correct. | Please change as: "an MLD" in this subclause. | Accepted - |
| 16607 | Arik Klein | 35.3.14.1 | 545.06 | typo: replace "a MLD" with "an MLD" in the following sentence: " This subclause describes rules for individually addressed management frame delivery by a MLD with the exception of the following frames specified below" | As in comment | Accepted - |
| 16331 | Juseong Moon | 35.3.14.2 | 547.23 | "a MLO" is not correct. | Please change as: "an MLO". | Accepted - |
| 16835 | Mark RISON | 35.3.14.1 | 545.38 | " is" should be " are" | As it says in the comment | Accepted - |
| 16836 | Mark RISON | 35.3.14.1 | 546.06 | "listed at the beginning of 35.3.14.1 (General)" should be just "listed above" | As it says in the comment | Rejected –  We keep the full description to avoid any confusion of above. |
| 16838 | Mark RISON | 35.3.14.1 | 545.07 | "the following frames specified below" is excessive | Change to "the following frames" | Accepted - |
| 16839 | Mark RISON | 35.3.14.2 | 547.01 | "Intended STA" should be "intended STA" | As it says in the comment | Accepted - |
| 16840 | Mark RISON | 35.3.14.2 | 547.11 | "shall include MLO Link Information element " missing article | As it says in the comment. Also at line 15 and 29 and 33 | Accepted - |
| 15628 | Xiangxin Gu | 35.3.24.3 | 586.44 | There are 3 "shall start as soon as practical after the individually addressed TWT information frame exchange rather than immediately". It's better to put it in general section. | as the comment | Rejected –  These are for different TWT operation, which is the reason why having different sentences in different subclauses |
| 15636 | Xiangxin Gu | 11.2.2 | 359.52 | Change "a MMPDU" to "an MMPDU". | As the comment | Accepted - |
| 15692 | Carol Ansley | 4.5.3.2 | 66.36 | editorial direction is unclear | clarify if the sentence/paragraph is to be moved to the beginning of 4.5.3.2 or 4.5.3.3 or simply show the sentence at the beginning of 4.5.3.2 (if that is where it goes) as part of the edits | Rejected-  This subclause in the following instruction means 4.5.3.2 since it is in 4.5.3.2.  ***Move the following third paragraph as the first paragraph of this subclause:***  The different association services support the different categories of mobility. |
| 15861 | Chunyu Hu | 35.3.5.1 | 507.45 | Missing "The" in front of "Non-AP MLD". | As in comment. | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 15861 |
| 15983 | Binita Gupta | 35.3.5.1 | 507.09 | Sentence does not read well grammatically - add "have" before "setup up link (s)" | As in comment | Rejected –  The referred texts are “set up links”, where “set” is a verb. |
| 16131 | Jian Yu | 35.3.5.1 | 505.24 | Typo, authentication is duplicated. | Remove the extra authentication | Rejected-  This is a reference issue due to framemaker and will be handled by editor during publication. |
| 16324 | Juseong Moon | 11.13 | 385.07 | "a MLD" is not correct. | Please change as: "an MLD". | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 16324 |
| 16326 | Juseong Moon | 35.3.13 | 544.56 | "A MLD" is not correct. | Please change as: "An MLD". | Accepted - |
| 16688 | Qi Wang | 11.10.9.1.1 | 385.01 | Incorrect clause numbering | Move Frame report, Channel Load Report, and Noise Histogram Report one level up. | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 16688 |
| 16749 | Mark RISON | 35.3.2 | 480.31 | "and the AP" should be "if the AP". Also at line 35 | As it says in the comment | Accepted - |
| 16750 | Mark RISON | 35.3.2 | 480.41 | "if the individually addressed frame is a " is already at line 22 | Change to "if the frame is a ". Ditto at line 45 | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 16750 |
| 17000 | Mark RISON | 35.3.24.4 | 586.40 | "affiliated with the MLD" should be "affiliated with the associated MLD" | Change throughout this page | Revised-  The first paragraph is for receiver behavior of either MLD and the second paragraph is for transmitter beahvior of either MLD. We revise to clarify the confusion.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17000 |
| 17098 | Mark RISON | 35.9 | 622.07 | " that applies to HE TB PPDU shall also apply to EHT TB PPDU." poor grammar | Change to " that applies to HE TB PPDUs shall also apply to EHT TB PPDUs." | Accepted - |
| 17099 | Mark RISON | 35.9 | 622.17 | "EHT PHY does not support" missing article | As it says in the comment | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17099 |
| 17389 | Brian Hart | 9.2.4.7.8 | 143.13 | Spurious "The"s | Write "Encoding of ...". Ditto P144L8, P144L41 | Rejected –  “the encoding of” is use more than 40 times in revme D2.0. |
| 17545 | Brian Hart | 9.4.2.47 | 231.47 | Ambiguous antecedent for "it": most naturally "MIC calculation" but probably "The EC subfield" is intended. | Try "The Element Count subfield does not include ..." | Accepted - |
| 17547 | Brian Hart | 9.4.2.47 | 232.61 | Missing article | Try "The definitions of \*the\* Key Info, Key Length, RSC, and Wrapped Key fields are ...". Ditto P233L13, L17, L32 | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17547 |
| 17548 | Brian Hart | 9.4.2.47 | 233.13 | Definitions cannot be found in the IGTK subelement | Try "The definitions of Key ID, IPN, Key Length, and Wrapped Key fields are the same as the respective definitions of the corresponding fields in the IGTK subelement. Ditto P233:32 | Rejected –  Those fields are defined in IGTK subelement in 9.4.2.47 FTE |
| 17549 | Brian Hart | 9.4.2.47 | 233.17 | Missing "in" | Try "The definition of the Link ID Info field is the same as \*in\* the MLO GTK ..." or better the "The definition of the Link ID Info field is the same as the definition of the Link ID Info field in the MLO GTK ..." Ditto P233L36 | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17549 |
| 17556 | Brian Hart | 9.4.2.157.3 | 236.02 | "f" should be "if" | Change to "if" | Accepted - |
| 18004 | Yanjun Sun | 9.4.2.157.3 | 237.02 | Typo: "f" --> "if" | As in comment | Accepted - |
| 17558 | Brian Hart | 9.4.2.157.3 | 237.01 | BTW baseline language "The maximum supported NSS as indicated in by the value of" makes no sense and should be fixed. Maybe 11be and 11me editors could discuss this among themself and fix the baseline? | Editorial referral and fix | Rejected –  The commenter is encouraged to submit the comment to revme. |
| 17911 | Kazuto Yano | 11.21.14 | 391.31 | A period is missing at the end of this sentence. | As in comment. | Acceptd - |
| 17917 | Kazuto Yano | 35.3.5.1 | 507.10 | One closing parenthesis is missing at the end of this sentence. | As in comment. | Revised-  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0289r0 under all headings that include CID 17917 |

**Discussion: None**

*TGbe editor: Change Clause 35.3.1 as follows (track change on):*

**35.3.5 Multi-link (re)setup**

**35.3.5.1 Multi-link (re)setup procedure**

(…existing texts..)

NOTE 5—The link requested by the non-AP MLD might not exist because the AP MLD has removed the corresponding affiliated AP (see 35.3.6.2.2 (Removing affiliated APs)),(#15039) in which case the AP MLD might reject the requested link or the AP MLD might add the corresponding affiliated AP (see 35.3.6.2.1 (Adding affiliated APs)) and the AP MLD might accept the requested link.

(…existing texts..)

An AP MLD shall assign a single AID to a non-AP MLD upon successful multi-link setup. All the non-AP STAs affiliated with the non-AP MLD shall have the same AID as the one assigned to the non-AP MLD during multi-link setup.

NOTE 7—In a multiple BSSID set, the first 2*n* bits of the partial virtual bitmap of TIM element are reserved for the indication of group addressed frame for the BSSIDs in the set (see 11.1.3.8.5 (Traffic advertisement in a multiple BSSID set)). As a result, (#15520)an AP MLD does not assign, to a non-AP MLD, an AID value that is less than 2*N* where *N* is the maximum of the value carried in the MaxBSSID Indicator (*n*) field of the Multiple BSSID element corresponding to each link that is accepted as part of the multi-link (re)setup where the AP affiliated with the AP MLD belongs to a multiple BSSID set.

After successful multi-link (re)setup between a non-AP MLD and an AP MLD, the non-AP MLD is associated with the AP MLD following the (re)association procedure between MLDs as described in 11.3 (STA authenticationAuthentication and association) (i.e., in State 3 or State 4, see 11.3.2 (State variables)), and the non-AP MLD and the AP MLD set up link(s) for multi-link operation (see 35.3 (Multi-link operation))(#17917).

(…existing texts..)

In this example, the AP MLD has three affiliated APs: AP 1 operates in the 2.4 GHz band, AP 2 operates in the 5 GHz band, and AP 3 operates in the 6 GHz band. The non-AP(#15861) MLD initiates the multi-link setup procedure and non-AP STA 1 affiliated with the non-AP MLD sends an Association Request frame to AP 1 affiliated with the AP MLD, i.e., the TA field of the Association Request frame is set to the MAC address of the non-AP STA 1 and the RA field of the Association Request frame is set to the MAC address of the AP 1.

(…existing texts..)

*TGbe editor: Change Clause 3.2 as follows (track change on):*

**3.2 Definitions specific to IEEE 802.11**

(…existing texts..)

**wireless network management (WNM) sleep mode:** An extended power save mode for ~~non-access-point-~~ non-access point (non-AP) stations (STAs) and non-AP multi-link devices (MLDs) whereby a non-AP STA or non-AP(#15158) STAs affiliated with a non-AP MLD need not listen for every delivery traffic indication map (DTIM) Beacon frame and do~~es~~ not perform group temporal key/integrity group temporal key/beacon integrity group temporal key (GTK/IGTK/BIGTK) updates.

(…existing texts..)

**multi-link probe request:** A Probe Request frame that is transmitted by a station (STA) affiliated with a non-access point (non-AP) multi-link device (MLD) carrying a(#15347) Probe Request Multi-Link element to solicit information of one or more APs affiliated with an AP MLD as defined in 35.3.4.2 (Use of multi-link probe request and response).

**multi-link probe response:** A Probe Response frame transmitted by an access point (AP) affiliated with an AP multi-link device (MLD) carrying a(#15348) Basic Multi-Link element in response to a multi-link probe request to provide complete profile or requested information of one or more APs affiliated with an AP MLD as defined in 35.3.4.2 (Use of multi-link probe request and response).

(…existing texts..)

*TGbe editor: Change Clause 4.3.21.23 as follows (track change on):*

**4.3.21.23 WNM sleep mode**

***Change as follows:***

WNM sleep mode is an extended power save mode ~~for non-AP STAs~~ in which a non-AP STA or all STAs affiliated with a non-AP MLD need not listen for every DTIM Beacon frame, and need not perform GTK/ IGTK/BIGTK updates. For non-MLO, WNM sleep mode enables a non-AP STA to signal to an AP that it might sleep for a specified length of time. For MLO, WNM sleep mode enables a non-AP STA affiliated with the non-AP MLD to signal to an AP affiliated with the AP MLD that all the non-AP(#15159) STAs affiliated with the non-AP MLD might sleep for a specified length of time. This enables a non-AP STA or a non-AP MLD to reduce power consumption and remain associated while the non-AP STA or the non-AP MLD has no traffic to send to or receive from the AP or AP MLD.

*TGbe editor: Change Clause 4.5.3.2 as follows (track change on):*

* + - 1. **Mobility types**

***Change the first paragraph as follows:***

The three transition types of significance to this standard that describe the mobility of STAs or MLDs(#15183) within a network are as follows:

* + - * + ***No-transition:*** In this type, two subclasses that are usually indistinguishable are identified:

Static—no motion.

Local movement—movement within the PHY range of the communicating STAs, i.e., movement within a basic service area (BSA).

* + - * + ***BSS-transition:*** This type is defined for a STA or an MLD as follows:
* ~~a~~A STA movement from one BSS in one ESS to another BSS within the same ESS.
* A non-AP MLD movement from one AP MLD in one ESS, where each non-AP STA affiliated with the non-AP MLD is within one BSS and different non-AP STAs affiliated with the non-AP MLD are within different BSSs, to another AP MLD within the same ESS, where each non-AP STA affiliated with the non-AP MLD is within another BSS and different non-AP STAs affili- ated with the non-AP MLD are within different BSSs.
* A non-AP MLD movement from one AP MLD in one ESS, where each non-AP STA affiliated with the non-AP MLD is within one BSS and different non-AP STAs affiliated with the non-AP MLD are within different BSSs, to another BSS within the same ESS and becoming a non-AP STA, where the MLD MAC address of the non-AP MLD is the same as the MAC address of the non-AP STA.
* A non-AP STA movement from one BSS in one ESS to an AP MLD within the same ESS and becoming a non-AP MLD, where each non-AP STA affiliated with the non-AP MLD is within another BSS, different non-AP STAs affiliated with the non-AP MLD are within different BSSs and the MAC address of the non-AP STA is the same as the MLD MAC address of the non-AP MLD.

A fast BSS transition is a BSS transition that establishes the state necessary for data connectivity before the reassociation rather than after the reassociation.

* + - * + ***ESS-transition:*** This type is defined as STA movement from a BSS in one ESS to a BSS in a different ESS. This case is supported only in the sense that the STA might move. Maintenance of upper-layer connections cannot be guaranteed by IEEE Std 802.11; in fact, disruption of service is likely to occur.

***Move the following third paragraph as the first paragraph of this subclause:***

The different association services support the different categories of mobility.

*TGbe editor: Change Clause 9.4.1.6 as follows (track change on):*

* + - 1. **Listen Interval field**

(…existing texts..)

NOTE—The value 0 might be used by a STA that is not affiliated with an MLD and never enters power save mode or by a non-AP MLD of which all affiliated non-AP STAs (#17486) ~~that~~ never enter~~s~~ power save mode.

(…existing texts..)

*TGbe editor: Change Clause* 35.3.24.2 *as follows (track change on):*

**35.3.24.2 Individual TWT agreements**

(…existing texts..)

Between an AP MLD and a non-AP MLD associated with the AP MLD, if an individually addressed TWT Information(#15484) frame for individual TWT, which is intended for one STA affiliated with the associated MLD with a setup link, is transmitted to another STA affiliated with the associated MLD with a setup link and an acknowledgement in response to the TWT Information(#15484) frame is received, then the STA of the intended link shall consider the corresponding TWT agreement of the intended link suspended starting as soon as practical after the TWT Information(#15484) frame exchange rather than immediately as described in 26.8.4.2 (TWT Information frame exchange for individual TWT).

*TGbe editor: Change Clause* 35.3.24.3 *as follows (track change on):*

**35.3.24.3 Broadcast TWT operation**

Between an AP MLD and a non-AP MLD associated with the AP MLD, if an individually addressed TWT Information frame(#15484) for broadcast TWT with All TWT subfield set to 1, which is intended for one STA affiliated with the associated MLD with a setup link, is transmitted to another STA affiliated with the associated MLD with a setup link and an acknowledgement in response to the TWT Information frame(#15484) is received, then the STA of the intended link shall consider all the broadcast TWT schedules as suspended starting as soon as practical after the TWT Information(#15484) frame exchange rather than immediately as described in 26.8.4.3 (TWT Information frame exchange for broadcast TWT).

*TGbe editor: Change Clause* 35.3.24.4 *as follows (track change on):*

**35.3.24.4 Flexible wake time operation**

Between an AP MLD and a non-AP MLD associated with the AP MLD and for the MLD that is either the AP MLD or the non-AP MLD,(#17000) if an individually addressed TWT Information(#15484) frame for flexible wake time, which is intended for one STA affiliated with the MLD with a setup link, is received by another STA affiliated with the MLD with a setup link, then the corresponding PM mode change and power state change for the STA of the intended link shall start as soon as practical after the individually addressed TWT Information(#15484) frame exchange rather than immediately as described in 26.8.4.4 (TWT Information frame exchange for flexible wake time).

Between an AP MLD and a non-AP MLD associated with the AP MLD and for the MLD that is either the AP MLD or the non-AP MLD,(#17000) if an individually addressed TWT Information(#15484) frame for flexible wake time, which is intended for one STA affiliated with the associated MLD with a setup link, is transmitted to another STA affiliated with the associated MLD with a setup link and an acknowledgement in response to the TWT Information(#15484) frame is received by the transmitting STA affiliated with the MLD, then the corresponding PM mode change and power state change for the STA of the intended link shall start as soon as practical after the individually addressed TWT Information(#15484) frame exchange rather than immediately as described in 26.8.4.4 (TWT Information frame exchange for flexible wake time).

*TGbe editor: Change Clause* 11.20.6.5.1 *as follows (track change on):*

**11.20.6.5.1 General**

***Change the first three paragraphs as follows:***

A wideband (#15511)off-channel TDLS direct link is a 40 MHz, 80 MHz, 160 MHz, or 320 MHz off-channel TDLS direct link for EHT STAs, a 40 MHz, 80 MHz, 160 MHz, or 80+80 MHz off-channel TDLS direct link for VHT and HE STAs or a 2 MHz, 4 MHz, 8 MHz, or 16 MHz off-channel TDLS direct link for S1G STAs.

(…existing texts..)

*TGbe editor: Change Clause* 35.3.14 *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(#16327) MLD with the exception of the following frames(#16838):

* 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
* LMR frame
* FTM frame

An MLD with dot11QMFActivated equal to false 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)(#15548)) that is delivered to the associated MLD.

An MLD with dot11QMFActivated equal to false 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 (General)(#15548)) that are delivered from the associated MLD.

An MLD with dot11QMFActivated equal to false shall maintain a transmit MMPDU timer for each MMPDU (except the frames listed at the beginning of 35.3.14.1 (General)(#15548)). The transmit MMPDU timer shall be started when the MMPDU is passed to the MAC.

For an MLD with dot11QMFActivated equal to false, the frame retry counter and retry limit for each MMPDU that belongs to a TC that requires acknowledgment are(#16835) implementation specific.

An MLD with dot11QMFActivated equal to false shall continue to deliver the failed individually addressed Management frame (except the frames listed at the beginning of 35.3.14.1 (General)(#15548)) to an associated MLD on the setup links subject to additional constraints (see [35.3.7 (Link management)](#bookmark50))) until any of the following conditions occurs:

* The retry limit is met.
* The transmit MMPDU timer for the MMPDU exceeds dot11EDCATableMSDULifetime.
* The individually addressed Management frame is successfully delivered.

Between an(#17964) MLD and an associated peer MLD, a STA affiliated with the MLD with dot11QMFActivated equal to false shall not transmit other individually addressed Management frames (except the frames listed at the beginning of 35.3.14.1 (General)(#15548)) over a setup link while the current individually addressed Management frame (except the frames listed at the beginning of 35.3.14.1 (General)(#15548)) 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](#bookmark50) [management)](#bookmark50)), an MLD may transmit an individually addressed MMPDU, which is intended for one or more STA(s) affiliated with the associated MLD operating on enabled link(s)(#15549), to another STA (other than the intended STA(s)) 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)](#bookmark79).

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, which is intended for one or more STA(s) affiliated with the associated MLD operating on an enabled link, to another STA (other than the intended STA(s)) 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)](#bookmark50)).

An individually addressed MMPDU transmitted by an MLD through an affiliated STA is intended for a STA affiliated with the peer MLD unless specified otherwise to be intended for an MLD or to be capable of intended for more than one STA affiliated with the peer 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

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)](#bookmark50)).

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)](#bookmark50)).

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](#bookmark50) [management)](#bookmark50)).

* + - 1. **Identification of the intended(#16839) STA**

Between an AP MLD and a non-AP MLD associated with the AP MLD, an individually addressed MMPDU that is not a TWT Setup frame that includes a Link ID Bitmap subfield in its TWT element and that is intended for one or more STA(s) affiliated with the associated MLD operating on enabled link(s)(#16608) shall follow the below procedure:

* If the individually addressed MMPDU is transmitted to another STA (other than the intended STA(s)) 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(#16840) MLO Link Information element that identifies the intended link(s) of the MMPDU as the last element but before the Vendor Specific element(s) (if present).
* Otherwise, the individually addressed MMPDU may include an(#16840) MLO Link Information element that identifies the intended link(s) of the MMPDU as the last element but before the Vendor Specific element(s) (if 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 in its TWT element shall not include an(#16331) MLO Link Information element.

Only 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(#16840) 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(#16840) 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.

*TGbe editor: Change Clause* 11.2.2 *as follows (track change on):*

* + 1. **Bufferable MMPDUs**

***Change*** [***Table 11-3 (Bufferable/nonbufferable classification of MMPDUs)***](#bookmark0) ***as follows:***

**Table 11-3—Bufferable/nonbufferable classification of MMPDUs**

|  |  |
| --- | --- |
| **Description** | **Classification** |
| For non-MLO, an~~An~~(#15636) MMPDU that is carried in one or more Action (except for Fine Timing Measurement frame and Fine Timing Measurement Request frame), Disassociation, or Deauthentication frame.  For MLO, an MMPDU that is carried in one or more Action (except for TPC Request frame, Link Measurement Request frame, Fine Timing Measurement frame and Fine Timing Measurement Request frame), Disassociation, or Deauthentication frame. | Bufferable |

*TGbe editor: Change Clause* 11.13 *as follows (track change on):*

**11.13 SA Query procedures**

***Change the first three paragraphs follows:***

If dot11RSNAProtectedManagementFramesActivated is true, then the STA or MLD shall support the SA Query procedure.

To send an SA Query Request or SA Query Response frame to a peer STA or a peer MLD, the SME shall issue an MLME-SA-QUERY.request or MLME-SA-QUERY.response primitive respectively. Reception of an SA Query Request or SA Query Response frame is signaled to the SME with an MLME-SA-QUERY.indication or MLME-SA-QUERY.confirm primitive respectively.

A STA or an(#16324) MLD that supports the SA Query procedure and receives an SA Query Request frame shall respond with an SA Query Response frame if none of the following are true:

* the STA or the non-AP MLD is not currently associated to the STA or the AP MLD that sent the SA Query Request frame
* the STA has sent a (Re)Association Request frame within dot11AssociationResponseTimeOut but has not received a corresponding (Re)Association Response frame
* dot11RSNAOperatingChannelValidationActivated is true and the sending STA had indicated OCVC capability in its association and either:
  + OCI element is not present in the request
  + Operating channel information indicated does not match the current channel information (see

12.2.9 (Requirements for Operating Channel Validation))

(…existing texts..)

*TGbe editor: Change Clause* 35.3.13 *as follows (track change on):*

**35.3.13 Multi-link device individually addressed data delivery without block ack negotiation**

(…existing texts..)

An(#16326) MLD shall not transmit other individually addressed QoS Data frames through a STA affiliated with the MLD belonging to the TID without block ack negotiation to any STA affiliated with the associated MLD while the current individually addressed QoS Data frame belonging to the TID without block ack negotiation has not yet completed to the point of success, failed due to retry limit, or other MAC discard (e.g., lifetime expiration).

*TGbe editor: Change Clause* 11.10.9 *as follows (track change on):*

**11.10.9.2(#16688) Frame report**

***Change the ninth paragraph as follows:***

A STA that is not extended spectrum management capable shall not include a Wide Bandwidth Channel Switch subelement or Bandwidth Indication subelement in a Frame request or Frame report. A STA shall not include a Wide Bandwidth Channel Switch subelement or Bandwidth Indication subelement in a Frame request or Frame report sent to a STA that is not extended spectrum management capable. If the Wide Bandwidth Channel Switch subelement is included in a Frame request or Frame report, then the Operating Class shall include a 40 MHz channel spacing.

**11.10.9.3(#16688) Channel load report**

***Change the fifth paragraph as follows:***

A STA that is not extended spectrum management capable shall not include a Wide Bandwidth Channel Switch subelement or Bandwidth Indication subelement in a Channel Load request or Channel Load report. A STA shall not include a Wide Bandwidth Channel Switch subelement or Bandwidth Indication subelement in a Channel Load request or Channel Load report sent to a STA that is not extended spectrum management capable. If the Wide Bandwidth Channel Switch subelement is included in a Channel Load request or a Channel Load report, then the Operating Class shall indicate a 40 MHz channel spacing.

**11.10.9.4(#16688) Noise Histogram report**

***Change the eighth paragraph as follows:***

A STA that is not extended spectrum management capable shall not include a Wide Bandwidth Channel Switch subelement or Bandwidth Indication subelement in a Noise Histogram request or Noise Histogram report. A STA shall not include a Wide Bandwidth Channel Switch subelement or Bandwidth Indication subelement in a Noise Histogram request or Noise Histogram report sent to a STA that is not extended spectrum management capable. If the Wide Bandwidth Channel Switch subelement is included in a Noise Histogram request or a Noise Histogram report, then the Operating Class shall indicate a 40 MHz channel spacing.

*TGbe editor: Change Clause* 35.3.2 *as follows (track change on):*

* + 1. **Multi-link device addressing**

An MLD uses an MLD MAC address that singly identifies the MLD. STAs affiliated with an MLD shall use different MAC addresses.

NOTE 1—The MLD MAC address of an MLD might be the same as the MAC address of one affiliated STA or might be different from the MAC address of any affiliated STA.

For an individually addressed frame sent on a link between two MLDs, the following applies:

* the value of the Address 2 (TA) field (if present) in the MAC header of the frame that is not a Probe Response frame shall be the MAC address of the transmitting STA affiliated with the MLD corresponding to that link except for the Individual/Group bit, which is set to 1 when the TA field value is a bandwidth signaling TA and set to 0 otherwise.
* if the frame(#16750) is a Probe Response frame and the AP operating on the link is an AP affiliated with the AP MLD
  + if(#16749) the AP does not belong to a multiple BSSID set or corresponds to the transmitted BSSID in a multiple BSSID set, then the value of the Address 2 (TA) field in the MAC header of the frame shall be set to the MAC address of the AP.
  + if(#16749) the AP corresponds to the nontransmitted BSSID in a multiple BSSID set, then the value of the Address 2 (TA) field in the MAC header of the frame shall be set to the transmitted BSSID in the multiple BSSID set (see 11.1.4.3.4 (Criteria for sending a response)).
* the value of the Address 1 (RA) field in the MAC header of the frame shall be the MAC address of the receiving STA affiliated with the MLD corresponding to that link.
* if the frame(#16750) is a Management frame, the value of the Address 3 field in the MAC header of the Management frame shall be set based on 9.3.3.1 (Format of (PV0) Management frames).
* if the frame(#16750) is a Data frame, the value of the Address 3 field and the Address 4 field (if present) in the MAC header of the Data frame shall be set based on Table 9- 58 (Address field contents for Data frames transmitted by nonmesh STAs) and the settings of the To DS and From DS bits in the MAC header of the Data frame, where the BSSID is the MAC address of the AP affiliated with the AP MLD corresponding to that link.

NOTE 2—For frames sent over a direct path in a single link TDLS direct link, by a non-AP STA affiliated with a non- AP MLD, the value of the Address 2 (TA) field is set to the MLD MAC address of the non-AP MLD as described in

[35.3.21.2 (TDLS direct link over a single link)](#bookmark106).

For a frame sent by a STA affiliated with the MLD with Address 1 field set to a group address (if allowed as described in 9.3.1 (Control frames), 9.3.2 (Data frames), and 9.3.3 ((PV0) Management frames)), the value of the Address 2 field, the Address 3 field (if present), and the Address 4 field (if present) in the MAC header of the frame shall be set as defined in 9.3.1 (Control frames), 9.3.2 (Data frames), and 9.3.3 ((PV0) Management frames), where the BSSID is the following:

* if the STA is an AP, then the BSSID is the MAC address of the AP
* if the STA is a non-AP STA affiliated with the non-AP MLD that has performed multi-link setup with an AP MLD, and a link is set up between the non-AP STA affiliated with the non-AP MLD and an AP affiliated with the AP MLD, then the BSSID is set to the MAC address of the AP affiliated with the AP MLD.

*TGbe editor: Change Clause* 35.9 *as follows (track change on):*

* 1. **Operating mode indication**

An EHT AP that supports 320 MHz shall set dot11EHTOMIOptionImplemented to true.

An EHT STA with dot11EHTOMIOptionImplemented that is equal to true shall set the EHT OM Control Support subfield in the EHT MAC Capabilities Information field in the EHT Capabilities element it transmits to 1; otherwise the EHT STA shall set the EHT OM Control Support subfield to 0.

An EHT STA with dot11EHTOMIOptionImplemented that is equal to true shall set dot11OMIOptionImplemented to true.

An EHT STA that transmits a frame with an A-Control subfield of HE variant HT Control field, which includes an EHT OM Control subfield shall concatenate the OM Control subfield within the same A-Control subfield after the EHT OM Control field. An EHT STA shall not include an EHT OM Control field in an A- Control field unless the OM Control field is present in the same A-Control field.

NOTE 1—An EHT STA is an HE STA and as such inherits all the functionalities defined in 26.9 (Operating mode indication).

NOTE 2—Based on the requirement to concatenate the OM Control subfield after an EHT OM Control subfield and the definition of OMI initiator and OMI responder in 26.9 (Operating mode indication), an EHT STA that transmits a frame including an EHT OM Control subfield is an OMI initiator, and an EHT STA with dot11EHTOMIOptionImplemented to true that receives a frame including an EHT OM Control subfield is an OMI responder.

For an EHT STA that is an OMI initiator or an OMI responder, the rule described in 26.9.3 (Transmit operating mode (TOM) indication) that applies to HE TB PPDUs(#17098) shall also apply to EHT TB PPDUs(#17098).

An OMI initiator that transmits a frame including an EHT OM Control subfield and an OMI responder that receives a frame including an EHT OM Control field shall follow the rules defined in 26.9 (Operating mode indication), except that the *NSS ,* the *NSTS* , and/or the maximum operating channel width shall be calculated

by the EHT OM Control subfield combined with the OM Control subfield as defined in 9.2.4.7.8 (EHT OM Control).

NOTE 3—An(#17099) EHT PHY does not support STBC. The terms “space-time stream” and “spatial stream” are equivalent in EHT.

If the operating channel width of the STA is greater than 80 MHz, then the maximum number of spatial streams that the STA supports in reception for a given EHT-MCS as a function of the received EHT PPDU bandwidth *BW* at an EHT STA transmitting only an OM Control subfield or an EHT OM Control subfield combined with an OM Control subfield is defined in Equation (35-3).

floor*Rx*-*NSS*-*from*-*OMI*  *Max*-*EHT*-*NSS*-*at*-*BW*  *Max*-*EHT*-*NSS*-*at*-80 (35-3) where

*Rx*-*NSS*-*from*-*OMI* is *NSS* indicated by the Rx NSS subfield in the OM Control subfield (see 9.2.4.6a.2

(OM Control)) or indicated by the Rx NSS Extension subfield in the EHT OM Control subfield combined with the Rx NSS subfield in the OM Control subfield (see 9.2.4.7.8 (EHT OM Control)).

*Max*-*EHT*-*NSS*-*at*-*BW* is the maximum NSS among all EHT-MCS at *BW* MHz from the Supported EHT-MCS And NSS Set field (9.4.2.313.4 (Supported EHT-MCS And NSS Set field)) transmitted by the STA.

*Max*-*EHT*-*NSS*-*at*-80 is the maximum NSS among all EHT-MCS at 80 MHz from the Supported EHT- MCS And NSS Set field (9.4.2.313.4 (Supported EHT-MCS And NSS Set field)) transmitted by the STA.

*TGbe editor: Change Clause* 9.4.2.47 *as follows (track change on):*

**9.4.2.47 Fast BSS Transition element (FTE)**

***Change the fourth and fifth paragraphs as follows:***

The RSNXE Used subfield of the MIC Control field is used in the third and fourth messages of the FT authentication sequence to indicate whether the STA or the STA affiliated with the MLD transmitting the frame containing the FTE includes an RSNXE in other frames. This subfield is set to 0 in other frames.

The Element Count subfield of the MIC Control field contains the number of elements that are included in the message integrity code (MIC) calculation. The Element Count subfield(#17545) does not include the Fragment element(s) if the FTE is fragmented.

***Change*** [***Table 9-218 (Subelement IDs)***](#bookmark127) ***as follows (not all lines shown):***

**Table 9-218—Subelement IDs**

|  |  |
| --- | --- |
| **Value** | **Contents of Data field** |
| 0 | Reserved |
| 1 | PMK-R1 key holder identifier (R1KH-ID) |
| 2 | GTK |
| 3 | PMK-R0 key holder identifier (R0KH-ID) |
| 4 | IGTK |
| 5 | Operating Channel Information (OCI) |
| 6 | BIGTK |
| 7 | MLO GTK |
| 8 | MLO IGTK |
| 9 | MLO BIGTK |
| ~~7~~10–255 | Reserved |

***Change the 19th paragraph as follows:***

When sent by a non-AP STA or a non-AP MLD through an affiliated non-AP STA, the R0KH-ID indicates the R0KH with which the S0KH negotiated the PMK-R0 it is using for this transition. When sent by an AP or an AP MLD through an affiliated AP, the R0KH-ID indicates the R0KH that the S0KH will be using to generate a PMK-R0 security association. It is encoded following the conventions from 9.2.2 (Conventions).

***Insert the following paragraphs at the end of the subclause:***

The MLO GTK subelement contains the GTK for a link, which is encrypted (see procedures in 13.8.5 (FT authentication sequence: contents of fourth message)) and is defined in [Figure 9-425a (MLO GTK subele-](#bookmark128) [ment format)](#bookmark128).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subelement ID | Length | Key Info | Link ID Info | Key Length | RSC | Wrapped Key |

Octets: 1 1 2 1 1 8 24–40

**Figure 9-425a—MLO GTK subelement format**

The Link ID Info field of the MLO GTK subelement is as defined in [9.4.1.75 (Link ID Info field)](#bookmark105). The Link ID subfield contains the link identifier for the link (see 35.3.3.2 (Link ID)).

The definitions of the(#17547) Key Info, Key Length, RSC, and Wrapped Key fields are the same as in the GTK subele- ment.

The MLO IGTK subelement contains the IGTK for a link, used for protecting robust Management frames. The MLO IGTK subelement format is shown in [Figure 9-425b (MLO IGTK subelement format)](#bookmark129).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subelement ID | Length | Key ID | IPN | Link ID Info | Key Length | Wrapped Key |

Octets: 1 1 2 6 1 1 24–40

**Figure 9-425b—MLO IGTK subelement format**

The definitions of the(#17547) Key ID, IPN, Key Length, and Wrapped Key fields are the same as in the IGTK subelement.

The definition of the(#17547) Link ID Info field is the same as in(#17549) the MLO GTK subelement described above.

The MLO BIGTK subelement contains the BIGTK for a link, used for protecting Beacon frames. The MLO BIGTK subelement format is shown in [Figure 9-425c (MLO BIGTK subelement format)](#bookmark130).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subelement ID | Length | Key ID | BIPN | Link ID Info | Key Length | Wrapped Key |

Octets: 1 1 2 6 1 1 24–40

**Figure 9-425c—MLO BIGTK subelement format**

The definitions of the(#17547) Key ID, BIPN, Key Length, and Wrapped Key fields are the same as in the BIGTK sub- element.

The definition of the(#17547) Link ID Info field is the same as in(#17549) the MLO GTK subelement described above.

*TGbe editor: Change Clause* 9.4.2.157 *as follows (track change on):*

**9.4.2.157 VHT Capabilities element**

**9.4.2.157.3 Supported VHT-MCS and NSS Set field**

***Change the second last paragraph as follows:***

The value of Max VHT NSS for a given MCS is equal to the smaller of

— The maximum value of *n* for which the Max VHT-MCS for *n* SS has a value that indicates support for that MCS or

— The maximum supported *NSS* as indicated in by the value of the Rx NSS field of the OM Control subfield if(#17556) EHT OM Control subfield is not present in the same A-Control field or by the value of the Rx NSS Extension field of the EHT OM Control subfield combined with the value of the Rx NSS field of the OM Control subfield (and further defined in the Table 26-9 (Setting of VHT Channel Width and VHT NSS at an HE STA transmitting the OM Control subfield))

*TGbe editor: Change Clause* 11.21.14 *as follows (track change on):*

**11.21.14 Proxy ARP service**

(…existing texts…)

The IPv6 ND function at the STA and the non-AP MLD shall register all of the IPv6 addresses on the interface (see section 10 of IETF RFC 8929) to the proxy ARP service at the AP (or the AP MLD) to ensure that the proxy ARP service is aware of all those addresses and will proxy for them. The proxy ND operation may support address mobility (section 6 of IETF RFC 8929) to transfer a role of ND proxy for this STA to the AP with which the STA is associated (or for the non-AP MLD to the AP MLD with which the non-AP MLD is associated) following a mobility event.(#17911)