IEEE P802.11  
Wireless LANs

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| 11be D3.0 CR for Some Clauses in 9.4 | | | | |
| Date: 2023-03-09 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel |  |  |  |

Abstract

This submission proposes resolutions for the following CIDs:

15357, 17485, 17487, 18081, 17538, 15928, 16435, 17546, 17554, 17347,

18100, 17747, 17969, 17970, 15779, 15959

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Green tag and editorial revision.
* Rev 2: Revision for CID 17538 and CID 15928
* Rev 3: Revision based on the discussion during the teleconference

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.***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15357 | John Wullert | 9.4.1.6 | 205.55 | The phrase "at least a" does not seem appropriate when what is being specified is a specific minimum number (one) | Rephrase as "For MLO, the Listen Interval field is used to indicate to the AP MLD how often at least one of the non-AP STAs affiliated with a non-AP MLD wakes to listen to Beacon frames..." | Accepted - |
| 17485 | Brian Hart | 9.4.1.6 | 205.60 | How can the recipient of the (Re)Assoc request know the intent of a STA in "with respect to the beacon interval corresponding to each of the links that the non-AP MLD intends to setup in the (Re)Association Request frame)"? | Try "The value of this field is in units of the maximum beacon interval value across the links that the non-AP MLD requests to be setup via the Basic Multi-Link element sent in the same frame." | Revised –  The requested links include the link that is used to send (Re)Association Request frame and the links indicated in the Basic Multi-link element.  We try to revise along the line suggested by the commenter.  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17485 |
| 17487 | Brian Hart | 9.4.1.8 | 206.23 | Although written "A or B or C", that is not what is meant! | Try "The field represents the 16-bit ID of a STA when assigned by an AP or PCP. This field represents the 16-bit ID of a non-AP MLD when assigned by an AP MLD. " | Accepted - |
| 18081 | Abhishek Patil | 9.4.1.8 | 206.31 | The phrase 'that is a STA that is not associated to an EHT AP' can be simplified as ', that is associated with a non-EHT AP, ' | As in comment | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 18081 |
| 17538 | Brian Hart | 9.4.2.26 | 229.29 | Subject/verb number mismatch. Also, unclear if "affiliated" modifies just "all STAs" or "a STA or all STAs" | Try "A STA unaffiliated with an MLD or each STA affiliated with an MLD sets the ..." or some other fix. Ditto L37/39/42/47/51/58 | Revised –  Agree in principle with the commenter for the verb mismatch. “Each” may not be suitable because there is an emphasize that all STAs affiliated with an MLD set the same value to indicate support rather than indicate independently.  We revise accordingly.  TGbe editor to make the changes shown in 11-23/0354r3 under all headings that include CID 17538 |
| 15928 | Zhou Lan | 9.4.2.26 | 229.24 | The WNM for non-AP MLD is missing from Table 9-190 for MLO case. As stated in last paragraph of the subclause 11.2.3.1, the WNM procedure is performed at the MLD level and applies to all the STAs affiliated with the MLD. Please add WNM to the table. | As in comment | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0354r3 under all headings that include CID 15928 |
| 16435 | Morteza Mehrnoush | 9.4.2.26 | 229.24 | The WNM for non-AP MLD is missing from Table 9-190 for MLO case. As stated in last paragraph of the subclause 11.2.3.1, the WNM procedure is performed at the MLD level and applies to all the STAs affiliated with the MLD. Please add WNM to the table. | As in comment | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0354r3 under all headings that include CID 15928 |
| 17546 | Brian Hart | 9.4.2.47 | 232.58 | For clarity, identify that the Link ID subfield the is within the Link ID Info subfield. Othewise it looks like one the Link ID Info subfield has been mislabeled as the Link ID subfield | As in comment | Revised –  Agree in principle with the commenter.  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17546 |
| 17554 | Brian Hart | 9.4.2.78 | 234.45 | It is not specified what entity is "non-MLO" | Try "For a non-AP not affiliated with an MLD ..." Ditto at P234L49, "For a non-AP MLD, ... the non-AP MLD | Rejected –  Non-MLO refers to operations that do not involve two MLDs.  ***non-multi-link operation (MLO):*** *Operations that do not involve two MLDs as described in 35.3 (Multilink operation).*  The following sentence then refers to the entity of non-AP STA and AP.  *For non-MLO, the BSS Max Idle Period element contains the time period a non-AP STA can refrain from transmitting frames to the AP before the AP might disassociates the STA due to inactivity.* |
| 17347 | Alfred Asterjadhi | 9.4.2.317 | 300.01 | I believe only one bit can be set to 1 for EHT. Please add a statement. | As in comment. | Revised –  The statement is provided in 35.3.14.2 Identification of the Intended STA. We simply provide a reference and do clean up.  *Only one bit in the Link ID Bitmap subfield of the MLO Link Information element shall be set to 1.*  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17347 |
| 18100 | Abhishek Patil | 9.4.2.317 | 300.01 | Delete the "(s)" in "link(s)" and "STA(s)" to be consistent with the normative text in 35.3.14.2 (P547L26) and the description text on P299L49 | As in comment | Revised –  The statement is provided in 35.3.14.2 Identification of the Intended STA. We provide a reference and do clean up.  *Only one bit in the Link ID Bitmap subfield of the MLO Link Information element shall be set to 1.*  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17347 |
| 17747 | Brian Hart | 9.4.2.317 | 299.49 | Subject of "is the intended recipient" is unclear; the MLD is the peer of an undefined entity; there can be multiple intended STAs but this is not mentioned; also "where ... operating on" is inelegant | Try "The MLO Link Information element is carried in an individually addressed Management frame sent by a STA affiliated with an MLD to identify the link on which peer STA(s) affiliated with a peer MLD operate and where the peer STA(s) are the intended recipient of the Management frame." | Revised –  We note that only one bit in the MLO Link Information element is set to 1, so only one intended STA rather than more than one.  *Only one bit in the Link ID Bitmap subfield of the MLO Link Information element shall be set to 1.*  We do editorial revision to clarify the sentence.  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17747 |
| 17969 | Xiaofei Wang | 9.4.2.317 | 299.47 | This sentence "The MLO Link Information element is carried in an individually addressed Management frame to identify the link where the intended STA affiliated with the peer MLD is operating on and is the intended recipient of the contents of the Management frame carrying this element." is very garbled and it is hard to understand its meaning. Please rewrite to clarify. | as in comment | Revised –  We do editorial revision to clarify the sentence.  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17747 |
| 17970 | Xiaofei Wang | 9.4.2.317 | 300.01 | what is an "intented STA(s)"? Intented by which entity? Please clarify | as in comment | Revised –  We add affiliated with the peer MLD.  TGbe editor to make the changes shown in 11-23/0354r1 under all headings that include CID 17970 |
| 15779 | Guogang Huang | 9.6.8 | 154.50 | when a non-AP MLD initiates fast BSS transition over the DS with an AP MLD, the STA Address field and the Target AP Address field are respectively set to the MLD MAC address of the non-AP MLD and the target AP MLD. Add the text to Clarify how to set the STA Address field and Target AP Address field in FT Action frames | As in comment. | Rejected –  For Target AP Address, general term target FTR has been used.  *“The Target AP Address field is set to ~~the BSSID value of the target AP~~MAC address of the target FTR.”*  For STA Address field, general term FTO has been used.  *The STA Address field is set to the fast BSS transition originator’s (FTO’s) MAC address.* |
| 15959 | Binita Gupta | 9.6.8.1 | 305.34 | Change "fast BSS transition originator (FTR)" -> "fast BSS transition responder (FTR)" | as in comment | Accepted - |

**Discussion:**

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

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

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

For non-MLO, the~~The~~ Listen Interval field is used to indicate to the AP how often an S1G STA with dot11NonTIMModeActivated equal to false or a non-S1G STA in power save mode wakes to listen to Beacon frames. It is also used to indicate to an AP the duration during which an S1G STA with dot11NonTIMModeActivated equal to true is required to transmit at least one frame that is addressed to the associated AP. This field is derived from the ListenInterval parameter when present as a parameter of an MLME primitive. The value is in units of beacon interval if dot11ShortBeaconInterval is false and in units of short beacon interval if dot11ShortBeaconInterval is true (see 11.1.3.10.2 (Generation of S1G Beacon frames)).

For MLO, the Listen Interval field is used to indicate to the AP MLD how often at least one of the non-AP STAs(#15357) affiliated with a non-AP MLD wakes to listen to Beacon frames if all STAs affiliated with the non-AP MLD are in power save mode. This field is derived from the ListenInterval parameter when present as a parameter of an MLME primitive. The value of this field is in units of the maximum beacon interval value (with respect to the beacon interval corresponding to each of the links that the non-AP MLD requests for (re)setup in the (Re)Association Request frame (see 35.3.5.1 (Multi-link (re)setup procedure)))(#17485).

The length of the Listen Interval field is 2 octets. The Listen Interval field is shown in Figure 9-88 (Listen Interval field format carried in a non-S1G PPDU).

***Change the now-shifted fourth paragraph as follows:***

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 whose all affiliated STAs ~~that~~ never enters power save mode.

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

For non-MLO, an~~An~~ AP uses the listen interval in determining the lifetime of frames that it buffers for a STA.

For MLO, an AP MLD uses the listen interval in determining the lifetime of frames that it buffers for a non- AP MLD.

*TGbe editor: Change Clause 9.4.1.8 as follows (track change on):*

* + - 1. **AID field**

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

In infrastructure BSS operation, the AID field contains a value assigned by an AP, ~~or~~ PCP or an AP MLD during association. The field represents the 16-bit ID of a STA when assigned by an AP or PCP. This field represents the 16-bit ID of a non-AP MLD when assigned by an AP MLD.(#17487) In mesh BSS operation, the AID field is a value that represents the 16- bit ID of a neighbor peer mesh STA, assigned during mesh peering. The length of the AID field is 2 octets. The AID field is shown in Figure 9-138 (AID field format).

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

The AID field for a non-DMG and non-S1G STA associated to a non-EHT AP(#18081) is in the range of 1 to 2007. The AID field for a STA associated to an EHT AP or for a(#18081) non-AP MLD associated to an AP MLD is in the range of 1 to 2006. This value is placed in the 14 LSBs of the AID field, with the two MSBs of the AID field set to 1.

*TGbe editor: Change Clause 9.4.2.26 as follows (track change on):*

**9.4.2.26 Extended Capabilities element**

***Change the selected entries in*** [***Table 9-190 (Extended Capabilities field)***](#bookmark122) ***as follows (not all lines shown):***

**Table 9-190—Extended Capabilities field**

|  |  |  |
| --- | --- | --- |
| **Bit** | **Information** | **Notes** |
| 2 | Extended Channel Switching | ~~The~~A STA sets the Extended Channel Switching field ~~is~~to 1 to indicate support for the communication of channel switching information through the transmission and reception of the Extended Channel Switch Announcement element and Management frame, as described in  9.6.7.7 (Extended Channel Switch Announcement frame format). The Extended Channel Switching field is 0 to indicate a lack of support for extended channel switching. All STAs affiliated with an MLD set the Extended Channel Switching field to the same value.(#17538) |
| 12 | Proxy ARP Service | ~~The~~An AP sets the Proxy ARP Service field to 1 when dot11ProxyARPActivated is true, and sets it to 0 otherwise. See  11.21.14 (Proxy ARP service). A non-AP STA sets the Proxy ARP Service field to 0. All STAs affiliated with an MLD set the Proxy ARP Service field to the same value. (#17538) |
| 17 | WNM Sleep Mode | A STA sets the WNM Sleep Mode field to 1 when dot11WNMSleepModeActivated is true, and sets it to 0 otherwise. All STAs affiliated with an MLD set the WNM Sleep Mode field to the same value. See 11.2.3.16 (WNM sleep mode).(#15928) |
| 81 | SAE Password Identifiers In Use | ~~The~~An AP sets the SAE Password Identifiers In Use field to 1 when any password in the dot11RSNAConfigPasswordValueTable has a password identifier and sets it to 0 otherwise. All APs affiliated with an AP MLD set the SAE Password Identifiers In Use field to the same value. See 12.4.3 (Representation of a password). (#17538) |
| 82 | SAE Password Identifiers Used Exclusively | ~~The~~An AP sets the SAE Password Identifiers Used Exclusively field to 1 when every password in the dot11RSNAConfigPasswordValueTable has a password identifier and sets it to 0 otherwise. All APs affiliated with an AP MLD set the SAE Password Identifiers Used Exclusively field to the same value. See 12.4.3 (Representation of a password). (#17538) |
| 84 | Beacon Protection Enabled | ~~The~~An AP sets the Beacon Protection Enabled field to 1 when dot11BeaconProtectionEnabled is true. Otherwise, it is set to 0. All APs affiliated with an AP MLD set the Beacon Protection Enabled field to the same value.  This field is reserved for a non-AP STA.  See 11.52 (Beacon frame protection procedures). (#17538) |
| 85 | Mirrored SCS | ~~The~~A STA sets the Mirrored SCS field to 1 when dot11MSCSActivated is true and  sets it to 0 otherwise. All STAs affiliated with an MLD set the Mirrored SCS field to the same value. (#17538) |

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

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

(…existing texts…)

***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 of the Link ID Info field(#17546) contains the link identifier for the link (see 35.3.3.2 (Link ID)).

(…existing texts…)

* + - 1. **MLO Link Information element**

The MLO Link Information element is carried in an individually addressed Management frame to identify the link thatthe intended STA affiliated with the peer MLD is operating on, and the intended STA(#17747) is the intended recipient of the contents of the Management frame carrying this element (see 35.3.14.2 (Identification of the Intended STA))(#17347).

The MLO Link Information element is defined in [Figure 9-1002ax (MLO Link Information element for-](#bookmark243) [mat)](#bookmark243).

|  |  |  |  |
| --- | --- | --- | --- |
| Element ID | Length | Element ID Extension | Link ID Bitmap |

Octets: 1 1 1 2

**Figure 9-1002ax—MLO Link Information element format**

The Element ID, Length, and Element ID Extension fields are defined in [9.4.2.1 (General)](#bookmark109).

The Link ID Bitmap field indicates the link (#17347) that(#17970) the intended STA (#17347) affiliated with the peer MLD(#17970) is(#17347) operating on (see 35.3.3.2 (Link ID)). A value of 1 in bit position *i* of the Link ID Bitmap field indicates link ID *i*.

*TGbe editor: Change Clause 9.6.8.1 as follows (track change on):*

* + 1. **FT Action frame details**
       1. **General**

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

Four Action frame formats are defined to support fast BSS transitions over the DS, which are initiated through the currently associated ~~AP~~fast BSS transition responder (FTR)(#15959). The FT Action frames are sent over the air between the ~~STA~~fast BSS transition originator (FTO) and the current ~~AP~~FTR. The Action frame is used as a transport mechanism for data that are destined for the target ~~AP~~FTR. An FT Action field, in the octet immediately after the Category field, differentiates the FT Action frame formats. The FT Action field values associated with each FT Action frame format are defined in Table 9-481 (FT Action field values).