IEEE P802.11
Wireless LANs

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| Resolution for CIDs assigned to Abhi – Part 6 |
| Date: May 7th 2023 |
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 Abstract

This submission proposes resolutions for following 10 CIDs received for TGbe LB271:

17593 17616 17617 17618 17649 17657 17626 17663 17666 15541

Revisions:

* Rev 0: Initial version of the document.
	+ CIDs 17616 17617 17618 were deferred based on discussion during TGbe MAC call on 6/8/23
* Rev 1: updated resolution for CIDs 17616 17617 17618
* Rev 2: Minor editorial fixes to the resolution for deferred CIDs 17616 17617 17618 based on offline feedback from Edward.
	+ Also includes security bugfix (tagged with one of the pending CIDs).

***TGbe editor: Baseline for this document is 11be D3.2***

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

***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** | **Pg.Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 17593 | Brian Hart | 9.4.2.240 | 247.22 | This implies the NI element be can carried in another element - but how can that be? (When a TLV is carried in another element, it is a subelement) | We need a widespread clean-up of these "elements" that are apearing as subelements. Normally there is a defined mapping from one to the other: i.e. "subelement X has the same format as the element X [except ...]". BTW, this demarcation between elements and subelements is more rigid that say the labels "subfield" and "field", where pretty much anything goes. This is because "subelement" is a defined term with its own section (9.4.3) so more rigor is needed. | **Rejected**The Non-Inheritance element can be carried either within the Multiple BSSID element or Basic Multi-Link element. In both instances, it is carried within a subelement (e.g., Nontransmitted BSSID Profile subelement) which consists of several other elements. Therefore, the existing reference as ‘element’ within an element is fine since the embedded element is within a subelement. |
| 17616 | Brian Hart | 9.4.2.312.2.3 | 254.32 | The Basic Multi-Link element can be sent in (Re)Assoc Req frames. Here, AFAIK the Basic ML element is mostly describing the non-AP MLD (i.e., its MLD MAC address etc); so here the Basic ML element is \*not\* describing an AP MLD. | If the Link ID Info subfield is only transmitted by an AP(?), then, to make the clause 9 language complete, add this limitation at P253L29 (along the lines of P254L54). Else apply a more correct fix. | **Revised**D3.0 had erroneously deleted a sentence that said that the Basic ML IE transmitted by a non-AP STA does not include the Link ID field. This was fixed in D3.1. The text related to non-AP not carrying Link ID and BPCC subfields is moved up to the clause on presence indication and the text related to inclusion in Mgmt frames from the AP is also rewritten to better convey the intention. Also adds FT Action frame to the exception.In addition, the resolution also fixes a bug in the spec related to the link used for authentication, (re)association and 4-way handshake.**TGbe editor, please make changes shown in 11-23/0743r2 tagged 17616** |
| 17617 | Brian Hart | 9.4.2.312.2.3 | 254.54 | This is really a rule on the related "Present" variable, so is in the wrong section | Move/merge to P253L33. Similarly P254L57-60 and P255L1-5. | **Revised**Resolution to CID 17616 merges the rules for presence of Link ID and BPCC subfields and move them to the clause on presence indicators.**TGbe editor, please make changes shown in 11-23/0743r2 tagged 17616** |
| 17618 | Brian Hart | 9.4.2.312.2.3 | 254.58 | What is the behavior for an Authentication frame (not present / optionally present / defined in section xxx)? Also, elements are only carried in mgmt frames, so recommend delete "Mgmt". Also, spurious comma. | 1) Define behavior for Auth frame (or use xref). 2) Delete "Management", 3) Delete comma in ", when". | RevisedAgree in principle. Resolution for CID 17616 address this comment. **TGbe editor, please make changes shown in 11-23/0743r2 tagged 17616** |
| 17649 | Brian Hart | 9.4.2.312.2.3 | 260.06 | Confusing indenting; makes "otherwise" more powerful than it should be | Indent "Set to 1 ..." and "Set to 0 otherwise" so it is clear these are dependent on +HTC-HE Sup = 1 | **Accepted** |
| 17657 | Brian Hart | 9.4.2.312.2.4 | 263.19 | Probably unintendedly ambiguous antecedent (it => j) | try "otherwise the bit Bj is set to 0" | **Revised**Agree in principle. The suggested change is made. In addition, an error in the paragraph is fixed as a resolution to this comment.**TGbe editor, please make changes shown in 11-23/0743r0 tagged 17657** |
| 17626 | Brian Hart | 9.4.2.312.2.4 | 263.33 | Upper bound of the elements expected in the Complete profile is undefined. | Define an upper bound on (or equality for) the complete profile - e.g. list of allowable elements or something more generic like "union of all elements allowable in Beacon, Probe Response and ?(Re)Assocation Reponse frames excepting xxxx" or "union of all elements sent in Beacon, Probe Response and ?(Re)Assocation Reponse frames by each affiliated AP of the AP MLD excepting xxxx". | **Rejected**The contents of the complete profile are based on elements that are applicable to the reported STA (i.e., satisfies the condition in the corresponding table in clause 9.3.3) and inheritance applies. Therefore, the upper bound is based on the elements listed in the corresponding table in 9.3.3 for the Management frame that carries the Basic ML IE. |
| 17663 | Brian Hart | 9.4.2.312.2.4 | 265.64 | There is no "list" of subelements in the field | Try "One or more Per-STA Profile subelements are included in the Link Info field (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)). Similarly look at P269L30 | **Revised**Agree in principle. The suggested change is made for Probe Request ML IE, Reconfiguration ML IE and Priority Access ML IE.**TGbe editor, please make changes shown in 11-23/0743r0 tagged 17663** |
| 17666 | Brian Hart | 9.4.2.312.2.4 | 267.23 | Grammar glitch; needs changing/checking around "arries the MAC address of the AP can operate on" | Maybe "The STA MAC Address subfield of the STA Info field carries the MAC address of the AP [that operates | that can operate] on the link identified by the Link ID subfield and is affiliated with the same MLD as the STA that transmitted the Reconfiguration Multi-Link element." | **Revised**Agree in principle. The suggested change is made as a resolution.**TGbe editor, please make changes shown in 11-23/0743r0 tagged 17666** |
| 15541 | Chaoming Luo | 35.3.12.4 | 538.31 | This case is missing: An AP affiliated with an AP MLD where the AP corresponds to a transmitted BSSID in a multiple BSSID set shall indicate pending buffered traffic for a non-AP MLD associated with that AP MLD.Neither does the first nor the second paragraph include this case. | Change: the AP is not a member of a multiple BSSID setTo: the AP is not a member of a multiple BSSID set or corresponds to a transmitted BSSID in a multiple BSSID set | **Rejected**The second paragraph in 35.3.12.4 covers the case of traffic indication for a non-AP MLD associated with the AP corresponding to the transmitted BSSID. The phrase “any AP MLD that has an affiliated AP in the same multiple BSSID set as the transmitting AP” includes the transmitted BSSID. |

x-x-x-x-x-x-x-x-x-x Start of changes for CID 17616 x-x-x-x-x-x-x-x-x-x

**9.4.2.312.2.2 Presence Bitmap subfield of the Multi-Link Control field in a Basic Multi-Link element**[17616]

***TGbe editor: Please add the following paragraph in this subclause as shown below:***

The Link ID Info Present subfield is set to 1 if the Link ID Info subfield is present in the Common Info field. Otherwise, the Link ID Info Present subfield is set to 0.

The BSS Parameters Change Count Present subfield is set to 1 if the BSS Parameters Change Count subfield is present in the Common Info field. Otherwise, the BSS Parameters Change Count Present subfield is set to 0.

Present subfield and the BSS Parameters Change Count Present areset to 0 in a transmitted affiliated with a non-AP MLD Present subfield Present set to 1 affiliated with AP MLDwhen the element is carried in an or an FT Action frame (see 9.6.8 (FT Action frame details))

**9.4.2.312.2.3 Common Info field of the Basic Multi-Link element**[17616]

***TGbe editor: Please delete the following paragraphs in this subclause as shown below:***

The format of the Link ID Info subfield is defined in 9.4.1.75 (Link ID Info field). The Link ID subfield of the Link ID Info field indicates the link identifier of the AP that is affiliated with the AP MLD which is described in the Basic Multi-Link element and satisfies one of the following:

—It is the AP that transmitted the Basic Multi-Link element.

—It is the AP that corresponds to a nontransmitted BSSID that is a member of the same multiple BSSID set as the AP that transmitted the Multiple BSSID element containing the profile for the non-transmitted BSSID which includes the Basic Multi-Link element.

The BSS Parameters Change Count subfield in the Common Info field carries an unsigned integer, initialized to 0. The value carried in the subfield is incremented by 1 when a critical update (as defined in 11.2.3.15 (TIM Broadcast) and 35.3.10 (BSS parameter critical update procedure)) occurs to the BSS parameters of the AP that is affiliated with an AP MLD which is described in the Basic Multi-Link element and satisfies one of the following:

—It is the AP that transmitted the Basic Multi-Link element.

—It is the AP that corresponds to a nontransmitted BSSID that is a member of the same multiple BSSID set as the AP that transmitted the Multiple BSSID element containing the profile for the non-transmitted BSSID which includes the Basic Multi-Link element.

**[BUGFIX]**[17616]

**Discussion:** TGbe spec needs to clarify that frame exchanges for authentication, (re)association and 4-way handshake happen on the same link. Normative text is added to clause 35.3.5 to clarify this expectation. Furthermore, the text on ‘link recommendation’ for sending frames to the AP for ML setup (after discovery) is updated to remove all references to MLME primitives corresponding to (re)association request. In addition, missing text is added to clause 13.7.1.

**35.3.5 ML (re)setup**

**35.3.5.1 ML (re)setup procedure**

***TGbe editor: Please add the following paragraph and the NOTE after the 4th paragraph in this subclause as shown below:***

For the (Re)Association Request frame sent by a non-AP MLD to an AP MLD:

* the A2 field shall be the same as the A2 field of the latest Authentication frame(s) sent from the non-AP MLD to the AP MLD that leads to a successful authentication to set the state to State 2. (see 11.3.2)
* the A1 field shall be the same as the A1 field of the latest Authentication frame(s) sent from the non-AP MLD to the AP MLD that leads to a successful authentication to set the state to State 2. (see 11.3.2)

NOTE – If non-AP MLD has performed a successful authentication beforehand with an AP MLD to save time for the later association, and the non-AP MLD cannot transmit to the AP affiliated with the AP MLD that responds to the Authentication frame sent from the non-AP MLD that leads to successful authentication (for example, due to the reason that AP MLD removes the affiliated AP), then the non-AP MLD might initiate another authentication exchange with AP MLD through any AP affiliated with the AP MLD using PMKSA caching.

13.7.1 FT reassociation in an RSN

***TGbe editor: Please add the following paragraph after the paragraph starting “If in the Reassociation Response frame the RSNE fields other than the PMKID” in this subclause as shown below:***

If FTR is an AP MLD and in the Reassociation Response frame, the affiliated AP MAC address for each link in the Basic Multi-Link element are not identical to the corresponding AP MAC address received in the Beacon and Probe Response frames from the corresponding AP affiliated with the FTR or in the multi-link probe response frame from the FTR, the S1KH of the FTO shall discard the response.

* + - * 1. **Semantics of the service primitive**

***TGbe editor: Please update the contents of this subclause as shown below:***

The primitive parameters are as follows: MLME-ASSOCIATE.request(

...

EHTCapabilities,

MultiLink,

,

TID-To-Link Mapping,

VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| ListenInterval | Integer |  0 | For non-MLO, specifies~~Specifies~~ how often the STA awakens and listens for the next Beacon frame, if it enters power save mode.For MLO, specifies how often at least one STA affiliated with the MLD awakens and listens for the next Beacon frame, if all STAs affiliated with the MLD enter power save mode. |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the local MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
|  |  |  |  |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

* + - * 1. **Semantics of the service primitive**

***TGbe editor: Please update the contents of this subclause as shown below:***

The primitive parameters are as follows: MLME-REASSOCIATE.request(

EHTCapabilities,

MultiLink,

TID-To-Link Mapping,

VendorSpecificInfo

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| ... |  |  |  |
| ListenInterval | Integer |  0 | For non-MLO, specifies~~Specifies~~ how often the STA awakens and listens for the next Beacon frame, if it enters power save mode.For MLO, specifies how often at least one STA affiliated with the MLD awakens and listens for the next Beacon frame, if all STAs affiliated with the MLD enter power save mode. |
| ... |  |  |  |
| EHTCapabilities | As defined in EHT Capabilities element | As defined in 9.4.2.313 (EHT Capabilities element) | Specifies the parameters in the EHT Capabilities element that are supported by the STA. The parameter is present if dot11EHTOptionImplemented is true; otherwise not present. |
| MultiLink | Basic Multi-Link element | As defined in 9.4.2.312 (Multi-Link element) | Indicates the Multi-Link parameters of the local MLD. This parameter is present if dot11MultiLinkActivated is true and is absent otherwise. |
|  |  |  |  |
| TID-To-Link Mapping | TID-To-Link Mapping element | As defined in 9.4.2.314 (TID-To-Link Mapping element) | Indicates links on which frames belonging to each TID can be exchanged. This parameter is present if dot11MultiLinkActivated is true, dot11TIDtoLinkMappingActivated is true, and the STA affiliated with an MLD initiates both an association with an AP MLD and a TID-to-link mapping negotiation. Otherwise it is not present. |
| VendorSpecificInfo | A set of elements | As defined in9.4.2.25 (Vendor Specific element) | Zero or more elements. |

* + - 1. **Non-AP STA, non-AP MLD, and non-PCP STA association initiation procedures**

***TGbe editor: Please update the contents of this paragraph in this subclause as shown below:***

Upon receipt of an MLME-ASSOCIATE.request primitive, a non-AP STA, non-AP MLD, and non-PCP STA shall associate with an AP, AP MLD, or PCP, respectively, using the following procedure:

* + - * 1. If the state for the AP, AP MLD, or PCP is State 1, the MLME shall inform the SME of the failure of the association by issuing an MLME-ASSOCIATE.confirm primitive, and this procedure ends.
				2. All the states, agreements and allocations listed in both numbered lists in [11.3.6.4 (Non-AP STA,](#_bookmark5) [non-AP MLD, and non-PCP STA reassociation initiation procedures)](#_bookmark5) item c) are deleted or reset to initial values.
				3. The ~~MLME~~non-AP STA shall transmit an Association Request frame to the AP or PCP or a non-AP STA affiliated with the non-AP MLD shall transmit an Association Request frame with Basic Multi- Link element to an AP affiliated with the AP MLD.. The RSNE contained in the MLME-ASSOCIATE.request primitive shall be included in the Association Request frame. The RSNE shall specify exactly one pairwise cipher suite and exactly one AKM suite. If the MLME- ASSOCIATE.request primitive contained the EmergencyServices parameter equal to true, an Interworking element with the UESA field set to 1 shall be included in the Association Request frame.
			1. **Non-AP STA, non-AP MLD, and non-PCP STA reassociation initiation procedures**

***TGbe editor: Please update the contents of this paragraph in this subclause as shown below:***

Upon receipt of an MLME-REASSOCIATE.request primitive, a non-AP STA, non-AP MLD, and non-PCP STA shall reassociate with an AP, AP MLD, or PCP, respectively, using the following procedure:

* + - * 1. If the STA (with respect to the AP or PCP) or non-AP MLD (with respect to the AP MLD) is not associated in the same ESS or the state for the new AP, AP MLD, or PCP is State 1, the MLME shall inform the SME of the failure of the reassociation by issuing an MLME-REASSOCIATE.confirm primitive, and this procedure ends.
				2. The ~~MLME~~non-AP STA shall transmit a Reassociation Request frame to the new AP or PCP or a non-AP STA affiliated with the non-AP MLD shall transmit a Reassociation Request frame with Basic Multi-Link element in the Reassociation Request frame to an AP affiliated with the new AP MLD.. The RSNE contained in the MLME- ASSOCIATE.request primitive shall be included in the Reassociation Request frame. The RSNE shall specify exactly one pairwise cipher suite and exactly one AKM suite. If the MLME- REASSOCIATE.request primitive contained the EmergencyServices parameter equal to true, an Interworking element with the UESA field set to 1 shall be included in the Reassociation Request frame.

x-x-x-x-x-x-x-x-x-x End of changes for CID 17616 x-x-x-x-x-x-x-x-x-x

***TGbe editor: Please update the contents of the following row in Table 9-401i in this subclause as shown below:***

***TGbe editor: Please note, there is no change to the text. Instead, the content under “If the +HTC-HE Support subfield is 1:” is indented to the right.***

**Table 9-401i—Subfields of the MLD Capabilities And Operations subfield**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| AAR Support | An AP MLD indicates support for receiving a frame with an AAR Control subfield | If the +HTC-HE Support subfield is 1: [17649]Set to 1 if the AP MLD supports the AAR Control subfield functionality.Set to 0 otherwise.Reserved for non-AP MLD or if the +HTC-HE Support subfield is 0.See 35.3.16.8.3 (AP assisted medium synchronization recovery procedure). |

**9.4.2.312.2.4 Link Info field of the Basic Multi-Link element**

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

[17657]Each bit B*j* (*j* ¹ *i*) in the NSTR Indication Bitmap subfield included in the Per-STA Profile subelement with Link ID subfield equal to *i* (where 0 £ *i* < 15 ) is set to 1 if the link pair corresponding to Link IDs equal to <*i*, *j>* forms an NSTR link pair where j is the link ID of the link on which a STA affiliated with the same MLD as the reported STA is operating on; otherwise the bit B*j* is set to 0. Bit B*i* in the NSTR Indication Bitmap subfield included in the Per-STA Profile subelement with Link ID subfield value equal to *i* is reserved.

**9.4.2.312.3 Probe Request Multi-Link element**

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

[17663]If the Link Info field is present (see 35.3.4.2 (Use of multi-link probe request and response)), then one or more Per-STA Profile subelements are included (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)).

**9.4.2.312.4 Reconfiguration Multi-Link element**

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

One or more Per-STA Profile subelements are included [17663]in the Link Info field (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)).

**9.4.2.312.6 Priority Access Multi-Link element**

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

One or more Per-STA Profile subelements are included [17663]in the Link Info field (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)).

**9.4.2.312.4 Reconfiguration Multi-Link element**

***TGbe editor: Please update the following paragraph in this subclause as shown below:***

The STA MAC Address subfield of the STA Info field carries the MAC address of the AP that[17666] can operate on the link identified by the Link ID subfield and is affiliated with the same MLD as the STA that transmitted the Reconfiguration Multi-Link element.