IEEE P802.11
Wireless LANs

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| CC36 Resolution for CIDs related to ML element – Part 2 |
| Date: February 22, 2022 |
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 Abstract

This submission proposes resolutions for the following 34 CIDs received for TGbe CC36:

* 7704, 5177, 5911, 7584, 5178, 5057, 5826, 8282, 7571, 4020,
* 5748, 5735, 6557, 8058, 5377, 6704, 7392, 5665, 8031, 7813,
* 6871, 6189, 6190, 6191, 6192, 6535, 5740, 8225, 4084, 4085,
* 4086, 5059, 5060, 5967

**Revisions:**

* Rev 0: Initial version of the document.
* Rev 1: Corrected the document number in the resolution table.
* Rev 2: Changes based on offline feedback from members. Added part II and part III to address additional related CIDs.
* Rev 3: Includes live updates made during the TGbe MAC call on 02/28/2022
* Rev 4: Added resolution for CID 6704

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.

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

**PART I**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Section** | **Pg.Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 5178 | Guogang Huang | 9.4.2.295b.2 | 133.61 | Change "MAC Address Present" to "STA MAC Address Present" | As in comment. | **Accepted** |
| 7704 | Xiaofei Wang | 9.4.2.295b.2 | 133.42 | The MAC Address of a reported STA should always be present in the Per-STA Profile subelement format. When information is provided for a STA operating on the indicated Link, the receiving MLD needs the STA MAC address to conduct further operation without needing to send extra management frames to inquire the MAC address. | will submit a contribution | **Revised** Agree with the commenter in principle. However, in Beacon and Probe Response frames, the MAC address of the other APs affiliated with the same AP MLD as the transmitting AP is included in the RNR element. Inclusion of the STA MAC address subfield, therefore, will lead to duplication of information and Beacon bloating (6 octets/per-STA profile). The STA MAC address is included in all frames transmitted by a non-AP STA. The STA MAC address is included in all frames other than Beacon and Probe Response frames transmitted by an AP.**Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 7704.** |
| 5177 | Guogang Huang | 9.4.2.295b.2 | 133.64 | In the (Re)Association Response frame, the MAC Address Present subfield should be set to 0 because the non-AP MLD already has got the <Link ID, affiliated AP MAC address> info during the discovery phase. | Remove this sentence "An STA sets this subfield to 1 when the element carries complete profile". And add the the following text in 35.3.5.4 to clarify the setting of the MAC Address Present subfield:The MAC Address Present subfield of the STA Control field of the Per-STA Profile subelement of the Basic variant Multi-link element carried in the (Re)Association Response frame is set to 0. The affiliated AP MAC addresses are obtained during discovery. | **Revised**The RNR element is not included in (Re)Association Response frames. To keep the frame self-contained, STA MAC address subfield must be included in the (Re)Association Response frames.**Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 7704.** |
| 5911 | Li-Hsiang Sun | 9.4.2.295b.2 | 133.64 | For the complete profile in a ML probe response, MAC address of the AP on a reported link is already in RNR and can be ommitted in the ML element per-STAprofile | change to "An STA sets this subfield to 1 when the element carries complete profile unless RNR carries the BSSID of the reported AP" | **Revised**Agree with the commenter in principle. However, in Beacon and Probe Response frames, the MAC address of the other APs affiliated with the same AP MLD as the transmitting AP is included in the RNR element. Inclusion of the STA MAC address subfield, therefore, will lead to duplication of information. The STA MAC address is included in all frames transmitted by a non-AP STA. The STA MAC address is included in all frames other than Beacon and Probe Response frames transmitted by an AP.**Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 7704.** |
| 7584 | Tomoko Adachi | 9.4.2.295b.2 | 134.42 | "The STA MAC Address subfield of the STA Info field carries the MAC address of the (AP or non-AP) STA that can operate ..." It is clear that when "STA" is used, it includes both AP and non-AP STA, and such expression is used throughout the baselines. | Delete "(AP or non-AP)" from the cited text. | **Accepted** |

**DISCUSSION**

If the AP that transmits a Beacon or Probe Response frame is affiliated with an AP MLD, then Clause 35.3.4.1 specifies that the AP shall include a Reduced Neighbor Report element that carries a TBTT Information field corresponding to each AP affiliated with the same AP MLD (see Fig. (1)). Thus, inclusion of the STA MAC address field in the Link Info field (if present) will lead to duplication of information as the MAC Address of the affiliated APs (BSSID) is already included in the RNR element in Probe Response and Beacon frames.



**Fig. (1) Contents of Beacon frame or Probe Response frame**

On the other hand, (Re)Association Response frames transmitted by an AP affiliated with an AP MLD do not carry the Reduced Neighbor Report element (see Fig. (2)). Therefore, the AP must include the MAC address of the other APs affiliated with the same AP MLD in the STA MAC address subfield of the Link Info field.



**Fig. (2) Contents of (Re)Association Response frame**

Since no frames transmitted by a non-AP STA affiliated with a non-AP MLD includes the Reduced Neighbor Report element, the non-AP STA must include the MAC address of the other non-AP STAs affiliated with the same non-AP MLD in the STA MAC address subfield of the Link Info field.

***TGbe editor: Please note Baseline is 11be D1.4***

**9.4.2.312.2 Basic Multi-Link element**

***TGbe editor: Please revise the figure 9-1002k (STA Control field format) as shown below [CID 5178]***

B0 B3 B4 B5 B6 B7 B8 B9 B10 B15

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Link ID | Complete Profile | STA MACAddress Present | Beacon Interval Present | DTIM Info Present | NSTRLink Pair Present | NSTRBitmap Size | Reserved |

Bits: 4 1 1 1 1 1 1 6

**Figure 9-1002k—STA Control field format (#5178)**

***TGbe editor: Please revise the following paragraph and add the Note as shown below [CID 5178, 7704]***

The STA (#5178) MAC Address Present subfield indicates the presence of the STA MAC Address subfield in the STA Info field and is set to 1 if the STA MAC Address subfield is present in the STA Info field; otherwise set to 0. The STA MAC Address Present subfield of the STA Control field is set to 1 in a Basic Multi-Link element that is included in a frame that is sent by a non-AP STA affiliated with a non-AP MLD or that is included in a frame that is sent by an AP affiliated with an AP MLD and that is not a Beacon or Probe Response frame (#7704).

NOTE – When the Basic Multi-Link element is included in an Authentication frame transmitted by a STA affiliated with an MLD, the element does not include the Link Info field (see 35.3.5.4 (Usage and rules of Basic Multi-Link element in the context of multi-link (re)setup)) and, therefore, does not include the STA MAC Address subfield (#7704).

**PART II**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Section** | **Pg.Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 5057 | Gaurang Naik | 9.4.2.295b.2 | 129.31 | Some subfields in the Common Info field are present for an AP MLD as well as non-AP MLD, while some of them are present only for AP MLDs. The description of this is not consistent. For example, Link ID Info subfield is present only when an AP transmits the frame - this is specified in Clause 9. Similarly, Medium Synchronization Delay Information subfield is only present when an AP transmits the frame - this is specified in Clause 35. All these cases must be specified in Clause 9. | As in comment | **Revised**Agree with the commenter. A statement is added to clarify that the Medium Synchronization Delay Information subfield is not included in frames sent by a non-AP STA. The EML Capabilities and MLD Capabilities subfields may or may not be present in frames sent by a non-AP STA. Therefore, no changes are made w.r.t. these subfields. **Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 5057.** |
| 5826 | Lei Wang | 9.4.2.295b.1 | 128.27 | The description of the Common Info field for the Probe Request variant Multi-Link element is missing in Subsection 9.4.2.295b.3. So, the reference given in line 27 page 128 is not valid. | Add the description of the Common Info field for the Probe Request variant Multi-Link element in Subsection 9.4.2.295b.3. | **Revised**Agree with the commenter. The statement was revised to make the description of the Common Info field general across the different Multi-Link element variants as a resolution for CID 4813 in doc 11-21/1264r5. **TGbe editor: No further changes are required for the resolution of this CID.** |
| 8282 | Zhiqiang Han | 9.4.2.295b.2 | 130.38 | This dot11MSDOFDMEDthreshold parameter is not included in Annex C, please add it. | as in comment. | **Revised**The parameter dot11MSDOFDMEDthreshold was added to Annex C as a resolution for CID 7574 in document 11-21/1339r2. The changes appear in D1.4**TGbe editor: No further changes are required for the resolution of this CID.** |
| 7571 | Tomoko Adachi | 9.4.2.295b.2 | 130.38 | dot11MDSOFDMEDthreshold is not defined in Annex C. Why not simply set the threshold value without using the MIB value? | Define the CCA\_ED threshold that shall be used within the BSS to be -72 + the value in the Medium Synchronization OFDM ED Threshold subfield.Change the sentence in pp.ll 130.38 to read "The Medium Synchronization OFDM ED Threshold subfield specifies the CCA\_ED threshold to be used within all the BSSs affiliated with the AP MLD for medium synchronization recovery and is defined in Table 9-322an (Medium Synchronization OFDM ED Threshold subfield)." | **Revised**The parameter dot11MSDOFDMEDthreshold was added to Annex C as a resolution for CID 7574 in document 11-21/1339r2. The changes appear in D1.4**TGbe editor: No further changes are required for the resolution of this CID.** |
| 4020 | Abhishek Patil | 9.4.2.295b.3 | 136.01 | The subfield names Link ID and Complete Profile are misleading since they are actually referring to the requested AP | Change the subfield names to Link ID Requested and Complete Profile Requested respectively. | **Accepted**Agree with the commenter. The suggested names are in line with the function of these subfields. **TGbe editor: please update the corresponding field names in Probe Request Multi-Link element throughout the TGbe spec.** |
| 5748 | Laurent Cariou | 9.4.2.295b.3 | 135.59 | Complete profile field name should be changed to something like "complete profile requested" as its usage and definition is different from the comoplete profile in basic variant ML element and it is therefore confusing | as in comment | **Revised**Agree with the commenter. Same resolution as CID 4020.  |
| 5735 | Laurent Cariou | 35.3.2.2 | 247.14 | Should we specify that this complete profile field is used in the context of Basic Variant ML element? Cause things are different for probe request variant ML element. Things would also be cleaner if we use another field name for probe request variant, something like "complete profile requested", | as in comment | **Revised**Agree with the commenter. Same resolution as CID 4020.  |
| 6557 | Patrice Nezou | 9.4.2.295b.2 | 128.42 | The Basic variant Multi-Link element contains information related the MLD devices and internal details of the STA of the MLD. For clarity and to save extra overhead, it may be useful to create dedicated Ies. | As in comment | **Rejected**The structure of the Multi-Link is designed so that information that is common to all STAs affiliated with an MLD is carried in the Common Info field, while STA-specific information is carried in Per-STA Profile subelements in the Link Info field. The group has made significant progress with this flexible design, including defining three variants of the Multi-Link element. Furthermore, Clause 35.3.2.3 defines an inheritance mechanism by which information is inherited from the core frame (i.e., the frame that carries the ML element) to the Per-STA Profiles. Consequently, the additional overhead due to the structure of the ML element is substantially minimized. |
| 8058 | Yuchen Guo | 9.4.2.295b.2 | 129.51 | The name of "Link ID Info" is not clear enough, suggest changing it to "Transmitting Link ID Info" | as in comment | **Accepted**Agree with the commenter. **TGbe editor: please update the cited field name in Basic Multi-Link element throughout the TGbe spec.** |
| 5377 | Jay Yang | 9.4.2.295b.2 | 129.51 | Too distinguish the term of Link ID subfield and Link ID info subfield, can we change the term of Link ID info to Link info subfield containing Link ID subfield. | as the comments. | **Revised**Agree with the commenter. Same resolution as CID 8058.  |
| 6704 | Rojan Chitrakar | 9.4.2.295b.2 | 129.32 | Since the Link ID Info field is intended to carry the link identifier of the link in which the MLE is transmitted, the field should be renamed to a more descriptive name (e.g. Host Link ID or Transmitting Link ID), else the name Link ID Info is easy to confuse with Link Info field. | Rename the Link ID Info field to a more descriptive name (e.g. Host Link ID or Transmitting Link ID) and also rename the Link ID Info Present subfield in the Presence Bitmap. | **Revised**Agree with the commenter. Same resolution as CID 8058.  |
| 7392 | Stephen McCann | 9.4.2.295b.2 | 134.23 | Missing equals typos in the sentence "The NSTR Bitmap Size subfield in a STA Control field is set to 1 if the length of the corresponding NSTR Indication Bitmap subfield is 2 octets and is set to 0 if the length of the corresponding NSTR Indication Bitmap subfield is 1 octet" | Change the cited sentence to "The NSTR Bitmap Size subfield in a STA Control field is set to 1 if the length of the corresponding NSTR Indication Bitmap subfield is equal to 2 and is set to 0 if the length of the corresponding NSTR Indication Bitmap subfield is equal to 1." | **Accepted**Agree with the commenter |
| 5665 | Julien Sevin | 35,3,2,2 | 247.39 | In order to use the passive scanning for initiating a ML association, the beacon should contain a Basic variant Multi-Link element with the profiles of all affiliated Aps | Select one link/affiliated AP in which the transmitted beacon frames contains all the information to initiate a ML discovery following a passive scanning | **Rejected**The existing rules for carrying information of other APs of the same AP MLD were designed with the objective of avoiding Beacon bloating. The proposed change is against this design approach.  |
| 8031 | Yuchen Guo | 35.3.2.2 | 247.39 | AP should have the freedom to carry complete info of a reported AP in Beacon or non-ML probe response, the current text does not allow that. | change "shall" to "may" | **Rejected**The existing rules for carrying information of other APs of the same AP MLD were designed with the objective of avoiding Beacon bloating. The proposed change is against this design approach. |
| 7813 | Yiqing Li | 35.3.2.2 | 247.39 | The paragraphgh here should be aligned with the texts "An AP affiliated with an AP MLD shall include, in a Beacon frame or a Probe Response frame, which is not an ML probe response, only the Common Info field of the Basic variant Multi-Link element as defined in 9.4.2.295b (Multi-Link element) unless conditions in 35.3.9 (General procedures) are satisfied" which is located at 35.3.4.4 (Multi-Link element usage rules in the context of discovery) to avoid misunderstanding. | Delete this paragraph or change this sentence as "...shall not include a complete profile or a partial profile of a reported AP..." | **Rejected**The two identified statements (shown below) are aligned. The first statement indicates that that the complete profile of the other APs is not carried, while the second statement identifies that except under the scenarios identified in Clause 35.3.10, the AP is not allowed to carry the Link Info field. * ‘An AP affiliated with an AP MLD shall not include a complete profile of a reported AP affiliated with the same AP MLD in the Beacon frame or a Probe Response frame that is not an ML probe response that it transmits.’ and
* ‘An AP affiliated with an AP MLD shall include, in a Beacon frame or a Probe Response frame, which is not an ML probe response, only the Common Info field of the Basic variant Multi-Link element as defined in 9.4.2.295b (Multi-Link element) unless conditions in 35.3.9 (General procedures) are satisfied’
 |
| 6871 | Rubayet Shafin | 35.3.2.2 | 247.50 | "partial profile" is not defined | please define "partial profile" | **Revised**Agree with the commenter. The definition of partial profile was added in Clause 35.3.2.2.**Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 6871.** |
| 6189 | Michael Montemurro | 35.3.2.2 | 247.29 | This sentence makes no sense and needs to be reworded to explain a requirement: "The complete information of a reported STA in a Management frame, carrying Basic variant Multi-Link element, is defined as all the elements and fields that would be included in the frame if the reported STA were to transmit that Management frame." What management frame? A beacon? A probe response? | Change "The complete information of a reported STA in a Management frame, carrying Basic variant Multi-Link element, is defined as all the elements and fields that would be included in the frame if the reported STA were to transmit that Management frame"to"When the Complete Profile subfield is set to 1 in the Basic variant of the Multilink element, the elements and fields that are included in the Common Info and Link Info fields contain the same values for the affiliated STA as if the STA was transmitting the Management frame" | **Revised**The cited statement was revised to ‘The complete profile of a reported STA consists of all the elements and fields (subject to exceptions discussed later in this subclause) that would be included in a Management frame, that is of the same subtype as that transmitted by the reporting STA carrying the Basic Multi-Link element, if the reported STA were to transmit the frame.’ as a resolution for CID 8329 in document 11-21/1176r5. The questions raised by the commenter have been addressed in the revised statement.**TGbe editor: No further changes are required for the resolution of this CID.**  |
| 6190 | Michael Montemurro | 35.3.2.2 | 247.39 | This requirement makes no sense and needs to be reworded: "An AP affiliated with an AP MLD shall not include a complete profile of a reported AP affiliated with the same AP MLD in the transmitted Beacon frame or a Probe Response frame that is not an ML probe response as defined in 35.3.4.4" | Change "An AP affiliated with an AP MLD shall not include a complete profile of a reported AP affiliated with the same AP MLD in the transmitted Beacon frame or a Probe Response frame that is not an ML probe response as defined in 35.3.4.4."to"An AP affiliated with an AP MLD shall only include a Multi-link element with the Complete Profile subfield set to 1 in Beacon frames and Probe Response frames that are not ML probe response frames as defined in 35.3.4.4." | **Rejected**The cited statement adds a normative requirement on an AP affiliated with an AP MLD to never carry the complete profile of other APs affiliated with the same AP MLD. The proposed change is asking for the opposite, i.e., an AP affiliated with AP MLD shall only carry the complete profile of other APs affiliated with the same AP MLD. |
| 6191 | Michael Montemurro | 35.3.2.2 | 247.54 | This requirement makes no sense and needs to be reworded: "A STA affiliated with a non-AP MLD shall include, in (Re)Association Request frame it transmits, a complete profile of other STAs affiliated with its MLD, that are capable of operating on the links that it is requesting to be part of a multi-link setup (also see 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link setup))." | Change "A STA affiliated with a non-AP MLD shall include, in (Re)Association Request frame it transmits, a complete profile of other STAs affiliated with its MLD, that are capable of operating on the links that it is requesting to be part of a multi-link setup (also see 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link setup))."to"When an non-AP MLD sends a (Re)association Request frame transmitted through an affiliated STA, it shall include a Multi-Link element with the Complete Profile subfield set to 1, including Common Info and Link Info for affiliated STAs that are capable of operating on the links that it is requesting to be part of a multi-link setup (also see 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link setup))." | **Revised**Agree with the commenter that the cited statement can be simplified. The statement is revised.**Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 6191.** |
| 6192 | Michael Montemurro | 35.3.2.2 | 247.60 | This requirement makes no sense and needs to be reworded: "An AP affiliated with an AP MLD, in (Re)Association Response frame it transmits, a complete profile of other APs affiliated with its MLD, that are operating on the links that are accepted as part of a successful multi-link setup (also see 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link setup))." | Change "An AP affiliated with an AP MLD, in (Re)Association Response frame it transmits, a complete profile of other APs affiliated with its MLD, that are operating on the links that are accepted as part of a successful multi-link setup (also see 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link setup))."to"When an AP MLD sends a (Re)Association Response frame transmitted through an affiliated AP, it shall include a Multi-Link element with the Complete Profile subfield set to 1, including Common Info and Link Info for all APs affiliated with its MLD, that are operating on the links that are accepted as part of a successful multi-link setup (also see 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link setup)). | **Revised**Agree with the commenter that the cited statement can be simplified. The statement is revised.**Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 6192.** |
| 6535 | Pascal VIGER | 35.3.2.2 | 248.40 | In the Figure 35-3, the Multi-Link Control field and Common Info field are not represented, but are nominated inside the folowing text. This is disturbing. | Add indications of Multi-Link Control and Common Info fields (as done for STA Control / Info etc.) | **Revised**The Figure 35-3 was revised as a resolution for CID 4248 in document 11-21/1176r5. The issues raised by the commenter (i.e., indication of the Multi-Link Control and Common Info field) have been added to the revised figure and already appears in D1.4.**TGbe editor: No further changes are required for the resolution of this CID.** |
| 5740 | Laurent Cariou | 35.3.2.3 | 249.48 | Note 1. Unclear that this applies to the entire subclause. Please clarify. | as in comment | **Revised**The cited note was deleted as a resolution for CID 7812 in document 11-21/1176r9. **TGbe editor: No further changes are required for the resolution of this CID.** |
| 8225 | Yuxin LU | 35.3.2.3 Inheritance in a per-STA profile | 249.29 | "it inherits the elements from the reporting STA", suggest to add a normative verb, such as "it shall inherit" | As in comment | **Rejected**The cited statement is part of an informative paragraph. The normative requirements are specified in the subsequent paragraphs.  |
| 4085 | Abhishek Patil | 35.3.18 | 284.40 | In a multiple BSSID set, the nonTxBSSIDs inherit most of the BSS parameters from the TxBSSID. With the introduction of rTWT feature, it is possible that each BSSID in the set has its own rTWT SPs (which means BSS specific TWT and Quiet IEs). Alternative all BSSIDs in the set have the same SPs (which means inheritance of both IEs). In a scenario where multiple BSSID set exists on more then one link and APs within each set are affiliated to different AP MLDs, there exists several AP MLDs in the device. When TxBSSID on one of the link advertises Quiet IE, it will cause the APs in the MBSSID set on another link to include the Quiet IE in the Basic varient Multi-Link element contained in the Beacon frame and in the NonTxBSSID Profile carried in the Multiple BSSID element contained in the Beacon frame (see 35.3.9). Such duplication of information will bloat the beacon frame on other links. In addition, it will cause the BSS Parameter Change Count to increment for all the reported APs in the MBSSID set on that link since inclusion of TWT IE is considered as a critical update (11.2.3.15). This will cause several non-AP MLDs that are associated with different AP MLDs affiliated with APs in MBSSID set to retrieve the update from their respective AP MLDs. This can lead to undesired consequences - such as probe storms or beacon bloating. | The standard needs to provide mechanisms to address frame bloating issue and means for associated non-AP MLDs to retrieve the updates in an efficient manner. Commenter will provide a contribution | **Rejected**Agree with the commenter that when a critical update – such as channel switching or channel quieting – affects most or all the APs operating on a link (e.g., BSSIDs in an MBSSID set), the APs operating on another (reporting) link and that are affiliated with the affected APs will duplicate this information. In typical deployments, the 6 GHz APs are part of an MBSSID set, while 5 GHz and 2.4 GHz APs are part of a cohosted AP set. Therefore, the 5 GHz and 2.4 GHz APs will transmit Beacons independently. The duplicated information will be sent across different Beacons and individual Beacon frames will not be bloated.There may be scenarios where two or more APs affiliated with an AP MLD are part of an MBSSID set on their respective links. In this case, there can be duplication of information in the Beacon frame transmitted by the TxBSSID on the reporting link (across the different Multi-Link elements). In scenarios where the MBSSID set has a large membership, the number of nonTxBSSIDs in an MBSSID set that are reported in the TxBSSID's Beacon can be minimized by using EMA and, therefore, the resulting Beacon bloating is likely to not be significant. |
| 4086 | Abhishek Patil | 35.3.18 | 284.40 | In a multiple BSSID set, the nonTxBSSIDs inherit most of the BSS parameters from the TxBSSID. The (Extended) Channel Switch Announcement element are always inherited. In a scenario where multiple BSSID set exists on more then one link and APs within each set are affiliated to different AP MLDs, there exists several AP MLDs in the device. When one of the link advertises channel switch announcement, it will cause the APs in the MBSSID set on another link to include the channel switch elements in the Basic varient Multi-Link element contained in the Beacon frame and in the NonTxBSSID Profile carried in the Multiple BSSID element contained in the Beacon frame (35.3.9). Such duplication of information is inefficient and will bloat the beacon frame on other links. The standard needs to provide mechanism(s) address this. | Commenter will provide a contribution | **Rejected**Agree with the commenter that when a critical update – such as channel switching or channel quieting – affects most or all the APs operating on a link (e.g., BSSIDs in an MBSSID set), the APs operating on another (reporting) link and that are affiliated with the affected APs will duplicate this information. In typical deployments, the 6 GHz APs are part of an MBSSID set, while 5 GHz and 2.4 GHz APs are part of a cohosted AP set. Therefore, the 5 GHz and 2.4 GHz APs will transmit Beacons independently. The duplicated information will be sent across different Beacons and individual Beacon frames will not be bloated.There may be scenarios where two or more APs affiliated with an AP MLD are part of an MBSSID set on their respective links. In this case, there can be duplication of information in the Beacon frame transmitted by the TxBSSID on the reporting link (across the different Multi-Link elements). In scenarios where the MBSSID set has a large membership, the number of nonTxBSSIDs in an MBSSID set that are reported in the TxBSSID's Beacon can be minimized by using EMA and, therefore, the resulting Beacon bloating is likely to not be significant. |
| 5059 | Gaurang Naik | 35.3.18 | 284.55 | In case of channel switching, the reporting APs on links other than the affected links will carry the Channel Switch Announcement element in the Beacon frames as well as in the Multi BSSID element corresponding to all AP MLDs in on that link. With 16 VAPs and 3-4 links, this can lead to severe Beacon bloating issues. The spec must provide a mechanism to address this issue. | As in comment | **Rejected**Agree with the commenter that when a critical update – such as channel switching or channel quieting – affects most or all the APs operating on a link (e.g., BSSIDs in an MBSSID set), the APs operating on another (reporting) link and that are affiliated with the affected APs will duplicate this information. In typical deployments, the 6 GHz APs are part of an MBSSID set, while 5 GHz and 2.4 GHz APs are part of a cohosted AP set. Therefore, the 5 GHz and 2.4 GHz APs will transmit Beacons independently. The duplicated information will be sent across different Beacons and individual Beacon frames will not be bloated.There may be scenarios where two or more APs affiliated with an AP MLD are part of an MBSSID set on their respective links. In this case, there can be duplication of information in the Beacon frame transmitted by the TxBSSID on the reporting link (across the different Multi-Link elements). In scenarios where the MBSSID set has a large membership, the number of nonTxBSSIDs in an MBSSID set that are reported in the TxBSSID's Beacon can be minimized by using EMA and, therefore, the resulting Beacon bloating is likely to not be significant. |
| 5060 | Gaurang Naik | 35.3.18 | 284.55 | In case of channel quieting, the reporting APs on links other than the affected links will carry the Quiet element or the Quiet Channel element in the Beacon frames as well as in the Multi BSSID element corresponding to all AP MLDs in on that link. With 16 VAPs and 3-4 links, this can lead to severe Beacon bloating issues. The spec must provide a mechanism to address this issue. | As in comment | **Rejected**Agree with the commenter that when a critical update – such as channel switching or channel quieting – affects most or all the APs operating on a link (e.g., BSSIDs in an MBSSID set), the APs operating on another (reporting) link and that are affiliated with the affected APs will duplicate this information. In typical deployments, the 6 GHz APs are part of an MBSSID set, while 5 GHz and 2.4 GHz APs are part of a cohosted AP set. Therefore, the 5 GHz and 2.4 GHz APs will transmit Beacons independently. The duplicated information will be sent across different Beacons and individual Beacon frames will not be bloated.There may be scenarios where two or more APs affiliated with an AP MLD are part of an MBSSID set on their respective links. In this case, there can be duplication of information in the Beacon frame transmitted by the TxBSSID on the reporting link (across the different Multi-Link elements). In scenarios where the MBSSID set has a large membership, the number of nonTxBSSIDs in an MBSSID set that are reported in the TxBSSID's Beacon can be minimized by using EMA and, therefore, the resulting Beacon bloating is likely to not be significant. |
| 4084 | Abhishek Patil | 35.3.18 | 284.40 | In a multiple BSSID set, the nonTxBSSIDs inherit most of the BSS parameters from the TxBSSID. As a result, when there is a chance to a certain BSS parameter for the TxBSSID, it will trigger an update to the BSS Parameter for all the nonTxBSSIDs that inherit that parameter. This will cause the BSS Parameter Change Count to increment for several APs operating on that link (35.3.8). This will cause several non-AP MLDs that are associated with different AP MLDs affiliated with APs in MBSSID set to retrieve the update from their respective AP MLDs. This can lead to undesired consequences - such as probe storms or beacon bloating. The standard needs to provide mechanism(s) address this. | Commenter will provide a contribution | **Rejected**Agree with the commenter that when a critical update affects all APs operating on a link (e.g., when the APs are part of an MBSSID set), the BPCCs corresponding to each of the APs in the Beacon frame(s) transmitted on the reporting link will be incremented. In typical deployments, the 6 GHz APs are part of an MBSSID set, while 5 GHz and 2.4 GHz APs are part of a cohosted AP set. Therefore, the 5 GHz and 2.4 GHz APs will transmit Beacons independently. A protocol that requires STAs associated with one cohosted AP to parse the Beacon frames transmitted by another cohosted AP is complicated. Furthermore, trusting such information can open the protocol to security vulnerabilities. Additionally, the APs of the different AP MLDs need not all be in the 5 GHz or 2.4 GHz link. Typical deployments will have these APs spread out over 5 GHz and 2.4 GHz links.The TGbe spec provides an option to the APs operating on the 2.4 GHz and 5 GHz links to transmit a broadcast Probe Response frame. This can minimize the Probe storming issue from STAs associated with the same AP.  |

**9.4.2.312.2 Basic Multi-Link element**

***TGbe editor: Please add the following statement as shown below [CID 5057]***

The Medium Synchronization Delay Information subfield in the Common Info subfield is not present if the Basic Multi-Link element is sent by a non-AP STA. When the Basic Multi-Link element is included in a frame sent by an AP, the (#5057) condition for the presence of the Medium Synchronization Delay Information subfield in the Common Info field is defined in 35.3.16.8 (Medium access recovery procedure). The format of the Medium Synchronization Delay Information subfield is defined in Figure 9-1002g (Medium Synchronization Delay Information subfield format).

**35.3.2.2 Advertisement of complete or partial per-link information**

***TGbe editor: Please revise the following paragraphs as shown below [CID 6871, 6191, 6192]***

If a reporting STA affiliated with an MLD transmits a frame that carries a Basic Multi-Link element, which includes a Per-STA Profile subelement that carries the complete profile for a reported STA, then the STA shall set the Complete Profile subfield of the STA Control field in that Per-STA Profile subelement to 1. Otherwise, the reporting STA shall set the Complete Profile subfield of the STA Control field in the Per-STA Profile subelement to 0 and the profile of the reported STA is defined as partial profile (#6871).

…

When a STA affiliated with a non-AP MLD transmits a (Re)Association Request frame, it shall include complete profile(s) of other STAs affiliated with the same non-AP MLD as the transmitting STA, that are capable of operating on the links which the non-AP MLD is requesting to be part of a multi-link setup (also see 35.3.5.4 (Usage and rules of Basic Multi-Link element in the context of multi-link (re)setup)). (#6191)

When an AP affiliated with an AP MLD transmits a (Re)Association Response frame, it shall include complete profile(s) of other APs affiliated with the same AP MLD as the transmitting AP, that are operating on the links which are requested as part of a multi-link setup (also see 35.3.5.4 (Usage and rules of Basic Multi-Link element in the context of multi-link (re)setup)). (#6192)

**PART III**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Section** | **Pg.Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 5967 | Liwen Chu | 35.3.2.2 | 248.01 | The name of Link Info field is misleading. Change it to Per STA Profiel Set field | As in comment | **Revised**Agree with the commenter in principle. The description of the contents of the Link Info field is scattered across the variants. However, in addition to Per-STA Profile subelements, the Link Info field can also carry Vendor Specific elements. Hence, the name ‘Per-STA Profile Set’ is not appropriate. The paragraphs defining the contents of the Link Info field were revised to make the text clearer. **Tgbe editor: please make the changes shown in doc 11-22/0024r4 tagged as 5967.** |

**9.4.2.312.1 General**

***TGbe editor: Please update the following paragraph and Table as shown below [CID 5967]***

The Link Info field carries information specific to the links and is optionally present. When the Link Info field is present, it contains one or more subelements. The subelement format and ordering of subelements are defined in 9.4.3 (Subelements). Link Info field of the (#5967)

**Table 9-401c—Optional subelement IDs for Link Info field of the Multi-Link element (#5967)**

|  |  |  |
| --- | --- | --- |
| **Subelement ID** | **Name** | **Extensible** |
| 0 | Per-STA Profile | Yes |
| 1–220 | Reserved |  |
| 221 | Vendor Specific | Vendor defined |
| 222–255 | Reserved |  |

***TGbe editor: Please revise the following subclause titles as shown below [CID 5967]***

**9.4.2.312.2.1 Multi-Link Control field of the Basic Multi-Link element (#5967)**

**…**

**9.4.2.312.2.2 Common Info field of the Basic Multi-Link element (#5967)**

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

***TGbe editor: Please revise the following paragraphs as shown below [CID 5967]***

 (#5967)If the Link Info field is present, one or more Per-STA Profile subelements are included in the list of subelements (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)) (#5967).

**9.4.2.312.3 Probe Request Multi-Link element**

***TGbe editor: Please revise the following paragraphs as shown below [CID 5967]***

 (#5967)If the Link Info field is present, one or more Per-STA Profile subelements are included in the list of subelements (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)) (#5967).

**9.4.2.312.4 Reconfiguration Multi-Link element**

***TGbe editor: Please revise the following paragraphs as shown below [CID 5967]***

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

 (#5967) (#5967)One or more Per-STA Profile subelements are included in the list of subelements in the Link Info field (see Table 9-401c (Optional subelement IDs for Link Info field of the Multi-Link element)) (#5967).