IEEE P802.11
Wireless LANs

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| Resolution for CID 1038 (CC 34) |
| Date: Feb 26, 2021 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Inc. |  |  | appatil@qti.qualcomm.com |
| Alfred Asterjadhi |  |  | aasterja@qti.qualcomm.com |
| George Cherian |  |  | gcherian@qti.qualcomm.com |
| Duncan Ho |  |  | dho@qti.qualcomm.com |
| Yanjun Sun |  |  | yanjuns@qti.qualcomm.com |
| Gaurang Naik |  |  | gnaik@qti.qualcomm.com |

 Abstract

This submission proposes resolutions for CID 1038 received for TGbe CC34.

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 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.***

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 1038 | Abhishek Patil | 129/01 | 35.3.4 | Each AP of an AP MLD may operate at different transmit power. This may be by choice or due to regulator requirements. The standard must provide sufficient information for a non-AP MLD to determine if it can close the DL with all the APs of the AP MLD before it initiates an ML setup with the AP MLD. | The commenter will provide contribution (Also see 11-20/508) | **Revised**A new subclause was created in Clause 35.3.4 (Discovery of an AP MLD) to describe how the AP MLD can help the non-AP MLD determine which links can be closed between the AP MLD and the non-AP MLD. A Beacon TxPower Difference field was defined in the Per-STA profile subelement of the Multi-Link element and a corresponding presence subfield was defined in the Per-STA Control field.**TGbe editor please implement changes as shown in doc 11-21/0386r0 tagged as 1038.** |

***TGbe editor: Please note baselines are REVmd D5.0, 11ax D8.0, and 11be D0.3***

**35.3.4 Discovery of AP MLD**

***TGbe editor: Please insert the following (new) subclause as shown below:***

**35.3.4.x Addressing Reachability**

An AP affiliated with an AP MLD can independently select the transmit power for the Beacon frames that it transmits based on deployment scenario or to satisfy local regulatory requirements for operating on that band. In addition, the pathloss characteristics for each band are different. Therefore, it is likely that a STA of a non-AP MLD is able to receive Beacon frames transmitted by an AP affiliated with an AP MLD while another STA affiliated with the same non-AP MLD is unable to receive Beacon frames from another AP affiliated with the same AP MLD. An AP affiliated with an AP MLD provides information that can aid a non-AP MLD determine if it can receive Beacon frames on all the link where the AP MLD is operating on as described in this subclause.

An AP affiliated with an AP MLD shall, when responding to an ML probe request that is requesting complete profile of another AP affiliated with the same AP MLD, provide the difference between the reporting AP’s beacon transmit power normalized to 20 MHz (expressed in EIRP) and the beacon transmit power of the reported AP normalized to 20 MHz (in EIRP), if the difference is non-zero. When the difference is non-zero, the reporting AP shall provide the difference in the Beacon TxPower Difference field of the Per-STA profile, of the Basic variant Multi-Link element, corresponding to the reported AP. Otherwise, it shall not include this field in the Basic variant Multi-link element. The AP shall transmit the frame carrying Beacon TxPower Difference field at the same transmit power as its Beacon frames.

Based on the presence and the value carried in the Beacon TxPower Difference field, a non-AP MLD shall be able to estimate the difference in the receive power for other links of the AP MLD. A non-AP MLD may, based on this estimate, make decisions on selecting a suitable AP MLD for performing multi-link setup. For example, if the non-AP MLD estimates that it won’t be to receive Beacon frames from one or more reported AP(s) affiliated with the AP MLD, it may decide to select a different AP MLD for performing multi-link setup.

An example of reachability estimation is shown in Figure 35-xxx (Example of reachability estimation).



**Figure 35-xxx – Example of reachability estimation**

In the example shown in Figure 35-xxx (Example of reachability estimation), STA1 affiliated with a non-AP MLD (N) sends an ML probe request to AP1 affiliated with AP MLD (A), requesting complete information of AP2 and AP3 which are also affiliated with AP MLD (A). AP1 responds with an ML probe response, sent at the same transmit power as its Beacon frame, that provides the difference between the beacon transmit power between AP1 and AP2 (carried in the per-STA Profile subfield, of the Basic variant Multi-Link element, corresponding to AP2), and the difference between the beacon transmit power between AP1 and AP3 (carried in the per-STA Profile subfield, of the Basic variant Multi-Link element, corresponding to AP3). Using this information, the non-AP MLD (N) can compute an estimate of the received power for the Beacon frames transmitted on AP2 and link AP3, respectively.

The computation of difference in the received power on links L1 and L2 is shown in Equation (35-x1).

$∆Rx\_{[L2-L1]}= ∆Tx\_{\left[L2-L1\right]}-(∆PL\_{[L2-L1]})$ (35-x1)

where,

 $∆Rx\_{[L2-L1]}$ is the difference in receive power between the link L2 and the link L1

$∆Tx\_{[L2-L1]}$ is the difference in transmit power between the link L2 and the link L1

$(∆PL\_{[L2-L1]})$ is the estimated difference in the path loss between the link L2 and the link L1

NOTE – The estimated difference in the path loss between the reporting link and the reported link depends on the device implementation and is outside the scope of this standard.

The computation of the estimated received power on link L2 is shown in Equation (35-x2).

$RxP\_{L2}^{\*}$ = $RxP\_{L1}-∆Rx\_{[L2-L1]}$ (35-x2)

where,

$RxP\_{L2}^{\*}$ is the estimated receive power on link L2

$RxP\_{L1}$ is the actual received power on link L1

**9.4.2.295b.2 Basic variant Multi-Link element**

***TGbe editor: Please update the contents after Table 9-322an in this subclause as shown below:***

Each Per-STA Profile subelement starts with Per-STA Control field followed by a variable number of fields and elements as defined in 35.3.2 (Container for multi-link information).

The format of the Per-STA profile subelement is defined in Figure 9-788xx (Per-STA profile subelement).

|  |  |  |
| --- | --- | --- |
|  | Per-STA Control | Beacon TxPower Difference |
| Octets: | TBD | 0 or 1 |

**Figure 9-788xx – Per-STA profile subelement format**

The format of the Per-STA Control field is defined in Figure 9-788ej (Per-STA Control field format).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B0 |  | B3 | B4 | B5 | B6 TBD |
| Li | ink ID | Complete Profile | Beacon TxPower Difference Present | Reserved |
| Bits: |  | 4 |  | 1 | 1 | TBD |

**Figure 9-788ej – Per-STA Control field format**

The Link ID subfield specifies a value that uniquely identifies the link where the reported STA is operating on.

The Complete Profile subfield is set to 1 when the Per-STA Profile subelement of the Multi-Link element is complete as defined in 35.3.2.2 (Complete or partial per-STA profile). Otherwise the subfield is set to 0.

The Beacon TxPower Present subfield is set to 1 when if the Beacon TxPower Difference field is present in the Link Info field. Otherwise, the subfield is set to 0.

Other subfields are TBD.

The Beacon TxPower Difference field carries the 8-bit 2s complement of the difference between the beacon transmit power normalized to 20 MHz (in EIRP) of the AP transmitting Multi-Link element and the beacon transmit power normalized to 20 MHz (in EIRP) of the AP reported in the Per-STA Profile subelement if the difference is non-zero. If the difference is zero, the Beacon TXPower Difference field is not present.

NOTE – If the beacon transmit power normalized to 20 MHz (in EIRP) of the AP that carries the ML probe response is 20 dBm and the beacon transmit power normalized to 20 MHz (in EIRP) of an AP that is reported in the Per-STA profile of the Basic variant Multi-Link element carried in the ML probe response is 23 dBm then the Beacon TxPower Difference field of the Per-STA profile field corresponding to that AP carries 11111101.

The Vendor Specific subelements have the same format as their corresponding elements (see 9.4.2.25 (Vendor Specific element)). Zero or more Vendor Specific subelements are included in the list of optional subelements.