### IEEE P802.11Wireless LANs

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| 11be D1.0 CR for CR for Miscellaneous CIDs Part II |
| Date: 2022-04-04 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel Corporation | 2200 Mission College Blvd, Santa Clara, CA 950542200  |  | po-kai.huang@intel.com |

Abstract

This submission proposes resolutions for the following CIDs:

5303, 5275, 6642, 8338, 6629, 4049, 6359, 6182, 5184, 5356, 7434

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on the discussion with Abhi
* Rev 2: Revision based on the discussion in 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 D1.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe D1.0 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** |
| 5303 | Jarkko Kneckt | 35.3.5.3 | 257.35 | Please allow ML element to contain zero or more Per-STA Profiles. It is important that AP MLD does not need to fail ML associations when only a single link is allowed to setup with AP MLD. 802.11be STAs should be able to setup any number of links with ML authenticaton and ML association. Different signaling for single link setup adds delays, complexity and overheads. | Please change:"one or more" to "zero or more" | Revised – For the problem of MLD association with only one link, we note that it is possible that AP MLD only supports 2.4 GHz and 5 GHz, and non-AP MLD only supports 5 GHz and 6 GHz. As a result, the only overlapping link is 5 GHz, and this is a strong reason why you need to enable MLD association with only one link if client prefers to use MLD association for all AP MLDs all the time.We only clarify the case of zero or more per-STA profiles and fix a bug. TGbe editor to make the changes shown in 11-21/599r1 under all headings that include CID 5303. |
| 5275 | Insun Jang | 35.3.5.4 | 256.33 | Single-link setup cases between MLDs should be considered, e.g., non-AP MLD requests one link or AP MLD accepts one link only | 5275 | Revised – For the problem of MLD association with only one link, we note that it is possible that AP MLD only supports 2.4 GHz and 5 GHz, and non-AP MLD only supports 5 GHz and 6 GHz. As a result, the only overlapping link is 5 GHz, and this is a strong reason why you need to enable MLD association with only one link if client prefers to use MLD association for all AP MLDs all the time.We only clarify the case of zero or more per-STA profiles and fix a bug. TGbe editor to make the changes shown in 11-21/599r1 under all headings that include CID 5303. |
| 6642 | Pooya Monajemi | 35.3.5.4 | 256.37 | AP MLD may only accept the link on which the request was sent. Text is not clear about how this case is handled. | 6642 | Revised – For the problem of MLD association with only one link, we note that it is possible that AP MLD only supports 2.4 GHz and 5 GHz, and non-AP MLD only supports 5 GHz and 6 GHz. As a result, the only overlapping link is 5 GHz, and this is a strong reason why you need to enable MLD association with only one link if client prefers to use MLD association for all AP MLDs all the time.We only clarify the case of zero or more per-STA profiles and fix a bug. TGbe editor to make the changes shown in 11-21/599r1 under all headings that include CID 5303. |
| 8338 | Zhiqiang Han | 35.3.5.4 | 257.13 | There is a special case. non-AP STA wants to initiate a multi-link setup but the AP can only setup one link. In this case, AP will not include the Basic variant Multi-Link element. The spec shall cover this case. | 8338 | Revised – For the problem of MLD association with only one link, we note that it is possible that AP MLD only supports 2.4 GHz and 5 GHz, and non-AP MLD only supports 5 GHz and 6 GHz. As a result, the only overlapping link is 5 GHz, and this is a strong reason why you need to enable MLD association with only one link if client prefers to use MLD association for all AP MLDs all the time.We only clarify the case of zero or more per-STA profiles and fix a bug. TGbe editor to make the changes shown in 11-21/599r1 under all headings that include CID 5303. |
| 6629 | Po-Kai Huang | 35.3.5.1 | 254.50 | Clarify that the setup is successful if any link is accepted and a failure if none of the links is accepted. | As in comment. | Revised –Agree in principle with the commenters. We add the sentence to say failure if none of the links are accepted and successful otherwise. TGbe editor to make the changes shown in 11-22/0599r2 under all headings that include CID 6629. |
| 4049 | Abhishek Patil | 35.3.5.1 | 255.10 | What is the reason to limit the links to nonoverlapping channels? A link is defined as a Tuple consisting of <Operating Class, Channel and BSSID>. Therefore, it is possible to have two different BSSIDs operating on the same channel. Also, if there is to be a limit then it should be only for baseline features i.e., tied to dot11EHTBaselineFeaturesImplementedOnly equal to true | As in comment | Rejected - A proposed resolution for this CID was discussed as part of the comment resolutions in 11-22/526r0, however the group could not reach consensus on a proposed change that would resolve the comment. |
| 6359 | Morteza Mehrnoush | 35.3.5.1 | 255.11 | Do we need to add "shall" as below?"An MLD that requests or accepts multi-link (re)setup for any two links shall ensure that each link is located on different nonoverlapping channels." | as in comment | Rejected - A proposed resolution for this CID was discussed as part of the comment resolutions in 11-22/526r0, however the group could not reach consensus on a proposed change that would resolve the comment. |
| 6182 | Michael Montemurro | 12.5.3.3.1 | 214.61 | Since the PTKSA is between the non-AP MLD and the AP MLD, unicast management frame exchanges will have to be encapsulated by the MLD entities. The link for the management frame can be identified by the BSSID of the affiliated AP by both the AP MLD and the non-AP MLD. A solution like this would allow a unicast management frame to be transmitted between the affilaited STA and the affiliated AP across any available link through the AP MLD and non-AP MLD. | Update clauses 12.5.3.3, 12.5.5.3, and the appropriate clauses in 35 to specify that unicast management frames use A3 set to the affiliated AP MAC to identify the link and are encapsulated by the MLD prior to transmission.The commenter is willing to create a contribution to update the draft with these changes. | Revised - Due to the reason that MLD MAC address maybe the same as the MAC address of an affiliated AP, and not all the management frame are intended for a specific link, A3 is not a proper choice for the signaling. We introduce the signaling in the framebody.TGbe editor to make the changes shown in 11-21/1877r12 under all headings that include CID 6244. |
| 5184 | Guogang Huang | 12.5.3.3.1 | 215.41 | Define how to construct AAD for individually addressed management frame | As in comment. | Rejected – It has been defined in clause 12 that only individual addressed data frame between AP MLD and non-AP MLD needs AAD swap. For other cases, baseline procedure is used. |
| 5356 | Jarkko Kneckt | 11.13 | 205.55 | The current channel validation information contains channel information and procedure only for a single link. This is not suitable setup for multi-link operation, where a non-AP MLD may have more than 1 link with the AP MLD. The operating channel validation should be done in association, fast transition, SA Query, AP channel Switch, ML Reconfiguration, | Please add channel validation information for more than 1 link and add the procedure how to validate more links. | Rejected –There is no consensus during offline discussion.One argument is that there is a way to validate channel information of other links using beacon protection since EHT has mandated beacon protection on EHT AP as shown below.An EHT AP shall have dot11BeaconProtectionEnabled set to 1.                Specifically, for AP MLD, all the operating channel information for each affiliated AP (operating class and primary channel) are already included in reduced neighbor report (see 35.3.4.1 AP behavior), and during channel switch, channel switch announcement or extended channel switch announcement, channel information are also included in all beacons of sent by APs affiliated with the AP MLD (see 35.3.11 Multi-link procedures for channel switching, extended channel switching, and channel quieting). For ML reconfiguration, we only have link deletion, which is also announced in all beacons and can be verified with BIP. For SA Query, the OCI element for the transmitting STA is included and can be verified.                 Another argument is that Beacon protection is still not enough, and we need more mechanism on top of that.                   |
| 7434 | Thomas Derham | 11.13 | 0.00 | The MLD engages in procedures such as SA Query that involve OCV, however it is not defined how operating channel(s) are validated when an MLD is using multiple links | Add support to OCI for multiple links, or define an alternative mechanism with equivalent security for MLDs | Rejected –There is no consensus during offline discussion.One argument is that there is a way to validate channel information of other links using beacon protection since EHT has mandated beacon protection on EHT AP as shown below.An EHT AP shall have dot11BeaconProtectionEnabled set to 1.                Specifically, for AP MLD, all the operating channel information for each affiliated AP (operating class and primary channel) are already included in reduced neighbor report (see 35.3.4.1 AP behavior), and during channel switch, channel switch announcement or extended channel switch announcement, channel information are also included in all beacons of sent by APs affiliated with the AP MLD (see 35.3.11 Multi-link procedures for channel switching, extended channel switching, and channel quieting). For ML reconfiguration, we only have link deletion, which is also announced in all beacons and can be verified with BIP. For SA Query, the OCI element for the transmitting STA is included and can be verified.                 Another argument is that Beacon protection is still not enough, and we need more mechanism on top of that.                   |

**Discussion:**

**Propose:**

**TGbe editor: Modify 35.3.5.4 Usage and rules of Basic Multi-Link element in the context of multi-link (re)setup as follows (track change on):**

(#6752)(#8234)(#6360)A non-AP MLD may initiate a multi-link setup with an AP MLD to (#2478)(re)set up one or more links with AP(s) affiliated with the AP MLD. When a non-AP MLD initiates a multi-link (re)setup with an AP MLD, a STA that is affiliated with the non-AP MLD shall transmit an (Re)Association Request frame on the link that it desires to use as part of the multi-link (re)setup(#3153). An AP that is affiliated with the AP MLD shall transmit an (Re)Association Response frame on the link on which it received the (Re)Association Request frame. (#5293)

……………(existing texts)………………………

The (#6700)Basic Multi-Link element carried in the (Re)Association Request frame shall include the Common Info field and may include the Link Info field.(#5293)

(#6624)NOTE 1—When a (Re)Association Request frame is sent from a non-AP EHT STA that does not support the
multi-link operation, the Basic Multi-Link element is not carried in the (Re)Association Request frame.

(#1747)(#1789)(#2348)The Common info field of the (#6700)Basic Multi-Link element carried in the
(Re)Association Request frame shall include the MLD MAC address, the MLD Capabilities, and the EML Capabilities subfields, and shall not include the Link ID Info, the BSS Parameters Change Count, and the
Medium Synchronization Delay Information subfields.

(#1747)(#1789)(#2348)NOTE—The presence of the subfields in the Common Info field is signaled via the Multi-Link
Control field of the (#6700)Basic Multi-Link element as defined in 9.4.2.312.2 (Basic Multi-Link element(#6700)).

(#2125)(#2479)For each requested link in addition to the link on which the (Re)Association Request frame
is transmitted, the Link Info field (#6729)of the Basic Multi-Link element carried in the (Re)Association
Request frame shall contain the corresponding Per-STA Profile subelement(s). If there is no other requested link in addition to the link on which the (Re)Association Request frame is transmitted, the Basic Multi-Link element carried in the (Re)Association Request frame shall not include the Link Info field.(#5303)

For each Per-STA Profile subelement included in the Link Info field, the Complete Profile subfield of the STA Control field shall be set to 1 (see 35.3.2.2 (Advertisement of complete or partial per-link information(#1859))).

……………(existing texts)………………………

The (#6700)Basic Multi-Link element carried in the (Re)Association Response frame shall include the Common Info field and may include the Link Info field. (#5293)

(#6624)NOTE 2—When a (Re)Association Response frame is sent to a non-AP EHT STA that does not support the
multi-link operation, the Basic Multi-Link element is not carried in the (Re)Association Response frame.

(#1747)(#1789)(#2348)The Common info field of the (#6700)Basic Multi-Link element carried in the
(Re)Association Response frame shall include the MLD MAC address, the MLD Capabilities, the EML
Capabilities, the Link ID Info, and the BSS Parameters Change Count subfields.

(#1747)(#1789)(#2348)NOTE 3—The presence of the subfields in the Common Info field is signaled via the Multi-Link
Control field of the (#6700)Basic Multi-Link element as defined in 9.4.2.312.2 (Basic Multi-Link element(#6700)).

(#2125)For each requested link in addition to the link on which the (Re)Association Response frame is
transmitted, the Link Info field (#6729)of the Basic Multi-Link element carried in the (Re)Association
Response(#5303) frame shall contain the corresponding Per-STA Profile subelement(s). If there is no other requested link in addition to the link on which the (Re)Association Response frame is transmitted, the Basic Multi-Link element carried in the (Re)Association Response(#5303) frame shall not include the Link Info field.(#5303)

For each Per-STA Profile subelement included in the Link Info field, the Complete Profile subfield of the STA Control field shall be set to 1 (see 35.3.2.2 (Advertisement of complete or partial per-link information(#1859))) and the Status Code field included in the STA Profile subfield of the Per-STA Profile subelement shall indicate SUCCESS if the link is accepted or the failure cause if the link is not accepted. (#6729)The Status Code field in the
(Re)Association Response frame body shall indicate, as defined in 9.4.1.9 (Status Code field), whether the
link on which the (Re)Association Request frame is received is accepted or not.

……………(existing texts)………………………

***TGbe editor: Modify 35.3.5.*1 *Multi-link (re)setup procedure as follows: (track change on)***

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

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

(…existing texts…)

(#1656)An MLD that requests or accepts multi-link (re)setup for any two links ensures that each link is located on different nonoverlapping channels.

(#3220)If the link on which the (Re)Association Request frame was received cannot be accepted by the AP
MLD, the AP MLD shall treat the multi-link (re)setup as a failure and shall not accept any requested links. Otherwise, the multi-link (re)setup is successful.(#6629)

(…existing texts…)

***TGbe editor: Modify 35.3.5.4 Usage and rules of Basic Multi-Link element in the context of multi-link (re)setup(#6700) as follows: (track change on)***

(…existing texts…)

(#3220)If the link on which the (Re)Association Request frame was received cannot be accepted by the AP
MLD, the AP MLD shall treat the multi-link (re)setup as a failure and shall not accept any requested links.

(…existing texts…)