IEEE P802.11  
Wireless LANs

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| LB 266 Resolution for CIDs related to MLO Power-save | | | | |
| Date: July 7, 2022 | | | | |
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Abstract

This submission proposes resolutions for following 19 CIDs received for TGbe LB266:

10649, 10104, 10897, 12281, 12483, 12637, 13331, 13615, 13694, 13616, 13617, 12638, 11747, 11748, 12639, 13618, 10245, 13380, 13381

**Revisions:**

* Rev 0: Initial version of the document.

***TGbe editor: The baseline for this document is 11be D2.0***

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** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 10649 | Abhishek Patil | 35.3.12.1 | 441.01 | Typo - should say STA affiliated with the non-AP MLD | Replace "Each AP affiliated ..." with "Each STA affiliated ..." | **Revised**  Agree with the comment. The term ‘AP’ at the cited location is replaced with ‘non-AP STA’. Also for consistency, the term ‘STA’ is replaced with ‘non-AP STA’ in the paragraph starting “Figure 35-15 (…”. NOTE - this includes updating the title of Figure 35-15  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 10104 | Xiangxin Gu | 35.3.12.1 | 441.01 | "Each AP affiliated with the non-AP MLD" -> "Each STA affiliated with the non-AP MLD" | As in the comment | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 10897 | Akira Kishida | 35.3.12.1 | 441.01 | "Each AP affiliated with the non-AP MLD" should be "Each STA affiliated with the non-AP MLD" | As in the comment. | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 12281 | KENGO NAGATA | 35.3.12.1 | 441.01 | "Each AP affiliated with the non-AP MLD" should be "Each STA affiliated with the non-AP MLD" | As in the comment. | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 12483 | Prashant Kota | 35.3.12.1 | 441.01 | "Each AP affiliated with the non-AP MLD indicates that it is in active mode by setting to 0 the Power Management subfield (namely PM bit in the figure) in the Frame Control field of a transmitted frame. " - Here AP cannot be affiliated to non-AP MLD. It should be STA. | We propose change as "Each STA affiliated with the non-AP MLD indicates that it is in active mode by setting to 0 the Power Management subfield (namely PM bit in the figure) in the Frame Control field of a transmitted frame. " | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 12637 | Arik Klein | 35.3.12.1 | 441.01 | Need to replace "AP" with "non-AP STA" in the following sentence: "Each AP affiliated with the non-AP MLD indicates that it is in active mode by setting to 0 the Power Management subfield (namely PM bit in the figure) in the Frame Control field of a transmitted frame" | The sentence should be revised as follows:" Each \*non-AP STA\* affiliated with the non-AP MLD indicates that it is in active mode by setting to 0 the Power Management subfield (namely PM bit in the figure) in the Frame Control field of a transmitted frame" | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 13331 | Muhammad Kumail Haider | ï»¿35.3.12.1 | 441.01 | "ï»¿Each AP affiliated with the non-AP MLD" --> "ï»¿Each STA affiliated with the non-AP MLD" | as in comment | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 13615 | Rubayet Shafin | 35.3.12.1 | 441.01 | It should be --each "STA" affiliated with the non-AP MLD, instead of each "AP" affiliated with the non-AP MLD | As in comment | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 13694 | Yunbo Li | 35.3.12.1 | 441.01 | typo. "Each AP affiliated with the non-AP MLD" =>"Each STA affiliated with the non-AP MLD" | Change "Each AP" to "Each STA". | **Revised**  Agree with the comment. The resolution is same as that for CID 10649  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 10649** |
| 13616 | Rubayet Shafin | 35.3.12.2 | 441.53 | The "MLD" should be replaced with "AP-MLD" | As in comment | **Revised**  **TGbe Editor: Please replace “MLD” with “AP MLD” at the cited location** |
| 13617 | Rubayet Shafin | 35.3.12.3 | 441.63 | The "MLD" should be replaced with "AP-MLD" for homogeneity and clarity in the spec | As in comment | **Revised**  **TGbe Editor: Please replace “MLD” with “AP MLD” at the cited location** |
| 12638 | Arik Klein | 35.3.12.3 | 442.05 | The Disassociation frame is not sent by the AP MLD, but by any of its affiliated AP. Please revise the following sentence as proposed: "At least one STA affiliated with a non-AP MLD shall send .... if the non-AP MLD intends to avoid getting disassociated from the AP MLD due to nonreceipt of frames." | Please revise the sentence as follows: "At least one STA affiliated with a non-AP MLD shall send .... if the non-AP MLD intends to avoid getting disassociated from \*any AP affiliated with\* the AP MLD due to nonreceipt of frames." | **Rejected**  The sentence doesn’t mention receiving a Disassociation frame (note D is upper case) from the AP MLD. Rather it mentions getting disassociated (lower case d) from the AP MLD. The sentence describes the disassociation operation not frame exchange. |
| 11747 | Gaurav Patwardhan | 35.3.12.3 | 442.06 | Insert "to its associated AP MLD" before "per BSS Max Idle Period". | as in comment | **Revised**  Agree with the comment. The cited sentence is updated to clarify that a non-AP MLD must transmit at least one frame via one of its affiliated STA to its associated AP MLD to avoid getting disassociated from that AP MLD.  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 11747** |
| 11748 | Gaurav Patwardhan | 35.3.12.3 | 442.11 | Replace "considered inactive if the AP MLD" with "considered inactive if its associated AP MLD" | as in comment | **Revised**  Agree with the comment. The cited sentence is updated to clarify the inactivity is with respect to its associated AP MLD.  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 11748** |
| 12639 | Arik Klein | 35.3.12.3 | 442.11 | The frame exchange is initiated by the non-AP STA affiliated the non-AP MLD, not by the non-AP MLD. Please revise the following sentence, as proposed: "A non-AP MLD is considered inactive if the AP MLD has not received a Data frame, PS-Poll frame, or Management frame (protected or unprotected as specified in this paragraph) or a frame exchange sequence initiated by the non-AP MLD on any enabled link for a time period greater than or equal to the time specified by the Max Idle Period subfield of the BSS Max Idle Period element." | Please revise the sentence as follows: "A non-AP MLD is considered inactive if the AP MLD has not received a Data frame, PS-Poll frame, or Management frame (protected or unprotected as specified in this paragraph) or a frame exchange sequence initiated by \*any non-AP STA affiliated with\* the non-AP MLD on any enabled link for a time period greater than or equal to the time specified by the Max Idle Period subfield of the BSS Max Idle Period element." | **Accepted**  **NOTE: to assist the editor, the necessary changes are shown in doc 11-22/1004r1 tagged 12639** |
| 13618 | Rubayet Shafin | 35.3.12.3 | 442.17 | Keep-alive frames don't need to be sent periodically. | Replace "periodic" with "protected" | **Accepted** |
| 10245 | John Wullert | 35.3.12.3 | 442.16 | The text in the first of the two bullets does not adequately describe the condition that differentiates the two. It should indicate that the the the Idle Options subfield requires "protected" keepalive frames. | Rephrase as "the Idle Options subfield of the BSS Max Idle Period element requires protected keepalive frames and..." | **Revised**  Agree with the comment. The issue occurred due to a typo. The term periodic is replaced with protected as a resolution to CID 13618.  **TGbe editor:** Replace "periodic" with "protected" |
| 13380 | Liwen Chu | 35.3.12.5 | 444.50 | It should be that non-AP MLD sends the request through its affiliated STA. | update the text according to the comment. | **Revised**  Agree with the comment. The sentence is revised to clarify that a non-AP MLD transmits the Request frame via one of its affiliated non-AP STA.  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 13380** |
| 13381 | Liwen Chu | 35.3.12.5 | 444.55 | It should be that AP MLD sends the response through its affiliated STA. | update the text according to the comment. | **Revised**  Agree with the comment. The sentence is revised to clarify that a AP MLD transmits the Request frame via one of its affiliated AP (multiple instances).  **TGbe editor, please make changes as shown in 11-22/1004r1 tagged 13381** |

**35.3.12 Multi-link power management**

**35.3.12.1 General**

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

Figure 35-15 (Each non-AP STA affiliated with a non-AP MLD maintains its own power state) illustrates the power save operation for each non-AP STA affiliated with a non-AP MLD during multi-link operation. As depicted in the figure, during the initial portion of the illustration, both STAs affiliated with the non-AP MLD are in active mode and are involved in frame exchange with the respective APs on the links. [10649]Each non-AP STA affiliated with the non-AP MLD indicates that it is in active mode by setting to 0 the Power Management subfield (namely PM bit in the figure) in the Frame Control field of a transmitted frame. At some point in time, STA 2 affiliated with the non-AP MLD operating on Link 2 indicates to AP 2 that it is entering power save mode (i.e., sets PM bit to 1) and transitions to doze state after the successful frame exchange. STA 2 remains in doze state for the rest of the illustration. After a period of time, STA 1 enters power save mode (i.e., sets PM bit to 1) after the successful frame exchange. While operating in power save mode, STA 1 wakes up to receive the Beacon frame transmitted by AP 1 and determines that AP MLD has BUs belonging to TID(s) mapped to Link 1. Based on this determination, STA 1 indicates to AP 1 that it has transitioned to awake state by transmitting a PS-Poll or U-APSD trigger frame on Link 1. STA 1 participates in frame exchange with AP 1 while in awake state.

**35.3.12.3 MLD max idle period management**

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

[11747]The non-AP MLD shall send, to its associated AP MLD, at least one keepalive frame (such as Data frame, PS-Poll frame, or Management frame), via one of its affiliated non-AP STAs, per BSS Max Idle Period if the non-AP MLD intends to avoid getting disassociated from the AP MLD due to nonreceipt of frames. A keepalive frame shall be protected or unprotected as indicated in the Idle Options subfield.

[11748]A non-AP MLD is considered inactive by its associated AP MLD if the AP MLD has not received a Data frame, a PS-Poll frame, or a Management frame (protected or unprotected as specified in this paragraph) or a frame exchange sequence initiated by [12639]any of the STAs affiliated with the non-AP MLD on any enabled link for a time period greater than or equal to the time specified by the Max Idle Period subfield of the BSS Max Idle Period element. An AP MLD may disassociate a non-AP MLD if:

**35.3.12.5 WNM sleep mode in multi-link operation**

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

[13380]A non-AP MLD may transmit, via one of its affiliated non-AP STAs, a WNM Sleep Mode Request frame (see 9.6.13.19 (WNM Sleep Mode Request frame format)) to an AP affiliated with an AP MLD that has indicated support for WNM sleep mode capability.

[13381]An AP MLD shall send, via one of its affiliated APs, a WNM Sleep Mode Response frame in response to a WNM Sleep Mode Request frame received from a STA affiliated with a non-AP MLD. An AP MLD may send, via one of its affiliated APs, the WNM Sleep Mode Response frame without solicitation upon the AP MLD’s deletion of all traffic filter sets established according to the traffic filtering agreement between the AP MLD and the non-AP MLD (see 9.6.13.20 (WNM Sleep Mode Response frame format)).