IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MLO Mandatory/optional | | | | |
| Date: 2021-11-05 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Laurent Cariou |  |  |  | laurent.cariou@intel.com |

R1: clarification of instructions

R2: amend spec text to better match agreed motion.

R3: spec text exactly as motion.

R4: first step, include mandate for AP side

R6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CID | Subclause | Comment | Proposed change | Resolution |
| 5772 | 35.3.1 | the task group agreed on motion 142 saying: The support of the following MLO features is mandatory for 802.11be AP and 802.11be STA. This means that an EHT STA shall support MLO and shall be capable of being part of an MLD. This is still not captured in the spec and needs to be added. | as in comment |  |

1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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).***

This document captures spec text for the following motions :

[1] The support of the following MLO features is mandatory for 802.11be AP and 802.11be STA.

* Discovery procedure, setup procedures, security procedures, default mapping (all TIDs mapped to all links, all setup links enabled), TIM indicating BUs at MLD level, BA at MLD level, power save per link, power state change indications per link, and BSS parameter critical update procedure.
* NOTE – The above does not preclude other functionalities being added to the list.

[Motion 142, #SP303, [23] and [165]]

[2] Single-link/radio (TBD) non-AP MLD: A non-AP MLD that supports operation on more than one link but can only receive, or transmit frames on one link at a time.

[Motion 119, #SP118, [7] and [259]]

[Motion 119, #SP125, [7] and [260]]

[3] An AP MLD shall be able to serve a single radio non-AP MLD.

[Motion 142, #SP308, [23] and [243]]

[4] An STR AP MLD with two or more affiliated EHT APs:

* shall be capable to receive a PPDU on each affiliated EHT AP independently to the transmit/reception status on the other affiliated EHT APs;
* shall be capable to transmit concurrent PPDUs simultaneously to the same non-AP MLD by at least two affiliated EHT APs on at least two affiliated EHT APs of the AP MLD;
* shall support asynch channel access across all the affiliated EHT APs links.
* NOTE – All APs affiliated with an AP MLD are EHT APs.

[Motion 142, #SP309, [23] and [243]]

[5]

Do you agree to add the following to the 11be SFD?

* A multi-radio non-AP MLD that is operating on a pair of links on which it is STR capable shall be capable of operating with channel aggregation on that pair of links
* A regular AP MLD (that corresponds to an AP MLD that is not a soft-AP MLD) shall be an STR AP MLD
* Note: channel aggregation is used here to mean the simultaneous transmission and reception of PPDUs overlapping in time on different links

Y/N/A: 48/9/24

1. **Proposed spec text**

**PART 1a: incorporating part of SFD motion 1 (for AP side)**

* Multi-link operation
* General

***TGbe editor: Add the following paragraph at the end of subclause 35.3.1 (General) as follows [1]:***

An EHT AP shall have dot11MultiLinkActivated set to true and shall be affiliated with an AP MLD. The EHT AP and its affiliated AP MLD follow the rules defined in 35.3 (Multi-link operation).

Do you agree to incorporate the changes proposed in Part 1a of document 20/1965r7 to 802.11be specification?

**PART 1b: incorporating part of SFD motion 1 (for AP side)**

All EHT APs that have the same SSID and that are in the same co-located AP set shall be affiliated with the same AP MLD.

Do you agree to incorporate the changes proposed in Part 1b of document 20/1965r7 to 802.11be specification?

**PART 1c: incorporating part of SFD motion 1 (for STA side)**

**TBD**

**PART 2**

***TGbe editor: Modify the following subclause 35.3.12.2 (Simultaneous transmit and receive (STR) operation) as follows: [4] [5]***

* Multi-link channel access
* General

An STA, which is affiliated with an MLD, is allowed to contend for the WM on its link independently from the other STA(s) affiliated with the same MLD, unless explicitly stated otherwise in the subclause below.

* Simultaneous transmit and receive (STR) operation

An STA that is affiliated with an MLD capable of simultaneous transmit and receive (STR) over a pair of links and that is operating on a link in that pair of links may contend for access to WM or transmit a frame to an STA of another MLD capable of STR over that pair of links on that link regardless of any activity occurring on the other link within that pair of links.

An MLD shall announce whether the MLD is capable of STR over a pair of links as defined in 35.3.12.4 (Capability signaling).

Figure 35-5 (Channel access of two MLDs operating as STR over a pair of links) shows an example of an AP MLD and a non-AP MLD that are operating as STR over a pair of links and that are contenting for access to the WM and subsequent frame exchanges between two MLDs on those links. After the AP MLD has set up link 1 and link 2 with the non-AP MLD, then AP 2 may receive data frames from STA 2 on link 2, while AP 1 contends for the WM and then transmits data frames to STA 1 on link 1.



If an STA is affiliated to an MLD capable of simultaneous transmit and receive (STR) over a pair of links and that is operating on a link in that pair of links, then the STA shall support receiving a PPDU regardless of any activity occurring on the other link within that pair of links. [4][5]

An AP MLD that is not a soft-AP MLD shall support simultaneous transmit and receive (STR) over all pairs of links. [5]

If an AP MLD that is not a soft-AP MLD has at least two affiliated APs, then it shall be capable of having at least two affiliated APs simultaneously transmit PPDUs to the same non-AP MLD that overlap in time. [4]

A non-AP MLD that is capable of simultaneous transmit and receive (STR) on a pair of links shall support having the two affiliated STAs operating on the two links of the pair of links simultaneously transmit PPDUs to the same MLD that overlap in time. [5]

**35.3.14 Multi-link single radio operation**

***TGbe editor: Add the following subclause 35.3.14 (Multi-link single radio operation) after 35.3.13 Multi-link Channel Access subclause as follows [2][3]:***

A single radio non-AP MLD is defined in 3.2 (Definitions specific to IEEE 802.11). An AP MLD shall support operation with a single radio non-AP MLD (e.g. multi-link setup on multiple links, default mapping, dynamic link transitions, power management, multi-link block ack, ...) by following the rules defined in 35.3 (Multi-link operation)