IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Proposed Draft Text  MAC MLO Enhanced Multi-link Operation Mode | | | | |
| Date: 2020-9-9 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Young Hoon Kwon | NXP |  |  | younghoon.kwon@nxp.com |
| Yongho Seok | MediaTek |  |  |  |
| Minyoung Park | Intel |  |  |  |
| Xiandong Dong | Xiaomi |  |  |  |
| Yujin Noh | Newracom |  |  |  |
| Sharan Naribole | Samsung |  |  |  |
| Sanghyun Kim | Wilus |  |  |  |
| Gaurav Patwardhan | HPE |  |  |  |
| Rana Abdelaal | Broadcom |  |  |  |
| Laurent Cariou | Intel |  |  |  |
| Duncan Ho | Qualcomm |  |  |  |
| Ming Gan | Huawei |  |  |  |
| Liwen Chu | NXP |  |  |  |

Abstract

This submission proposes draft text to be included in 802.11be Draft 0.1 for the following topic:

* MAC MLO Enhanced Multi-link operation mode
  + Based on the following motion:

802.11be shall define a mechanism that in R1 a non-AP MLD indicates maximum number of spatial streams that it is capable of transmitting or receiving at a time, while operating in any of the links within the specified set of links in which the enhanced multi-link operation mode is applied.

* + - Each STA in the non-AP MLD operating in any of the links within the specified set of links shall support the indicated maximum number of spatial streams.
    - The enhanced multi-link operation mode is optional mechanism.
    - Note- The name of the enhanced multi-link operation mode can be changed.

[Motion 124, #SP187, [1] and [189]]

* + Further, based on the motion from Multi-link single-radio operation:

802.11be supports the multi-link operation for a non-AP MLD that is defined as follows to be included in R1.

* A non-AP MLD that can: 1) transmit or receive data/management frames to another MLD on one link at a time, and 2) listening on one or more links.
  + The “listening” operation includes CCA as well as receiving initial control messages (e.g., RTS/MU-RTS).
  + The initial control message may have one or more additional limitations: spatial stream, MCS (data rate), PPDU type, frame type.
  + Link switch delay may be indicated by the non-AP MLD.

[Motion 119, #SP126, [3] and [181]]

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Deleted NSS and NSTS, and clarified frame exchange sequence based on review comments
* Rev 2: Editorial changes based on review comments
* Rev 3: Additional changes from offline discussion
* Rev 4: Additional changes from offline discussion
* Rev 5: Simplified the description on the initial frame exchange and some further editorial changes

***TGbe editor: Insert the new subclause title 33.x.z Enhanced multi-link multi-radio operation as follows:***

**33.x.z Enhanced multi-link multi-radio operation**

A non-AP MLD may operate in the enhanced multi-link multi-radio (EMLMR) mode on a specified set of the enabled links between the non-AP MLD and its associated AP MLD. (*name of the mode is TBD*) The specified set of the enabled links in which the EMLMR mode is applied is called EMLMR links.

An MLD with dot11EHTEMLMROptionImplemented equal to true shall set the EMLMR mode subfield of the TBD Capabilities element, which indicates MLD level capabilities, to 1; otherwise, the MLD shall set the EMLMR mode subfield to 0.

A non-AP MLD with dot11EHTEMLMROptionImplemented equal to true shall set the EMLMR Rx NSS subfield of TBD element to dot11SupportedEMLMRRxNSS and the EMLMR Tx NSTS subfield of TBD element to dot11SupportedEMLMRTxNSTS, which indicate MLD level capabilities.

A non-AP MLD with dot11EHTEMLMROptionImplemented equal to true operates in the EMLMR mode by TBD signaling.

A non-AP MLD with dot11EHTEMLMROptionImplemented equal to true may indicate its link switch delay in a TBD management frame.

When a non-AP MLD operates in the EMLMR mode, after initial frame exchange subject to its per-link spatial stream capabilities and operating mode on one of the EMLMR links, the non-AP MLD shall be able to support the following until the end of the frame exchange sequence initiated by the initial frame exchange:

* Receive PPDUs with the number of spatial streams up to the value as indicated in the EMLMR Rx NSS subfield of TBD element at a time on the link for which the initial frame exchange was made.
* Transmit PPDUs with the number of space-time streams up to the value as indicated in the EMLMR Tx NSTS subfield of TBD element at a time on the link for which the initial frame exchange was made.

After the end of the frame exchange sequence, each STA of the non-AP MLD in the EMLMR mode shall be able to receive PPDU, subject to its per-link spatial stream capabilities and operating mode and any switching delay indicated by the non-AP MLD.