IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Proposed Draft Text for  MLO Multi-Link Channel Access: Capability Signaling | | | | |
| Date: 2021-03-04 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Yunbo Li | Huawei |  |  | [liyunbo@huawei.com](mailto:liyunbo@huawei.com) |
| Ming Gan |  |  |  |  |
| Yuchen Guo |  |  |  |  |
| Guogang Huang |  |  |  |  |
| Yiqing Li |  |  |  |  |
| Zhenguo Du |  |  |  |  |
| Rob Sun |  |  |  |  |

Abstract

This submission proposes draft text for MLO Multi-Link Channel Access: Capability Signaling based on the following portions of the SFD:

Revisions:

* Rev 0: Initial version of the document. Updated base on doc 21/0154r0. The frame format realted to capability signalling in basic variant MLelement is added. CR for below CIDs are added.
  + 9 CIDs: 1759, 2719, 2139, 1465, 2887, 1466, 1656, 3392, 1796
* Rev 1:

The common info part of the basic ML element transmitted by a non-AP MLD in a (Re)Association Request frame shall include a field that indicates the maximum number of affiliated STAs in the non-AP MLD that support simultaneous exchange of Data frames (n).

* A field value that corresponds to n = 1 indicates that the non-AP MLD is a single radio MLD.
* A field value that corresponds to n = 2 or more indicates that the non-AP MLD is a multi-radio MLD.

[Motion 146, #SP340, [30] and [257]]

The common part of the basic ML element transmitted by an MLD contains an EMLSR Mode subfield and an EMLMR Support subfield.

[Motion 146, #SP341, [30] and [257]]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 1759 | Hanseul Hong | 142.30 | 35.3.13.4 | The terminology 'multi-radio MLD' exists only here. Define the term or remove 'multi-radio' part. | As in the comment | Revised –  Agree in principle with the commeter.  Add the definition of multi-radio MLD in subclause 3.2.  TGbe editor to make the changes shown in 11-21/0373r0 |
| 2719 | Ryuichi Hirata | 142.30 | 35.3.13.4 | "multi-radio MLD" is not defined | Define multi-radio MLD. | Revised –  Agree in principle with the commeter.  Add the definition of multi-radio MLD in subclause 3.2.  TGbe editor to make the changes shown in 11-21/0373r0 |
| 2139 | Laurent Cariou | 0.00 | 35.3.13.4 | clarify the field to determine all the types of MLDs | as in comment | Revised –  Clarify the signalling is carried in Basic variant ML element.  TGbe editor to make the changes shown in 11-21/0373r0 |
| 1465 | Dana Ciochina | 142.30 | 35.3.13.4 | "The capability field/element indicates the MLD is a multi-radio or other types of MLD." Other type of MLD is very vague. It should be replaced with a clear statement | replace the expression with a clear statement. | Revised –  Agree in principle with the commeter.  Changed to single radio MLD.  TGbe editor to make the changes shown in 11-21/0373r0 |
| 2887 | Stephen McCann | 142.30 | 35.3.13.4 | What are the "other types of MLD"? | Define some other types of MLD. | Revised –  Agree in principle with the commeter.  Changed to single radio MLD.  TGbe editor to make the changes shown in 11-21/0373r0 |
| 1466 | Dana Ciochina | 142.32 | 35.3.13.4 | The formulation " in which case the pair of link is STR or NSTR" is ambiguous. It may mean a STA announces an additional condition based on which a link is considered NSTR or STR or it refers to definition of a pair of links as STR or NSTR based on announcement. Furthermore, the actual signaling is missing. | remove the ambiguity and indicate the actual signalling involved. | Revised –  Agree in principle with the commeter.  Clarify that it intends to indicate the STR/NSTR capability of each link pair.  The actual signalling is TBD for now. It will be added later when it has a conclusion.  TGbe editor to make the changes shown in 11-21/0373r0 |
| 1656 | Geonjung Ko | 142.33 | 35.3.13.4 | It is unclear what the below sentence means. "The two links of each link pair are on different channels."  If it means a condition, we need to make the capability signaling as conditional. | As per comment | Revised –  Agree in principle with the commeter.  Delete this sentence, and add below sentence in 35.3.5.1 (Multi-link (re)setup procedure) to make it more clear.  “Any two links that requested or accepted for multi-link (re)setup shall be on the different operating channels”  TGbe editor to make the changes shown in 11-21/0373r0 |
| 3392 | Zhou Lan | 142.33 | 35.3.13.4 | "links, in which case the pair of link is STR or NSTR. The two links of each link pair are on different channels.". Please clarify the meaning of channel here. | As stated in the comment | Revised –  Agree in principle with the commeter.  Delete this sentence, and add below sentence in 35.3.5.1 (Multi-link (re)setup procedure) to make it more clear.  “Any two links that requested or accepted for multi-link (re)setup shall be on the different operating channels”  TGbe editor to make the changes shown in 11-21/0373r0 |
| 1796 | Insun Jang | 142.27 | 35.3.13.4 | "affiliated STAs on a set of links" is not clear because e.g., when transmitted an Association Request frame, it includes the affilaited STAs are STAs only requested for ML setup. We need to clarify whether the STAs are all affiliated STAs of the MLD or affilaited STAs only requested for ML setup | As in the comment, please clarify that STAs in "affiliated STAs on a set of links" are all affiliated STAs of the MLD or affilaited STAs only requested for ML setup | Revised –  Agree in principle with the commeter.  Add a note to clarify that the affiliated STAs carried in the ML element could be all or part of the afflicated STA of the MLD.  TGbe editor to make the changes shown in 11-21/0373r0 |
|  |  |  |  |  |  |  |

***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.***

***TGbe editor: Please change the subclauses below follows:***

**3.2 Definitions specific to IEEE 802.11**

single link/radio non-access point (non-AP) multi-link device (MLD): A non-AP MLD that supports operation on more than one link but receives or transmits frames only on one link at a time.

Multi-link/radio non-access point (non-AP) multi-link device (MLD): A non-AP MLD that supports receives or transmits frames on more than one link at a time.

***TGbe editor: Please change the subclauses below follows:***

9.4.2.295b.2 Basic variant Multi-Link element

|  |  |  |  |
| --- | --- | --- | --- |
|  | MLD MAC Address | MLD Information | TBD |
| Octets: | 0 or 6 | TBD | TBD |

Figure 9- 788eh—Common Info field of the Basic variant Multi-Link element format

***TGbe editor: Please add below paragraphs in subclauses*** *9.4.2.295b.2****:***

The format of the MLD Information field in the Common Info field of the Basic variant Multi-Link element is defined in Figure 9-788eh1 (MLD Information field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 | B1 | B2-B6 |  |
|  | EMLSR Mode | EMLMR Support | Number of Radios | Reserved |
| Bits: | 1 | 1 | 4 | TBD |

Figure 9- 788eh1—MLD Information field format

The EMLSR Mode subfield is set to 1 when the non-AP MLD operating in EMLSR mode (see 35.3.14 (Enhanced multi-link single radio operation)). Otherwise the subfield is set to 0.

The EMLSR Support subfield indicates support for EMLMR operation. The EMLMR Mode subfield is set to 1 when EMLMR operation is supported (see 35.3.15 (Enhanced multi-link multi-radio operation)). Otherwise the subfield is set to 0.

The Number of Radios subfield indicates the number of radios of the MLD. The value of Number of Radios subfield equals to the number of radios of the MLD minus 1.

***TGbe editor: Please change the subclauses below follows:***

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

In the (Re)Association Requeust frame, the non-AP MLD indicates the links that are requested for (re)setup as described in 35.3.5.4 (Usage and rules of Basic variant Multi-link element in the context of multi-link setup)

In the (Re)Association Response frame, the AP MLD indicates the links that are accepted for (re)setup as described in 35.3.5.4 (Usage and rules of Basic variant Multi-link element in the context of multi-link setup).

After successful multi-link (re)setup between a non-AP MLD and an AP MLD, the non-AP MLD and the AP MLD setup links for multi-link operation, and the non-AP MLD is in associated state and is (re)associated with the AP MLD.

Any two links that requested or accepted for multi-link (re)setup shall be on the different operating channels. (#3392)

***TGbe editor: Please change the subclauses below follows:***

**35.3.13.4 Capability signaling**

An MLD can indicate capability to support exchanging frames simultaneously by affiliated STAs on a set of links to another MLD in Basic variant Multi-Link element.(#2139) When a STA affiliated with a non-AP MLD sends a (Re)Association Request frame, the Number of Radios subfield in the common info field of the Basic variant Multi-Link element indicates the non-AP MLD is a multi-radio MLD or single radio MLD.（#1465,2887） The non-AP MLD shall set the Number of Radio subfiled to the number of radios of the non-AP MLD minus 1. The Number of Radios subfield is set to 0 to indicate that the non-AP MLD is a single radio MLD, and is set to 1 or more to indicate that the non-AP MLD is a multi-radio MLD. A multi-radio MLD operating on multiple links can announce it is STR or NSTR for each pair of links.(#1466） (#1656,3392)

NOTE—If an MLD supports transmission on link 1 concurrent with reception on link 2, but cannot support transmission on link 2 concurrent with reception on link 1, this pair of links is NSTR.

NOTE – The affliated STAs be carried in the Basic variant Multi-Link element for multi-link (re)setup could be all or part the afficiated STAs of the MLD. How to choose the carried affliated STAs is out of scope of the standard. (#1796)

The ability of a non-AP MLD to perform STR on a pair of setup links may change after multi-link setup. The non-AP MLD may use TBD signaling on any enabled link to inform the AP MLD about the ability change to perform STR.

The limitation of updating frequency of the ability to perform STR as well as the switching delay is TBD.

***TGbe editor: Please change the subclauses below follows:***

**35.3.14 Enhanced multi-link single radio operation**

A non-AP MLD may operate in the EMLSR mode on the enabled links between the non-AP MLD and its associated AP MLD.

***Editor’s Note: Per the authors of 20/1291r12, the name of the EMLSR mode is TBD.***

An MLD with dot11EHTEMLSROptionImplemented equal to true shall set the EMLSR mode subfield of the Common Info field of the Basic variant Multi-Link element to 1; otherwise, the MLD shall set the EMLSR mode subfield to 0.

**35.3.15 Enhanced multi-link multi-radio operation**

A non-AP MLD may operate in the EMLMR mode on a specified set of the enabled links between the non-AP MLD and its associated AP MLD. The specified set of the enabled links in which the EMLMR mode is applied is called EMLMR links.

***Editor’s Note: Per the authors of 20/1440r7, the name of the EMLMR mode is TBD.***

An MLD with dot11EHTEMLMROptionImplemented equal to true shall set the EMLMR Support subfield of the Common Info field of the Basic variant Multi-Link element, which indicates MLD level capabilities, to 1; otherwise, the MLD shall set the EMLMR Support subfield to 0.

**Straw Poll: Do you support to incorporate the proposed draft text in document 11-21/0373r0 to the next versioin of TGbe Draft?**

**Result: Yes/No/Abstain**