IEEE P802.11
Wireless LANs

|  |
| --- |
| CR for 35.3.16.2 |
| Date: 2022-10-10 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yunbo Li | Huawei |  |  | liyunbo@huawei.com |
| Ming Gan |  |  |  |  |
| Yuchen Guo |  |  |  |  |
| Guogang Huang |  |  |  |  |
| Yousi Lin |  |  |  |  |
| Zhenguo Du |  |  |  |  |
| Stephen McCann |  |  |  |  |
| Edward Au |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause**  | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 10249 | John Wullert | 35.3.16.2 | 452.12 | These requirements specify the conditions under which the AP shall set the MLD Capabilities and Operations Present subfield to 0 and 1. This has the indirect effect of controlling when the AP should include the MLD Capabilities and Operations subfield. It would be better to explicitly require that the AP include the MLD Capabilities and Operations Present subfield. | Revise requirements in this paragraph to state when AP shall or shall not include MLD Capabilities and Operations Present subfield. | RejectedThe commenter fails to identify a technical issue. The MLD Capabilities and Operations Present subfield is always included in the Basic Multi-Link element based on the current frame format design. No modification is needed. |
| 10250 | John Wullert | 35.3.16.2 | 452.18 | These requirements specify the conditions under which the non-AP STA shall set the MLD Capabilities and Operations Present subfield to 0 and 1. This has the indirect effect of controlling when the non-AP STA should include the MLD Capabilities and Operations subfield. It would be better to explicitly require that the non-AP STA include the MLD Capabilities and Operations Present subfield. | Revise requirements in this paragraph to state when non-AP STA shall or shall not include MLD Capabilities and Operations Present subfield. | RejectedThe commenter fails to identify a technical issue. The MLD Capabilities and Operations Present subfield is always included in the Basic Multi-Link element based on the current frame format design. No modification is needed. |
| 11442 | Gaurang Naik | 35.3.16.2 | 452.12 | Replace 'An AP affiliated with AP MLD' with 'An AP affiliated with \*an\* AP MLD'. Similarly, replace 'A non-AP STA affiliated with non-AP MLD' with 'A non-AP STA affiliated with \*a\* non-AP MLD' on P452L18. | As in comment | Accepted |
| 10498 | Eldad Perahia | 35.3.16.2 | 452.25 | "in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs.." There is no point to the latter half of the sentence, delete. | as in comment | Revised.Agree with the commenter in principle. The sentence “, in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs” is deleted.TGbe editor to make changes in this document under CID 10498 in 22/ 1417r0 |
| 11261 | Sigurd Schelstraete | 35.3.16.2 | 452.25 | "the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs..". Isn't this obvious? What is the purpose of this statement? | Remove if not needed | Revised.Agree with the commenter in principle. The sentence “, in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs” is deleted.TGbe editor to make changes in this document under CID 10498 in 22/ 1417r0 |
| 11571 | Xiaofei Wang | 35.2.16.2 | 452.25 | what information does the phrase "in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs." add? It seems to be redundant and should be removed or rephrased to clarify the meaning. | as in comment | Revised.Agree with the commenter in principle. The sentence “, in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs” is deleted.TGbe editor to make changes in this document under CID 10498 in 22/ 1417r0 |
| 11754 | Gaurav Patwardhan | 35.3.16.2 | 452.25 | Delete the following text as it not give any new information when compared to the previous sentence. "in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs.." | as in comment | Revised.Agree with the commenter in principle. The sentence “, in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is operating with more than one affiliated APs” is deleted.TGbe editor to make changes in this document under CID 10498 in 22/ 1417r0 |
| 12651 | Arik Klein | 35.3.16.2 | 452.24 | Need to clarify that the specific subfields of the MLD Capabilities and Operations field resides in the Common Part of the Basic Multi-Link element, since 35.3.16.2 includes capability and operation signaling that reside in other parts of the Multi-link element.Please add the clarification as proposed. | Please revise the sentence as follows: "An AP MLD shall set the Maximum Number Of Simultaneous Links subfield \*in the Common Info field\* of the Basic Multi-Link element to the number of affiliated APs minus 1, ..." | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12651 in 22/ 1417r0 |
| 12652 | Arik Klein | 35.3.16.2 | 452.30 | Need to clarify that the specific subfields of the MLD Capabilities and Operations field resides in the Common Part of the Basic Multi-Link element, since 35.3.16.2 includes capability and operation signaling that reside in other parts of the Multi-link element.Please add the clarification as proposed. | Please revise the sentence as follows: "If dot11EHTBaseLineFeaturesImplementedOnly is equal to true, an NSTR mobile AP MLD shall set the Maximum Number of Simultaneous Links subfield \*in the Common Info field\* of the Basic Multi-Link element carried in transmitted Management frames to 1" | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12652 in 22/ 1417r0 |
| 12653 | Arik Klein | 35.3.16.2 | 452.34 | Need to clarify that the specific subfields of the MLD Capabilities and Operations field resides in the Common Part of the Basic Multi-Link element, since 35.3.16.2 includes capability and operation signaling that reside in other parts of the Multi-link element.Please add the clarification as proposed. | Please revise the sentence as follows: "A single radio non-AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the \*Common Info field of the \* Basic Multi-Link element carried in transmitted Management frames to 0." | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12653 in 22/ 1417r0 |
| 12654 | Arik Klein | 35.3.16.2 | 452.37 | Need to clarify that the specific subfields of the MLD Capabilities and Operations field resides in the Common Part of the Basic Multi-Link element, since 35.3.16.2 includes capability and operation signaling that reside in other parts of the Multi-link element.Please add the clarification as proposed. | Please revise the sentence as follows: "A single radio non-AP MLD with dot11EHTEMLSROptionImplemented equal to true shall set the Maximum Number Of Simultaneous Links subfield in the \*Common Info field of the \* Basic Multi-Link element to 0." | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12654 in 22/ 1417r0 |
| 12655 | Arik Klein | 35.3.16.2 | 452.41 | Need to clarify that the specific subfields of the MLD Capabilities and Operations field resides in the Common Part of the Basic Multi-Link element, since 35.3.16.2 includes capability and operation signaling that reside in other parts of the Multi-link element.Please add the clarification as proposed. | Please revise the sentence as follows: "If a multi-radio non-AP MLD requests more than one link during multi-link setup, the multi-radio non-AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the \*Common Info field of the\* Basic Multi-Link element carried in transmitted Management frames to a value equal to or larger than 1." | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12655 in 22/ 1417r0 |
| 12657 | Arik Klein | 35.3.16.2 | 453.06 | Need to clarify that the specific subfields of the MLD Capabilities and Operations field resides in the Common Part of the Basic Multi-Link element, since 35.3.16.2 includes capability and operation signaling that reside in other parts of the Multi-link element.Please add the clarification as proposed. | Please revise the sentence as follows: "A non-AP MLD may set the Frequency Separation For STR subfield \*in the Common Info field of the Basic Multi-Link element\* to a nonzero value ...; otherwise the non-AP MLD shall set the Frequency Separation For STR subfield to 0" | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12657 in 22/ 1417r0 |
| 11262 | Sigurd Schelstraete | 35.3.16.2 | 452.26 | Two periods at end of sentence | Remove one period | Accepted. |
| 13742 | Yunbo Li | 35.3.16.2 | 452.26 | delete one dot at the end of the paragraph. | as in comment. | Accepted |
| 13849 | Sanghyun Kim | 35.3.16.2 | 452.26 | There is a duplicated period at the end of the sentence. | Please delete the duplicated period. | Accepted |
| 11959 | Jarkko Kneckt | 35.3.16.2 | 452.33 | The Maximum Number Of Simultaneous Links subfield is not needed by the STA MLD. The STA MLD controls links availability by using power save or operation in EMLSR mode. This controlling makes sure that STA will be available only on the links that the STA cna manage. | Please remove the Maximum Number Of Simultaneous Links subfield from 802.11be. | Rejected.The Maximum Number Of Simultaneous Links subfield is an important parameter. Based on this subfield, the AP MLD can distinguish whether an associated non-AP MLD is a single radio MLD or a multi-radio MLD, and hence the AP MLD can do different preparation for them. Additionally, some other features also use the Maximum Number Of Simultaneous Links subfield. For example, a NSTR mobile AP MLD shall set the value of this field to 1. Changing the value of Maximum Number Of Simultaneous Links subfield implies addition or removal of a link. As a result, it is not good to remove the Maximum Number Of Simultaneous Links subfield. |
| 13802 | Yuchen Guo | 35.3.16.2 | 452.37 | This paragraph is covered by the previous paragraph. | Delete this paragraph or merge it with the previous paragraph | RejectedThe description of the previous paragraph identified by the commenter is not clear whether a non-AP MLD in EMLSR mode is included or not. This paragraph is added per the request of CID 7623 in doc 21/1203r1 (<https://mentor.ieee.org/802.11/dcn/21/11-21-1203-01-00be-cc36-cr-35-3-15-4-capability-signaling.docx>) to clarify the case of EMLSR. |
| 12357 | Massinissa Lalam | 35.3.16.2 | 452.49 | Typo, replace "A MLD" with "An MLD". | As in comment | Accepted |
| 13803 | Yuchen Guo | 35.3.16.2 | 452.49 | A MLD should be An MLD | As in the comment | Revised.Agree with the commenter.TGbe editor to make changes in this document under CID 12357 in 22/ 1417r0 |
| 13392 | Liwen Chu | 35.3.16.2 | 452.28 | a NSTR mobile AP MLD may operate with one link only. | Fix the issues mentioned in the comment | RevisedAgree with the commenter. “with no link removal” is added to cover the link removal case for NSTR mobile AP MLD.TGbe editor to make changes in this document under CID 13392 in 22/ 1417r1 |
| 13393 | Liwen Chu | 35.3.16.2 | 452.56 | a NSTR mobile AP MLD may operate with one link only. | Fix the issues mentioned in the comment | RevisedAgree with the commenter. “with no link removal” is added to cover the link removal case for NSTR mobile AP MLD.TGbe editor to make changes in this document under CID 13392 in 22/ 1417r1 |
| 10364 | Tomoko Adachi | 35.3.16.2 | 453.11 | The Frequency Separation For STR subfield is set to a non-zero value if a non-AP MLD intends to indicate such info. And the AP MLD might take into account the info to set up BSSs in the future. Only by this description, it looks as though this subfield will not be in use. There should be more examples how to use this subfield, such as use it to suggest TID-to-link mapping, add a new link, etc. | Change "An AP MLD might take into account the information provided by associated non-AP MLDs in the Frequency Separation For STR subfield in their transmitted Multi-Link elements when ..." to "An AP MLD may take into account the information provided by associated non-AP MLDs in the Frequency Separation For STR subfield in their transmitted Multi-Link elements to operate, control and manage the links." | RejectedThe group discussed whether “might”, of “may” should be used in that sentence. The group converged on word “might”. |
| 12358 | Massinissa Lalam | 35.3.16.2 | 453.01 | "An MLD shall set to 0 every bit in the NSTR Indication Bitmap subfield of the Basic Multi-Link element that corresponds to a link pair where one of the STAs in the link pair operates in the 2.4 GHz band and the other STA operates in the 5 GHz or 6 GHz band." This implies that a multi-radio non-AP MLD operating on both 2.4 and 5 GHz must set very NSTR bits of the bitmap to 0 which contradicts previous paragraph. Clarification is needed. | Clarify to what type of MLD this paragraph applies | RevisedThe sentence identified in this comment applies to both AP MLD and non-AP MLD, so there is no further clarification about the MLD type is needed. Nevertheless, the sentence is not accurate, because the NSTR Indication Bitmap subfield is not always present. The words “if present” are added for clarification.TGbe editor to make changes in this document under CID 12358 in 22/ 1417r0 |
| 12656 | Arik Klein | 35.3.16.2 | 453.01 | Add a note that in case the MLD includes only a single link pair where on of the links operates in the 2.4GHz band and the other link operates in 5GHz or 6GHz band - the NSTR Link Pair Present is set to 0 and NSTR Indication bitmap subfield is not included. This is concluded from the paragraphs in P452L54 and 453L1 | As in comment | Revised.Agree with the commenter.The NSTR Indication Bitmap subfield is not always present. The words “if present” are added for clarification.TGbe editor to make changes in this document under CID 12358 in 22/ 1417r0 |
| 10499 | Eldad Perahia | 35.3.16.2 | 453.01 | "An MLD shall set to 0 every bit in the NSTR Indication Bitmap subfield". What does a single radio device do? | clarify | RevisedThe words “if present” are added. The NSTR Indication Bitmap subfield will not present for single radio device.TGbe editor to make changes in this document under CID 12358 in 22/ 1417r0 |

**Discussion:**

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).***

1. **Proposed spec text**

The baseline for this text is TGbe D2.2

***TGbe editor: Modify the paragraphs in 35.3.16.2(Multi-link device capability and operation signaling) as follows:***

**35.3.16.2 Multi-link device capability and operation signaling**

An AP affiliated with an (#11442) AP MLD shall set the MLD Capabilities and Operations Present subfield in the Multi-Link Control field of the Basic Multi-Link element to 1 when carried in Beacon, Probe Response, and (Re)Association Response frames it transmits. Otherwise, it shall set the MLD Capabilities and Operations Present subfield to 0.

A non-AP STA affiliated with a (#11442) non-AP MLD shall set the MLD Capabilities and Operations Present subfield in the Multi-Link Control field of the Basic Multi-Link element to 1 when carried in a (Re)Association Request frame it transmits. Otherwise, it shall set the MLD Capabilities and Operations Present subfield to 0.

An AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Common Info field of the (#12651) Basic Multi-Link element to the number of affiliated APs minus 1 (#10498).

If dot11EHTBaseLineFeaturesImplementedOnly is equal to true, an NSTR mobile AP MLD with no link removal (#13392) shall set the Maximum Number of Simultaneous Links subfield in the Common Info field (#12652) of the Basic Multi-Link element carried in transmitted Management frames to 1.

A single radio non-AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Common Info field of the (#12653) Basic Multi-Link element carried in transmitted Management frames to 0.

A single radio non-AP MLD with dot11EHTEMLSROptionImplemented equal to true shall set the Maximum Number Of Simultaneous Links subfield in the Common Info field of the (#12654) Basic Multi-Link element to 0.

If a multi-radio non-AP MLD requests more than one link during multi-link setup, the multi-radio non-AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Common Info field of the (#12655) Basic Multi-Link element carried in transmitted Management frames to a value equal to or larger than 1.

A multi-radio non-AP MLD shall announce each pair of links formed by links that requested a multi-link setup as STR or NSTR in a transmitted (Re)Association Request frame.

An (#12357) MLD shall be capable of simultaneously transmitting or receiving frames on affiliated STAs up to a value indicated in the Maximum Number Of Simultaneous Links subfield in the Basic Multi-Link element plus 1, under the rules defined in subclauses below.

An MLD shall set the NSTR Link Pair Present subfield value to 1 in a STA Control field that corresponds to link ID *i* (where ) only if it is a multi-radio MLD and contains at least one NSTR link pair formed by the link with link ID *i*; otherwise it shall set the subfield value to 0. An NSTR mobile AP MLD shall set the NSTR Link Pair Present subfield value to 1 in the STA Control field that corresponds to link ID *i*. An AP MLD that is not an NSTR mobile AP MLD shall set the NSTR Link Pair Present subfield value in each STA Control field to 0.

An MLD shall set to 0 every bit in the NSTR Indication Bitmap subfield , if present,(#12358) of the Basic Multi-Link element that corresponds to a link pair where one of the STAs in the link pair operates in the 2.4 GHz band and the other STA operates in the 5 GHz or 6 GHz band.

A non-AP MLD may set the Frequency Separation For STR subfield in the Common Info field of the Basic Multi-Link element (#12657) to a nonzero value if it intends to indicate the minimum frequency separation that is recommended between two links for the non-AP MLD for STR operation; otherwise the non-AP MLD shall set the Frequency Separation For STR subfield to 0.

An AP MLD might take into account the information provided by associated non-AP MLDs in the Frequency Separation For STR subfield in their transmitted Multi-Link elements when the AP MLD intends to set up BSSs in the future referring to the information provided by those non-AP MLDs or switch the BSS operating channel of one or more of the setup links with those non-AP MLDs. How the AP MLD uses the information provided by the Frequency Separation For STR subfield is out of scope of the standard.

NOTE 1—The non-AP MLD ensures that the minimum frequency separation indicated in the Frequency Separation For STR subfield starts from the frequency edge of the maximum supported bandwidth indicated by the Supported Channel Width Set subfield in the HE Capabilities element and the Support For 320 MHz in 6 GHz subfield in the EHT Capabilities element of each link.

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

NOTE 2—The ability might change due to an AP switching BSS operating channels of one or more of the setup links with the non-AP MLD.

***End of change***