IEEE P802.11  
Wireless LANs

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| CR for 35.3.15.4: Capability Signaling | | | | |
| Date: 2021-07-06 | | | | |
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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.

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 4116 | Abhishek Patil | 35.3.14.4 | 275.42 | The title can be more descriptive. | Consider changing the title to "Multi-Link Capability Signaling" | Revised.  Agree with the commenter, make the changes accordingly.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4116  TGbe editor to search the whole spec and change the title of this sub-clause when it is referenced in other places. |
| 4077 | Abhishek Patil | 35.3.14.4 | 276.01 | Move the paragraph starting "An MLD shall set the MLD Capabilities Present subfield in ..." to be the first paragraph in this subclause. Also please provide the rules when carries in Beacon and Probe Response frames. | As in comment | Revised  The conditions of the present of MLD Capabilities subfield are descripted in subclause 9.4.2.295b.2 (Basic variant Multi-Link element) base on the CR of CID4014 in doc 11-21/1206r4, so the rules don’t need to repeat here. The related paragraphs are deleted.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4077 |
| 4405 | Arik Klein | 35.3.14.4 | 276.03 | It is not clear if the MLD Capabilities Present subfield in the Multi-Link Control field of the Basic variant Multi-Link element shall be set to 0 if not carried in either a (Re)Association Request frame or (Re)Association Response frame | Option 1: If the MLD Capabilities Present subfield is set to 1 ONLY if carried in a (Re)Association Request frame or (Re)Association Response frame, add the following sentence: "Otherwise - it is set to 0" Option 2: If the MLD Capabilities Present subfield is set to 1 if carried in other frames besides the (Re)Association Request frame or (Re)Association Response frame (excluding the Authentication frame) - please specify in which frame it occurs and add these frames to the current text. | Revised  The conditions of the present of MLD Capabilities subfield are descripted in subclause 9.4.2.295b.2 (Basic variant Multi-Link element) base on the CR of CID4014 in doc 11-21/1206r4, so the rules don’t need to repeat here. The related paragraphs are deleted.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4405 |
| 4076 | Abhishek Patil | 35.3.14.4 | 275.45 | What is the value when the element is carried in the Beacon and Probe Response frame? | Include Beacon and Probe Response frame in the description text. | Revised  The conditions of the present of MLD Capabilities subfield are descripted in subclause 9.4.2.295b.2 (Basic variant Multi-Link element) base on the CR of CID4014 in doc 11-21/1206r4. Here it doesn’t need to mention particular frame types. So the names of management frames are deleted to make it general.  Because for an AP MLD, it is neither (E)MLSR nor EMLMR, the Maximum Number Of Simultaneous Links subfield is always equal to the number of affiliated APs, so changes the value to the number of afflicated APs for simplicity.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4076 |
| 5764 | Laurent Cariou | 35.3.14.4 | 0.00 | shouldn't we need a rule for how the AP sets this field (Max number of simultaneous links) in a beacon/probe response frame (if included). I assume it is set to the number of APs in the AP MLD. | as in comment | Revised  The conditions of the present of MLD Capabilities subfield are descripted in subclause 9.4.2.295b.2 (Basic variant Multi-Link element) base on the CR of CID4014 in doc 11-21/1206r4. Here it doesn’t need to mention particular frame types. So the names of management frames are deleted to make it general.  Because for an AP MLD, it is neither (E)MLSR nor EMLMR, the Maximum Number Of Simultaneous Links subfield is always equal to the number of affiliated APs, so changes the value to the number of afflicated APs for simplicity.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 5764 |
| 6312 | Ming Gan | 35.3.14.4 | 275.44 | Add "the number of per-STA profiles included in the Basic variant Multi-Link element in transmitted (Re)Association Response frames should be equal to or larger than 1", otherwise, the Maximum Number Of Simultaneous Links subfield set by the AP MLD could be 0. | as in the comment | Revised  Agree with the commenter, clarify that the number of affiliated APs in the AP MLD is larger than 1.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6312 |
| 4403 | Arik Klein | 35.3.14.4 | 275.44 | The sentence refers to the value setting of the "Maximum Number Of Simultaneous Links" subfield in the MLD Capabiities if it is included in the (Re)Association Response. What is the expected value the MLD is included in Beacon ? Probe Response? | Add a definition for the value setting of the "Maximum Number Of Simultaneous Links" subfield in the MLD Capabiities if it is included in the Beacon / Probe Response If it is reserved - please specify it in the text | Revised  The conditions of the present of MLD Capabilities subfield are descripted in subclause 9.4.2.295b.2 (Basic variant Multi-Link element) base on the CR of CID4014 in doc 11-21/1206r4. Here it doesn’t need to mention particular frame types. So the names of management frames are deleted to make it general.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4403 |
| 8248 | Yuxin LU | 35.3.14.4 Capability signaling | 275.52 | Suggest to add a paragraph for AP MLD similar to this paragraph | Such as add "An AP MLD shall set the Maximum Number Of Simultaneous Links subfield value to be greater than or equal to1 in transmitted (Re)Association Response frames." | Revised  The above paragraph already covers AP MLD side.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 8248 |
| 6856 | Rubayet Shafin | 35.3.14.4 | 275.45 | is "that of" referring to Maximum Number Of Simultaneous Links? Doesn't make sense | delete "that of" | Revised  The paragraph is modified, no “that of” in the updated version.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6856 |
| 6857 | Rubayet Shafin | 35.3.14.4 | 275.45 | should it be "less than or equal to" instead of "greater than or equal to"? | as in comment | Revised  The paragraph is modified, making changes to “equal to” in the updated version.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6857 |
| 6983 | Sanghyun Kim | 35.3.14.4 | 275.45 | Type 'per-STA' | Change 'per-STA' to 'Per-STA' | Revised.  The sentence is re-orgnized, this typo doesn’t exsit any more.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6983 |
| 6313 | Ming Gan | 35.3.14.4 | 275.44 | The case of NSTR soft AP MLD is missing, or move the last paragraph here | as in the comment | Revised  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6983 |
| 7342 | Stephen McCann | 35.3.14.4 | 276.43 | typo "equals to" | Change "equals to" to "is equal to". The same change needs to be made on P286L6, P326L18, P411L9, P411L13, P411L40, P412L56, P419L13, P422L58, P538L13 | Revised  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7342  TGbe editor to search the whole specification and change “equals to” to “is equal to” in other places. |
| 6137 | Matthew Fischer | 35.3.14.4 | 276.46 | "value equal to 1" is not syntactically correct | Change "value equals to 1" to "value of 1" | Revised  Changes “to a value equals to” to “to”  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6137 |
| 7343 | Stephen McCann | 35.3.14.4 | 276.46 | typo "to a value equals to" | Change "to a value equals to" to "to" | Revised  Agree with the commenter.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7343 |
| 7630 | Tomoko Adachi | 35.3.14.4 | 276.45 | "An NSTR soft AP MLD shall set the Maximum Number Of Simultaneous Links subfield in ... to a value equals to 1." It can be said "An NSTR soft AP MLD shall set the Maximum Number Of Simultaneous Links subfield in ... to 1." | As in comment. | Revised  Agree with the commenter.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7630 |
| 7728 | Xiaofei Wang | 35.3.14.4 | 276.46 | Change "to a value equals to 1" to "to 1" | as in comment | Revised  Agree with the commenter.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7728 |
| 4404 | Arik Klein | 35.3.14.4 | 275.49 | The sentence refers to the value setting of the "Maximum Number Of Simultaneous Links" subfield in the MLD Capabiities if it is included in the (Re)Association Request. What is the expected value the MLD is included in Probe Request? Authentication? | Add a definition for the value setting of the "Maximum Number Of Simultaneous Links" subfield in the MLD Capabiities if it is included in the Probe Request / Authenticate If it is reserved - please specify it in the text | Revised  The previous paragraphs clarifiy whether the MLD Capabilities Present subfield set to 1 in Association Request, Probe Request and Authentication frames. Here it doesn’t need to mention particular frame types. So the names of management frames are deleted to make it general.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4404 |
| 6858 | Rubayet Shafin | 35.3.14.4 | 275.57 | The sentence " A multi-radio non-AP MLD shall announce each pair of links formed by links that requested for multi-link setup is STR or NSTR in transmitted (Re)Association Request frame" does not make sense. This is also grammatically incorrect. | Please clarify what the author of the sentence tried to convey. Maybe changing "is" to "as" will fix it? Please confirm with the original author. | Revised  Agree with the commenter. “is” is changed to “as”.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6858 |
| 4830 | Dibakar Das | 35.3.14.4 | 275.57 | "A multi-radio non-AP MLD shall announce each pair of links ..."-> "A multi-radio non-AP MLD shall announce whether each pair of links ..." | As in comment. | Revised  Change “is” to “as” in this sentence to make it clear.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4830 |
| 7623 | Tomoko Adachi | 35.3.14.4 | 275.49 | "A single radio non-AP MLD shall set ..." What is "single radio non-AP MLD"? It needs clarification. Is it a non-AP MLD in EMLSR mode? | As in comment. | Revised  The definition of a single radio non-AP MLD has already been included in sub-clause 3.2  No Matter the single radio MLD operation in EMLSR mode or not, it always shall set the Maximum Number Of Simultaneous Links subfield to 0.  A sentence is added to clarify the non-AP MLD with dot11EHTEMLSROptionImplemented equal shall set the Maximum Number Of Simultaneous Links subfield to 0  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7623 |
| 7624 | Tomoko Adachi | 35.3.14.4 | 275.53 | "A multi-radio non-AP MLD shall set ..." What is "multi-radio non-AP MLD"? It needs clarification. Is it a non-AP MLD in EMLMR mode? Then, how does a non-AP MLD which is not in EMLMR mode and which does not have any NSTR link pairs set the Maximum Number Of Simultaneous Links subfield? | As in comment. | Rejected.  The definition of a multi-radio non-AP MLD has already been included in sub-clause 3.2  The value of Maximum Number Of Simultaneous Links subfield shoud not vary when a multi-radio MLD changes its EMLMR mode, so it does not need to mention EMLMR mode here. |
| 7625 | Tomoko Adachi | 35.3.14.4 | 275.57 | "A multi-radio non-AP MLD shall announce ..." What is "multi-radio non-AP MLD"? It needs clarification. | As in comment. | Rejected.  The definition of a multi-radio non-AP MLD has already been included in sub-clause 3.2 |
| 7626 | Tomoko Adachi | 35.3.14.4 | 276.11 | "... only if it is a multi-radio MLD ..." What is "multi-radio MLD"? It needs clarification. Is it a non-AP MLD in EMLMR mode? Then a non-AP MLD in EMLSR mode shall set the NSTR Link Pair Present subfield value to 0, by which the non-AP MLD cannot tell the AP MLD the information on the NSTR link pairs? It seems better for the AP to know the NSTR link pairs even for non-AP MLDs in EMLSR mode. | As in comment. | Rejected.  The definition of a single radio non-AP MLD and multi-radio non-AP MLD has already been included in sub-clause 3.2.  Doesn’t see a value to indicate the NSTR capability for the link pairs for single radio MLD in EMLSR mode. |
| 4831 | Dibakar Das | 35.3.14.4 | 275.60 | Move the note to the part where NSTR Link pair is defined for better readability. | As in comment. | -Revised.  It has already been moved to sub-claluse 3.1 of D1.01 in doc 11-21/0530r5 (Motion 214)  TGbe editor doesn’t need to do further changes base on D1.01 |
| 6959 | Sanghyun Kim | 35.3.14.4 | 275.60 | A link pair may be a STR link pair of an MLD, while the same link pair is an NSTR link pair of another MLD. | To make the NOTE1 more clear, please add 'of that MLD' at the end of the NOTE | Revised  Agree with the commenter, “for that MLD” is added.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6959 |
| 6314 | Ming Gan | 35.3.14.4 | 276.12 | For NSTR Link Pair Present subfield, the case of NSTR soft AP MLD is missing. Or move the last paragraph here | as in the comment | Revised  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6314 |
| 8206 | Yunbo Li | 35.3.14.4 | 276.48 | In the above paragraphs in this subclause, it alreay clarify that if there is at least one NSTR link pair formed by a link, the NSTR Link Pair Present subfield value shall set to 1 in corresponding STA Control field. The second bullet is redundant. | remove the second bullet | Revised  TGbe editor to make the changes shown in doc 21/1203r2 under CID 8206 |
| 5304 | Jarkko Kneckt | 35.3.14.4 | 276.48 | The LinkId 15 is reserved for unknown value and should not be used | Please use only linkId values 0-14 and allocate value 15 for unknown linkId. | Rejected.  “<15” is used in the sentence, it already means that the link with link ID 15 is not included. |
| 6769 | Romain GUIGNARD | 35.3.14.4 | 275.16 | Please clarify in which field is the NSTR indication bitmap subfield. It is currently difficult to know where it is. | as in comment | Revised  “of the Basic variant Multi-Link element” is added to clarify the location of the NSTR indication bitmap subfield.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 6769 |
| 4931 | Eldad Perahia | 35.3.14.4 | 276.16 | "An MLD shall set to 0 every bit in the NSTR Indication Bitmap subfield 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." Does this mean that NSTR is not allowed between 2.4 GHz and other bands for both AP and non-AP STAs? How does this work with a single radio device? | as in comment | Rejected.  Based on the task group’s agreement, if one link in 2.4GHz and the other link in 5GHz or 6GHz, this link pair will be STR link pair. For single radio non-AP MLD, it will only use one link at a time, so it doesn’t matter that the link pair is STR or NSTR. In the current spec, it already clarifies that a single radio non-AP MLD will set the Maximum Number Of Simultaneous Links subfield to 0, and it doesn’t need to indicate the STR/NSTR for each link pair. |
| 6770 | Romain GUIGNARD | 35.3.14.4 | 275.37 | I think the non-AP MLD shall inform the AP MLD if the Frequency Separation For STR subfield is not set or if the ability is different from the result infered by the Frequency Separation For STR subfield. Otherwise, the AP may consider pair of links as STR while the pair of links is become NSTR after for example operating channel modification. | Please clarify the text | Rejected.  The Frequency Separation For STR subfield is reported by a non-AP MLD, so it doesn’t make sense that the STA’s ability is different from the value in the Frequency Separation For STR subfield.  Besides, this parameter is used to aid AP MLD to do BSS setup or channel switch (see next paragraph). For the STR/NSTR capability, AP MLD will always relay on the indication in NSTR Indication Bitmap subfield. |
| 7627 | Tomoko Adachi | 35.3.14.4 | 276.27 | "An AP MLD might take into account the information provided by associated non-AP MLDs in the Frequency Separation For STR subfield ..." If the Frequency Separation For STR subfield is likely not to be used, then it's a waste to set such subfield. | Change "might" to "may" in pp.ll 276.27. Or delete the Frequency Separation For STR subfield throughout the draft. | Revised.  “might” is more proper here than “may” base on offline discussion, so keep “might” unchanged. In order to clarify how to use the Frequency Separation For STR subfield is out of scope of the standard, one sentence is added.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7627 |
| 7856 | Yonggang Fang | 35.3.14.4 | 276.27 | An AP MLD should setup BSS first before an non-AP MLD can assoicate with. How an AP MLD can consider "the information provided by associated non-AP MLDs in the Frequency Separation For STR subfield in their transmitted Multi-Link elements" in the BSS setup ? | Please clarify this | Revised  AP can consider the history information provided by associated non-AP MLDs when it intends to set up new BSSs. Text “in the future referring to the information provided by those non-AP MLDs” is added for clarification.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7856 |
| 7628 | Tomoko Adachi | 35.3.14.4 | 276.33 | "... starts from the frequency edge of the maximum supported bandwidth indicated in the EHT Capabilities element ..." The field name should be clarified. | As in comment. | Revised.  Clarify that the indication is in  the Supported Channel Width Set subfield in the HE Capabilities element and the Support For 320MHz In 6GHz subfield in the EHT Capabilities element.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 7628 |
| 4474 | Arik Klein | 35.3.14.4 | 276.39 | Use the term "perform STR operation" rather than "perform STR" | The correct sentence shall be:"The ability of a non-AP MLD to perform STR opeeration 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 operation" | Revised.  Agree with the commenter.  TGbe editor to make the changes shown in doc 21/1203r2 under CID 4474 |

***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**

***TGbe editor: Please change below paragraphs in subclauses 3.1(Definitions) as follows:***

**3.1 Definitions**

**Nonsimultaneous transmit and receive (NSTR) link pair:** A pair of links within an MLD for which the receiver requirements specified in Clause 36 (Extremely high throughput (EHT) PHY specification) are not met on one of the links when a STA of the MLD is transmitting on the other link. Each link of such a pair is a member of the NSTR link pair.

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 for that MLD. **(#6959)**

***TGbe editor: Please change below paragraphs in subclauses 35.3.4.4 (Multi-Link element usage rules in the context of discovery) as follows:***

**35.3.4.4 Multi-Link element usage rules in the context of discovery**

(#4077, 4405)

***TGbe editor: Please change below paragraphs in subclauses 35.3.5.4 (Usage and rules of Basic variant Multi-Link element in the context of multi-link (re)setup) as follows:***

**35.3.5.4 Usage and rules of Basic variant Multi-Link element in the context of multi-link (re)setup**

(#4077, 4405) (#4077, 4405) (#4077, 4405) (#4077, 4405)

***TGbe editor: Please change below paragraphs in subclauses 35.3.15.4 (Capability signaling) as follows:***

## (#4116) Multi-Link device capability signaling

(#4076, 5764, 6312, 4403, 8248)An AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Basic variant Multi-Link element to the number of affliated APs minus 1, in which the number of affiliated APs in the AP MLD shall be greater than 1.(#6856, 6857). (#6983)

(#6313) If dot11EHTBaselineFeaturesImplementedOnly is equal to (#7342) true, an NSTR soft AP MLD shall set the Maximum Number Of Simultaneous Links subfield of the Basic variant Multi-Link element carried in transmitted Management frames to 1. (#6137, 7343, 7630, 7728)

A single radio non-AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Basic variant Multi-Link element carried in transmitted Management frames to 0.(#4404)

(#7623) An non-AP MLD with dot11EHTEMLSROptionImplemented equal to true shall set the Maximum Number Of Simultaneous Links subfield in the Basic variant Multi-Link element to 0.

A multi-radio non-AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Basic variant 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.(#6858, 4830)

(#4831)

(#4077, 4405)

(#4077, 4405)

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 0  *i*  15 ) 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. (#6314, 8206)An NSTR soft 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 soft 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 of the Basic variant Multi-Link element (#6769) 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 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 (#7627) 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.(#7856)

NOTE 2—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 320MHz In 6GHz subfield in the EHT Capabilities element of each link. (#7628)

The ability of a non-AP MLD to perform STR operation (#4474)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. (#4474)

NOTE 3—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.

(#6313, 6314)

***End of change***