IEEE P802.11  
Wireless LANs

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| CR for 35.3.16.2 | | | | |
| Date: 2023-05-04 | | | | |
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Abstract

This submission proposes comment resolution(s) for the following 15 CID(s) received in LB271 on TGbe D3.1

CIDs:

15064, 15414, 15415, 15555, 15556, 15643, 16276, 16858, 16860, 16861, 16862, 16863, 16864, 17872, 18302

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: green tags are added. And also with several minor editoral changes.

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| **CID** | **Commenter** | **Clause** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15064 | Michail Koundourakis | 35.3.16.2 | 0.00 | PM signaling currently relies on per-link signaling. It would be more efficient to define a mechanism via which an non-AP MLD can signal PM transitions on all links in a single frame exchange. Especially for single radio (EMLSR) devices, this can save power by eliminating the overhead of having to announce unavailability on multiple links. | Add a mechanism a non-AP MLD can use to signal PM on multiple links, using a single frame exchange. | Rejected  Power save mode signaling is carried in FC of a Data or Management frame, so very minor signaling overhead for PM mode switch. Don’t see a significant overhead reduce when allow a cross link signaling.  For EMLSR cases, the power save mode of each link after EMLSR mode enabled or disabled already been clearly defined (see 35.3.17 (Enhanced multi-link single radio operation)). No extra signaling is needed for EMLSR operation. |
| 15414 | John Wullert | 35.3.16.2.1 | 551.23 | It is not clear what the word "otherwise" is suggesting an exception to. It seems most likely it is refering to the frame the field is carried in. | Replace "Otherwise, ..." with "When carried in other frames, ..." | Revised  Agree with the commenter.  **TGbe editor, please make changes as shown in 11-23/0723r1 tagged 15414** |
| 15415 | John Wullert | 35.3.16.2.1 | 551.29 | It is not clear what word "otherwise" is suggesting an exception to. It seems most likely it is refering to the frame the field is carried in. | Replace "Otherwise, ..." with "When carried in other frames, ..." | Revised  Agree with the commenter.  **TGbe editor, please make changes as shown in 11-23/0723r1 tagged 15415** |
| 15555 | Chaoming Luo | 35.3.16.2 | 551.40 | This paragragh is covered by the previous one. It is redundant. | Either remove this paragraph or remove the previous one. | Rejected  The 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. |
| 15556 | Chaoming Luo | 35.3.16.2 | 551.59 | Change 'An MLD' to 'A non-AP MLD', since the cases of AP MLD are described separately after that. | As in comment | Accepted |
| 15643 | Xiangxin Gu | 35.3.16.2 | 551.40 | The case described is covered by the previous sentence. | Combine it into the previous sentence. | Rejected  The 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. |
| 16276 | Ryuichi Hirata | 35.3.16.2.1 | 551.18 | The ability to perform STR depends on some parameters (BW, Tx Power, etc.). But current spec does not consider this and this may reduce spectrum efficiency. | Solve this issue. This could be solved by indicating additional parameters about the ability to perform STR (cross link interference, etc.) and enable MLD to change STR/NSTR operation dynamically. | Rejected  This topic has been discussed. The task group fails to reach consensus to allow NSTR status varies depends on different PPDU transmission parameters (such as BW, power, MCS,…)  See doc 11-22/1745r1 |
| 16858 | Mark RISON | 35.3.16.2.1 | 551.32 | "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." duplicates Clause 9 | Delete the cited text | Revised  The encoding of the Maximum Number Of Simultaneous Links subfield in Table 9-401i in subclause 9.4.2.312.2.3 is updated to avoid the duplication.  **TGbe editor, please make changes as shown in 11-23/0723r1 tagged 16858** |
| 16860 | Mark RISON | 35.3.16.2.1 | 551.36 | "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. A single radio non-AP MLD with dot11EHTEMLSROptionActivated 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." -- the second sentence is a special case of the first | Delete the second sentence | Rejected  The 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. |
| 16861 | Mark RISON | 35.3.16.2.1 | 551.37 | "carried in transmitted Management frames" -- elements can't be carried in anything else | Delete (also at line 45) | Accepted |
| 16862 | Mark RISON | 35.3.16.2.1 | 551.54 | "An 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." duplicates Clause 9 | Delete the cited text | Revised  The encoding of the Maximum Number Of Simultaneous Links subfield in Table 9-401i in subclause 9.4.2.312.2.3 is updated to avoid the duplication.  **TGbe editor, please make changes as shown in 11-23/0723r1 tagged 16858** |
| 16863 | Mark RISON | 35.3.16.2 | 0.00 | The scope of multi-link operation is not clear. For example, if you can't do 5G + 6G simultaneously, but can do 6G simultaneously with 2G4, what value do you put in Maximum Number Of Simultaneous Links? Does it vary per link? | As it says in the comment | Rejected  The Maximum Number Of Simultaneous Links doesn’t tie to NSTR link pairs. In an example that a non-AP MLDs has 3 links which are link 1 @2.4 GHz, link 2 @ 5 GHz, link 3 @ 6 GHz respectively, and link 2 and link 3 forms an NSTR link pair, the Maximum Number of Simultaneous Links subfield will be set to 2 to indicate that this non-AP MLD can simultaneously operating on 3 links. Aligned transmissions can happen link 2 and link 3 at the same time, aligned receptions can also happen link 2 and link 3 at the same time. |
| 16864 | Mark RISON | 35.3.16.2.1 | 551.64 | "has removed the nonprimary link" is not clear, and the sentence looks as if it might contradict with the previous sentence | As it says in the comment | Rejected  Don’t see any ambiguity for “has removed the nonprimary link”. Before the nonprimary link is removed, there is one NSTR link pair for the NSTR mobile AP MLD, so the NSTR Link Pair Present subfield is set to 1. After the nonprimary link is removed, there is only one link left for this NSTR mobile AP MLD, and no NSTR link pair anymore, so the NSTR Link Pair Present subfield is set to 0. It is aligned with the previous sentence. |
| 17872 | Gaurang Naik | 35.3.16.2.1 | 551.54 | simultaneously transmitting or receiving frames \*on\* affiliated STAs --> simultaneously transmitting or receiving frames \*via\* affiliated STAs | As in comment | Accepted |
| 18302 | kaiying Lu |  | 490.10 | "The Maximum Number Of Simultaneous Links subfield" is capability of the MLD. Change to "AP MLD shall set the Maximum Number Of Simultaneous Links subfield in the Basic Multi-Link element to the maximum number of affiliated APs minus 1, in which the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is capable of operating with more than one affiliated APs." | As in comment. | Rejected  The commenter fails to identify a technical issue. An AP MLD shall be capable of operating with all affilicated APs, so don’t see the value to add proposed text “the number of affiliated APs in the AP MLD shall be greater than 1 when the AP MLD is capable of operating with more than one affiliated APs”. |

Discussion：

**Proposed spec text**

***TGbe editor: Please make the following changes in subclause 35.3.16.2.1 (General):***

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

**35.3.16.2.1 General**

An AP affiliated with an AP MLD shall set the (#16857)MLD Capabilities And Operations Present subfield in the Multi-Link Control field of the Basic Multi-Link element to 1 when carried in transmitted Beacon, Probe Response, and (Re)Association Response frames. When a Basic Multi-Link element is carried in other frames, the AP (#15414) shall set the (#16857)MLD Capabilities And Operations Present subfield to 0.

A non-AP STA affiliated with a non-AP MLD shall set the (#16857)MLD Capabilities And Operations Present subfield in the Multi-Link Control field of the Basic Multi-Link element to 1 when carried in transmitted (Re)Association Request frames. When a Basic Multi-Link element is carried in other frames, the non-AP STA (#15415) shall set the (#16857)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 Basic Multi-Link element to the number of affiliated APs minus 1.

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 (#16861) to 0.

A single radio non-AP MLD with dot11EHTEMLSROptionActivated 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.

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 (#16861) 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, by setting the corresponding bit in the NSTR Indication Bitmap subfield of the Basic Multi-Link element to 0 or 1, respectively (see 9.4.2.312.2 (Basic Multi-Link element)).

An MLD shall be capable of simultaneously transmitting or receiving frames via (#17872) 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.

A non-AP (#15556) 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. 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* unless the NSTR mobile AP MLD has removed the nonprimary link, in which case NSTR mobile AP MLD shall set the subfield to 0. 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, 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 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.

***TGbe editor: Please make the following changes in subclause 9.4.2.312.2.3 (Common Info field of the Basic Multi-Link element):***

**9.4.2.312.2.3 Common Info field of the Basic Multi-Link element**

**Table 9-401i—Subfields of the MLD Capabilities And Operations subfield**

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| **Subfield** | **Definition** | **Encoding** |
| Maximum Number Of Simultaneous Links | Indicates the maximum number of STAs affiliated with the MLD that support simultaneous transmission or reception of frames on the respective links. | (#16858)Set to a value between 0 and 14, which is the maximum number of affiliated STAs of the MLD that support simultaneous transmission or reception of frames minus 1.  The value 15 is reserved.  See 35.3.16.2 (Multi-link device capability and operation signaling). |