**IEEE P802.11
Wireless LANs**

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| LB266 CR for 35.3.20 (NSTR Mobile AP MLO)  |
| Date: 2022-07-25 |
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Abstract

This submission proposes resolutions for multiple comments related to TGbe D2.0 with the following CIDs (31 CIDs):

* 10014, 10132, 10720, 10900, 11644, 12284, 12330, 12390, 12391, 12392, 12437, 12438, 12523, 12734, 12735, 13073, 13075, 13425, 13651, 13652, 13653, 13851, 14035, 14074, 14087, 11165, 10033

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Added CID #10033. Modified resolutions on CID #12284, #13007, #10014, #10132 and #12390. Some editorial changes.
* Rev 2: Deferred CID #10168, #10721, #13007, #10855 and #11270. Modified resolutions on CID #12330, #10132, #10033, #12392
* Rev 3: clean up texts and comments
* Rev 4: clean up and green tagged some CIDs
* Rev 5: Defer CIDs #10900, #12284 and #13653. Modified resolutions on CID#10032
* Rev 6: Defer CIDs #10132, #10014, #10168, #10721, #13007, #12390
* Rev 7: Modified comment resolutions for #10132, #12390, #10168, #10721, #13007

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 subsequent TGbe Draft. This introduction is 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).***

***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.***

| **CID** | **Commenter** | **Subclause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| 10132 | Jay Yang | 35.3.19.1  | 468.59 | need some sentence to clarify the Trigger Based channel access | as the comments. | RevisedAgree with the commenter in principle. Tgbe editor please implement changes as shown in doc 11-22/1233r7 tagged as #10132 |
| 12390 | Rojan Chitrakar | 35.3.19.1 | 469.12 | Why "peer device" is used here when the immediately preceding sentence and elsewhere use associated non-AP STA? | Replace "peer device" with associated non-AP STA. |  Revised.Changed to Tgbe editor please implement changes as shown in doc 11-22/1233r7 tagged as #12390. |
| 10168 | Julien Sevin | 35.3.19.1  | 468.44 | In the scope of an NSTR mobile AP MLD operation, an NSTR mobile AP MLD shall designate one link of an NSTR link pair as the primary link. No procedure has been specified to designate the primary link | Specify a procedure for designating a primary link | RevisedAgree with the comment in princilple.A Primary Link Indication subfield is added when the AP MLD Type Indication is set to 1 in the Common Info field of ML element. Tgbe editor please implement changes as shown in doc 11-22/1233r7 tagged as #10168. |
| 10721 | Xiandong Dong | 35.3.19.1 | 468.45 | is it needed to difine a mechnism wrt how does the NSTR mobile AP designate a link as primary link, if not, how does the non-AP MLD know it will not send probe request on nonprimary link, please clarify | As in the comment | RevisedAgree with the comment in princilple.A Primary Link Indication subfield is added when the AP MLD Type Indication is set to 1 in the Common Info field of ML element. Tgbe editor please implement changes as shown in doc 11-22/1233r7 tagged as #10721 |
| 13007 | Chunyu Hu | 35.3.19.1 | 468.44 | How is the primary link designation is done? Does it need to be signaled/advertised to (un)associated STAs? If not, is the primary link selection permanent throughput the lifetime of the BSS? | Need to develop text to address the problems raised in the comment. | RevisedAgree with the comment in princilple.A Primary Link Indication subfield is added when the AP MLD Type Indication is set to 1 in the Common Info field of ML element. If the primary link needs to be changed, channel switching can be performed to achieve this purpose.Tgbe editor please implement changes as shown in doc 11-22/1233r7 tagged as #13007. |

1. **Introduction**
2. **Proposed spec text**

**35.3.20 NSTR mobile AP MLD operation**

**35.3.20.1 General**

***TGbe editor: Please modify the following subclause 35.3.20.1 as follows:***

An NSTR mobile AP MLD shall be an AP MLD which sets dot11EHTNSTRMobileAPMLDImplemented to true. If dot11EHTBaseLineFeaturesImplementedOnly is equal to true, an NSTR mobile AP MLD shall have one NSTR pair of links and shall follow with the restrictions below:

* Each AP affiliated with an NSTR mobile AP MLD may optionally support the following features in addition to the optional features supported by a regular AP

•Support of DL and UL OFDMA operation if dot11EHTNSTRMobileAPMLDOFDMAImplemented is set to true (#10132)

•Support of two or more spatial streams

•Support for 160 MHz operating channel width in the 6 GHz band

* The NSTR mobile AP MLD is in a mobile device that is typically battery powered

NOTE 1—An NSTR mobile AP MLD follows the same rules defined in 35.3.2 (Multi-link device addressing) (#12735).

An NSTR mobile AP MLD shall designate one link of an NSTR link pair as the primary link. The NSTR mobile AP MLD shall schedule for transmissions of Beacon and Probe Response frames and group addressed Data frames only on the primary link. The other link of the NSTR link pair is the nonprimary link.

TSF timers of all APs affiliated with an NSTR mobile AP MLD shall be the same.

NOTE 2—A non-AP MLD that is associated with an NSTR mobile AP MLD follows the TSF timers of all APs affiliated with an NSTR mobile AP MLD in each link. Since TSF timers of all APs affiliated with an NSTR mobile AP MLD is the same, a non-AP MLD that is associated with an NSTR mobile AP MLD only needs to maintain one TSF timer for all the links.

A non-AP MLD shall perform frame exchanges during the authentication, (re)association, and 4-way handshake procedures only on the primary link of the NSTR mobile AP MLD.

NOTE 3—Any frames including management frames are disallowed to be transmitted on the nonprimary link alone through EDCA channel access.

STAs affiliated with a non-AP MLD that is associated with an NSTR mobile AP MLD and APs affiliated with an NSTR mobile AP MLD shall follow the procedure defined in 35.3.16.6 (Start time sync PPDUs medium access) when intending to transmit in the nonprimary link with the following additional constraints:

—A STA affiliated with the non-AP MLD may initiate a PPDU transmission to its associated AP affiliated with the NSTR mobile AP MLD in the nonprimary link only if the other STA affiliated with the same non-AP (#13851) MLD in the primary link is also initiating the PPDU as a TXOP holder to its associated AP(#13851) with the same start time.

—An AP affiliated with the NSTR mobile AP MLD may initiate a PPDU transmission to its associated non-AP STA in the nonprimary link only if the other AP affiliated with the same NSTR mobile AP MLD in the primary link is also initiating the PPDU as a TXOP holder with the same start time.

APs affiliated with an NSTR mobile AP MLD that are simultaneously transmitting PPDUs to the associated non-AP STAs (#12390) affiliated with an MLD shall align the end time of PPDUs following the same rules that are defined for an AP MLD in 35.3.16.5 (PPDU end time alignment).

STAs affiliated with a non-AP MLD that are simultaneously transmitting PPDUs to the respective associated (#12390) APs affiliated with an NSTR mobile AP MLD shall align the end time of PPDUs following the same rules that are defined for an AP MLD in 35.3.16.5 (PPDU end time alignment).

NOTE 4—The end time alignment of PPDUs carrying the response frames follow the same rules as those for the soliciting PPDUs.An NSTR mobile AP MLD shall set the SRS Support subfield in the Common Info field of the Basic Multi-Link element it transmits to 1 to indicate support for the reception of a frame that carries an SRS Control subfield if its dot11SRSOptionImplemented is true; otherwise, the MLD shall set it to 0.

If STAs affiliated with a non-AP MLD or its associated NSTR mobile AP MLD simultaneously transmit PPDUs to a STA affiliated with an MLD that has dot11SRSOptionImplemented equal to true, and the transmitted PPDUs solicit control response frames and the MLD intends to align the end times of the PPDUs sent in response by the peer STAs, then at least one of the PPDUs soliciting a control response frame shall carry an MPDU with SRS Control subfield following the procedure defined in 35.3.16.5.2 (End time alignment of response PPDUs using SRS Control field).

Default TID-to-link mapping mode shall be supported in the NSTR link pair.

An AP affiliated with an NSTR mobile AP MLD that is operating on the primary link shall not be disabled. (#10033, #12437, #12438, #12523, #13075, #14035, #14074, #14087).

**35.3.20.2 Discovery of an NSTR mobile AP MLD**

The discovery procedure for an NSTR mobile AP MLD is the same as the procedure described in 35.3.4 (Discovery of an AP MLD) with the following exceptions:

—An AP affiliated with an NSTR mobile AP MLD and that is operating on the primary link of an NSTR link pair shall indicate that it is an NSTR mobile AP MLD by setting (#12391, #11165)AP MLD Type Indication subfield to 1 in MLD Capabilities and Operations field of Common Info field in the Basic Multi-Link element. The AP shall indicate that it is operating on the primary link by setting the Primary Link Indication subfield to 1 in the MLD Capabilities and Operations subfield. A reporting AP may also advertise in the Reduced Neighbor Report element that a reported AP is operating on a primary link by setting the Primary Link Indication subfield to 1 in the MLD Parameters subfield of the TBTT Information field corresponding to the reported AP. (#10168, #10721, #13007)

—An AP affiliated with an NSTR mobile AP MLD and that is operating on the primary link of an NSTR link pair shall include a Reduced Neighbor Report element with the MLD Parameters subfield present in a TBTT Information field corresponding to a reported AP affiliated with the NSTR mobile AP MLD and that is operating on the nonprimary link of the NSTR link pair in a Beacon and Probe Response frames that it transmits. The Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short-BSSID subfield, the BSS Parameters subfield and the 20 MHz PSD subfield shall not be present in the TBTT Information Field for that reported AP. The TBTT Information Field Type subfield shall set to 1 to identify, together with the TBTT Information Length subfield, the format of the TBTT Information field for the reported AP operating on the nonprimary link —A non-AP STA affiliated with a non-AP MLD shall not transmit a Probe Request frame to the AP affiliated with the NSTR mobile AP MLD and that is operating on the nonprimary link of the NSTR link pair. To request a complete profile of the AP operating on the nonprimary link, a non-AP STA affiliated with a non-AP MLD may send a Multi-Link probe request to an AP affiliated with the NSTR mobile AP MLD and that is operating on the primary link (see 35.3.4.2 (Use of Multi-Link probe request and response)).

—The NSTR mobile AP MLD shall not respond to any received Probe Request frames on the nonprimary link (#10720, #12392).

**35.3.19.3 NSTR mobile AP MLD multi-link procedures for channel switching, extended channel switching, and channel quieting (#13425)**

Multi-link procedures for channel switching, extended channel switching, and channel quieting for an AP affiliated with an NSTR mobile AP MLD on the nonprimary link follow the same rules defined in 35.3.11 (Multi-link procedures for channel switching, extended channel switching, and channel quieting) with the following exceptions:

* An AP affiliated with an NSTR Mobile AP MLD on the primary link may schedule channel switching and quiet intervals for the AP affiliated with the same NSTR Mobile AP MLD on the nonprimary link by including the corresponding elements in the STA Profile field of the Per-STA Profile subelement corresponding to the AP on the nonprimary link carried in Beacon frames and Probe Response frames that it transmits on the primary link.

—The timing fields in the Channel Switch Announcement element, the Extended Channel Switch Announcement element, the Quiet element, and the Quiet Channel element shall be applied in reference to the most recent TBTT and BI indicated in the corresponding element(s) of the AP operating on the primary link.

**Annex C**

(normative)

**ASN.1 encoding of the MAC and PHY MIB**

**C.3 MIB Detail**

***TGbe editor: Please modify the following C.3 MIB Detail as follows:***

Dot11StationConfigEntry ::= SEQUENCE

 {

…

dot11EHTNSTRMobileAPMLDImplemented TruthValue,

dot11RestrictedTWTOptionImplemented TruthValue,

(#10132)dot11EHTNSTRMobileAPMLDOFDMAImplemented TruthValue

 }

(#10132)dot11EHTNSTRMobileAPMLDOFDMAImplemented OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a capability variable.

 Its value is determined by device capabilities.

 This attribute, when true, indicates the ability of the EHT NSTR mobile AP MLD to support OFDMA operation.

 If the attribute is false, the station does not support OFDMA operation."

 ::= { dot11StationConfigEntry <Last assigned + 1> }

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

***TGbe editor: Please modify the following Figure as below:***

B0 B3 B4 B5 B6 B7 B11 B12 B13 B15

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Maximum Number Of Simultaneous Links | SRS Support | TID-To-Link Mapping Negotiation Support | Frequency Separation For STR | AAR Support | Reserved |
| AP MLD Type Indication  | Primary Link Indication (optional) | Reserved |

 Bits: 4 1 2 5 1 3

**Figure 9-1002l—MLD Capabilities and Operations subfield format** (#10168, #10721, #13007)

***TGbe editor: Please modify the following Table as below:***

**Table 9-401j—Subfields of the MLD Capabilities and Operations field *(continued)*** (#10168, #10721, #13007)

|  |  |  |
| --- | --- | --- |
| Subfield | Definition | Encoding |
| … | … | … |
| Frequency Separation For STR/AP MLD Type Indication/Primary Link Indication  | Frequency Separation For STR: Indicates the minimum frequency gap between any two links that is recommended by the non-AP MLD for STR operation. The fre-quency gap is specified as the dif-ference between the nearest frequency edges of the two links.AP MLD Type Indication: Indicates the type of an AP MLD.Primary Link Indication: Indicates the primary link for an NSTR mobile AP MLD. | Frequency Separation For STR:For a non-AP MLD:Set to 0 to indicate that no frequency sepa-ration information is provided.Set to a nonzero value *n* to indicate that the STR frequency gap is MHz.AP MLD Type Indication: For an AP MLD:Set B7 to 0 to indicate that the AP MLD is not an NSTR mobile AP MLD; B8–B11 are reserved.For an NSTR mobile AP MLD:Set B7 to 1 to indicate that the AP MLD is an NSTR mobile AP MLD;B9–B11 are reserved.Primary Link Indication: It is present when AP MLD Type Indication is set to 1.Set B8 to 1 to indicate that the AP is operating on a primary link Indication: otherwise, set to 0.See 35.3.16.2 (Multi-link device capability and operation signaling). |
| … | … | … |