**IEEE P802.11  
Wireless LANs**

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| LB266 CR for 35.3.19 (NSTR Mobile AP MLO) | | | | |
| Date: 2022-10-25 | | | | |
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Abstract

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

* 10131, 10854, ~~10855~~, 11270, 11375, ~~11979~~, 12224, 12329, 12738, 12741, 12742, ~~14004, 14036, 14037~~, 14038, 14039, ~~14073, 14111~~, 13818,13422, 13423,13850
* 10092, 10093, 10778, 11765, 12497, 13513, 13514, 13866

Revisions:

* Rev 0: Initial version of the document.
* Rev1: Updated CR for #10854. Added CR for editorial comments for subclause 35.3.19 and 35.2.1.1

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.***

**Part 1 for subclause 35.3.19**

| **CID** | **Commenter** | **Subclause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- | --- |
| 10131 | Jay Yang | 35.3.19.1 | 468.42 | neeed a sentence to clarify the link MAC and MLD MAC in NSTR mobile AP MLD | as the comments. | Revised  Agree with the comment in principle. The note has been accepted in doc11-22/1233r8. “NOTE 1—(#12735)An NSTR mobile AP MLD follows the same rules defined in 35.3.2 (Multi-link device addressing(#12991)).”  No further change is needed. |
| 10854 | Jinsoo Choi | 35.3.19.1 | 468.39 | What about other pamameters that are not specifically addressed here such as MCS, MRU(Multiple RU), static puncturing(6GHz), etc., regarding supporting features? Need to clarify this and improve the text accordingly if needed. | As in the comment | Revised  Agree with the comment in principle.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #10854. |
| 10855 | Jinsoo Choi | 35.3.19.1 | 468.40 | The text "The NSTR mobile AP MLD is in a mobile device that is typically battery powered" would restrict the usage of this feature as some limited device type, but can we extend this good feature to other type of devices like many IoT equipments (in fixed position) with being battery powered or some home appliances implemented under limited antenna/BW configuration (even not being battery powered)? It might be good not to exclude this type of devices if we can improve the sentence without requiring any significant changes in the spec (that is not intention of this comment). | As in the comment. | Revised  Agree with the comment in principle.  The NSTR mobile AP MLD is ordinarily moving around with battery powered but might also be in a fixed.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #10855. |
| 11979 | Albert Petrick | 35.3.19.1 | 468.42 | The term "NSTR Mobile AP MLD" is first introduced in sections 4.0., 9.4 and not defined until sub-clause 35.3.19.1. This terms may be referenced in 11be R2 features, future amendments and future REVmx baseline. This definition belongs in section 3 Definitions. | Move the definition on P468L42 to section 3. Definition "The NSTR mobile AP MLD is in a mobile device that is typically battery powered." | Revised  Agree with the comment in princilple.  A definition of NSTR mobile AP MLD will be provided under CID #11177 in doc 11-22/1196.  The NSTR mobile AP MLD is ordinarily moving around with battery powered but might also be in a fixed location.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #11979. |
| 11270 | Sigurd Schelstraete | 35.3.19.1 | 468.40 | "The NSTR mobile AP MLD is in a mobile device that is typically battery powered". This sounds like a note, not a requirement | Make text a note | Revised  Agree with the comment in princilple.  The NSTR mobile AP MLD is ordinarily moving around with battery powered but might also be in a fixed.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #11270. |
| 11375 | Qi Wang | 35.3.19.1 | 468.25 | Currently, there is no mechanism to enable a non-AP MLD to know whether an AP is mobile or stationary, and such a mechanism is needed. | Please define a mechanism to enable a non-AO MLD to know whether an AP is mobile or stationary. | Rejected.  The commentor withdrew the comment. |
| 12224 | Stephen McCann | 35.3.19.1 | 468.32 | This definition of an NSTR mobile AP MLD states that it has one NSTR link pair. This is not the same as an AP MLD, so I think a clause that introduces the architecture of an NSTR mobile AP MLD should be provided in clause 4 | Text defining the architecture of an NSTR mobile AP MLD and why it differs from that of an AP MLD, needs to be added to clause 4. | Revised  Agree with the comment in princilple.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #12224. |
| 12329 | Guogang Huang | 35.3.19.1 | 468.46 | No schedule for Beacon and Probe Response frames should be extended to the regular AP MLD. Thus no legacy STA associates with this AP, which is very useful to manage the leagcy STA's association. | Please allow an AP MLD not to schedule the Beacon and Probe Response frames on some link if the corresponding affiliated AP doesn't want serve the legacy STA and the non-AP MLD only can set up this link by initiating the multi-link setup on another link | Rejected.  For regular AP MLD, Beacon and Probe Response frames are useful for EHT STAs/MLDs. In order to control the legacy STA’s association, BSS membership selector element can be used. |
| 12738 | Liuming Lu | 35.3.19.1 | 468.62 | The additional constraints are currently specified for the transmission in the nonprimary link of a NSTR mobile AP MLD, which may limit the efficency of frame exchanges between a NSTR mobile AP MLD and non-AP MLD. For non-AP MLD its affiliated STA can initiate its transmission by obtaining the TXOP through EDCA mechanism to become a TXOP holder or get the TXOP shared by the mobile AP MLD. The current specificaiton lacks of the mechanism to allow the non-AP MLD to request the AP MLD to share its obtained TXOP with the non-AP MLD. | Suggest to specify the mechanism to allow the non-AP MLD to request the AP MLD to share its obtained TXOP with the non-AP MLD. And the mechanism of synchronous transmission in two links for non-AP MLD by obtaining the TXOP through EDCA to become a TXOP holder or get the TXOP shared by the Soft AP MLD needs to be considered to be specified. | Rejected.  Triggerred TXOP sharing is an optional feature. An NSTR mobile AP MLD may support this optional feature and follow the NSTR mobile AP ML channel access rule to support it.  No extra rules are needed. |
| 12741 | Liuming Lu | 35.3.19.1 | 468.56 | The opration of the non-AP MLD associated a NSTR mobile AP MLD includes two modes: one is an operation only on the primary link, the other is an operation on the two links including a primary link and a nonprimary link. Which mode the non-AP MLD associated an NSTR mobile AP MLD operates on is unclear in Draft 2.0. Furthermore if a NSTR non-AP MLD is associated STR AP MLD, the NSTR non-AP MLD can also operate on the two links including a primary link and a nonprimary link. | Suggest to specify a mode of the operation on the two links including a primary link and a nonprimary link. The non-AP MLD associated a NSTR mobile AP MLD can enable or disable the operation mode | Rejected.  A non-AP MLD may choose to be associated with an NSTR mobile AP MLD by setting up on either primary link or both primary and nonprimary links. If it supports T2L mapping negotiation, it also allows the non-AP MLD associated with an NSTR mobile AP MLD to operate on either primary link or both links.  No extra rules are needed. |
| 12742 | Liuming Lu | 35.3.19.1 | 468.63 | Start time sync PPDUs medium access for STAs affiliated with an MLD, which is an NSTR mobile AP MLD or a Non-AP MLD associated with an NSTR mobile AP MLD and operates on a pair of links including a primary link and a nonprimary link, needs to be clarified. And the synchronization of the EDCA operation across the primary link and nonprimary link also needs to be further specified. | As in comment | Rejected.  The spec has specified the start time sync PPDUs medium access shall follow the procedure defined in 35.3.16.6 (Start time sync PPDUs medium access).  The commenter failed to identify the issues. |
| 14004 | Geonjung Ko | 35.3.19.1 | 469.36 | This sentence may be redundant, because default mapping is supported by all MLDs. | Remove the sentence. | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #14004. |
| 14036 | Kaiying Lu | 35.3.19.1 | 468.25 | Error recovery mechanism for NSTR mobile AP MLO needs to be clairified | Commenter will provide comment resolution | Revised  Agree with the comment in princilple.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #14036. |
| 14037 | Kaiying Lu | 35.3.19.1 | 468.25 | TXOP obtained on the nonprimary link of NSTR mobile AP MLD needs to be terminated due to errors on primary link. Clarify it. | As in comment. | Revised  Agree with the comment in princilple.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #14037. |
| 14073 | Liuming Lu | 35.3.19.1 | 469.11 | The channel access rules for the APs affiliated with an NSTR mobile AP MLD and STAs affiliated with a non-AP MLD associated with an NSTR mobile AP MLD need to be clarified, such as the TXOP rules, error recovery mechanism. | As in comment. | Revised  Agree with the comment in princilple.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #14073. |
| 14038 | Kaiying Lu | 35.3.19.1 | 468.25 | Medium Synchronization rules for non-primary link needs to be specified | Commenter will provide comment resolution | Rejected.  The nonprimary link follows the same medium sync recovery rules as defined in 35.3.16.8 (Medium access recovery procedure). No further changes are needed. |
| 14039 | Kaiying Lu | 35.3.19.1 | 468.25 | Clarify BSS color of nonprimary link. | Commenter will provide comment resolution | Rejected.  It is accepted by the group that “Each AP affiliated with an AP MLD can independently select, disable, and update its BSS color (see 26.17.3 (BSS color)) for its BSS.” No need special rule for NSTR mobile AP MLD. |
| 14111 | Li-Hsiang Sun | 35.2.1.2.2 | 400.16 | For a NSTR mobile AP MLD, it should not send MU-RTS TXS frames to different MLDs on different links simultaneously but it can send basic trigger frames to different MLDs on different links simultaneously | Specify for a NSTR mobile AP MLD, MU-RTS TXS sent on different links simultaneously must be addressed to the same non-AP MLD  A non-AP MLD associated with a NSTR mobile AP MLD only receiving MU-RTS TXS on the nonprimary link should not respond to the MU-RTS TXS | Revised  Agree with the comment in princilple.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #14111. |
| 13818 | Yuchen Guo | 35.3.19 | 468.53 | "is the same" should be "are the same" | Change "is the same" to "are the same" | Accepted.  The same comment has been resolved under CID 10657 in 22/1357r2. |
| 13850 | Sanghyun Kim | 35.3.19.1 | 468.53 | Since TSF timers of all APs affiliated with an NSTR mobile AP MLD "is" the same => Since TSF timers of all APs affiliated with an NSTR mobile AP MLD "are" the same | As in comment | Accepted.  The same comment has been resolved under CID 10657 in 22/1357r2. |
| 13422 | Liwen Chu | 35.3.19.2 | 468.32 | change "follow with"to "follow" | As in comment | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #13422. |
| 13423 | Liwen Chu | 35.3.19.2 | 469.64 | I assume ML Probe Request is the only method to acquire the complete information of secondary link AP. | change "may" to "shall" in the sentence. | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #13423. |

1. **Introduction**

**N/A**

1. **Proposed spec text**

**35.3.19 NSTR mobile AP MLD operation**

**35.3.19.1 General**

***TGbe editor: Please modify the following subclause 35.3.19.1 as follows:***

An (#11468)AP MLD that is an NSTR mobile AP MLD shall set dot11EHTNSTRMobileAPMLDImplemented to true, otherwise it shall set dot11EHTNSTRMobileAPMLDImplemented to false. If dot11EHTBaseLineFeaturesImplementedOnly is equal to true, an NSTR mobile AP MLD shall have one NSTR pair of links and shall follow (#13422)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 (#11469)an AP affiliated with an AP MLD which is not an NSTR mobile AP MLD:
* Support of DL and UL OFDMA operation
* Support of two or more spatial streams
* Support for 160 MHz operating channel width in the 6 GHz band
* (#10854)Support for MRU for DL/UL OFDMA if DL/UL OFDMA operation is supported
* An NSTR mobile AP MLD is ordinarily in a mobile device that is moving around and typically battery powered but might also be in a fixed location. (#10855, #11270, #11979)

…

(#14004)

***TGbe editor: Please add the following subclause 35.3.19.2 as follows:***

***…***

* 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 -shall(#13423) send a (#11318)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(#11318))).

***TGbe editor: Please add the following subclause 35.3.19.4 as follows:***

**35.3.19.4 TXOP of NSTR mobile AP ML Operation (#14036, #14037, #14073)**

When an NSTR mobile AP MLD or a non-AP MLD associated with an NSTR mobile AP MLD has gained the right to initiate transmission on an NSTR link pair through the rules in 35.3.16.6 (Start time sync PPDUs medium access), if a failure happened on at least one link of the NSTR pair of links, the MLD performs the procedures described as below:

* If the failure happened on the primary link, the TXOP initiator on the nonprimary link shall terminate the TXOP at the end of the initial frame exchange.
* If the failure happened on the nonprimary link, the TXOP initiator on the primary link receiving an expected response frame obtained a TXOP regardless of the failure of TXOP on the nonprimary link.

When an NSTR mobile AP MLD or a non-AP MLD associated with an NSTR mobile AP MLD has obtained TXOPs on an NSTR link pair respectively, after two PPDUs with end time alignment are transmitted by STAs affiliated with the MLD on the NSTR link pair of the MLD, if a failure happened on at least one link of the NSTR pair of links, the MLD shall follow the rules as below:

* If the failure happened on the primary link, the TXOP holder on the primary link may perform PIFS or backoff recovery. The other TXOP holder affiliated with the same MLD on the nonprimary link shall terminate the TXOP at the end of the current frame exchange.
* If the failure happened on the nonprimary link, the TXOP holder on the nonprimary link shall terminate the TXOP without performing PIFS recovery. The other TXOP holder of the same MLD on the primary link may continue the obtained TXOP regardless of the failure of TXOP on the nonprimary link.

(#14111)APs affiliated with an NSTR mobile AP MLD with dot11EHTTXOPSharingTFOptionImplemented equal to true which gained channel access and transmitted MU-RTS TXS trigger frames simultaneously on an NSTR link pair shall only address to the associated non-AP STAs affiliated with the same non-AP MLD.

***TGbe editor: Please modify the following subclause 4.9.5 as follows:***

**4.9.5 Reference model for multi-link operation (MLO)**

**…**

An AP MLD always operates in cooperation with one or more affiliated APs, one for each link. The MLD lower MAC sublayer components implement link specific functions that operate independently of the lower MAC in other affiliated APs, and are shared between each affiliated AP and the AP MLD operations. Some behaviors of MLO require the use of one or more affiliated APs’ upper MAC components. In particular, the affiliated AP MLD upper MAC sublayer components support group addressed traffic, and traffic to or from any non-AP STAs (which are not capable of MLO). The high-level structure of an AP MLD along with its affiliated APs is shown in Figure 4-30c (High level architecture for AP MLD with affiliated APs).

(#12224) NOTE – The high-level structure of an NSTR mobile AP MLD operating on an NSTR link pair has an affiliated AP Non‐MLD upper MAC sublayer (traffic to/from non‐MLD peer STAs and group addressed MLD traffic) only for the primary link of the NSTR link pair.

**Part 2 for subclause 35.2.1.1**

| **CID** | **Commenter** | **Subclause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- | --- |
| 10092 | Yiqing Li | 35.2.2.1 | 399.47 | "sets" should be "set" | As commented. | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #10092. |
| 10093 | Yiqing Li | 35.2.2.1 | 399.48 | "an non-HT" should be "a non-HT" | As commented. | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #10093. |
| 10778 | Dennis Sundman | 35.2.2.1 | 399.33 | On line 33, the term transmitting is used: "...320 MHz bandwidth support transmitting a Control frame..." but on line 39 the term sending is used: "...320 MHz bandwidth support sending a Control frame...". For consistency I propose to use the same terminology. | Change the word "sending" on line 39 to "transmitting". | Accepted.  The same comment has been resolved under CID 12496 in 22/1118r0.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #10778. |
| 11765 | Osama Aboulmagd | 35.2.2.1 | 399.33 | The sentence; "AN EHT STA that is a STA 6G with 320 MHz bandwidth support..." | change to : "AN EHT STA that is a STA 6G with 320 MHz bandwidth supports..." | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #11765. |
| 12497 | Jeongki Kim | 35.2.2.1 | 399.47 | Change "sets" to "set" | As in comment | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #12497. |
| 13513 | Amelia Andersdotter | 35.2.2.1 | 399.33 | Change "support" to "supports" | Change "support" to "supports" | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #13513. |
| 13514 | Amelia Andersdotter | 35.2.2.1 | 399.39 | Change "support" to "supports" | Change "support" to "supports" | Accepted.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #13514. |
| 13866 | yujin noh | 35.2.2.1 | 399.33 | The term Â¡Â°transmittingÂ¡+/- in first paragraph and the term Â¡Â°sendingÂ¡+/- in second paragraph are not unified. | It needs to be unified to same term. | Accepted.  The same comment has been resolved under CID 12496 in 22/1118r0.  Tgbe editor please implement changes as shown in doc 11-22/1846r2 tagged as #13866. |

***TGbe editor: Please modify the following subclause 35.2.1.1 as follows:***

**35.2.1.1 Bandwidth signaling**

An EHT STA that is a STA 6G with 320 MHz bandwidth supports(#11765, #13513) transmitting a Control frame in non-HT duplicate format with a bandwidth signaling TA addressed to an EHT STA shall set the (#13768)TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT signaled (#11015)via the scrambling sequence and SERVICE field.according to Table 36-1 (TXVECTOR and RXVECTOR parameters).

An EHT STA that is a STA 6G with 320 MHz bandwidth (#13514)supports (#12496, #10778, #13866) transmitting (#14095)a CTS frame in non-HT duplicate format in response to an RTS frame in non-HT duplicate format with a bandwidth signaling TA addressed to the EHT STA shall set the (#13768)TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT signaled (#11016)via the scrambling sequence and SERVICE field according to Table 36-1 (TXVECTOR and RXVECTOR parameters).

NOTE—In an EHT BSS set up by an EHT AP that has included the Disabled Subchannel Bitmap field in the EHT Operation element, both an EHT STA transmitting a Control frame in non-HT duplicate format with a bandwidth signaling TA and an EHT STA responding a Control frame in non-HT duplicate format set(#10092, #12497) the TXVECTOR parameter INACTIVE\_SUBCHANNELS of a(#10093) non-HT duplicate PPDU based on the value indicated in the most recently exchanged Disabled Subchannel Bitmap field in the EHT Operation element for that BSS, when the EHT STAs set dot11EHTBaseLineFeaturesImplementedOnly to true.