**IEEE P802.11  
Wireless LANs**

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| LB266 CR for 35.3.16.5.1 (PPDU end time alignment) Part 2 | | | | |
| Date: 2022-10-31 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Yongho Seok | Mediatek |  |  | yongho.seok@mediatek.com |
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Abstract

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

* 10359, 10707, 10709, 10054, 11652, 13702, 13957, 10251, 10853, 11265, 11445, 11984, 12272, 12662, 13672, 13806, 13928, 13954, 12415, 12431, 11266, 13396, 13929, 13557, 12447, 13397, 10034, 11600, 11647, 10656, 11447

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: CID 10054, 12415, 12431 were deferred.

Figure 35-24 for CID 10656, 11447 has been updated.

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** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| 10359 | 35.3.16.5 | 0.00 | The PPDU end time alignment is for NSTR. Make it clear by changing the suclause title of 35.3.16.5 or add such description at the beginning of 35.3.16.5.1. | As in comment. | Revised-  Agree in principle with the comment. Chane the title to clarify that the PPDU end time alignment is for the NSTR link pait.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 10359. |
| **TGbe Editor: Change the tile of 35.3.16.5.**  35.3.16.5 PPDU end time alignment on a NSTR link pair (#CID 10359) | | | | | |
| 10707 | 35.3.16.5 | 455.01 | In a case that an AP MLD transmits to a NSTR non-AP MLD, after the AP MLD accesses the channel on one NSTR link and reserves a TXOP of AC1, it is possible that the AP MLD accesses the channel on the other NSTR link and reserves a TXOP of AC2. The PPDU end time alignment cannot be achieved if the TXOP limit of AC2 is shorter than the remaining time of the ongoing PPDU transmission. | A method is needed to solve this issue | Rejected-  When the PPDU end time alignment can not be achieved, the AP MLD has an option that schedules the PPDU not soliciting an immediate response.  So, the scenario that the commeter mentioned is not an issue that has to be solved. |
| 10709 | 35.3.16.5 | 455.01 | When NSTR MLD obtains a TXOP for transmitting to its AP MLD on one NSTR link, the AP MLD may also be contending the channel for transmitting to the NSTR MLD on the other NSTR link. | If the AP MLD gains the channel in this case, it may occupy the channel first and find a chance to share its TXOP with the NSTR MLD. Then, the NSTR MLD can achieve PPDU alignment on both links. | Rejected-  The comment fails to identify a specific issue to be addressed. It fails to identify changes in sufficient detail so that the specific wording of the changes that will satisfy the commenter can be determined. |
| 10054 | 35.3.16.5.1 | 455.13 | non-AP MLD in addition to the start time sync should do the end time alignment (per current spec only AP MLD should do the end time alignement); consider a scenario where PPDU1 over link1 and PPDU2 over link2 (link1 and link2 are NSTR link pair) start time are synced, but end time are not aligned, so the response from the AP MLD over one of the links will be corrupted by the longer PPDU. Please add the end time alignment requirement for the non-AP MLD. | as in comment | Rejected-  When a non-AP MLD obtaining a TXOP transmits PPDUs on the NSTR link pair, the ending time alignment can be necessary.  But it is an implementation choice of the transmitting STA. |
| 11652 | 35.3.16.5.1 | 455.13 | non-AP MLD in addition to the start time sync should do the end time alignment (per current spec only AP MLD should do the end time alignment); consider a scenario where PPDU1 over link1 and PPDU2 over link2 (link1 and link2 are NSTR link pair) start time are synced, but end time are not aligned, so the response from the AP MLD over one of the links will be corrupted by the longer PPDU. Please add the end time alignment requirement for the non-AP MLD. | as in comment | Rejected-  When a non-AP MLD obtaining a TXOP transmits PPDUs on the NSTR link pair, the ending time alignment can be necessary.  But it is an implementation choice of the transmitting STA. |
| 12415 | 35.3.16.5.1 | 455.28 | End time alignment by non-AP STA is also needed in case of non-AP STAs' sync transmission. If end time is not aligned, APs' BA frames reception can be interrupted. Clear description on the end time alignment of sync transmission needs to be added. | As in comment | Rejected-  When a non-AP MLD obtaining a TXOP transmits PPDUs on the NSTR link pair, the ending time alignment can be necessary.  But it is an implementation choice of the transmitting STA. |
| 13702 | 35.3.16.5.1 | 455.19 | The transmitters of PPDUs with end time alignment are APs in current spec. when non-AP MLD transmit UL PPDUs to NSTR mobile AP MLD, end time alignment is also required. | please extend the PPDU end time alignment to non-AP MLD. | Rejected-  The spec already has the related requirement.  “STAs affiliated with a non-AP MLD that are simultaneously transmitting PPDUs to the respective 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).” |
| 13957 | 35.3.16.5.1 | 455.19 | PPDU end time alignment is used for a non-AP MLD associated with an NSTR mobile AP MLD, regardless of whether the non-AP MLD is operating on an NSTR link pair. | Extend the procedure to a non-AP MLD associated with an NSTR mobile AP MLD. | Rejected-  The spec already has the related requirement.  “STAs affiliated with a non-AP MLD that are simultaneously transmitting PPDUs to the respective 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).” |
| 10251 | 35.3.16.5.1 | 455.23 | This requirement refers to a "high priority frame", but that term is not defined or used elsewhere. | Define the phrase "high priority frame" | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 10251. |
| 10853 | 35.3.16.5.1 | 455.24 | What is the high priority frame that makes an exception of PPDU end time alignment? Need to specify it. | As in comment | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 10853. |
| 11265 | 35.3.16.5.1 | 455.24 | What is a "high priority frame" | Provide technical definition or reference | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 11265. |
| 11445 | 35.3.16.5.1 | 455.24 | There is no definition for high-priority frames. Pls define what a high-priority frame here refers to. | As in comment | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 11445. |
| 12272 | 35.3.16.5.1 | 455.24 | "The AP shall align the end time of the PPDUs soliciting an immediate response per the rules defined in this subclause, except if the PPDU carries a high priority frame." What exactly is a high priority frame? Is it something like a high priority AC. Needs to be clarified. | As in comment. | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 12272. |
| 12662 | 35.3.16.5.1 | 455.24 | What does "high priority frame" term mean? Please clarify or remove the exceptional condition in the sentence (which refers to high priority frame). | As in comment | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 12662. |
| 13672 | 35.3.16.5.1 | 455.24 | PPDU end time alignment: PPDU soliciting an immediate response per the rules in subclause 35.3.16.5.1 except if a PPDU carries a high priority frame. The exception is open ended. Clarify what is a high priority frame. Is this a QoS data frame, BlockAck. etc.? | Clarify provide text of high priority frame type details and cite sub-clause references of the intended priority frame or provide as a NOTE. | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 13672. |
| 13806 | 35.3.16.5.1 | 455.24 | What is "high priority" frame | please add a note to illustrate high priority frame | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 13806. |
| 13928 | 35.3.16.5.1 | 455.24 | priority frame is vague, please remove it. Otherwiese, please specify it. | Remove priority frame | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 13928. |
| 13954 | 35.3.16.5.1 | 455.24 | The definition of a high priority frame is missing. | Define a high priority frame or remove the exception. | Revised-  Agree in principle with the comment.  There is not a reached consense and there is no proposal to consider a frame as the the high priority frame. The resolution is to remove “high priority frame as the commenter suggested.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 13954. |
| **TGbe Editor: Change subclause 35.3.16.5 as the following:**  When an AP MLD simultaneously transmits to the STAs of a non-AP MLD operating on a pair of NSTR links for that MLD and at least one of the PPDUs carries a frame that is soliciting an immediate response, then  —The AP shall align the end time of the PPDUs soliciting an immediate response per the rules defined in this subclause~~, except if the PPDU carries a high priority frame~~. (#CID 10251, 10853, 11265, 11445, 12272, 12662, 13672, 13806, 13928, 13954) | | | | | |
| 12431 | 35.3.16.5.1 | 455.29 | In UL synched PPDU transmission, after successful TXOP setup, PIFS recovery can be performed for the consecutive frame in one of the NSTR links. Since 8us margin is allowed in end time alignment, retransmitted data with PIFS recovery may colide with BA on the other link. A solution to this issue needs to be defined. | As in comment | Rejected-  Since the PIFS is greater than the 8us, the retransmitted data can’t be collided with the BA on the other link. |
| 11266 | 35.3.16.5.1 | 455.34 | "the end of the last OFDM symbol or the time of the end of the packet extension if present, whichever is later.". "whichever is later" is redundant. If the PE is present it will always be later. | See comment | Rejected-  “whichever is later” is not a redundant wording.  If this is removed, then the spec does not say which one is the end time of the PPDU. |
| 13396 | 35.3.16.5.1 | 455.37 | The earlier requriement is not enough. The late requirement should lso be defined, e.g. if the PPDU with carried Trigger frame end >4us later than another link's PPDU, the NSTR non-AP MLD can't do CCA when another link's PPDU also solicit responding PPDU (with BA for example). | Fix the issues mentioned in the comment | Rejected-  If the earlier requirement is met, the following can’t be happened.  “if the PPDU with carried Trigger frame end >4us later than another link's PPDU, the NSTR non-AP MLD can't do CCA” |
| 13929 | 35.3.16.5.1 | 455.38 | "earlier" case is mentioned, but how about "later" | please complete this sentence | Rejected-  First bullet covers that case.  “the difference between the end times of simultaneously transmitted PPDUs is less than or equal to 8 μs” |
| 13557 | 35.3.16.5 | 455.52 | Add more examples or descriptions on how to ensure PPDU alignment | As in comment | Rejected-  “An AP MLD may use any type of padding to align the end time of transmitted PPDUs”  How to use the padding to align the end time is an implementation issue. |
| 12447 | 35.3.16.5.1 | 455.57 | When an AP MLD simultaneously solicits one or more TB PPDU transmisions from a pair of STAs affiliated with a non-AP MLD and operating on a pair of NSTR link pair, adding solicited user information in trigger frame on another link can be used for end time alignment. | as in the comment | Rejected-  “…such as using the Padding field in a Trigger frame, post-EOF A-MPDU padding, aggregating other MPDUs in the A-MPDU, or a packet extension.”  These are just example. It is not necessary to list all options. |
| 13397 | 35.3.16.5.1 | 456.01 | The case of one TB PPDU soliciting responding frame while another one soliciting no responding frame is missing. | Fix the issues mentioned in the comment | Rejected-  Because the spec does not require any rules for that case that the commenter mentioned, it does not anything.  For example, we don’t need to say that a field can be set to any value for some case. |
| 11984 | 35.3.16.5.1 | 455.24 | Figure 35-20: STA-MLD label on Link 1, Link 2 and Link 3 is not defined in D2.0 and is ambiguous. Changed STA MLD to "non-AP MLD" | as commented | Revised-  Agree in principle with the comment.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 11984. |
| 10034 | 35.3.16.5.1 | 456.09 | In Figure 35-20, the NSTR/STR link pair relation of link1/2/3 are not specificed. Please clarify what is the NSTR/STR link pair relation among any two links | as in comment | Revised-  Agree in principle with the comment.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 10034. |
| 11600 | 35.3.16.5.1 | 456.09 | Mention that this is an example and that in this example, (Link1, Link 2) and (Link1, Link 3) both form NSTR pairs. | As in comment | Revised-  Agree in principle with the comment.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 11600. |
| 11647 | 35.3.16.5.1 | 456.09 | In Figure 35-20, the NSTR/STR link pair relation of link1/2/3 are not specified. Please clarify what is the NSTR/STR link pair relation among any two links | as in comment | Revised-  Agree in principle with the comment.  TGbe editor to make the changes shown in 11-22/1832r0 under all headings that include CID 11647. |
| 10656 | 35.3.16.5.1 | 456.21 | Clarify that the end time alignment rules (and tolerance) applies to the control response frames (HE/EHT TB PPDU and ACK frames) as well. | As in comment | Revised-  Agree in principle with the comment.  TGbe editor to make the changes shown in 11-22/1832r1 under all headings that include CID 10656. |
| 11447 | 35.3.16.5.1 | 456.22 | Revise 'STA MLD' to 'non-AP MLD' in the figure. Also, the figure is misleading in that it shows start-time alignment of PPDUs for PPDUs transmitted by the AP MLD and shows that response frames from the non-AP MLD are perfectly end-aligned. Both of the above are not true. Revise the figure to illustrate only the end-alignment of AP MLD's frames. | As in comment | Revised-  Agree in principle with the comment.  TGbe editor to make the changes shown in 11-22/1832r1 under all headings that include CID 11447. |
| **TGbe Editor: Change subclause 35.3.16.5 as the following:**  An example showing the ~~The~~ relationship between the end times of DL PPDUs sent over the NSTR link pair (link 1 and link 2, link 1 and link 3, link 2 and link 3) ~~link 1, link 2, and link 3~~ (#CID 11984, 10034, 11600, 11647) between an AP MLD (whose affiliated APs are AP1, AP2 and AP3) and a non-AP MLD (whose affiliated STAs are STA1, STA2 and STA3) (#10656, 11447)is shown in Figure 35-24 (PPDU end time alignment timing relationships).  **TGbe Editor: Change Figure 35-24 (PPDU end time alignment timing relationships) with the following:** | | | | | |