IEEE P802.11
Wireless LANs

|  |
| --- |
| LB 271 Resolution for |
| Date: March 9th 2023 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Technologies Inc. |  |  |  |
| Alfred Asterjadhi |  |  |  |
| Gaurang Naik |  |  |  |
| George Cherian |  |  |  |
| Duncan Ho |  |  |  |
| Yanjun Sun |  |  |  |
| Abdel Karim |  |  |  |
|  |  |  |  |  |

 Abstract

This submission proposes resolutions for following 30 CIDs received for TGbe LB271 against D3.0:

15405 15532 18156 15533 16791 15534 15209 16795 16794 16793

16797 16796 16798 15535 18157 15122 15536 16799 16278 16801

16802 16803 15123 15124 15825 16804 16805 16806 17830 17831

**Revisions:**

* Rev 0: Initial version of the document.

***TGbe editor: the baseline for this document is TGbe D3.0***

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. 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** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 15405 | John Wullert | 35.3.8 | 525.28 | The first two sentences of this paragraph state that a frame can be sent via an affiliated STA "on any enabled link". This is not correct - there is direct correspondance between the affiliated STA and one specific link | Change "through an affiliated STA to the recipient MLD, on an enabled link" to "to the recipient MLD through any affiliated STA on its corresponding link" in the first sentence and change "an affiliated STA on any enabled link" to "any affiliated STA on its corresponding link" in the second. | **Revised**Agree in principle with the comment. Proposed resolution accounts for the suggested changes with some modifications for better clarity.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 15405.** |
| 15532 | Chaoming Luo | 35.3.8 | 525.29 | Change: through an affiliated STA to the recipient MLD, on any enabled link,To: through any affiliated STA that is operating on an enabled link to the recipient MLD | As in comment | **Revised**Agree with the comment. Same resolution as 15405**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 15405.** |
| 18156 | Abhishek Patil | 35.3.8 | 525.29 | The frame transmission on a link is subject to the power-save state of the non-AP STA operating on that link. | Add "and subject to power-save state (see 35.3.12)" after "on any enabled link". Same comment applies to the subsequent sentence for ADDBA Response frame. | **Revised**Agree in principle with the comment. Sentence is rephrased to make it clear that the reception is subject to the STAs power state.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 18156.** |
| 15533 | Chaoming Luo | 35.3.8 | 525.32 | Change: through an affiliated STA, on any enabled link,To: through any affiliated STA that is operating on an enabled link, | As in comment | **Revised**Agree with the comment. Accounted for the suggested changes with minor editorial modifications.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 15533.** |
| 16791 | Mark RISON | 35.3.8 | 525.31 | "subject to thepower states of the STAs operating on the link" is not clear | Delete the cited text | **Revised**Sentence is clear in the intention, which is that the frame is sent to the recipient if it is awake essentially. Proposed resolution is to make some editorial changes to the sentence for better readability (such as replace ‘STAs’ with ‘STA’ and replace ‘the link’ with ‘that link’).**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 16791.** |
| 15534 | Chaoming Luo | 35.3.8 | 525.33 | Why do we use plural form 'STAs'? It should be 'STA'. | Change: subject to the power states of the STAs operating on the linkTo: subject to the power state of the STA operating on the link | **Revised**Agree with the comment. The sentence was modified as a resolution to CID 16791 and the term ‘STAs’ is updated to ‘STA’**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 16791.** |
| 15209 | Yoshio Urabe | 35.3.8 | 525.47 | Instead of "a single transmit buffer control", "a single common transmit buffer control" is clearler and consistent with "a single common receive reordering buffer" in P526L38. | Insert "common" between "a single" and "transmit buffer control". | **Accepted** |
| 16795 | Mark RISON | 35.3.8 | 525.50 | "An originator MLD shallrelease the transmit buffer associated with a successfully received MPDU upon receiving BlockAck framecontaining the reception status for that MPDU." -- this might to imply that partial-state BA is not allowed | Change to "[...] upon receiving a BlockAck framethat indicates the reception of that MPDU." But how does this differ from non-ML BA? | **Accepted**Regarding the question in the comment: This rule does not differ from non-ML BA in terms of functionality, but it is performed at the MLD level. |
| 16794 | Mark RISON | 35.3.8 | 525.51 | "upon receiving BlockAck frame" missing article | Add "a" after "upon" | **Accepted** |
| 16793 | Mark RISON | 35.3.8 | 525.51 | "release the transmit buffer" -- what does this mean? | Change to "update the scoreboard(s)" | **Rejected**The comment fails to identify a technical issue and is asking a question. Release the transmit buffer means that it frees the transmit buffer. The term “release” is used in baseline under the same context (please refer to P1951L55 for example in REVme D2.0). |
| 16797 | Mark RISON | 35.3.8 | 525.54 | "In a block ack agreement between two MLDs, the buffer size is indicated based on the Buffer Size subfield(of the Block Ack Parameter Set field) together with the Extended Buffer Size field (when ADDBAExtension element is included).NOTE 2--The ADDBA Extension element is optionally present in an ADDBA Request or ADDBA Response frame(see 9.6.4 (Block Ack Action frame details)). When block ack agreement is negotiated between two MLDs, if ADDBAExtension element is present, then the total buffer size is computed as described in 9.4.2.139 (ADDBA Extensionelement).During the block ack agreement establishment, the Block Ack Timeout field and buffer size indicated in theADDBA Request frame are advisory. " -- isn't this the same as for non-ML BA? | Delete the cited text | **Rejected**As the text suggest, the buffer size for a BA agreement between MLDs must also consider the Extended Buffer Size field in ADDBA Extension element. This is not the case with legacy. Hence the cited paragraph and the NOTE is needed. |
| 16796 | Mark RISON | 35.3.8 | 525.60 | "When block ack agreement is negotiated between two MLDs, if ADDBAExtension element is present" missing articles | Add articles | **Revised**Agree with comment and added missing articles.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 16796.** |
| 16798 | Mark RISON | 35.3.8 | 526.04 | "the originator may change the size " -- I think that's required for those two conditions | Change "may" to "shall" | **Rejected**The originator is free to use the initially intended WinStartO or decide to increase it if the originator sees it fit. If this is changed to shall then the originator has to change it, which is not the intention. |
| 15535 | Chaoming Luo | 35.3.8 | 526.05 | The condition described is confusing. Assuming the 'ADDBA Response frame' in the first subbullet is part of the established block ack agreement, the only case for 'may change WinSizeO' is the buffer size indicated in the response '>=' request, because the '<' case is described as 'shall change'. | Change: When a block ack agreement is established between two MLDs,To: If the buffer size indicated in the ADDBA Response frame is greater or equal than the buffer size indicated in the ADDBA Request frame, | **Rejected**As the commenter pointed, the following paragraph covers the case where the ADDBA Response indicated a smaller buffer size (and hence it is a mandatory requirement on the originator to change (i.e., reduce) the buffer size). This paragraph, however, gives an option (i.e., ‘may’) to the originator to change (i.e., increase) the buffer size if (based on the 1st bullet) the recipient has indicated (in its ADDBA Response frame) a higher size. Also see similar discussion in REVme for CID 1818 [REVme]. |
| 18157 | Abhishek Patil | 35.3.8 | 526.06 | ‘O’ should be a subscript. Same on line 13. 'R' should be a subscript on line 49 | As in comment | **Accepted** |
| 15122 | Tomoko Adachi | 35.3.8 | 526.06 | "..., the originator may change the size of its transmission window (WinSizeO) so that the transmit window meets the following conditions: ..."The two items that are listed after this is not a reason to change the size but just conditions that needs to be met. | Change it to read "..., the originator may change the size of its transmission window (WinSizeO) under the following conditions: ..." | **Revised**Agree in principle. Accounted for the suggested changes with minor editorial modifications to preserve the intention of the sentence. **TGbe editor: please implement changes as shown in 11-23/301r0 tagged 15122.** |
| 15536 | Chaoming Luo | 35.3.8 | 526.06 | Change: the transmit windowTo: the transmission window | As in comment | **Accepted** |
| 16799 | Mark RISON | 35.3.8 | 526.11 | This seems to duplicate the previous para and bullets | Pick one and delete the other | **Rejected**The first paragraph is covering the case where the recipient has indicated (in its ADDBA Response frame) buffer sizes greater than or equal to the one in the (originator’s) ADDBA Request frame. While the second paragraph is covering the case where the recipient has indicated buffer size smaller that originator’s ADDBA Request frame. The first gives an option (i.e., ‘may’) to the originator to change (i.e., increase) the buffer size if (based on the 1st bullet) the recipient has indicated (in its ADDBA Response frame) a higher size. While the 2nd paragraph is a ‘shall’ requirement for the originator to change the size. |
| 16278 | Ryuichi Hirata | 35.3.8 | 526.26 | For faster retrasnmission, it is better to share reception status indicating reception failure on different link. | as in the comment. | **Rejected**A recipient STA cannot differentiate between a failed MPDU and an MPDU that was not transmitted. Hence this information cannot be shared across links either. |
| 16801 | Mark RISON | 35.3.8 | 526.40 | What about reordering for MMPDUs? | Clarify whether/how MMPDUs are reordered | **Rejected**The comment fails to identify a technical issue and is asking a question. Reordering of MMPDUs is not covered under BA procedures (which deal with Data only) but are discussed in another subclause (please refer to the rules in 35.3.14). |
| 16802 | Mark RISON | 35.3.8 | 526.46 | "Each received MPDU shall be analyzed by the scoreboard context control as well as bythe receive reordering buffer control. " seems to disallow partial-state BA | Don't mandate a scoreboard context | **Rejected**The comment fails to identify a specific issue to be addressed. It fails to specify specific changes that would satisfy the comment. In response to the comment, the text does not intend to disallow partial state BA. |
| 16803 | Mark RISON | 35.3.8 | 526.49 | "the smaller of bitmap length and buffer size" missing articles | As it says in the comment | **Revised** Agree with comment and added missing articles.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 16803.** |
| 15123 | Tomoko Adachi | 35.3.8 | 526.50 | "... and buffer size indicated in the ADDBA Response." | Change it to read "... and buffer size indicated in the ADDBA Response frame." | **Accepted** |
| 15124 | Tomoko Adachi | 35.3.8 | 526.57 | "have a common (single) scoreboard context control maintained by the MLD with partial state operation on each setup link," It seems better to add "or" after the comma. | As in comment. | **Revised**Agree in principle. Added ‘or’ at the end of the 1st two bullets. Also moved this sentence (with its 3 bullets) as a separate paragraph of its own.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 15124.** |
| 15825 | Muhammad Kumail Haider | 35.3.8 | 527.01 | "affiliated of the same MLD" -> "affiliated with the same MLD" | as in comment | **Accepted** |
| 16804 | Mark RISON | 35.3.8 | 527.01 | "affiliated of" should be "affiliated with" | As it says in the comment | **Accepted** |
| 16805 | Mark RISON | 35.3.8 | 527.07 | "received in subsequent TXOP" missing article | As it says in the comment | **Revised** Agree with comment and added missing articles.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 16805.** |
| 16806 | Mark RISON | 35.3.8 | 527.13 | 11me is going to reword PBAC | Add an Editor's Note to that effect, so it's not forgotten | **Rejected**The comment fails to identify a technical issue. Once REVme decides to reword and incorporates those changes to their latest draft, TGbe can act on this aspect (based on the comments received during that time).  |
| 17830 | Yunbo Li | 35.3.8 | 526.53 | "each STA" and "each setup link" are not accurate, should only apply to links that the TID mapped to. | clarify the rules in each bullet apply to the links that the TID mapped to. | RevisedAgree with the comment. The three bullets were updated to imply that the rules apply to the links where the TID is mapped to.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 17830.** |
| 17831 | Yunbo Li | 35.3.8 | 527.02 | discard the temporary record after the end of the current TXOP will disallow transmit BA of a following TXOP. | add below sentence to cover the case that BA is transmitted in a following TXOP."If BA is not transmitted at the end of the current TXOP, the temporary record should be discarded right before processing the scoreboard context of the next received the QoS Data frame of the TID from the initiator MLD in the link" | **Revised** A recipient discarding the temporary record does not prohibit an originator from soliciting another BA in a subsequent TXOP. However, if such a BA is solicited then the receive status of MPDUs sent in previous TXOPs will not be included as it is discarded (which is a property of partial state BA scoreboard maintenance). A NOTE is added to provide guidance on the expected behavior at the originator to reduce unnecessary retries.**TGbe editor: please implement changes as shown in 11-23/301r0 tagged 17831.** |

### Block ack procedures in Multi-link operation

***TGbe editor: Please update the contents of this paragraph in this subclause as shown below:***

To setup a block ack agreement between two MLDs, an originator MLD shall send, through [15405]any affiliated STA operating on an enabled link, an ADDBA Request frame to the recipient MLD, [18156]subject to the power state of the receiving STA affiliated with the recipient MLD (also see 32.3.12). The ADDBA Request frame shall indicate the TID for which the block ack agreement is being set up. Upon receiving an ADDBA Request frame, the recipient MLD shall respond through [15533]any affiliated STA operating on an enabled link, with an ADDBA Response frame subject to the power [16791]state of the receiving STA operating on that link.

***TGbe editor: Please update the contents of this NOTE in this subclause as shown below:***

[16796]NOTE 2—The ADDBA Extension element is optionally present in an ADDBA Request or ADDBA Response frame (see 9.6.4 (Block Ack Action frame details)). When a block ack agreement is negotiated between two MLDs, if the ADDBA Extension element is present, then the total buffer size is computed as described in 9.4.2.139 (ADDBA Extension element).

***TGbe editor: Please update the contents of this paragraph in this subclause as shown below:***

When a block ack agreement is established between two MLDs, the originator may change the size of its transmission window (*WinSizeO*) [15122]provided the transmit window meets the following conditions:

* Is not greater than the buffer size indicated in the ADDBA Response frame.
* Is not greater than 1024 if the sender and receiver of the ADDBA Response frame are MLDs.

***TGbe editor: Please update the contents of this paragraph in this subclause as shown below:***

A recipient MLD shall maintain a single common receive reordering buffer for each <peer MLD, TID> tuple under a block ack agreement, independent of the number of links that are setup. The receive reordering buffer shall be responsible for reordering MSDUs or A-MSDUs so that MSDUs or A-MSDUs are eventually passed up to the next MAC process in the order of received sequence number. It shall also be responsible for identifying and discarding duplicate frames (i.e., frames that have the same sequence number as a currently buffered frame) that are part of this block ack agreement. It shall maintain its own state independent of the scoreboard context control to perform this reordering as specified in 10.25.6.6 (Receive reordering buffer control operation). Each received MPDU shall be analyzed by the scoreboard context control as well as by the receive reordering buffer control. [16803]The bitmap corresponding to each scoreboard context control shall have the same size *WinSizeR*, which is set to the smaller of the bitmap length and the buffer size indicated in the ADDBA Response.

[15124]For each <peer MLD, TID> tuple under a block ack agreement, a recipient MLD shall have only one of the following modes of operation:

* maintain an independent scoreboard context control and partial state operation at each STA affiliated with the MLD [17830]operating on the link where the TID is mapped to, [15124]or
* have a common (single) scoreboard context control maintained by the MLD with partial state operation on each setup link [17830]where the TID is mapped to, [15124]or
* have a common (single) scoreboard context control maintained by the MLD with full state operation on each setup link [17830]where the TID is mapped to.

***TGbe editor: Please update the contents of the following NOTE in this subclause as shown below:***

NOTE 4—If a recipient MLD has independent scoreboard context control at an affiliated STA (STA 1), then STA 1’s *WinStartR* might not be within 211 of the *WinStartR* at another affiliated STA (STA 2) of the same MLD. As a result, STA 1 can fail to accurately update the scoreboard context and hence, might provide an incorrect reception status for an MPDU received in [15124]a subsequent TXOP. Therefore, it is recommended that STA 1 discards its temporary record in a timely manner. If the affiliated STA can be in sync with the latest information at another STA affiliated with the same MLD, then it does not have to discard the temporary record at the end of the current TXOP.

***TGbe editor: Please add the following NOTE immediately after NOTE 4 in this subclause as shown below:***

[17831]NOTE 5 – An originator MLD is expected to solicit an immediate BA within the TXOP by following 10.25.6.9 (Originator’s support of recipient’s partial state) to reduce the probability that MPDUs are unnecessarily retransmitted.