IEEE P802.11
Wireless LANs

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| CR for 35.3.16.7 Error recovery on a NSTR link pair within PIFS |
| Date: 2023-04-25 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yunbo Li | Huawei |  |  | liyunbo@huawei.com |
| Ming Gan |  |  |  |  |
| Yuchen Guo |  |  |  |  |
| Guogang Huang |  |  |  |  |
| Yousi Lin |  |  |  |  |
| Zhenguo Du |  |  |  |  |
| Stephen McCann |  |  |  |  |
| Edward Au |  |  |  |  |
|  |  |  |  |  |

Abstract

This submission proposes comment resolution(s) for the following 10 CID(s) received in LB271 on TGbe D3.1

CIDs:

15226, 15644, 15813, 16316, 16318, 16336, 16893, 16894, 16895, 17835

Revisions:

* Rev 0: Initial version of the document.

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| **CID** | **Commenter** | **Clause**  | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 15057 | Yongjiang Yi | 35.3.16.7 | 559.21 | response frames is less | response frames are less | RejectedThe subject of the commenting sentence is “the difference” which is a singular, so “is less than” is used. |
| 15644 | Xiangxin Gu | 35.3.16.7 | 559.48 | It is helpful to have a figure to illustrate the relationship between these time boundaries. | To add a figure | RejectedIt is hard to show all possible cases in single figure. Multiple figures will significant increase the length of this subclause.The logic of the text is that the first bullet covers the IFS on the link that response frame “ends last while successful”; the second bullet covers the IFS on the link that response frame “ends last while failed”; the last bullet covers the IFS on the link that response frame “ends first (no matter successful or failed)”. More analysis can be found in doc 11/21-0062r1 |
| 15813 | Muhammad Kumail Haider | 35.3.16.7 | 0.00 | There are multiple instances of both "a NSTR" and "an NSTR" in this subclause and throughout the spec. The correct usage is "an NSTR" | Replace "a NSTR" to "an NSTR" throughout the spec to be consistent and grammatically correct | AcceptedNote to the commenter: All the instances of “a NSTR” have been replaced with “an NSTR” in the resolution of CID 16247**Note to TGbe editor: no further change is needed.** |
| 16316 | Juseong Moon | 35.3.16.7 | 559.12 | "Belong(s) to a NSTR link pair" is not correct. | Please change "Belong(s) to a NSTR link pair" to ''Belong(s) to an NSTR link pair' in this subclause. | AcceptedNote to the commenter: All the instances of “a NSTR” have been replaced with “an NSTR” in the resolution of CID 16247**Note to TGbe editor: no further change is needed.** |
| 16318 | Juseong Moon | 35.3.16.7 | 559.11 | Name of the subclause 35.3.16.7, "Error recovery on a NSTR link pair within PIFS" is not correct. | Please change the subclause name as: "Error recovery on an NSTR link pair within PIFS". | AcceptedNote to the commenter: All the instances of “a NSTR” have been replaced with “an NSTR” in the resolution of CID 16247**Note to TGbe editor: no further change is needed.** |
| 16336 | Yongho Kim | 35.3.16.7 | 559.40 | In UL/DL synchronized PPDU transmission in multi-link, after successful TXOP setup, PIFS recovery can be performed for the consecutive frame in one of the NSTR links, when BA frame is not transmitted in one or more link. Since 8us margin is allowed in end time alignment, retransmitted data with PIFS recovery may colide with BA on the other link due to the NSTR Interference.Subclause 35.3.16.7 could be expanded to address this issue. For example, if a response frame is not transmitted for a data frame, PIFS recovery could be performed in the link in which the transmission of the data frame ended first to account for the missing response frame. In the other link, the transmission should be ended without transmitting a response frame, and the reception information of the other link can be transmitted in the link in which the transmission of the data frame ended first.When the STA choose not to perform PIFS recovery in case of a response frame failure, the STA shall invoke backoff. | As in comment, please clarify PIFS recovery operation when response frame is not transmitted in one link of an NSTR link pair. | Rejected.It is not a simple extension for current PIFS recovery. Several significant changes are needed which are very challenge for the recipient MLD: 1. Response control frame is usually implemented in low MAC. Suspending a response frame is a challenge in low MAC
2. Implementation-wise, it is a challenge to move the response frame to another link. It requires to divide a frame exchange (initial frame/response frame) into two pieces and perform in two links.
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| 16893 | Mark RISON | 35.3.16.7 | 559.13 | "After two PPDUs with end time alignment (and the PPDUs carrying the expected response frames also haveend time alignment) are transmitted by each STA affiliated with an MLD on two links that belong to a NSTRlink pair of the MLD" is not clear as to the total number of PPDUs involved | "After two PPDUs with end time alignment (and the PPDUs carrying the expected response frames also haveend time alignment) are transmitted by each STA affiliated with an MLD on two links that belong to a NSTRlink pair of the MLD (i.e. a total of 4 PPDUs are transmitted by the non-AP MLD on those two links)" | RevisedThere are only two PPDUs that are transmitted by the non-AP MLD on those two links. The PPDUs carrying the expected response frame (transmitted by the responder MLD) are received by the non-AP MLD.The sentence is updated to clarify the relationship between the two PPDUs and the two responding PPDUs. **TGbe editor, please make changes as shown in 11-23/0694r0 tagged 16893** |
| 16894 | Mark RISON | 35.3.16.7 | 559.47 | All the requirements are expressed in terms of "should", i.e. they are not requirements at all | Consider changing them to "shall"s | RevisedAgree with the commenter. “Should” is added in the main body of the paragraph, and “shall”s are used in the subbullets.**TGbe editor, please make changes as shown in 11-23/0694r0 tagged 16894** |
| 16895 | Mark RISON | 35.3.16.7 | 559.63 | "an ED-based CCA" is rather vague and might allow implementations to just do part of ED-based CCA and claim to meet the shall | Change to "ED-based CCA as described in ..." | RevisedAgree with the commenter. Subclause 36.3.21.6.3 (CCA sensitivity for the primary 20 MHz channel) is added as a reference.**TGbe editor, please make changes as shown in 11-23/0694r0 tagged 16895** |
| 17835 | Yunbo Li | 35.3.16.7 | 559.62 | equal to PIFS also need to be covered in this sentence. | change "larger than SIFS and less than PIFS" to "larger than SIFS and less than or equal to PIFS" | Accepted |

Discussion：

**Proposed spec text**

***TGbe editor: Please make the following changes in subclause 35.3.16.7 (Error recovery on an NSTR link pair within PIFS):***

**35.3.16.7 Error recovery on an NSTR link pair within PIFS(#16247)**

After two PPDUs with end time alignment (and the PPDUs carrying the expected response frames for the frames carried in the two PPDUs (#16893) also have end time alignment) are transmitted by each STA affiliated with an MLD on two links that belong to (#16247)an NSTR link pair of the MLD, if the two STAs intend to transmit more PPDUs on both links in their respective TXOPs, when a failure happens on at least one of the two links, the MLD conducts the procedures described in this subclause.

If the MLD ensures that the difference between the end times of the two PPDUs carrying the expected response frames is less than or equal to 4 μs, the MLD may use either SIFS or PIFS between the end time of the PPDU carrying the response frame and the next PPDU sent in the same TXOP on the link where the response frame is received correctly, regardless of the PPDU receive status of the other link of the NSTR link pair.

NOTE 1—The value of 4 μs is derived from aRxTxTurnaroundTime used in 35.3.16.5 (PPDU end time alignment on an NSTR link pair(#16247)).

NOTE 2—It is stricter to maintain the difference between the end times of the two PPDUs carrying the expected response frame be less than or equal to 4 μs, when compared with the requirement of PPDU end time alignment in 35.3.16.5 (PPDU end time alignment on an NSTR link pair(#16247)).

NOTE 3—If SIFS is used between the end time of the PPDU carrying the response frame and the next PPDU sent in the same TXOP on the first link of the NSTR link pair where the response frame is received correctly, the PIFS recovery on the second link of the NSTR link pair might fail due to the interference caused by the transmission of the STA operating on the first link.

If the MLD ensures that the difference between the end times of the two PPDUs carrying the expected response frames is less than or equal to 8 μs (see 35.3.16.5 (PPDU end time alignment on an NSTR link pair(#16247))), after two PPDUs with end time alignment (and the PPDUs carrying the expected response frames also have end time alignment) are transmitted by STAs affiliated with the MLD on two links that belongs to (#16247)an NSTR link pair of the MLD, if PHY-RXSTART.indications are received on both links, but the response frames contained in the corresponding PPDUs are not successfully received in at least one of the links of the NSTR link pair, then the following rules should be followed (#16894):

—On the link on which the response frame ends last, if the response frame is successfully received, the time from the end of the PPDU carrying the response frame to the next PPDU sent in the same TXOP shall (#16894) be larger than or equal to SIFS and smaller than or equal to PIFS;

—On the link on which the response frame ends last, if the response frame is not successfully received (i.e., FCS fails), the time from the end of the PPDU carrying the response frame to the next PPDU sent in the same TXOP shall(#16894) be larger than or equal to PIFS - 4 μs and smaller than or equal to PIFS;

—On the link on which the response frame ends first, the time from the end of the PPDU carrying the response frame to the next PPDU sent in the same TXOP shall(#16894) be PIFS.

If the time from the end of the received PPDU carrying the response frame to the next PPDU sent in the same TXOP is larger than SIFS and less than or equal to (#17835) PIFS, then the STA affiliated with the MLD shall ensure that the medium is idle through an ED-based CCA as specified in 36.3.21.6.3 (CCA sensitivity for the primary 20 MHz channel) (#16895) before the transmission of the next PPDU.