IEEE P802.11
Wireless LANs

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| CR for 35.3.16.4 |
| Date: 2022-08-01 |
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| **CID** | **Commenter** | **Clause**  | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 13927 | Ming Gan | 35.3.16.4 | 454.21 | why is this definition is under subclause of NSTR, please place it correspondingly | move this sentence to STR subclause | Revised.Agree with the commenter in principle. The sentence identified by the commenter is removed, and the definition of NSTR link pair and STR link pair are added in subclause 35.3.16.2 (Multi-link device capability and operation signaling).TGbe editor to make changes in this document under CID 13927 in 22/ 1239r2 |
| 10713 | Liangxiao Xin | 35.5.16.4 | 454.21 | "A pair of links that is not indicated as an NSTR pair is an STR pair" sounds more like the definition of STR pair. However, this is a subcause of NSTR operation | change to "A pair of links that is not indicated as an STR pair is an NSTR pair" | Revised.Agree with the commenter in principle. The sentence identified by the commenter is removed, and the definition of NSTR link pair and STR link pair are added in subclause 35.3.16.2 (Multi-link device capability and operation signaling).TGbe editor to make changes in this document under CID 13927 in 22/ 1239r2 |
| 13805 | Yuchen Guo | 35.3.16.4 | 454.21 | NSTR pair should be NSTR link pair. Also for STR pair | add "link" before "pair" | Revised.Agree with the commenter. “NSTR pair” is replaced with “NSTR link pair”.TGbe editor to make changes in this document under CID 13805 in 22/ 1239r2 |
| 11443 | Gaurang Naik | 35.3.16.4 | 454.24 | Specify that the MLD is an AP MLD. Similarly, on L31 and L35, specify that the MLD is a non-AP MLD. | As in comment | Revised.Agree with the commenter. TGbe editor to make changes in this document under CID 11443 in 22/ 1239r2 |
| 10881 | Yousi Lin | 35.3.16.4 | 454.31 | Change "A non-AP STA )affiliated with an MLD" to "A STA affiliated with a non-AP MLD" | as in comment | Revised.Agree with the commenter. TGbe editor to make changes in this document under CID 11443 in 22/ 1239r2 |
| 10005 | Robert Sosack | 35.3.16.4 | 454.31 | Closing parenthesis without opening parenthesis in "A non-AP STA )affiliated with an MLD that". | Delete closing parenthesis. | Accepted |
| 10783 | Dennis Sundman | 35.3.16.4 | 454.31 | Remove the extra character ")" | Change "A non-AP STA )affiliated..." with "A non-AP STA affiliated..." | Accepted |
| 11264 | Sigurd Schelstraete | 35.3.16.4 | 454.31 | remove ")" | See comment | Accepted |
| 11755 | Gaurav Patwardhan | 35.3.16.4 | 454.31 | Delete the extra parantheses ')' | as in comment | Accepted |
| 12216 | Stephen McCann | 35.3.16.4 | 454.31 | Typo ")affiliated" | Change ")affiliated" to "affiliated" | Accepted |
| 12360 | Massinissa Lalam | 35.3.16.4 | 454.31 | Typo, remove remaining ) in "A non-AP STA )affiliated" | As in comment | Accepted |
| 13556 | Jian Yu | 35.3.16.4 | 454.31 | a needs to be deleted between STA and affiliated | As in comment | Accepted |
| 13999 | Geonjung Ko | 35.3.16.4 | 454.31 | Remove ")". | As in comment | Accepted |
| 10091 | Xiangxin Gu | 35.3.16.4 | 454.35 | The condition "and lack of availability of an alternative frame in the queue that would not introduce the opportunity for such interference" is not needed for an non-AP MLD to not transmit. | remove the condition. | RejectedIt is needed in some cases. For example:Case 1: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, and AP could make it PPDU end time aligns with the DL transmission on another link by adjusting the parameter (e.g. MCS), or by adding padding. Case 2: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, if the alternative frame not solicite an immediate Ack, and its PPDU length is shorter than the DL transmission on another link.  |
| 13701 | Yunbo Li | 35.3.16.4 | 454.35 | if the non-AP STA transmit a frame will interfere another STA affliated with the same non-AP MLD, any frame will assume to introduce similar cross link interference. In another word, the interference is not related to the content of the transmitting frame. So the sentence below seems redundant: "and lack of availability of an alternative frame in the queue that would not introduce the opportunity for such interference" | delete "and lack of availability of an alternative frame in the queue that would not introduce the opportunity for such interference". | RejectedIt is needed in some cases. For example:Case 1: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, and AP could make it PPDU end time aligns with the DL transmission on another link by adjusting the parameter (e.g. MCS), or by adding padding. Case 2: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, if the alternative frame not solicite an immediate Ack, and its PPDU length is shorter than the DL transmission on another link.  |
| 10129 | Jay Yang | 35.3.16.4 | 454.24 | not understand what's the meaning of "lack of lack of availability of an alternative frame in the queue that would not introduce the opportunity for such interference" | need more clarify on it. | RejectedThere is no ambuity for the commented sentence. No further clarification is needed.Several cases are listed below to show why an alternative frame that would not introduce cross link interference. In the implementation, more cases may exist.Case 1: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, and AP could make it PPDU end time aligns with the DL transmission on another link by adjusting the parameter (e.g. MCS), or by adding padding. Case 2: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, if the alternative frame not solicite an immediate Ack, and its PPDU length is shorter than the DL transmission on another link. Case 3: the alternative frame is destined to another STA; |
| 10503 | Eldad Perahia | 35.3.16.4 | 454.27 | "an alternative frame in the queue that would". How would an alternative frame not cause such interference? | clarify | RejectedThere is no ambuity for the commented sentence. No further clarification is needed.Several cases are listed below to show why an alternative frame that would not introduce cross link interference. In the implementation, more cases may exist.Case 1: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, and AP could make it PPDU end time aligns with the DL transmission on another link by adjusting the parameter (e.g. MCS), or by adding padding. Case 2: there is DL transmission on another link of an NSTR link pair, the alternative frame on this link is destined to same STA, if the alternative frame not solicite an immediate Ack, and its PPDU length is shorter than the DL transmission on another link. Case 3: the alternative frame is destined to another STA; |
| 10358 | Tomoko Adachi | 35.3.16.4 | 0.00 | "NSTR based interference" This term appears only here and there is no description what it is. Description required. | As in comment. | RevisedAgree with the commenter. The sentence is modified to avoid to use the term “NSTR based interference”.TGbe editor to make changes in this document under CID 10358 in 22/ 1239r2 |
| 13334 | Muhammad Kumail Haider | ï»¿35.3.16.4 | 454.26 | What constitutes NSTR based interference? A NOTE should be added with example(s)/scenarios to expand on the term | as in comment | RevisedAgree with the commenter. The sentence is modified to avoid to use the term “NSTR based interference”.TGbe editor to make changes in this document under CID 10358 in 22/ 1239r2 |
| 10502 | Eldad Perahia | 35.3.16.4 | 454.26 | "due to expected NSTR based interference at". what is NSTR based interference? | define the new term "NSTR based interference" | RevisedAgree with the commenter. The sentence is modified to avoid to use the term “NSTR based interference”.TGbe editor to make changes in this document under CID 10358 in 22/ 1239r2 |
| 10504 | Eldad Perahia | 35.3.16.4 | 454.34 | "NSTR based interference". what is NSTR based interference? | define the new term "NSTR based interference" | RevisedAgree with the commenter. The sentence is modified to avoid to use the term “NSTR based interference”.TGbe editor to make changes in this document under CID 10358 in 22/ 1239r2 |
| 10506 | Eldad Perahia | 35.3.16.4 | 454.46 | "NSTR interference". what is NSTR interference? | define the new term "NSTR interference" | RevisedAgree with the commenter. The sentence is modified to avoid to use the term “NSTR interference”.TGbe editor to make changes in this document under CID 10506 in 22/ 1239r2 |
| 10505 | Eldad Perahia | 35.3.16.4 | 454.27 | "empty until any frame exists in the". How would an alternative frame not cause such interference? | clarify | RejectedThere are different cases that a frame will not cause corss link interference. Below are some example for AP MLD side:1. The uplink reception of a PPDU from a non-AP STA on antoher link of the NSTR link pair is complete;
2. A new frame destined to another associated non-AP STA arrives;
3. There is DL transmission PPDU on another link of the NSTR link pair, a new frame on this link arrives, and its length suitable to do PPDU end time alignment with DL PPDU on anther link.
4. …

How to determine a frame that will not cause corss link interference is implementation related. It is not so necessary to explain how to get such a frame in the specification, and it is hard to exhaust all possible cases.  |
| 11135 | Brian Hart | 35.3.16.4 | 454.26 | "any frame from the transmission queue" reads oddly | Try "any frame in the transmission queue" | RevisedAgree with the commenter. Use the similar expression in the proceeding paragraph. i.e., change “from the transmission queue for that AC” to “corresponding to that AC”TGbe editor to make changes in this document under CID 11135 in 22/ 1239r2 |
| 11576 | Xiaofei Wang | 35.3.16.4 | 454.32 | "to not" should be "not to" | as in comment | RevisedAgree with the commenter. Change “to not” to “not to” for two locations.TGbe editor to make changes in this document under CID 11576 in 22/ 1239r2 |
| 12273 | Rajat Pushkarna | 35.3.16.4 | 454.21 | The channel access rules are not defined for a legacy STA performing channel access along with STAs affiliated with NSTR MLDs | As in comment. | RevisedAll the paragraphes except the 4th paragraph clearly mentioned MLD. The words “affiliated with an MLD” are added in the 4th paragraph to make it clear that the channel access rules are only for AP or non-AP STA affiliated with an MLDTGbe editor to make changes in this document under CID 12273 in 22/ 1239r2 |
| 12327 | Guogang Huang | 35.3.16.4 | 454.49 | the word 'if' is repeated, please delete the word 'if' | Change "regardless of whether if themedium is busy or not" to "regardless of whether themedium is busy or not" | Accepted. |
| 12419 | Juseong Moon | 35.3.16.4 | 454.45 | In NSTR operation, while backoff counter is zero and queue is being considered empty, another frame, destined to other STA not causing NSTR interference, can be queued and the EDCA queue becomes non-empty again. In this case, the data frame can be transmitted immediately without invoking new backoff because the backoff counter is already 0. However, draft 2.0 requires to invoke new backoff procedure. it is more efficient to transmit a frame which doesn't cause interference without backoff. | Please clarify the case to transmit a frame immediately to other STA upon a frame arrival while backoff counter is zero and queue is being considered empty. | Rejected.The rules in 11be draft 1.0 were similar as what commenter suggested. CID 6958 in document 11-21/1259r3 point out an issue that when an AP transmits a PPDU to multiple STAs affiliated with non-AP MLDs on link 1, if multiple affiliated STAs of these non-AP MLDs on link 2 are keeping their backoff counters to zero, collision will happen in this scenario.In order to avoid this issue, the rules are changed in draft 2.0 accordingly. As a result, backoff will be invoked regardless of whether the medium is idle or busy.  |
| 12423 | Yongho Kim | 35.3.16.4 | 454.59 | In NSTR link pair, when an NSTR non-AP STA's TXOP aquisition time is too close to the other link's TBTT at which the Beacon contains critical updates and the non-AP STA shall receive the Beacon, the non-AP STA is not able to end its TXOP since TXOP is set up at the time of transmission. In this case, the non-AP STA may defer its transmission either by considering its EDCAFs' queue is empty or invoking new backoffs until the the reception of the Beacon on the other link. | In order to clarify an NSTR non-AP STA's critical updates, please make the following chages. .If a STA that is affiliated with a non-AP MLD successfully finishes EDCA backoff obtains a TXOP on one link of one of its NSTR link pairs before the TBTT of the other link of the NSTR link pair, then it should perform one of the followings if the other STA affiliated with the same non-AP MLD intends to receive the Beacon frame scheduled at that TBTT on that link.1. end its TXOP before the TBTT of the other link2. consider EDCAFs' queue is empty if not enough time is remained to end its TXOP before the TBTT3. invoke new backoff with QSRC[AC] and CW[AC] unchanged | Rejected.The paragraph identified by the commenter addresses the case that a STA affiliated with a non-AP MLD already obtained a TXOP. What the commenter discussing is the case that when the timepoint backoff counter reaches 0, TBTT has arrived or is about to arrive. This case is covered by the 3rd and 4th paragraphes in 11be draft 2.1. As a result, no change is needed. |
| 12659 | Arik Klein | 35.3.16.4 | 454.52 | The AP MLD does not transmit any frame, but only one of its affiliated APs. Please revise the following sentence, as proposed: "An AP MLD should not transmit a frame that solicits ..." | Please revise the sentence as follows: "An AP affiliated with an AP MLD should not transmit a frame that solicits ..." | Accepted. |
| 13055 | Chittabrata Ghosh | 35.3.16.4 | 454.31 | A similar rule as in the quoted text "An AP MLD should not transmit a frame that solicits an immediate response to a STA that is affiliated with a non-AP MLD on a link that is a member of one or more NSTR link pairs for that non-AP MLD, if the immediate response is expected to overlap in time with group addressed MPDUs scheduled in another link of any of those NSTR link pairs and the non-AP MLD is expected to be receiving those group addressed MPDUs."is needed for an EHT STA that is participating in an r-TWT SP in one link, should not be scheduled an RU/M-RU in a TF by an EHT AP on another link that is a member of one or more NSTR link pairs. | Please add specific behavior to consider the scenario in this subclause | RejectedThe comment is rejected for the following reasons:1. Transmission of Group addressed MPDUs is prescheduled. While R-TWT is a groupcast TWT, multiple STAs will share an R-TWT SP. It is hard to expect the accurate timeslots the STA as an R-TWT member will TX/RX.
2. There may also be an R-TWT SP in another link. In this case, the suggested rule doesn’t work.
3. The low latency traffic may be mapping on both links. Of the scheduled MPDU in another link is disallowed, it may increase the delay.
 |
| 13056 | Chittabrata Ghosh | 35.3.16.4 | 454.31 | A similar rule as in quoted text:"If a STA that is affiliated with a non-AP MLD successfully obtains a TXOP on one link of one of its NSTR link pairs before the TBTT of the other link of the NSTR link pair, then it should end its TXOP before the TBTT of the other link if it intends to receive Beacon frames on the other link."is needed if the obtained TXOP in one link overlaps with the start time of a restricted TWT SP scheduled on other link | Please add specific behavior to satisy the issue pointed out in the comment | RejectedThe comment is rejected for the following reasons:1. The low latency traffic may be mapping on both links. The termination of TXOP on another link before rTWT SP of this link may incrase the delay.
2. It will add the complexity of TXOP management
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**Discussion:**

1. **Introduction**

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. The introduction and the explanation of the proposed changes are 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).***

1. **Proposed spec text**

The baseline for this text is TGbe D2.1

***TGbe editor: Modify the paragraphs in 35.3.16.2(Multi-link device capability and operation signaling) as follows:***

**35.3.16.2(Multi-link device capability and operation signaling)**

A multi-radio non-AP MLD shall announce each pair of links formed by links that requested a multi-link setup as STR or NSTR in a transmitted (Re)Association Request frame.

A pair of links is an NSTR link pair when the corresponding bit in the NSTR Indication Bitmap subfield of the Basic Multi-Link element is set to 1. (#13927, 13805)

A pair of links that is not indicated as an NSTR link pair is an STR link pair. (#13927)

***TGbe editor: Modify the paragraphs in 35.3.16.3(Simultaneous transmit and receive (STR) operation) as follows:***

**35.3.16.3 Simultaneous transmit and receive (STR) operation**

When a pair of links on which an MLD operates is an STR link pair, a STA that is affiliated with the MLD and that is operating on a link in that STR link pair shall access the WM on that link by following the rules defined in 10.3 (DCF) and 10.23.2 (HCF contention based channel access (EDCA)) regardless of any activity occurring on the other link within that STR link pair, except as specified in 35.3.16.4 (Nonsimultaneous transmit and receive (NSTR) operation).

All pairs of links where an AP MLD that is not an NSTR mobile AP MLD operates shall be STR link pairs.

 (#13927)

***TGbe editor: Modify the paragraphs in 35.3.16.4(Nonsimultaneous transmit and receive (NSTR) operation) as follows:***

**35.3.16.4 Nonsimultaneous transmit and receive (NSTR) operation**

(#13927)

An AP affiliated with an (#11443) AP MLD that has gained the right to initiate transmission of a frame of an AC on a link through the rules for EDCA backoff in 10.23.2.4 (Obtaining an EDCA TXOP) may choose not to (#11576) transmit any frame corresponding to (#11135) that AC due to expected interference caused by the transmission (#10358) at the STA operating on the other link of an NSTR link pair that the link belongs to within the intended recipient (#11443) non-AP MLD and due to lack of availability of an alternative frame in the queue that would not introduce the opportunity for such interference.

A (#11443)STA (#10005) affiliated with a (#11443) non-AP MLD operating on a link of an NSTR link pair (#10358) that has gained the right to initiate transmission of a frame of an AC on a link through the rules for EDCA backoff in 10.23.2.4 (Obtaining an EDCA TXOP) may choose not to (#11576) transmit any frame corresponding to that AC due to expected interference caused by the transmission (#10358) at the STA operating on the other link of the NSTR link pair within the (#11443) non-AP MLD and due to lack of availability of an alternative frame in the queue that would not introduce the opportunity for such interference.

An AP or non-AP STA affiliated with an MLD (#12273) that has gained the right to initiate transmission of a frame as described in 10.23.2.4 (Obtaining an EDCA TXOP) for an AC but does not transmit any frame corresponding to that AC for the reasons stated above may:

* invoke a backoff for the EDCAF associated with that AC as allowed per item h) of 10.23.2.2 (EDCA backoff procedure)
* consider the transmit queue for that AC as empty until any frame exists in the queue which if transmitted, the transmitter determines, will not cause an unacceptable level of interference caused by transmission at the STA operating on the other link of a NSTR link pair that the AP or non-AP STA belongs to (#10506), at which time the queue is considered to have become nonempty and backoff is invoked per the procedure described in item a) of 10.23.2.2 (EDCA backoff procedure) regardless of whether (#12327)the medium is busy or not.

An AP affiliated with an (#12659) AP MLD should not transmit a frame that solicits an immediate response to a STA that is affiliated with a non-AP MLD on a link that is a member of one or more NSTR link pairs for that non-AP MLD, if the immediate response is expected to overlap in time with group addressed MPDUs scheduled on a link that is a member of any of those NSTR link pairs and any of the other STA(s) affiliated with the non-AP MLD is expected to be receiving those group addressed MPDUs.

If a STA that is affiliated with a non-AP MLD successfully obtains a TXOP on one link of one of its NSTR link pairs before the TBTT of the other link of the NSTR link pair, then it should end its TXOP before the TBTT of the other link if the other STA affiliated with the same non-AP MLD intends to receive the Beacon frame scheduled at that TBTT on that link.

NOTE—The STA might not do so if it is not aware of the TSF of the other link.

***End of change***