IEEE P802.11
Wireless LANs

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| Resolution for comments related to NSTR-EMLSR handling with TDLS |
| Date: September 10, 2022 |
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 Abstract

This submission proposes resolutions for the following 16 comments received for TGbe LB266:

10058 13081 10060 11657 13083 13083 10061 13084 10367 11158 10660 13635 13671 13668 13669 13670

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Updated based on feedback from Rojan, Tomo and Stephane
* Rev 2: CIDs 10059 and 11656 are deferred based on offline discussion w/ Morteza
* Rev 3:
	+ Resolves additional CIDs related to TDLS co-existence w/ NSTR/EMLSR/EMLMR
	+ Revised resolution for CID 10058 based on offline discussions
	+ CIDs 10059 and 11656 are reassigned to Morteza
	+ Updated baseline to the latest REVme and TGbe drafts

***TGbe editor: Please note baseline is REVme D2.0 and 11be D2.2***

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.***

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| **CID** | **Commenter** | **Section** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 10058 | Morteza Mehrnoush | 35.3.21.2 | 471.12 | The current spec text for the TDLS operation only works when all the links of the non-AP MLD has STR link relation, however when the links of non-AP MLD have NSTR link relation (lets say L1 and L2 are NSTR link pair), the peer STA of non-AP MLD may initiate PPDU over L1 and AP of AP MLD may initiate PPDU over L2, and the end time of the PPDUs are not aligned, so the response frame by the non-AP MLD may corrupts either of the PPDUs. A mechanism to prevent such a self interference among NSTR link pair is needed. | as in comment | **Revised**A non-AP MLD can use baseline power-save indication (PM bit set to 1) to pause AP MLD’s transmission to the non-AP MLD on link(s) that form an NSTR pair with the TDLS link or belong to a link that is EMLSR/EMLMR and shares a radio with the TDLS link. In addition, the non-AP MLD can use the power-save mechanism defined for TDLS (see 11.2.3.12) to manage communication with its TDLS peer such that it doesn’t interfere with communication with the AP MLD. Furthermore, a non-AP MLD can use the channel usage procedure (defined in 11.21.15) to request guidance from the AP to form a TDLS link. This can serve as information to the AP to help the AP better schedule its transmissions to the non-AP MLD.**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 13081 | Chittabrata Ghosh | 35.3.21.2 | 471.12 | The current spec text for the TDLS operation only works when all the links of the non-AP MLD has STR link relation, however when the links of non-AP MLD have NSTR link relation (lets say L1 and L2 are NSTR link pair), the peer STA of non-AP MLD may initiate PPDU over L1 and AP of AP MLD may initiate PPDU over L2, and the end time of the PPDUs are not aligned, so the response frame by the non-AP MLD may corrupts either of the PPDUs. A mechanism to prevent such a self interference among NSTR link pair is needed. | as in comment | **The comment is a duplicate of CID 10058** |
| 10060 | Morteza Mehrnoush | 35.3.21.1 | 470.60 | If non-AP MLD is operating in EMLSR mode, and one STA of non-AP MLD wants to extablish a TDLS link with another device, there will be some limitations. The other deivce could be legacy device or EHT device (MLD and non-MLD); if it's a legacy deivce, it cannot initiate frame exchange considering the EMLSR rules; if it's a EHT device, it needs some information from the non-AP MLD which is operating in EMLSR mode like padding delay, etc, to be able to do the TDLS operation when the non-AP MLD operates in EMLSR mode for some scenarios. | there is no description of TDLS procedure when non-AP MLD operates in EMLSR mode and one of the STAs establishes a TDLS direct with anohter device; please add text to propose a solution for this. | **Revised**Same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 11657 | Morteza Mehrnoush | 35.3.21.1 | 470.60 | If non-AP MLD is operating in EMLSR mode, and one STA of non-AP MLD wants to establish a TDLS link with another device, there will be some limitations. The other device could be legacy device or EHT device (MLD and non-MLD); if it's a legacy device, it cannot initiate frame exchange considering the EMLSR rules; if it's a EHT device, it needs some information from the non-AP MLD which is operating in EMLSR mode like padding delay, etc, to be able to do the TDLS operation when the non-AP MLD operates in EMLSR mode for some scenarios. | there is no description of TDLS procedure when non-AP MLD operates in EMLSR mode and one of the STAs establishes a TDLS direct with another device; please add text to propose a solution for this. | **The comment is a duplicate of CID 10060** |
| 13083 | Chittabrata Ghosh | 35.3.21.1 | 470.60 | If non-AP MLD is operating in EMLSR mode, and one STA of non-AP MLD wants to extablish a TDLS link with another device, there will be some limitations. The other deivce could be legacy device or EHT device (MLD and non-MLD); if it's a legacy deivce, it cannot initiate frame exchange considering the EMLSR rules; if it's a EHT device, it needs some information from the non-AP MLD which is operating in EMLSR mode like padding delay, etc, to be able to do the TDLS operation when the non-AP MLD operates in EMLSR mode for some scenarios. | there is no description of TDLS procedure when non-AP MLD operates in EMLSR mode and one of the STAs establishes a TDLS direct with anohter device; please add text to propose a solution for this. | **The comment is a duplicate of CID 10060** |
| 13083 | Chittabrata Ghosh | 35.3.21.1 | 470.60 | If non-AP MLD is operating in EMLSR mode, and one STA of non-AP MLD wants to extablish a TDLS link with another device, there will be some limitations. The other deivce could be legacy device or EHT device (MLD and non-MLD); if it's a legacy deivce, it cannot initiate frame exchange considering the EMLSR rules; if it's a EHT device, it needs some information from the non-AP MLD which is operating in EMLSR mode like padding delay, etc, to be able to do the TDLS operation when the non-AP MLD operates in EMLSR mode for some scenarios. | there is no description of TDLS procedure when non-AP MLD operates in EMLSR mode and one of the STAs establishes a TDLS direct with anohter device; please add text to propose a solution for this. | **The comment is a duplicate of CID 10060** |
| 10061 | Morteza Mehrnoush | 35.3.21.1 | 470.60 | There is no text in spec to explain the TDLS power save procedure for the non-AP MLD which establishes TDLS direct link over a single link. The description of the procedure and solution to potential issues for the non-AP MLD operating in NSTR/EMLSR/EMLMR modes needs to be discussed. | as in comment | **Revised**Baseline provides a mechanism for TDLS power-save (see 11.2.3.12 (TDLS peer power save mode)). Regarding the NSTR/EMLSR/EMLMR handling, same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 13084 | Chittabrata Ghosh | 35.3.21.1 | 470.60 | There is no text in spec to explain the TDLS power save procedure for the non-AP MLD which establishes TDLS direct link over a single link. The description of the procedure and solution to potential issues for the non-AP MLD operating in NSTR/EMLSR/EMLMR modes needs to be discussed. | as in comment | **The comment is a duplicate of CID 10061** |
| 10367 | Tomoko Adachi | 35.3.21 | 0.00 | When an AP MLD having an NSTR link pair with a non-AP MLD and the non-AP MLD starts direct link communication in one of the NSTR link pair with a peer STA, as the non-AP MLD cannot receive frames on the other link, the AP MLD needs to be aware of which link is used for direct link communication in order to select the proper link where the non-AP MLD can receive frames from the AP MLD. | "Add a mechanism or constraints to solve the problem. | **Revised**Same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 11158 | Boon Loong Ng | 35.3.21 | 470.55 | TDLS operation with a non-AP MLD can be impacted by NSTR constraints of the non-AP MLD or peer non-AP MLD hosting that TDLS peer STA. | A procedure to handle the TDLS operation with MLD under NSTR constraints needs be described in the spec. | **Revised**Same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 10660 | Abhishek Patil | 35.3.21 | 470.57 | Baseline spec provides Channel Usage feature to enable an AP/non-AP coordinate the channel to use for p2p operation so that it doesn't interfere with infra-BSS operation. TGbe spec should explore utilizing and if needed expanding this feature for p2p operation when at least one of the link between the AP and non-AP MLD is an nSTR link. | As in comment | **Revised**Same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 13635 | Rubayet Shafin | 35.3.21.2 | 471.09 | Whenever, there is a peer-to-peer link (e.g. TDLS link) between any pair of STAs affiliated with a pair of non-AP MLDs over one link, and if any of the non-AP MLDs is not STR capable over any of the links, the other NSTR link(s) become essentially ineffective. Consider the following scenario that illustrates this situation--Assume that MLD\_S and MLD\_R are two non-AP MLDs and MLD\_A is an AP MLD. STA1 and STA2 are two non-AP STAs affiliated with the non-AP MLD, MLD\_S; STA3 and STA4 are two non-AP STAs affiliated with non-AP MLD, MLD\_R; and AP1 and AP2 are two APs affiliated with AP MLD, MLD\_A. Two links have been set up between MLD\_S and MLD\_A--- one between STA1 and AP1 over Link 1, and the other between STA2 and AP2 over Link 2. Moreover, two links have been set up between MLD\_R and MLD\_A--- one between STA3 and AP1 over Link 1, and the other between STA4 and AP2 over Link 2. STA3 and STA4, operating on Link 1 and Link 2, respectively, form an NSTR link pair. Now, a TDLS link has been established between STA1 and STA3. When STA3 is communicating to STA1 over the TDLS direct link, AP MLD, MLD\_A, usually is not aware of the communication over the TDLS link. MLD\_A is aware of MLD\_R' s NSTR capability; so without the TDLS link as long as STA3 is not transmitting to AP1 over Link 1, AP2 can perform downlink transmission to STA4 over Link 2. However, over the TDLS direct link, if STA3 is transmitting to STA1, then STA4 would not be able to receive packets from AP2 over Link2. | Spec needs to provide solution/guideline for handling NSTR issue when one or more non-AP STAs, affiliated with a non-AP MLD and forming NSTR link pair(s), establish TDLS direct link with one or more non-AP STAs affiliated with another non-AP MLD. | **Revised**Same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 13671 | Rubayet Shafin | 35.3.21 | 470.55 | An AP-MLD can intend to enable a setup link that may form an NSTR link pair to the off-channel TDLS direct link, as the AP MLD is not involved in TDLS channel switch and is unaware of the off-channel TDLS direct link. The potential NSTR link pair between the off-channel TDLS direct link and any link that is intended to be enabled in TID-to-link mapping negotiation should be avoided. If TID-to-link mapping negotiation is unsuccessful, default mapping will be applied, which will cause the NSTR link pair or congestion. | Please provide rules/mechanisms related to TDLS channel switch for non-AP MLD with NSTR constraints. | **Revised**Same resolution as CID 10058**TGbe editor, please make changes as shown in 11-22/1586r3 tagged 10058** |
| 13668 | Rubayet Shafin | 35.3.21.2 | 471.09 | The current single TDLS link discovery/setup process in the spec is broken for EMLSR or single radio devices. For example, when the MLD in the EMLSR mode (or a single radio non-AP MLD) is the TDLS initiator and a TDLS responding device is a legacy device, the TDLS discovery response can be sent over a link but the EMLSR device may not be operating on that link when the response frame is sent by the TDLS responder (EMLSR device at that time may have the radio on another link). Note that the response frame is not sent through the AP MLD. | Please provide text illustrating the mechanism to handle the issue related to TDLS discovery/setup process with device in EMLSR mode. | **Rejected**A non-AP MLD that is a TDLS initiator can use (baseline) power-save mechanism to pause the transmissions from its associated AP MLD during the discovery and setup phase. Furthermore, the non-AP MLD can pause its own transmissions to the AP MLD during the TDLS setup and discovery phase. |
| 13669 | Rubayet Shafin | 35.3.21.2 | 471.09 | The current single TDLS link discovery/setup process in the spec is broken for EMLMR devices. For example, when the non-AP MLD in the EMLMR mode is the TDLS initiator and a TDLS responding device is a legacy device, the TDLS discovery response can be sent over a link that is included in the EMLMR links and the EMLMR device is involved in EMLMR frame exchange on another link. The EMLMR device may not have any radio left on the link on which the response frame is sent by the TDLS responder. | Please provide text illustrating the mechanism to handle the issue related to TDLS discovery/setup process with device in EMLMR mode. | **Rejected**A non-AP MLD that is a TDLS initiator can use (baseline) power-save mechanism to pause the transmissions from its associated AP MLD during the discovery and setup phase. Furthermore, the non-AP MLD can pause its own transmissions to the AP MLD during the TDLS setup and discovery phase. |
| 13670 | Rubayet Shafin | 35.3.21.2 | 471.09 | When an NSTR non-AP MLD is the TDLS initiator, the TDLS responder can send the TDLS discovery response over a first link (direct link) while the NSTR non-AP MLD is transmitting frames to the AP MLD on a second link, where the first link forms an NSTR link pair with the second link. Accordingly, the NSTR non-AP MLD would not be able to receive the response frame from the TDLS responder. | Please provide text specifying rules for TDLS discovery/setup for the NSTR non-AP MLDs. | **Rejected**A non-AP MLD that is a TDLS initiator can use (baseline) power-save mechanism to pause the transmissions from its associated AP MLD during the discovery and setup phase. Furthermore, the non-AP MLD can pause its own transmissions to the AP MLD during the TDLS setup and discovery phase. |

**35.3.21.1 General** [10058]

***TGbe editor: Please add the following paragraph at the end of this subclause as shown below:***

If a non-AP STA affiliated with a non-AP MLD has established a TDLS direct link and the link on which the same or other non-AP STA affiliated with the non-AP MLD is operating on:

* is an EMLSR link or an EMLMR link with its associated AP and shares radio with a TDLS link.
* forms an NSTR link pair with a TDLS link.

then the same or the other non-AP STA affiliated with the non-AP MLD:

* should indicate that it is in power-save mode to its TDLS peer STA (by following the procedures described in 11.2.3.12 (TDLS peer power save mode)) to manage the peer’s transmissions to the non-AP MLD when the non-AP STA is in active state with its associated AP.
* should indicate that it is in power-save mode to its associated AP that is affiliated with the AP MLD to manage AP MLD’s transmissions to the non-AP MLD, when the non-AP MLD is not in TDLS peer power-save mode (see 11.2.3.12 (TDLS peer power save mode)).

A non-AP MLD that is operating in EMLSR mode or has an NSTR link pair may request guidance from its associated AP MLD on selecting a suitable channel for establishing a TDLS direct link by following the procedures defined in 11.21.15 (Channel usage procedures) to ensure co-existence between frame exchanges on the TDLS direct link and those with the AP MLD.

An AP MLD that has responded to a non-AP MLD’s request to establish a TDLS link by following the procedures defined in 11.21.15 (Channel usage procedures) should use the information for making scheduling decisions so that its transmissions to the non-AP MLD do not interfere with the TDLS link.