IEEE P802.11
Wireless LANs

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| LB279 Comment Resolution for eMLSR related CIDs |
| Date: 2024-03-15 |
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Abstract

This document provides comment resolution for CIDs 1164 and 1162 (2 total) using **REVmeD4.2** and **11beD5.0** as **references**.

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| **CID** | **Clause** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 1164 | 11.21 | 25.09 | The support of ranging under MLO is missing | 1, whether EMLSR/EMLMR STA is allowed to do the ranging.2, the range measurement should be done in link level, however the civic location etc. should be in MLD level since the link level STA is not known to the outside BSS. | ReviseTGbk editor, add changes specified in this document <https://mentor.ieee.org/802.11/dcn/24/11-24-0601-02-00bk-lb279-comment-resolution-for-cids-in-sec-9-part-2.docx> |
| 1162 | 11.21.6.3.111.21.6.4.3.111.21.6.4.5.2 | 0.00 | Add normative text to support possible changes associated with TB ranging measurement exchange when one or more ISTAs being in the eMLSR mode. There seems to be no need to add any changes for NTB ranging measurement exchange as the sequence initiates by ISTA so it can use the appropriate link. | As per comment |  ReviseTGbk editor, add changes specified in this document <https://mentor.ieee.org/802.11/dcn/24/11-24-0601-02-00bk-lb279-comment-resolution-for-cids-in-sec-9-part-2.docx> |

**Discussion:**

In prior discussions regarding MLD support the suggestions were to do the following:

1. Keep negotiation frame exchange (i.e., IFTMR and IFTM) as ‘single link’transmissions as opposed to MLD transmissions.
2. Keep existing TB ranging measurement exchange sequence the same as baseline even for ISTA in eMLSR mode. The reasoning is that ISTA is aware of the ranging availability window thus can make itself ready to be on-channel and not needing to have RSTA to send ICF frame(s).

The decision was for members to go check back with their implementation team to see if the above behavior would work and as such several companies reviewed their design and identified that their design requires the behavior described in 11be specification. Additionally, it was identified that negotiation management frames such as IFTMR & IFTM can also use MLD behavior.

11be specification includes the following management frames as ‘single link’ transmissions and the question is whether we should remove the IFTMR/IFTM from this list?



The proposal is to also add normative text where prior to any TB ranging measurement exchange the RSTA includes an ‘ICF phase’ to ensure the eMLSR ISTA is switched to the desired link before ranging measurmnet exchange can proceed. Once the ISTA is switched, the behavior is for this ISTA to be engaged in a frame exchange otherwise it would switch back to the listening operation (two/multiple 1x1 links) ‘quickly’. Therefore, right after ICF phase the ISTA must be included in the Polling, Measurement Sounding and Measurement Reporting phases. Diagrams below show two sequences.

1) both first and second instance include at least one ISTA in the eMLSR mode

2) the first instance includes at least one ISTA in eMLSR mode whereas the second instance does not include any ISTAs in eMLSR mode

Note that the non-TB ranging measurement echange does not require inclusion of ICF phase since it is initiated by the ISTA.

**Initial Control Frame exchange (ICF)**

(first Instance)

Polling Phase

(first Instance)

Measurement Sounding Phase

(first Instance)

Measurement Reporting Phase

(first Instance)

**Initial Control Frame exchange (ICF)**

(Second Instance)

Polling Phase

(Second Instance)

Measurement Sounding Phase

(Second Instance)

Measurement Reporting Phase

(second Instance)

TXOP

TXOP

Availability Window

**Initial Control Frame exchange (ICF)**

(first Instance)

Polling Phase

(first Instance)

Measurement Sounding Phase

(first Instance)

Measurement Reporting Phase

(first Instance)

Polling Phase

(Second Instance)

Measurement Sounding Phase

(Second Instance)

Measurement Reporting Phase

(second Instance)

TXOP

TXOP

Availability Window

For the secure LTF operation the TB ranging measurement exchange needs to be performed with an eMLSR ISTA as SU operation, meaning that RSTA would need a separate sequence of ICF+TB ranging measurement exchange for each eMLSR ISTA. The main reason is that in secure LTF, the UL sounding needs to be done one at a time in which case there would be a gap in frame exchange to an eMLSR ISTA causing it to switch back to listen mode, an undersirable behavior.

Secure LTF TB ranging meaurement exchange

**Initial Control Frame exchange (ICF)**

One eMLSR ISTA

(first Instance)

Polling Phase

One eMLSR ISTA

(first Instance)

Measurement Sounding Phase

One eMLSR ISTA

(first Instance)

Measurement Reporting Phase

One eMLSR ISTA

(first Instance)

**Initial Control Frame exchange (ICF)**

One eMLSR ISTA

(Second Instance)

Polling Phase

One eMLSR ISTA

(Second Instance)

Measurement Sounding Phase

One eMLSR ISTA

(Second Instance)

Measurement Reporting Phase

One eMLSR ISTA

(second Instance)

TXOP

TXOP

Availability Window

*Instruction to 11bK editor: Add paragraphs in section “11.21.6.3.1 (General)” of REVme D4.2 in P2663L44 as shown below:*

NOTE- Prior to the transmission of any ranging measurement frame(s) including IFTM frame (negotiation), FTM frame (measurement) and/or FTM session termination frame sent by an AP to an associated ISTA in the EMLSR mode, the AP needs to transmit an initial control frame exchange (see section 35.3.17 Enhanced multi-link single radio operation).

NOTE: The transmission of an ICF is not required for an unasscoiated ISTA as only the associated ISTA can negotiate to be in the EMLSR mode.

*Instruction to 11bK editor: Add the paragraphs in section “11.21.6.4.3.1 (General)” of REVmeD4.2 P2685L31 as shown below:*

To perform a TB ranging measurement exchange with an associated ISTA in the EMLSR mode, the RSTA shall transmit an initial control frame exchange (see section 35.3.17 Enhanced multi-link single radio operation) at the beginning of the TB ranging measurement exchange prior to the transmission of the triplet, which includes Polling, Measurement Sounding and Measurement Reporting phases; see Figure 11-xx1 (TB ranging availability window with two instances of polling/sounding/reporting triplets in separate TXOPs where the first TXOP includes an ISTA in eLMSR mode).

To perform a TB ranging measurement exchange with any combination of two or more ISTAs, where at least one ISTA is in the EMLSR mode, then the AP shall transmit a TF sounding frame to solicit responses as either HE TB Ranging NDPs (or EHT TB Ranging NDPs), or HE Ranging NDPs (or EHT Ranging NDPs) using UL MU MIMO transmission to avoid the ISTA(s) in the EMLSR mode switching back to the listening operation before the sequence ends.

**Initial Control Frame exchange (ICF)**

(first Instance)

Polling Phase

(first Instance)

Measurement Sounding Phase

(first Instance)

Measurement Reporting Phase

(first Instance)

Polling Phase

(Second Instance)

Measurement Sounding Phase

(Second Instance)

Measurement Reporting Phase

(second Instance)

TXOP

TXOP

Availability Window

Figure 11-xx1 TB ranging availability window with two instances of polling/sounding/reporting triplets in separate TXOPs where the first TXOP includes an ISTA in eLMSR mode

*Instruction to 11bK editor: Add the paragraph in section “11.21.6.4.5.2. (TB ranging measurement exchange with secure LTF)” of REVmeD4.2 P2701L43 after second paragraph as shown below:*

**11.21.6.4.5.2 TB ranging measurement exchange with secure ~~HE-~~LTF(11az)**

An example of the negotiation and two TB Ranging Measurement Exchanges with secure ~~HE-~~LTF is shown in

Figure 11-61 (Overview of the TB ranging measurement exchange with secure ~~HE-~~LTF(11az)), where the

LTF\_VALID\_SAC and SEC\_LTF\_CTR refer to the values of the Validation SAC and Secure ~~HE-~~LTF

Counter subfields, respectively. The first value of the Validation SAC and its associated Secure ~~HE-~~LTF

Counter subfields shall be included in a protected IFTM frame, and thereafter any subsequent value of the

Validation SAC and its corresponding Secure ~~HE-~~LTF Counter subfield shall be included in a protected R2I

LMR frame. The value of the Validation SAC subfield shall also be the same value of the SAC subfield in the

Trigger Dependent User Info field of the Secure Sounding Ranging Trigger frame. The description of how

these fields are set in the TB ranging measurement exchange is given next.

In a TB ranging measurement exchange with secure ~~HE-~~LTF where there are multiple ISTAs involved in the

measurement sequence, the RSTA shall transmit a Secure Sounding Ranging Trigger frame that includes a

single User Info field to trigger a single ISTA at a time.

To perform a TB ranging measurement exchange in secure LTF with an associated ISTA in the EMLSR mode, the RSTA shall transmit an initial control frame exchange (see section 35.3.17 Enhanced multi-link single radio operation) at the beginning of the TB ranging measurement exchange prior to the transmission of the triplet, which includes Polling, Measurement Sounding and Measurement Reporting phase. The RSTA shall perform a TB ranging measurement exchange in secure LTF with a single associated ISTA to avoid the ISTA switching back to the listening operation before the sequence ends; see Figure 11-xx2 (TB ranging availability window with two instances of polling/sounding/reporting triplets in separate TXOPs where each TXOP includes secure LTF ranging measurement with one ISTA in eLMSR mode).

To perform more than one TB ranging measurement exchange in secure LTF within a TXOP, the RSTA shall set the More TF subfield in the Common Info field of the Ranging Trigger frames with RA address set to broadcast to inform ISTAs, not involved in the current TB ranging measurement exchange, there may be additional TB ranging measurement exchange(s) during the availability window.

**Initial Control Frame exchange (ICF)**

One eMLSR ISTA

(first Instance)

Polling Phase

One eMLSR ISTA

(first Instance)

Measurement Sounding Phase

One eMLSR ISTA

(first Instance)

Measurement Reporting Phase

One eMLSR ISTA

(first Instance)

**Initial Control Frame exchange (ICF)**

One eMLSR ISTA

(Second Instance)

Polling Phase

One eMLSR ISTA

(Second Instance)

Measurement Sounding Phase

One eMLSR ISTA

(Second Instance)

Measurement Reporting Phase

One eMLSR ISTA

(second Instance)

TXOP

TXOP

Availability Window

Figure 11-xx2 TB ranging availability window with two instances of polling/sounding/reporting triplets in separate TXOPs where each TXOP includes secure LTF ranging measurement with one ISTA in eLMSR mode

**References: P802.11bkD1.0, P802.11beD5.0 & P802.11REVmeD4.0**