IEEE P802.11
Wireless LANs

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**Abstract**

This submission proposes resolutions of comments received from TGaz LB 249.

* CIDs:
	+ - Total CID: 4
		- CIDs: 3123, 3754, 3124, 3450

The comments are based on TGaz Draft 2.4 and “IEEE P802.11-REVmd/D3.2, March 2020”

Revision 0: initial draft

Revision 1: minor corrections

### CID 3123/ 3124/ 3754

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| **CID** | **Clause Number & page** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 3124 | 11.22.6.4.6.2Page 160 | Alireza Raissinia | Paragraphs (four of them) starting from line 20 and ending line 43) seem to describe a behavior when RSTA indicates the need for a new SAC for measurement is needed, which is missing from the text as it describes not to use TOD or TOA. | Add a phrase to highlight the condition when RSTA indicates the need for use of new SAC. | Revised.The change is applicable for TB and non-TB mode of operation.Modified section 11.22.6.4.6.1 & 11.22.6.4.6.2TGaz editor, make the changes identified in submission 11-20-0340 |
| 3754 | 11.22.6.4.6.1Page 154 | Mark RISON | This is confusing. In both cases the LTF\_SEQ is being set to "the Secure-LTF-bits-I2R", so there's no need for two bullets. Ditto R2I below | As it says in the comment | Revised.TGaz editor, make the changes identified in submission 11-20-0340 |
| 3123 | 11.22.6.4.6.1Page 153 | Alireza Raissinia | Delete " a new Secure LTF Counter" and add "LTF Generation Information corresponding to Secure LTF Counter" | As per comment | RevisedTGaz editor, make the changes identified in 11-20-0340 as below |

***TGaz Editor: Add following to section 3.2***

**3.2 Definitions specific to IEEE 802.11**

**Null-SAC-HE-LTF** : A HE LTF present in I2R NDP or R2I NDP in the Ranging frame exchange where SAC subfield in the STA Info field of Ranging NDP Announcement frame is 0 or where SAC subfield in the Trigger Dependent User Info field in the Ranging Secure Sounding Trigger frame is 0 or if TXVECTOR parameter LTF\_SEQUENCE is set to null (#3124).

**11.21.6.4.5.2 TB Ranging Measurement Exchange with Secure LTF**

***TGaz Editor: modify following to section 11.22.6.4.5.2 Page 159 line 1***

When an RSTA has established a secure LTF measurement setup with an ISTA as specified in 11.21.6.3.4 (Negotiation for secure LTF in the TB and Non-TB measurement exchange), the RSTA that sends a Ranging Secure Sounding Trigger frame to the STA shall set: (#1260)

* The SAC subfield in the Trigger Dependent User Info field (#1129) corresponding to the ISTA in the Ranging Secure Sounding Trigger frame to the same value as in the LTF Generation SAC field in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA, if the RSTA has not sent any Ranging Secure Sounding Trigger frame to the ISTA since the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA;
* Otherwise the SAC subfield in the Trigger Dependent User Info field in the STA Info field corresponding to the ISTA in the Ranging Secure Sounding Trigger frame to 0 to indicate that a new Secure LTF Counter (#2289) and the corresponding SAC (#3123) is needed.

The RSTA shall set the I2R Rep subfield of the STA Info field corresponding to the ISTA in the Ranging Secure Sounding Trigger frame equal to the RSTA Assigned I2R Rep corresponding to the ISTA.

After transmission of the Ranging Secure Sounding Trigger frame to the ISTA, the RSTA’s MAC sublayer shall issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter LTF\_SEQUENCE that is set as follows:

* Either (#3754) null (#1828, #1831), if the SAC subfield in the Trigger Dependent User Info field in the Ranging Secure Sounding Trigger frame 0 to receive null-SAC-HE-LTF (#3124).
* Or the Secure-LTF-bits-I2R based on (#1830, #1832) Secure LTF Counter (#2289) in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA (see 11.21.6.4.5.4 (Secure LTF Generation)).

When the RSTA receives the HE TB Ranging NDP from the ISTA, the RSTA shall:

1. Send a Ranging NDP Announcement frame.
2. Send an HE Ranging NDP with the TXVECTOR parameter LTF\_SEQUENCE set as follows:
	* Either (#3754) null (#1828, #1831) to send null-SAC-HE-LTF (#3124), if the SAC subfield in the Trigger Dependent User Info field in the Ranging Secure Sounding Trigger frame set to value of 0.
	* Or the Secure-LTF-bits-R2I based on (#1830, #1832) Secure LTF Counter (#2289) in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA (see 11.21.6.4.5.4 (Secure LTF Generation)).
3. Send a Location Measurement Report frame that includes the Secure LTF Parameters field to the ISTA.

Otherwise, the RSTA shall follow the rules in 10.22.2.2 (EDCA backoff procedure) as the frame exchange is not successful.

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***TGaz Editor: modify following to section 11.22.6.4.5.2 Page 160 line 24***

When an ISTA receives a Ranging Secure Sounding Trigger frame from an RSTA in which the value of the SAC subfield in the Trigger Dependent User Info field is equal to the value of the LTF Generation SAC subfield in the Secure LTF Parameters field in the last Fine Timing Measurement frame received or last Location Measurement Report frame received from the RSTA, the ISTA shall:

* Send an HE TB Ranging NDP with the TXVECTOR parameter LTF\_SEQUENCE set to the Secure-LTF-bits-I2R based on (#1830, #1832) the Secure LTF Counter (#2289) and the corresponding SAC (#3123) in the Secure LTF Parameters field in the last Fine Timing Measurement frame received, or last Location Measurement Report frame received from the RSTA (see 11.21.6.4.5.4 (Secure LTF Generation));
* Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter LTF\_SEQUENCE that is set to the Secure-LTF-bits-R2I based on (#1830, #1832) the Secure LTF Counter (#2289) in the Secure LTF Parameters field in the last Fine Timing Measurement frame received, or last Location Measurement Report frame received from the RSTA see 11.21.6.4.5.4 (Secure LTF Generation));

When an ISTA receives a Ranging Secure Sounding Trigger frame from an RSTA in which the value of the SAC subfield in the Trigger Dependent User Info field is not equal to the value of the LTF Generation SAC subfield in the Secure LTF Parameters field in the last Fine Timing Measurement frame received or last Location Measurement Report frame received from the RSTA, the ISTA shall:

1. Send an HE TB Ranging NDP with the TXVECTOR parameter LTF\_SEQUENCE set to (#2289) (#3124) null (#1828, #1831);
2. Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter LTF\_SEQUENCE that is set to (#2289) (#3124) null (#1828, #1831);

When an ISTA receives a Ranging NDP Announcement frame from an RSTA in which the AID11/RSID11 subfield in the STA Info field contains the 11 least significant bits of the AID or RSID of the ISTA, the ISTA shall:

1. Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter LTF\_OFFSET that is set to the Offset subfield value in the STA Info field;
2. Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter LTF\_N\_STS that is set to the R2I N\_STS subfield value in the STA Info field;
3. Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter LTF\_REP that is set to the R2I Rep subfield value in the STA Info field;

When a Location Measurement Report frame contains range measurement results measured from an I2R NDP and a R2I NDP, an RSTA or ISTA that transmits the RSTA2ISTA or ISTA2RSTA Location Measurement Report frame shall include the Secure LTF Parameters field in the Location Measurement Report frame and the Range Measurement SAC subfield in the Secure LTF Parameters field in the Location Measurement Report frame to the same value as in the SAC subfield in the Trigger Dependent User Info field in the Ranging Secure Sounding Trigger frame that solicited the I2R NDP and the R2I NDP. The Measurement Result LTF Offset field in the Secure LTF Parameter element in the Location Measurement Report frame shall set to the same value as in the Offset subfield of User Info field in the Ranging NDP Announcement frame that precedes the R2I NDP. When an ISTA or RSTA receives RSTA2ISTA or ISTA2RSTA Location Measurement Report frame, the ISTA or RSTA shall compare the value of Measurement Result LTF Offset field with the value of the Offset subfield in the corresponding User Info field of Ranging NDP Announcement frame, and if these two values don’t match, the ISTA or RSTA shall discard the measurement results carried in the Location Measurement Report frame. (#1580, #2283, #1163)

When an RSTA sending an HE Ranging NDP sets the TXVECTOR parameter LTF\_SEQUENCE to null (#1828, #1831) to generate null-SAC-HE-LTF (#3124), the RSTA shall not use the TOD value of HE Ranging NDP for the range measurement.

When an RSTA receiving an HE TB Ranging NDP sets the LTFVECTOR parameter in the PHY-RXLTFSEQUENCE.request primitive to (#3124) null (#1828, #1831), the RSTA shall not use the TOA value of the HE Ranging NDP and shall (#3842) set the Invalid Measurement Indication subfield to 1 in the TOA Error field in the Location Measurement Report carrying the TOA value of the HE TB Ranging NDP.

When an ISTA sending an HE TB Ranging NDP sets the TXVECTOR parameter LTF\_SEQUENCE to (#3124) null (#1828, #1831), the ISTA shall not use the TOD value of HE TB Ranging NDP for the range measurement.

When an ISTA receiving an HE Ranging NDP sets the LTFVECTOR parameter in the PHY-RXLTFSEQUENCE.request primitive to (#3124) null (#1828, #1831), the ISTA shall not use the TOA value of the HE Ranging NDP, and shall (#3842) set the Invalid Measurement Indication subfield to 1 in the TOA Error field in the Location Measurement Report carrying the TOA value of the HE Ranging NDP if the Location Measurement Report transmission from the ISTA was negotiated.

**11.21.6.4.5.3 Non-TB Ranging Measurement Exchange with Secure LTF.**

***TGaz Editor: modify following to section 11.22.6.4.5.3 Page 163 line 12***

When an ISTA has established a secure LTF measurement setup with an RSTA as specified in 11.21.6.3.4 (Negotiation for Secure LTF in the TB and Non-TB Ranging measurement exchange), this ISTA shall set the following subfields in any Ranging NDP Announcement frame addressed to that RSTA as follows: (#1260)

* The SAC subfield in the STA Info field with AID equal to 2043 in the Ranging NDP Announcement frame to the same value as in the LTF Generation SAC field in the Secure LTF Parameters field in the last Fine Timing Measurement frame received or last Location Measurement Report frame received from the RSTA, if the ISTA has not sent any Ranging NDP Announcement frame after the last Fine Timing Measurement frame received or last Location Measurement Report frame received from the RSTA;
* Otherwise the SAC subfield in the STA Info field with AID equal to 2043 in the Ranging NDP Announcement frame to 0 to indicate that a new Secure LTF Counter (#2289) and the corresponding SAC (#3123) is needed.

The ISTA shall set the I2R Rep subfield and R2I Rep subfield of the STA Info field in the Ranging NDP Announcement frame to the RSTA Assigned I2R Rep and the RSTA Assigned R2I Rep values respectively, corresponding to the RSTA.

An ISTA that sends a Ranging NDP a SIFS after transmission of the Ranging NDP Announcement frame shall set the TXVECTOR parameter LTF\_SEQUENCE as follows:

* Either (#3754) null (#1828, #1831) if the SAC subfield in the STA Info field with AID equal to 2043 in the Ranging NDP Announcement frame is set to a value of 0 to send null-SAC-HE-LTF (#3124);
* Or the Secure-LTF-bits-I2Rbased on (#1830, #1832) the Secure LTF Counter (#2289) and the corresponding SAC in the Secure LTF Parameters field in the last Fine Timing Measurement frame received or last Location Measurement Report frame received from the RSTA (see 11.21.6.4.5.4 (Secure LTF Generation)) (#3123).

After transmission of the Ranging NDP Announcement frame to the RSTA, the ISTA’s MAC sublayer shall issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter that is set (#2289) as follows:

* Either (#3754) null (#1828, #1831) if the SAC subfield in the STA Info field with AID equal to 2043 in the Ranging NDP Announcement frame is set to 0 to validate null-SAC-HE-LTF (#3124).
* Or the Secure-LTF-bits-R2I based on (#1830, #1832) the Secure LTF counter in the Secure LTF Parameters field in the last Fine Timing Measurement frame received or last Location Measurement Report frame received from the RSTA (see 11.21.6.4.5.4 (Secure LTF Generation)).

When an RSTA receives a Ranging NDP Announcement frame from an ISTA in which the SAC subfield in the STA Info field with AID equal to 2043 is set to value 0, the RSTA shall:

* Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter that is set to (#3754) null (#1828, #1831) to receive null-SAC-HE-LTF (#3124);
* Send a null-SAC-HE-LTF in HE Ranging NDP to ISTA with the TXVECTOR parameter LTF\_SEQUENCE set to (#3754) null (#1828, #1831), if the RSTA receives an HE Ranging NDP from the ISTA a SIFS after the ranging NDP Announcement frame (#3124);
* Send a Location Measurement Report frame that includes the Secure LTF Parameters field to the ISTA, if the RSTA receives an HE Ranging NDP from the ISTA a SIFS after the ranging NDP Announcement frame.

When an RSTA receives a Ranging NDP Announcement frame from an ISTA in which the value of the SAC subfield in the STA Info field with AID equal to 2043 is equal to the value of the LTF Generation SAC subfield in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA, the RSTA shall:

* Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter that is set to the Secure-LTF-bits-I2Rbased on (#1830, #1832) the Secure LTF Counter and corresponding SAC (#2289) in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame, or last transmitted Location Measurement Report frame to the ISTA; see 11.21.6.4.5.4 (Secure LTF Generation))
* Send an HE Ranging NDP with the TXVECTOR parameter LTF\_SEQUENCE set to the Secure-LTF-bits-R2I based on (#1830, #1832) the Secure LTF Counter (#2289) in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame, or last transmitted Location Measurement Report frame to the ISTA, if the RSTA receives an HE Ranging NDP from the ISTA a SIFS after the ranging NDP Announcement frame; see 11.21.6.4.5.3 (Secure LTF Generation))
* Send a Location Measurement Report frame that includes the Secure LTF Parameters field to the ISTA, if the RSTA receives an HE Ranging NDP from the ISTA a SIFS after the ranging NDP Announcement frame.

When an RSTA receives a Ranging NDP Announcement frame from an ISTA in which a value of the SAC subfield in the STA Info field with AID equal to 2043 is neither equal to 0 nor the value of the LTF Generation SAC subfield in the Secure LTF Parameters field in the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA, the RSTA shall:

* Not issue a PHY-RXLTFSEQUENCE.request primitive;
* Not send an HE Ranging NDP to the ISTA;
* Not send a Location Measurement Report frame to the ISTA.

When a Location Measurement Report frame contains range measurement results measured from an I2R NDP and a R2I NDP, an RSTA shall include the Secure LTF Parameters field in the Location Measurement Report frame and set the Range Measurement SAC subfield in the Secure LTF Parameters field in the Location Measurement Report frame to the same value as in the SAC subfield in the STA Info field with AID equal to 2043 in the Ranging NDP Announcement frame that solicited the I2R NDP and the R2I NDP.

When a STA sends null-SAC-HE-LTF in HE Ranging NDP (#3124) (#1828, #1831), the STA shall not use the TOD value of HE Ranging NDP for the secure range measurement.

When a STA receives null-SAC-HE-LTF in HE Ranging NDP (#3124) (#1828, #1831), the STA shall not use the TOA value of the HE Ranging NDP and shall (#3842) set the Invalid Measurement Indication subfield to 1 in the TOA Error field in the Location Measurement Report carrying the TOA value of the HE Ranging NDP.

When there is a transmission failure within a secure measurement exchange sequence, the recovery procedure of the LTF Generation SAC (#2289) is illustrated in Figure 11-37r (Error recovery of Non-TB Ranging measurement exchange using Secure LTF). (#1129)

***TGaz Editor: change the title of section 11.21.6.4.54. to follwing***

**11.21.6.4.5.4 Secure LTF Generation**

### CID 3450

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| **CID** | **Clause Number** | **Page** | **Comment** | **Proposed Change** | **Resolution** |
| 3450 | 11.22.6.3.3 | 140 | The exact detail of timestamping NDP tx and rx at the antenna connector should be clarified, as it is for | Add figures like Figure 6-17 to 11.22.6.4.2.2 and 11.22.6.4.3.3 (perhaps as part of Figure 11-36F, for example), to show the snapshot of the timestamp at the Antenna (not at the MLME) in the NDP cases. | Accepted.Adding figure inclause 6.3.56.1 |

***TGaz Editor: replace “Figure 16-7b and 16-7c with following figures***



Figure 6-17b Fine timing measurement primitives and timestamps capture for non-

TB ranging measurement exchange



Figure 16-7c Fine timing measurement primitives and timestamps capture for TB ranging measurement exchange

**Note to editor** : Figure 6-17 of section “6.3.56 Fine timing measurement (FTM)” in IEEE P802.11-REVmd/D3.2, March 2020 has Antenna shown in diagram to indicate timestamps t1 and t3 correspond to the point in time at which the start of the preamble for the transmitted frame appears at the transmit antenna connector and t2 and t4 correspond to the point in time at which the start of the preamble for the incoming frame arrives at the receive antenna connector.