IEEE P802.11
Wireless LANs

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| CC28 CR of Secure Non-TB Ranging Measurement Exchange Protocol |
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**Abstract**

This submission proposes resolutions of comments received from TGaz CC28.

(The proposed change is based on TGaz Draft 0.5.)

* CIDs: 451, 452, 453, 454, 182, 443, 445, 446, 447, 449, 53, 450, 456 (13 CIDs)

| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| 451  |  | 11.22.6.4.6 | Most if not all of the "a value of"s are not specifc enough | Change them to "the value of". Similar problem with "keep a current" -> "keep the current" | Revised- Agree in principle. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 456 | 64.00 | 11.22.6.4.6.1 | " The 17RSTA shall respond with the DL NDP and a Location Measurement Report frame a SIFS after 18the DL NDP" -- huh? A DL NDP afer a DL NDP? | Reword to cmake it clearer | Revised- The last DL NDP is a typo of an UL NDP. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 452 | 63.00 | 11.22.6.4.6 | There are multiple "determines the LTF sequence of an UL NDP transmitted"s. What does it mean to determine an LTF sequence on tx? | Clarify | Revised- The TXVECTOR parameter LTF\_SEQUENCE provides some parameters with which the PHY can determine the LTF sequence of the transmitted NDP PPDU. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 453 | 63.00 | 11.22.6.4.6 | There are multiple "determines the LTF sequence of an UL NDP received"s. What does it mean to determine an LTF sequence on rx? | Clarify | Revised-The MAC provides some parameters with which the PHY can determine the LTF sequence of the received NDP PPDU. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 445 | 63.00 | 11.22.6.4.6.1 | "The LTF sequence of an UL NDP transmitted a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP received a SIFS after the UL NDP" -- is not specific enough | Change the "an"s to "the"s. Ditto next paras | Revised- The TXVECTOR parameter LTF\_SEQUENCE provides some parameters with which the PHY can determine the LTF sequence of the transmitted NDP PPDU. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 446 | 63.00 | 11.22.6.4.6.1 | "The LTF sequence of an UL NDP transmitted a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP received a SIFS after the UL NDP" -- only the sequence of what is transmitted can be controlled | Change "received a SIFS" to "transmitted a SIFS". Ditto next paras | Revised-The MAC provides some parameters with which the PHY can determine the LTF sequence of the received NDP PPDU. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 454 |  | 11.22.6.4.6 | There are various "stored at the ISTA/RSTAs" (and one "stored as"). It's obvious that a STA can only use information in its storage | Delete all this verbiage | Revised-Agree in principle. The protocol is described with the field name. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 443 | 63.00 | 11.22.6.4.6.1 | " an initial Fine Timing Measurement frame" is not specific enough | Change "an" to "the" | Revised- A unified protocol for the simplification is proposed. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 449 | 63.00 | 11.22.6.4.6.1 | The term "initial measurement sequence" is not defined (nor subsequent) | Define these terms | Revised- Agree in principle. A unified protocol for the simplification is proposed. TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 447 | 63.00 | 11.22.6.4.6.1 | " in the initial Fine Timing Measurement frame that is associated with the LTF Generation SAC subfield in the STA Info field in the transmittedRanging NDP Announcement" is incomprehensible (how can a frame be associated with a subfield?) | Clarify, or delete from "that" onwards. Ditto next paras | Revised- A unified protocol for the simplification is proposed.  TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 450 | 64.00 | 11.22.6.4.6.1 | "NOTE1 - TBD (pre-determined) sequence is not suitable for a range measurement. " -- err, so what is it suitable for? | Clarify | Revised- When the TXVECTOR parameter LTF\_SEQUENCE is set to TBD, the STA shall not use ToD value for the range measurement. When a LTFVECTOR parameter in the PHY-RXLTFSEQUENCE.request primitive is set to TBD, the STA shall not use ToA value for the range measurement.TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |
| 53 | 64.00 | 11.22.6.4.6.1 | Modify NOTE2 text to state "NOTE2 - When the RSTA sends a DL NDP, it can use a pre-determined secure LTF sequence when it receives UL NDP with pre-determined Secure LTF sequence and correspondingly provide the Location Measurement report for this measurement as 'Invalid Measurement"." | As per comment | Revised- When the TXVECTOR parameter LTF\_SEQUENCE is set to TBD, the STA shall not use ToD value for the range measurement. When a LTFVECTOR parameter in the PHY-RXLTFSEQUENCE.request primitive is set to TBD, the STA shall not use ToA value for the range measurement.TGaz editor makes changes as shown in the as specified in 11-18/1781r3. |

***TGaz Editor: Change the titles of 11.22.6.4.6 and 11.22.6.4.6.1 as follows:***

11.22.6.4.6 Secure Non-TB ~~TB~~ and ~~Non-~~TB Ranging ~~Secure LTF~~ Measurement Exchange Protocol

11.22.6.4.6.1 Secure Non-TB Ranging mode

***TGaz Editor: Change the subclause 11.22.6.4.6.1 as follows:***

~~In an initial measurement sequence, an ISTA sends an Ranging NDP Announcement frame where the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame is set to the same value as in the LTF Generation SAC field in the Secure LTF Parameters field in an initial Fine Timing Measurement frame.~~

~~The LTF sequence of an UL NDP transmitted a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP received a SIFS after the UL NDP are determined by the LTF Sequence Generation Information in the Secure LTF Parameters field in the initial Fine Timing Measurement frame that is associated with the LTF Generation SAC subfield in the STA Info field in the transmitted Ranging NDP Announcement.~~

~~In a subsequent measurement sequence, an ISTA that correctly received a Secure LTF Parameters field in a Location Measurement Report frame sends a Ranging NDP Announcement frame where the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame is set to the same value as in the LTF Generation SAC field in the Secure LTF Parameters field in the Location Measurement Report frame.~~ ~~The LTF sequence of an UL NDP transmitted a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP received a SIFS after the UL NDP are determined by the LTF Sequence Generation Information in the Secure LTF Parameters field in the Location Measurement Report frame that is associated with the LTF Generation SAC subfield in the STA Info field in the transmitted Ranging NDP Announcement.~~

~~In a subsequent measurement sequence, an ISTA that did not correctly receive a Secure LTF Parameters field in a Location Measurement Report frame sends a Ranging NDP Announcement frame where the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame is set to the TBD (pre-determined) value to indicate that a new LTF Sequence Generation information is needed. The LTF sequence of an UL NDP transmitted a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP received a SIFS after the UL NDP are determined to the TBD (pre-determined) sequence.~~

~~NOTE 1 – TBD (pre-determined) sequence is not suitable for a range measurement.~~

An ISTA that sends a Ranging NDP Announcement frame to a RSTA shall set:

— The SAC subfield in the STA Info SAC field 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 received Fine Timing Measurement frame or last received Location Measurement Report frame from the RSTA, if the ISTA has not sent any Ranging NDP Announcement frame after the last received Fine Timing Measurement frame or last received Location Measurement Report frame from the RSTA;

— Otherwise the SAC subfield in the STA Info SAC field in the Ranging NDP Announcement frame to the TBD (pre-determined) value to indicate that a new LTF Sequence Generation information is needed.

An ISTA that sends an HE Ranging NDP PPDU a SIFS after transmission of the Ranging NDP Announcment frame to a RSTA shall set the TXVECTOR parameter LTF\_SEQUENCE as follows:

— TBD (pre-determined), if the SAC subfield in the STA Info SAC field in the Ranging NDP Announcement is set to TBD value;

— Otherwise the LTF sequence generation information in the Secure LTF Parameters field in the the last received Fine Timing Measurement frame or last received Location Measurement Report frame from the RSTA.

After transmission of the Ranging NDP Announcment frame to the RSTA, the ISTA’s MAC sublayer shall issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter that is set to the LTF sequence generation information in the Secure LTF Parameters field in the the last received Fine Timing Measurement frame or last received Location Measurement Report frame from the RSTA.

~~When an RSTA receives a Ranging NDP Announcement frame and a value of the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame is equal to a value of the LTF Generation SAC subfield in the Secure LTF Parameters field stored at the RSTA, the RSTA determines the LTF sequence of an UL NDP received a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP transmitted a SIFS after the UL NDP with the LTF Sequence Generation Information associated with the value of the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame. The RSTA shall respond with the DL NDP and a Location Measurement Report frame a SIFS after the DL NDP, where the Location Measurement Report frame shall contain a Secure LTF Parameters field with a new LTF Generation SAC and a new LTF Sequence Generation Information associated with the LTF Generation SAC.~~

~~When an RSTA receives a Ranging NDP Announcement frame and a value of the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame is not equal to a value of the LTF Generation SAC subfield in the Secure LTF Parameters field stored at the RSTA, the RSTA shall discard the received Ranging NDP Announcement frame and UL NDP. The RSTA shall not send a DL NDP and a Location Measurement Report frame and it shall keep a current LTF Generation SAC and its associated LTF Sequence Generation Information stored at the RSTA.~~

~~When an RSTA receives a Ranging NDP Announcement frame and a value of the LTF Generation SAC subfield in the STA Info field in the Ranging NDP Announcement frame is equal the TBD (pre-determined), the RSTA determines the LTF sequence of an UL NDP received a SIFS after the Ranging NDP Announcement frame and the LTF sequence of a DL NDP transmitted a SIFS after the UL NDP to TBD (pre-determined) sequence. The RSTA shall respond with the DL NDP and a Location Measurement Report frame a SIFS after the DL NDP, where the Location Measurement Report frame shall contain a Secure LTF Parameters field with a new LTF Generation SAC and a new LTF Sequence Generation Information associated with the LTF Generation SAC.~~

~~NOTE 2 – When the RSTA sends a DL NDP, it can use a pre-determined secure LTF sequence.~~

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

1. Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter that is set to TBD (pre-determined);
2. Send an HE Ranging NDP PPDU with the TXVECTOR parameter LTF\_SEQUENCE set to TBD (pre-determined) to the ISTA, if the RSTA receives an HE Ranging NDP PPDU from the ISTA a SIFS after the ranging NDP Announcement frame;
3. Send a Location Measurement Report frame that includes the Secure LTF Parameters field to the ISTA, if the RSTA receives an HE Ranging NDP PPDU from the ISTA a SIFS after the ranging NDP Announcement frame.

When a RSTA receives a Ranging NDP Announcement frame from an ISTA in which the value of the SAC subfield in the STA Info SAC field 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:

1. Issue a PHY-RXLTFSEQUENCE.request primitive with a LTFVECTOR parameter that is set to the LTF sequence generation information in the Secure LTF Parameters field in the the last transmitted Fine Timing Measurement frame or last transmitted Location Measurement Report frame to the ISTA;
2. Send an HE Ranging NDP PPDU with the TXVECTOR parameter LTF\_SEQUENCE set to the LTF sequence generation information 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 PPDU from the ISTA a SIFS after the ranging NDP Announcement frame;
3. Send a Location Measurement Report frame that includes the Secure LTF Parameters field to the ISTA, if the RSTA receives an HE Ranging NDP PPDU from the ISTA a SIFS after the ranging NDP Announcement frame.

When a RSTA receives a Ranging NDP Announcement frame from an ISTA in which a value of the SAC subfield in the STA Info SAC field is not 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:

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

When a Location Measurement Report frame contains range measurement results ~~calculated~~ measured from an UL NDP and a DL NDP ~~that have a secure LTF sequence suitable for a range measurement~~, an RSTA shall include the Secure LTF Parameters field in the Location Measurement Report frame and set ~~a value of~~ the Range Measurement SAC subfield in the Secure LTF Parameters field in the Location Measurement Report frame to the same value as in the ~~LTF Generation~~ SAC subfield in the STA Info SAC field in the Ranging NDP Announcement frame that solicited the UL NDP and the DL NDP.

When a STA sending an HE Ranging NDP PPDU sets the TXVECTOR parameter LTF\_SEQUENCE to TBD, the STA shall not use the ToD value of HE Ranging NDP PPDU for the range measurement.

When a STA receiving an HE Ranging NDP PPDU sets the LTFVECTOR parameter in the PHY-RXLTFSEQUENCE.request primitive to TBD, the STA shall not use the ToA value of the HE Ranging NDP PPDU and set the Invaild Measurement Indication subfield to 1 in the ToA Error field in the the Location Measurement Report carrying the ToA value of the HE Ranging NDP PPDU.