IEEE P802.11
Wireless LANs

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| Comment Resolution LB249 – Additional PHY CIDs |
| Date: 2020-08-06 |
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Abstract

This submission proposes a resolution to CIDs 4013, 4014, 4015, 4016, 4017, 4018

Revisions:

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 TGax Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGaz Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGaz Editor: Editing instructions preceded by “TGaz Editor” are instructions to the TGaz editor to modify existing material in the TGaz draft. As a result of adopting the changes, the TGaz editor will execute the instructions rather than copy them to the TGaz Draft.***

**The text preceded by “Discussion” is not part of the adopted changes.**

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| **CID** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| **4013** | 197.00 | 27 | The 11az draft is making many changes to the PHY section of 11ax. Create a new section which describes the 11az PHY and do not modify Section 28. This will prevent the industry from 11ax interoperabiilty problems. | Create a new section which describes the 11az PHY and do not modify Section 28. | **Reject**The changes to the 11ax PHY are too small to constitue a full independent section. |
| **4014** | 202.28 | 27.3.17a | Limit the number of modes to improve the likelihood that companies will implement 11az. | Eliminate the 2xLTF+0.8GI. Please don't resolve this comment with some bogus explanation about the need to save overhead for such a short frame | **Revised**Agree in principle, remobving this extra GI size does reduce complexity.Editor, make changes depicted in 11-20/XXXX |
| **4015** | 202.00 | 27.3.17a | There doesn't appear to be any PHY signaling that allows the PHY to distinguish HE Ranging NDPs from HE NDPs. This will increase client power consumption. | Add a PHY indication to distinguish HE Ranging NDP from HE NDP. | **Reject**The indication is given in the preceding Ranging NDP-A. |
| **4016** | 203.00 | 27.3.17a | Improve the likelihood that this amendment will actually be adopted in the market. FTM is currently not a very widely adopted technology. Improve the chances that 11az will actually be implemented. Reduce modes. | Either eliminate Repetition (no LTF\_REP) or only have LTF\_REP=2. Eliminate the variable from Table 28-2a. | **Reject**The use of repetition has two applications, PHY security and improved SNR, especially for 1x1 devices (whose NDP would otherwise have only 1 LTF symbol). In other cases, especially high Tx diversity (4x4, 8x8) this might cause large overhead. Also in the PHY security case, it is not yet clear if LTF\_REP=2 is sufficient or a larger number might be required, especially for lower bandwidths (20, 40 MHz). |
| **4017** | 203.23 | 27.3.17a | Improve the likelihood that this amendment will actually be adopted in the market. FTM is currently not a very widely adopted technology. Improve the chances that 11az will actually be implemented. Reduce modes. | Eliminate LTF\_OFFSET | **Reject**This parameters is needed such that a receiver does not need to parse all STA Info fields. |
| **4018** | 205.00 | 27.3.17a | Introducing 8PSK into LTFs will be unique to all the other amendments (11g, 11n, 11ac, FTM, 11ax). | Redesign the Randomized LTF sequences so that 8PSK is not used. Use QPSK. |  |

Discussion:

In an NDP, e.g., with 4 HE-LTF the total duration is

* 8+8+4+4+8+4 +4 (L-STF, L-LTF, L-SIG, RL-SIG, HE-SIG-A, HE-STF, PE) = 40 µs
* 4 HE-LTF with 0.8 µs GI is 4\*7.2 = 28.8 µs
* 4 HE-LTF with 1.6 µs GI is 4\*8 = 32 µs

The saving is on the HE-LTFs is 10%, while on the whole frame it is 68.8 vs.72 or 4.5%, not counting the SIFS. So supporting another mode to potentially save 5-10% overhead is not a good tradeoff.

Currently there is no rules as to how the transmitter picks the GI duration, the receiver has to always support both modes. We also limit to 1.6 µs for FTM frames in HE format and for HE TB Ranging NDP.

TGaz Editor: Modify the following figures and paragraphs starting on page 213, line 12 of 27.3.18a as follows:

**27.3.18a HE Ranging NDP**

The format of an HE Ranging NDP is shown in Figure [27-52a](#F27o52a) (HE Ranging NDP format).

TGaz Editor: Modify the following figure Figure 27-52a as follows:



**Figure 27-52a—HE Ranging NDP format**

The HE Ranging NDP has the following properties:

* Uses the HE SU PPDU format but without the Data field.
* No beamforming steering matrix is applied to the waveform, the Beamformed field in HE-SIG-A of a Ranging NDP is always set to 0. For transmission of Passive TB Ranging with dot11PassiveTBRangingAODImplemented set to 1, when NSTS = NTx, Q matrix is an Identity matrix, and when NSTS < NTx, Q matrix is antenna selection matrix with no antenna swapping. Q matrix becomes an Identity matrix when all 0 rows are removed. (#**2302**)
* Can use insecure HE-LTFs or Secure HE-LTFs with randomized LTF sequence; see [27.3.18d](#H27o3o18d) (Construction of Secure HE-LTF).
* Has a Packet Extension (PE) field that is 4 µs in duration; when using Secure HE-LTFs with randomized LTF sequence, the PE will start with a zero-power GI.
* When the TXVECTOR parameter NUM\_USER is more than 1, the TXVECTOR parameter NUM\_STS[1] is used to encode the NSTS And Mid-amble Periodicity field of the HE-SIG-A1. Otherwise, the TXVECTOR parameter NUM\_STS is used to encode the NSTS And Mid-amble Periodicity field of the HE-SIG-A1.
* The TXVECTOR parameter LTF\_REP that indicates the number of repetitions of the HE-LTF symbols. For decoding the HE-LTF fields, a PHY-RXLTFSEQUENCE.request primitive issued from the MAC provides the LTF\_REP parameter and LTF\_OFFSET parameter, which are not encoded in the HE-SIG-A, but included in the preceeding Ranging NDP Announcement frame. The LTF\_OFFSET parameter indicates the number of secure HE-LTF symbols to skip for receiving the corresponding user’s HE-LTF field, e.g., in Figure 27-52d the LTF\_OFFSET for the first and second user would be 0 and 4 respectively (#**3271**).

The only supported mode is 2x HE-LTF with 1.6 µs GI. The other combinations of HE-LTF modes and GI duration are disallowed.

The number of HE-LTF symbols in an HE Ranging NDP depends on the number of space-time streams N\_STS, the number of LTF repetitions LTF\_REP, and, when Secure HE-LTFs with randomized LTF sequence are used, the number of users NUM\_USERS.

TGaz Editor: Modify the following figure Figure 27-5b as follows:



**Figure 27-52b—Example of HE-LTFs in an HE Ranging NDP with N\_STS=2 and LTF\_REP =2**

When the TXVECTOR parameter LTF\_SEQUENCE is not present, insecure HE-LTFs as defined in Subclause 27.3.11.10 (HE-LTF) are used in the HE Ranging NDP. The number of HE-LTF symbols is the product of the number of LTF repetitions LTF\_REP and the conventional number of HE-LTF, N\_HE-LTF, based on the number of space-time streams N\_STS, as defined in Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams). The construction of the HE-LTFs in an HE Ranging NDP is done by repeating the steps in Subclause 27.3.6.9 (Construction of HE-LTF) LTF\_REP times. If the TXVECTOR parameter LTF\_SEQUENCE is not present, neither is the TXVECTOR parameter NUM\_USERS, which is then assumed to be 1.

When the TXVECTOR parameter LTF\_SEQUENCE is present, Secure HE-LTFs as defined in [27.3.18d](#H27o3o18d) (Construction of Secure HE-LTF), are used and the Packet Extension field will be partially replaced by a zero power GI in its first 1.6 µs, see Figure [27-52c](#F27o52c) (HE Ranging NDP format with Secure HE-LTFs). For the secure HE-LTF symbol or packet extension field with zero-power GI, the time domain signal has zero power during the period of GI. The total number of HE-LTF symbols is the product of the number of LTF repetitions LTF\_REP and *NHE-LTF*, the number of HE-LTF based on the number of space-time streams *NSTS*, as defined in Table 21-13 (Number of VHT-LTFs required for different numbers of space-time streams). (#2499)

TGaz Editor: Modify the following figure Figure 27-52c as follows:



**Figure 27-52c—HE Ranging NDP format with Secure HE-LTFs**

When the TXVECTOR parameter LTF\_SEQUENCE is present and the NUM\_USERS parameter is larger than 1, the TXVECTOR parameters LTF\_SEQUENCE, NUM\_STS and LTF\_REP will be in array form with NUM\_USERS entries. The number of Secure HE-LTF will depend on the sum of: N\_HE-LTF times LTF\_REP, across all users. In this case, the repetitions of the HE-LTF symbols are repetition of the structure for HE-LTF fields. The randomized HE-LTF sequences are different for HE-LTF repetitions. (#**2357**)

The Secure HE-LTF for each user are concatenated one after another to a maximum of 64 Secure HE-LTF. The sum Tx power across all the Nsts in each user’s secure HE-LTF field shall stay the same. (#**3129**)

TGaz Editor: Modify the following figure Figure 27-52d as follows:



**Figure 27-52d—Example of Secure LTFs with NUM\_USERS=2, N\_STS=[2,1] and LTF\_REP =[2,2]**