IEEE P802.11
Wireless LANs

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| Resolution for CIDs in 27.1.1 |
| Date: March 11, 2019 |
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 Abstract

This submission proposes resolutions for comments received for TGax LB238 (24):

20095, 20695, 21146, 21359, 21377, 21379, 21380, 21555

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: A minor typo corrected.
* Rev 2: Minor changes based on things pointed out while presenting the document in PHY AdHoc.

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 TGax Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

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

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| **CID** | **Commenter** | **Page** | **Line** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 20095 | Albert Petrick | 442 | 15 | 27.1.1 | Clarify fast varying channels. | Add " in the presence of fast varying channels." | **Revised**Agree with the comment.**TGax editor, please make changes as shown in 11-19/0385r2 CID 20095** |
| 20695 | Mark Rison | 441 | 21 | 27.1.1 | " if the 20 MHz-only non-AP HE STA is operating in the 5 GHz band." -- no antecedent to "the 20 MHz-only non-AP HE STA" | Change to " if the HE STA is a 20 MHz-only non-AP HE STA and is operating in the 5 GHz band." | **Accepted**Agree with the comment. |
| 21146 | Peter Ecclesine | 441 | 56 | 27.1.1 | Given the 6 GHz band is full of non-20 MHz based devices, there should be 40+40 non-contiguous channel width operation and 20+20 non-contiguous channel width operation options to best fill the available spectrum in the sub-bands. 20+20 especially for 6425-6525 MHz and 40+40 in the other bands. | Provide non-contiguous channel width operation more suitable for 100 MHz and 250 MHz subbands than the existing 80+80 operation | **Rejected**Discussion: Some 40+40 and 20+20 operations are already allowed through channel puncturing modes for MU PPDUs. Adding further non-contiguous modes at this stage will impact detailed SIG field design and lead to inter-op issues with the devices already in the market. The commenter is encouraged to bring forward a solution which will not have such an impact.  |
| 21359 | ron porat | 442 | 54 | 27.1.1 | "1.6 ╬╝s GI duration on the HE-LTF and Data field symbols when the 1x HE-LTF is used (receive) forfull bandwidth UL MU-MIMO if the HE STA supports UL MU-MIMO.The word ""(receive)"" suggests this requirement is for AP-STA only." | remove: (receive) | **Revised**Agree with the comment.**TGax editor, please make changes as shown in 11-19/0385r2 CID 21359** |
| 21377 | Sigurd Schelstraete | 442 | 46 | 27.1.1 | """in all supported channel widths and RUsizes for HE SU PPDUs."". It doesn't make sense to talk about ""all RU sizes"" for an SU PPDU." | Change to: "in all supported channel widths for HE SU PPDUs | **Accepted** Agree with the comment. |
| 21379 | Sigurd Schelstraete | 442 | 49 | 27.1.1 | "An HE STA shall support ""0.8 ╬╝s and 1.6 ╬╝s GI duration on both HE-LTF and Data field symbols of an HE SU PPDU and HEER SU PPDU if a 2x HE-LTF is used (transmit and receive)."" When written as such, this does not make clear that 2x HE-LTF is mandatory. In other places (e.g. page 443L49), this is expressed better (""Reception of an HE TB PPDU with a 2x HE-LTF and with 1.6 ╬╝s GI duration"")" | "Change wording to make it clear that the combination 0.8 (1.6) usec GI/2xHE-LTF is what's mandatory, e.g. ""2x HE-LTF with 0.8 ╬╝s and 1.6 ╬╝s GI duration on both HE-LTF and Data field symbols for HE SU PPDUs and HEER SU PPDUs""Note: similr issue with 4x HE-LTF and 1xHE-LTF support." | **Revised**Agree with the comment.**TGax editor, please make changes as shown in 11-19/0385r2 CID 21379** |
| 21380 | Sigurd Schelstraete | 443 | 57 | 27.1.1 | An HE AP shall support "HE MU PPDUs with 0.8 ╬╝s GI duration on both the HE-LTF and Data field symbols when the 4xHE-LTF is used if the HE AP supports HE ER SU PPDUs with 0.8 ╬╝s GI duration on both the HELTFand Data field symbols when the HE-LTF is a 4x HE-LTF (transmit)." | "Change to ""Transmission of HE MU PPDU ..."" and delete (transmit) at end of sentence to be consistent with previous bullet.Similar comment on page 444L18 and page 445L7." | **Revised**Agree with the comment.**TGax editor, please make changes as shown in 11-19/0385r2 CID 21380** |
| 21555 | Youhan Kim | 519 | 19 | 27.3.10.1 | "L-STF, L-LTF, L-SIG, RL-SIG and HE-SIG-A fields of an HE SU PPDU", "L-STF, L-LTF, L-SIG, RL-SIG, HE-SIG-A (repeated as described in 27.3.6 (Overview of the PPDU encoding process)) fields of an HE ER SU PPDU" and "L-STF, L-LTF, L-SIG, RL-SIG and HE-SIG-A fields of an HE TB PPDU" should be combined into one bullet. | Change P519L19-25 to "-L-STF, L-LTF, L-SIG, RL-SIG and HE-SIG-A fields of an HE SU, HE ER SU and HE TB PPDU<end\_of\_line> -L-STF, L-LTF, L-SIG, RL-SIG, HE-SIG-A and HE-SIG-B fields of an HE MU PPDU" | **Accepted** Agree with the comment. |

* Introduction to the HE PHY

***TGax Editor: Please make changes as shown below to the following paragraphs in this subclause***

**………….**

The HE PHY provides support for midambles, which facilitate the updating of the channel estimate during HE PPDU reception,[20095] which may be of use in high mobility scenarios that often result in significant variations of the wireless channel within the duration of a PPDU.

**………….**

(#15917)An HE STA shall support the following features:

* Transmission and reception of an HE SU PPDU that consists of a single RU spanning the entire PPDU bandwidth.
* Transmission and reception of an HE ER SU PPDU that consists of a 242-tone RU spanning the entire primary 20 MHz PPDU bandwidth.
* Binary convolutional coding (transmit and receive). Binary convolutional coding is not used in the following cases:
* An HE SU PPDU with a bandwidth greater than 20 MHz
* An RU of size greater than 242 subcarriers in an HE MU PPDU or an HE TB PPDU
* An HE SU PPDU with number of spatial streams greater than 4
* An RU allocated to a single user in an HE MU PPDU or for an HE TB PPDU with a number of spatial streams greater than 4
* An HE SU PPDU using HE-MCSs 10 or 11
* An RU in an HE MU PPDU or an HE TB PPDU using HE-MCSs 10 or 11
* LDPC coding (transmit and receive) in all supported HE PPDU types, RU sizes, and number of spatial streams if the STA supports transmitting and receiving in channel bandwidths greater than 20 MHz.
* LDPC coding (transmit and receive) in all supported HE PPDU types, RU sizes, and number of spatial streams if the STA declares support for transmitting or receiving more than 4 spatial streams.
* LDPC coding (transmit and receive) in all supported HE PPDU types, RU sizes, and number of spatial streams if the STA declares support for HE-MCSs 10 and 11 (transmit and receive).
* Single spatial stream HE-MCSs 0 to 7 (transmit and receive) in all supported channel widths and RU sizes for HE SU PPDUs.
* [21379]2x HE-LTF with 0.8 s GI duration on both HE-LTF and Data field symbols for HE SU PPDUs and HE ER SU PPDUs (transmit and receive)
* [21379] 2x HE-LTF with 1.6 s GI duration on both HE-LTF and Data field symbols for HE SU PPDUs and HE ER SU PPDUs (transmit and receive)
* [21379] 4x HE-LTF with 3.2 µs GI duration on both HE-LTF and Data field symbols of an HE SU PPDU and HE ER SU PPDU (transmit and receive).
* [21379, 21359]1x HE-LTF with 1.6 µs GI duration on both HE-LTF and Data field symbols) for full bandwidth UL MU-MIMO if the HE STA supports UL MU-MIMO.(#16052)

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An HE AP shall support the following features:

* Transmission of an HE MU PPDU where none of the RUs utilize MU-MIMO (DL OFDMA).
* Reception of an HE TB PPDU where none of the RUs utilize MU-MIMO (UL OFDMA).
* Transmission of an HE MU PPDU consisting of a single RU spanning the entire PPDU bandwidth and utilizing MU-MIMO (DL MU-MIMO), provided the AP is capable of transmitting 4 or more spatial streams.
* Transmission of the HE-SIG-B field in an HE MU PPDU at HE-MCSs 0 to 5.
* Single spatial stream HE-MCSs 0 to 7 (#16774)in all supported channel widths and RU sizes for HE MU PPDUs (transmit) or HE TB PPDUs (receive).
* 40 MHz and 80 MHz channel widths and all RU sizes and locations applicable to the 40 MHz and 80 MHz channel width in 5 GHz and 6 GHz bands(#16447, #15161) (transmit and receive).
* 0.8 µs and 1.6 µs GI duration on the HE-LTF and Data field symbols of an HE MU PPDU if a 2x HE-LTF is used (transmit).
* Reception of an HE TB PPDU with a 2x HE-LTF and with 1.6 µs GI duration on the HE-LTF and Data field symbols.
* (#16052)Reception of an HE TB PPDU with a 4x HE-LTF and with 3.2 µs GI duration on the HE-LTF and Data field symbols.
* Transmission of an HE MU PPDU with a 4x HE-LTF and with 3.2 µs GI duration on the HE-LTF and Data field symbols.
* [21380] Transmission of an HE MU PPDU with a 4x HE-LTF and with 0.8 µs GI duration on both the HE-LTF and the Data field symbols if the HE AP supports HE ER SU PPDUs with the same LTF and GI combination.

An HE AP may support the following features:

* MU-MIMO transmission on an RU in an HE MU PPDU where the RU does not span the entire PPDU bandwidth (DL MU-MIMO within OFDMA).
* MU-MIMO reception on an RU in an HE TB PPDU where the RU spans the entire PPDU bandwidth (UL MU-MIMO).
* MU-MIMO reception on an RU in an HE TB PPDU where the RU does not span the entire PPDU bandwidth (UL MU-MIMO within OFDMA).
* Reception of the payload on an RU in an HE MU PPDU where RU spans the entire PPDU bandwidth or a 106-tone RU within 20 MHz PPDU bandwidth.
* 40 MHz channel width in the 2.4 GHz band (transmit and receive). If it is supported then all RU sizes and locations applicable to 40 MHz channel width are supported in 2.4 GHz band (transmit and receive).
* 160 MHz and 80+80 MHz channel widths and 2×996-tone RU size applicable to the 160/80+80 MHz channel width in the 5 GHz and 6 GHz bands(#16447, #15161) (transmit and receive).
* Transmission of an HE MU PPDU with preamble puncturing.
* [21380] Transmission of an HE MU PPDU with a 4x HE-LTF and with 0.8 µs GI duration on both the HE-LTF and the Data field symbols if the AP does not support HE ER SU PPDUs with the same LTF and GI combination.
* Punctured sounding operation(#16723)

A non-AP HE STA shall support the following features:

* Reception of an HE MU PPDU where the RU allocated to the non-AP STA is not utilizing MU-MIMO (DL OFDMA).
* Transmission of an HE TB PPDU where the RU allocated to the non-AP STA is not utilizing MU-MIMO (UL OFDMA).
* Reception of an HE MU PPDU consisting of a single RU spanning the entire PPDU bandwidth and utilizing MU-MIMO (DL MU-MIMO). The maximum number of spatial streams per user the non-AP STA can receive in the DL MU-MIMO transmission shall be equal to the minimum of 4 and the maximum number of spatial streams supported for reception of HE SU PPDUs. The non-AP STA shall be able to receive its intended spatial streams in a DL MU-MIMO transmission with a total number of spatial streams of at least 4.
* Responding with the requested beamforming feedback in an HE sounding procedure with the maximum number of space-time streams in the HE sounding NDP(#15768) that the non-AP STA can respond to being at least 4.
* Reception of the HE-SIG-B field in an HE MU PPDU at HE-MCSs 0 to 5.
* Single spatial stream HE-MCSs 0 to 7 in all supported channel widths and RU sizes for HE MU PPDUs (receive) or HE TB PPDUs (transmit).
* 40 MHz and 80 MHz channel widths and all RU sizes and locations applicable to the 40 MHz and 80 MHz channel widths in the 5 GHz band (transmit and receive) except for a 20 MHz-only non-AP HE STA in which case the 40 MHz and 80 MHz channel widths, 996-tone RU, and 484-tone RU sizes in 5 GHz and 6 GHz bands(#16447, #15161) are not applicable.
* A 20 MHz operating non-AP HE STA shall support 26-, 52-, and 106-tone RU sizes on locations allowed in 27.3.2.8 (RU restrictions for 20 MHz operation) in the primary 20 MHz channel within 40 MHz and the primary 20 MHz channel within 80 MHz channel widths in the 5 GHz and 6 GHz bands(#16447, #15161) (transmit and receive).
* Reception of an HE MU PPDU with a 2x HE-LTF and with 0.8 µs GI duration on the HE-LTF and Data symbols.
* Reception of an HE MU PPDU with a 2x HE-LTF and with 1.6 µs GI duration on the HE-LTF and Data symbols.
* Transmission of an HE TB PPDU with a 2x HE-LTF and with 1.6 µs GI duration on the HE-LTF and Data field symbols.
* (#16052)Reception of an HE MU PPDU with a 4x HE-LTF and with 3.2 µs GI duration on the HE-LTF and Data field symbols.
* Transmission of an HE TB PPDU with a 4x HE-LTF and with 3.2 µs GI duration on the HE-LTF and Data field symbols.
* [21380] Reception of an HE MU PPDU with a 4x HE-LTF and with 0.8 µs GI duration on both the HE-LTF and the Data field symbols if the non-AP HE STA supports HE ER SU PPDUs for the same LTF and GI combination.