IEEE P802.11
Wireless LANs

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| Proposed resolution for CID 9501  |
| Date: 2019-07-13 |
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Abstract

This submission proposes resolutions for CID9501

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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** | **Pg/Ln** | **Comment** | **Clause** | **Comment** | **Proposed Resolution** | **Resolution** |
| 20440 | 3.2 | 37.34 | 3.2 | This definition doesn't parse. When simplified, it says, effectively, "A non-AP STA that indicates ... that it transmits support for only 20 MHz channel width". How does a STA "transmit support" for something? It either supports it or it doesn't. | Perhaps, replace with "A non-AP HE STA that indicates, via the Supported Channel Width Set ... element, that it supports only 20 MHz channel ..." | Accept.Please see the proposed text in this document.  |
| 20498 | 3.2 | 37.04 | 3.2 | “multi-user (MU) physical layer (PHY) protocol data unit (PPDU): A PPDU that carries one or more PHY service data units (PSDUs) for one or more stations (STAs) using the downlink multi-user multiple input, multiple output (DL MU-MIMO) technique, downlink orthogonal frequency division multiple access (DL OFDMA) technique, or a combination of the two techniques.” Is not accurate since MU PPDUs can also be used for UL; see also “uplink (UL) high efficiency (HE) multi-user (MU) physical layer (PHY) protocol data unit (PPDU): An HE MU PPDU transmitted by a non-AP STA. An UL HE MU PPDU carries only one PSDU.” | Change the definition to “multi-user (MU) physical layer (PHY) protocol data unit (PPDU): A PPDU that carries one or more PHY service data units (PSDUs) for one or more stations (STAs) using the downlink multi-user multiple input, multiple output (DL MU-MIMO) technique, downlink orthogonal frequency division multiple access (DL OFDMA) technique, or a combination of the two techniques, or carries a PSDU for an AP and is in high efficiency (HE) MU PPDU format.” | Accept.Please see the proposed text in this document.  |
| 20987 | 4.3.15a | 43.41 | 4.3.15a | “Mandatory support for the HE sounding protocol to support beamforming” is unclear. It’s mandatory only as the beamformee and as a non-AP STA | Change to “Support for the HE sounding protocol to support beamforming (mandatory as a non-AP beamformee, optional otherwise)” | Revised. Please see the proposed text in this document.  |
| 20988 | 4.3.15a | 44.08 | 4.3.15a | “An HE AP sends a Trigger frame to non-AP HE STAs to initiate OFDMA or MU-MIMO transmissions inthe uplink direction. The Trigger frame” – it’s obvious it’s to a non-AP STA, it’s fairly obvious it’s to an HE STA, TRS has been forgotten about. Also “ these Trigger frames “ is unclear because of the intervening sentence. Also MU-MIMO is about spatial streams not Rus | Change to “An HE AP sends a Trigger frame to initiate OFDMA or MU-MIMO transmissions in the uplink direction (or a TRS Control subfield to initiate OFDMA transmissions in the uplink direction). The Trigger frame or TRS Control subfield”. Change “ these Trigger frames “ to “ Trigger frames “. Change “assigns Rus” to “assigns Rus and spatial streams” | Revised.Please see the proposed text in this document.  |
| 21028 | 4.3.15a | 43.47 | 4.3.15a | Re CID 16363: there is no actual definition of “preamble puncturing” | At the referenced location add a “NOTE---Preamble puncturing is the mechanism whereby OFDMA is used to avoid transmisisons in certain subcarriers.” | Accept.Please see the proposed text in this document.  |

Tgax Editor: Please modify the following definition in section 3.2 as follows.

**Multi-user (MU) physical layer (PHY) protocol data unit (PPDU):** A PPDU that carries one or more PHY service data units (PSDUs) for one or more stations (STAs) using the downlink multi-user multiple input, multiple output (DL MU-MIMO) technique, downlink orthogonal frequency division multiple access (DL OFDMA) technique, or a combination of the two techniques, or carries a PSDU for an AP and is in high efficiency (HE) MU PPDU format..

**20 MHz-only non-access-point (non-AP) high efficiency STA (HE STA):** A non-AP HE STA that indi-cates in the Supported Channel Width Set subfield in the HE PHY Capabilities Information field of the HE Capabilities element that it support for only 20 MHz channel width for the frequency band in which it is operating.

Tgax Editor: Please modify section 3.2 as follows.

**4.3.15a High efficiency (HE) STA**

The IEEE 802.11 HE STA operates in frequency bands between 1 GHz and 7.125 GHz.

An HE STA that is a mesh STA does not transmit and does not receive HE TB PPDUs.

In the 5 to 7.125 GHz bands, the following apply:

* An HE STA is also a VHT STA if operating in the 5 GHz band except that a 20 MHz-only HE STA does not support 40 MHz and 80 MHz channel widths
* An HE STA shall support a 20 MHz operating channel width
* An HE STA that is not a 20 MHz-only non-AP HE STA shall support operation with a 40 MHz and 80 MHz channel width
* An HE STA may support operation with a 160 MHz and 80+80 MHz channel width

In the 2.4 GHz band, the following apply:

An HE STA is also an HT STA

An HE STA shall support a 20 MHz operating channel width

An HE STA may support a 40 MHz operating channel width

The main PHY features in an HE STA that are not present in VHT STA or HT STA are the following:

Mandatory support for DL and UL OFDMA

Mandatory support for DL MU-MIMO by an HE AP that supports 4 or more spatial streams when MU-MIMO is done on the entire PPDU bandwidth

Mandatory support for DL MU-MIMO reception for a non-AP HE STA

Mandatory support for the HE sounding protocol to support beamforming for a non-AP STA beamfomee and optional otherwise

Optional support for HE-MCSs 10 and 11

Optional support for UL MU-MIMO

Optional support for preamble puncturing

NOTE---Preamble puncturing is the mechanism whereby OFDMA is used to avoid transmisisons in certain subcarriersThe main MAC features in an HE STA that are not present in VHT STA or HT STA are the following:(#20251)

In an AP, mandatory support for the role of operating mode indication (OMI) responder and optional support for the role of OMI initiator

In an AP, mandatory support for individual target wake time (TWT) operation

In a non-AP STA, mandatory support for two NAV operation

In a non-AP STA, mandatory support for multiple BSSID operation

In an AP, optional support for two NAV operation

In a non-AP STA, optional support for the roles of OMI initiator and responder

In a non-AP STA, optional support for individual TWT operation

Optional support for dynamic fragmentation levels 1, 2 and 3

Optional support for broadcast TWT

Optional support for UL OFDMA-based random access (UORA)

Optional support for spatial reuse operation

Optional support for multi-TID A-MPDU operation

Optional support for ER BSS

Optional support for the NDP feedback report

An HE AP sends a Trigger frame to initiate OFDMA or MU-MIMO transmissions in the uplink direction TRS Control subfield to initiate OFDMA transmissions in the uplink direction).. The Trigger frame or TRS Control subfield identifies non-AP STAs participating in the UL MU transmissions and assigns RUs and/or spatial streams to these STAs. Multi-STA BlockAck frames can be used by the AP to acknowledge the frames transmitted by multiple non-AP STAs. The scheduling of these Trigger frames can be set up between a non-AP STA and the AP using TWT operation to save power and reduce collisions.

These features can reduce protocol overhead and increase aggregate network throughput (e.g., DL and UL OFDMA, DL/UL MU-MIMO), enhance peak link throughput (e.g., HE-MCS 10, 11(#20990)), enhance dense network efficiency (e.g., spatial reuse), and/or enhance power conservation (e.g., TWT). These features can, under certain circumstances, improve the average throughput per STA in a BSS by a factor of four, compared to VHT.

**Wireless network management**

**Event reporting**

***Change as follows:***

Event requests enable a STA to request a non-AP STA to send particular real-time event reports. The types of events include transition, RSNA, WNM log, BSS color collision, BSS color in use and peer-to-peer link events. A transition event is transmitted after a non-AP STA successfully completes a BSS transition. Transition events are used to diagnose transition performance problems. An RSNA event report describes the type of Authentication used for the RSNA. RSNA events are used to diagnose security and authentication performance problems. A WNM log event report enables a non-AP STA to transmit a set of WNM log event messages to the requesting STA. WNM log event reports are used to access the contents of a STA's WNM log. A BSS color collision event report enables a non-AP HE STA to signal BSS color collision to its associated AP. A BSS color in use event report enables a non-AP HE STA to signal a BSS color in use by the non-AP HE STA to its associated AP. A peer-to-peer link event report enables a non-AP STA to inform the requesting STA that a peer-to-peer link has been established. Peer-to-peer link event reports are used to monitor the use of peer-to-peer links in the network.