IEEE P802.11  
Wireless LANs

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| **Resolutions to comments to subclauses 10.3.7, 3.1, 3.2, and 27.5.1.1** |
| **Date:** 2018-11-12 |

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Abstract

This submission proposes resolutions for the following CIDs submitted to subclause 10.3.7, 3.1, 3.2, and 27.5.1.1 (**7 CIDs**):

* 16907,
* 16909, 16910, 16915,
* 16916, 16918
* 16921

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.***

# 10.3.7

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| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 16907 | Tomoko Adachi | 208.00 | Table 10-5 (Determination of the EstimatedAckTxTime based on properties of the PPDU causing the EIFS) in the baseline should be revisited to be compatible with 11ax. | As the response frame will be in variable length by multiple TIDs and multiple AIDs, it seems it's impossible to estimate the duration of the response frame. Thus, considering that dot11DynamicEIFSActivated is read-only, it's better to add a sentence in 10.3.7 that an HE STA with dot11DynamicEIFSActivated set to true and joining an HE BSS shall not use Equation (10-8).  Or delete the whole mechanism related to dot11DynamicEIFSActivated. | Revised.  See the instructions to the TGax editor in doc. 11-18/1853r1. |
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**Discussion**

Table 10-8 (Determination of the EstimatedAckTxTime based on properties of the PPDU causing the EIFS) is as follows:

**Table 10-8—Determination of the EstimatedAckTxTime based on properties of the PPDU causing the EIFS**

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| **Modulation of PPDU causing EIFS** | **Rate/MCS of PPDU causing EIFS** | **Other properties of PPDU causing EIFS** | **Presumed response** | **Presumed response rate** | **EstimatedAck TxTime (μs)** |
| (HR-)DSSS | 1 Mb/s |  | Ack | 1 Mb/s | 304 |
| (HR-)DSSS | ≥ 2 Mb/s (long preamble) |  | Ack | 2 Mb/s | 248 |
| (HR-)DSSS | ≥ 2 Mb/s (short preamble) |  | Ack | 2 Mb/s | 152 |
| (ERP-)OFDM | BPSK |  | Ack | 6 Mb/s | 44 |
| (ERP-)OFDM | QPSK |  | Ack | 12 Mb/s | 32 |
| (ERP-)OFDM | ≥16-QAM |  | Ack | 24 Mb/s | 28 |
| HT | BPSK | Aggregation = 0 | Ack | 6 Mb/s | 44 |
| HT | QPSK | Aggregation = 0 | Ack | 12 Mb/s | 32 |
| HT | ≥16-QAM | Aggregation = 0 | Ack | 24 Mb/s | 28 |
| HT | BPSK | Aggregation = 1 | BlockAck | 6 Mb/s | 68 |
| HT | QPSK | Aggregation = 1 | BlockAck | 12 Mb/s | 44 |
| HT | ≥16-QAM | Aggregation = 1 | BlockAck | 24 Mb/s | 32 |
| VHT | BPSK |  | BlockAck |  | 68 |
| VHT | QPSK |  | BlockAck |  | 44 |
| VHT | ≥16-QAM |  | BlockAck |  | 32 |

It does not include the case when an HE PPDU is causing the EIFS.

We can leave this table intentionally as is, since HE operation allows various responses and furthermore, HE PPDUs have TXOP\_DURATION that supercedes the EIFS rule when it is not set to UNSPECIFIED.

The third last paragraph in 10.3.7 in the baseline says as follows and covers the case when TXOP\_DURATION of a received HE PPDU is set to UNSPECIFIED:

“When dot11DynamicEIFSActivated is true and the modulation of the PPDU that causes the EIFS does not occur in Table 10-8 (Determination of the EstimatedAckTxTime based on properties of the PPDU causing the EIFS), then EIFS is determined as shown in Equation (10-7).”

The problem is when a non-HE PPDU carries MPDUs using HE MAC extensions.

One example will be a case when a Trigger frame is transmitted in a non-HE PPDU. The frame solicited by the Trigger frame is no longer just a simple Ack or a BlockAck frame.

Another example will be when an A-MPDU is transmitted in a non-HE PPDU and the bitmap length of the solicited Comporessed BlockAck frame is 32 octets which is newly added as an HE MAC extension.

So, the question will be whether we need to add any restriction to take care of those cases or not.

There are already legacy behaviors that won’t fit in Table 10-8. Say reverse direction protocol. And even when the prediction is not perfect, CSMA/CA can solve the problem.

Note that there is a statement in 27.6.4.1 as follows and multi-TID A-MPDUs will be always sent in HE-PPDUs:

“An HE STA shall not transmit a multi-TID A-MPDU or ack-enabled A-MPDU in a VHT PPDU or a HT PPDU.”

* **Propose no changes and to leave the behaviour as is. Add a note in 10.3.7 that when an HE PPDU invokes EIFS and the TXOP\_DURATION is UNSPECIFIED, Equation (10-7) is applied.**

**Proposed Change**

TGax Editor: Insert subclause 10.3.7 title from the baseline and change the third last paragraph as follows:

##### 10.3.7 DCF timing relations

Change the third last paragraph as follows:

When dot11DynamicEIFSActivated is true and the modulation of the PPDU that causes the EIFS does not occur in Table 10-8 (Determination of the EstimatedAckTxTime based on properties of the PPDU causing the EIFS), then EIFS is determined as shown in Equation (10-7).

NOTE—This also applies to an HE STA whose dot11DynamicEIFSActivated is true and which receives an HE PPDU with RXVECTOR parameter TXOP\_DURATION set to UNSPECIFIED invokes an EIFS.(#16907)

# 3.1

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| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 16909 | Tomoko Adachi | 33.09 | The part "(unfragemented)" is deleted from the definition of the A-MSDU. However, even with this change, it still says the A-MSDU is carried in a single MPDU, which means its not fragmented. After fragmentation, there will be multiple MPDUs generated. There is no need to describe the relation with MPDUs now. | Change the definition to simply "A structure that contains one or more MSDUs."  Or if there is an intention to clarify that the fragmentation can be done only when the recipient HE STA has such capability, add such explanation after the above. | Revised.  See the instructions to the TGax editor in doc. 11-18/1853r1. |
| 16910 | Tomoko Adachi | 33.05 | The baseline, IEEE Std 802.11-2016, has the PPDU definition as follows: "The unit of data exchanged between two peer PHY entities to provide the PHY data service." This can't include MU PPDU. (Note that this comment was submitted in the previous LB, and rejected saying that 802.11-2016 is defining it as "The uniit of data exchanged between PHY entities." but this is not true. Checked all the baselines to P802.11ax D3.0, also P802.11REVmd D1.0 and D1.1 and found no such change.) | Copy and paste the definition of PPDU from the baseline to clause 3.1 of the draft and strike out the part "two peer" to show its deleted. | Revised.  Agree in principle.  See the instructions to the TGax editor in doc. 11-18/1853r1. |
| 16915 | Tomoko Adachi | 33.05 | The definition of OFDMA should be in 3.1 as the same with MU-MIMO. | Add the following definition to 3.1.  orthogonal frequency division multiple access (OFDMA): A technique by which multiple stations (STAs) either simultaneously transmit to a single STA or simultaneously receive from a single STA over different radio frequencies. | Revised.  Agree in principle.  See the instructions to the TGax editor in doc. 11-18/1853r1. |
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TGax Editor: Change texts under 3.1 in P802.11ax D3.3 as follows:

##### 3.1 Definitions

Change the following definitions:

**aggregate medium access control (MAC) service data unit (A-MSDU):** A structure that contains one or more MSDUs and is treated as a single ~~(unfragmented)~~ MSDU when constructing one or more data medium access control (MAC) protocol data units (MPDUs).(#16909)

**multi-user multiple input, multiple output (MU-MIMO):** A technique by which multiple stations (STAs), each with one or more antennas, either simultaneously transmit to a single STA or simultaneously receive from a single STA independent data streams over the same radio frequencies.

~~NOTE—IEEE Std 802.11 supports only downlink (DL) MU-MIMO. See downlink multi-user multiple input, multiple output (DL-MU-MIMO) (in 3.2).~~

**physical layer (PHY) protocol data unit (PPDU):** The unit of data exchanged between ~~two peer~~ PHY entities to provide the PHY data service.(#16910)

Insert the following definition maintaining alphabetical order:

**orthogonal frequency division multiple access (OFDMA):** An OFDM-based multiple access technique by which multiple stations (STAs) either simultaneously transmit to a single STA or simultaneously receive from a single STA independent data streams over different groups of subcarriers.(#16915)

TGax Editor: Remove the definition of OFDMA under 3.2 in P802.11ax D3.3 as follows:

##### 3.2 Definitions specific to IEEE 802.11

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(#16915)…

# 3.2

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| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 16916 | Tomoko Adachi | 38.26 | Now that the definition of MU PPDU says its uses the DL-MU-MIMO technique, DL OFDMA technique, or a combination of the two techniques, the similar description should be added to the definition of HE TP PPDU. | Change the definition of HE TB PPDU to read "An HE PPDU transmitted with HE TB PPDU format that is capable of carrying one or more PHY service data units (PSDU) for one or more users using the uplink multi-user multiple input, multiple output (UL MU-MIMO) technique, uplink orthogonal frequency division multiple access (UL OFDMA) technique, or a combination of the two techniques." | Rejected.  The definition of MU PPDU covers all the DL MU PPDUs and is a larger concept than HE MU PPDU. And the deifinition for HE MU PPDU doesn’t add such phrase. Therefore, HE TB PPDU which stands on the equal level with the HE MU PPDU doesn’t need to add such phrase.  Note that a general term to express an UL MU PPDU, which will be a contrast to MU PPDU, is not defined. Currently, we don’t need to define it because HE TB PPDU is the only one. |
| 16918 | Tomoko Adachi | 37.00 | There are two similar definitions, one is for "high efficiency (HE) extended range (ER) single user (SU) physical layer (PHY) protocol data unit (PPDU)" starting from line 54 and the other is for "high efficiency (HE) extended range (ER) single-user (SU) physical layer (PHY) protocol data unit (PPDU)" starting from line 59. The second term is correct, as a hypen should be needed between singla and user. But for the sentence for the definition, the first one aligns with other definitions in the baseline. | Delete the second definition starting from pp.ll 37.59 and add "-" between "single" and "user" in pp.ll 37.54. | Accepted. |
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TGax Editor: Change texts under 3.2 in P802.11ax D3.3 as follows:

##### 3.2 Definitions specific to IEEE 802.11

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**high efficiency (HE) extended range (ER) single-user (SU)**(#16918) **physical layer (PHY) protocol data unit (PPDU):** A Clause 28 (High Efficiency (HE) PHY specification PPDU) PPDU with the TXVECTOR parameter FORMAT equal to HE\_ER\_SU.

(#16918)…

# 27.5.1.1

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| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 16921 | Tomoko Adachi | 277.55 | "An AP shall not transmit an HE MU PPDU of DL MU-MIMO within OFDMA allocated in an RU that is addressed to a STA unless the AP has received from the STA ..." Here, "a STA" should be "STAs", as multiple STAs are always transmitted in DL MU-MIMO within OFDMA. If it is to a single STA, then it don't have to be in DL MU-MIMO... | Change it to read "An AP shall not transmit an HE MU PPDU of DL MU-MIMO within OFDMA allocated in an RU that is addressed to STAs unless the AP has received from each of the STAs ...". | Revised.  It is resolved by CID 15643. |
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cf. See the following how it’s resolved by CID 15643.

##### 27.5 MU operation

##### 27.5.1 HE DL MU operation

##### 27.5.1.1 General

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An AP shall not transmit an HE MU PPDU with an RU that is narrower than the PPDU bandwidth and that is allocated to more than one STA (DL MU-MIMO) unless the AP has received from each STA an HE Capabilities element with the Partial Bandwidth DL MU-MIMO subfield in the HE PHY Capabilities Information field equal to 1.(#15643)

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