IEEE P802.11  
Wireless LANs

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| **Proposed Resolutions for CIDs related to HE MAC Capabilities** |
| **Date:** 2018-11-xx |

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Abstract

This submission proposes resolution for the following CIDs related to HE MAC Capabilities:

* 15033, 15034, 15885, 15887

The proposed changes are based on IEEE 802.11ax draft 3.2.

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.***

# CID 15033 and 15034

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 15033 | Abhishek Patil | 154.30 | UL 2x996-tone RU Support is reserved for AP | Add sentence to indicate that the field is reserved for AP | Revised.  Agreed in principle.  Instruction to Editor: Implement the proposed text changes in 11-18/1807r0 for CID 15033. |
| 15034 | Abhishek Patil | 154.38 | OM Control UL MU Data Disable RX Support is reserved for non-AP STA | Add sentence to indicate that the field is reserved for a non-AP STA | Revised.  Agreed in principle.  Instruction to Editor: Implement the proposed text changes in 11-18/1807r0 for CID 15034. |
|  |  |  |  |  |  |

**Discussion**

None

**Proposed Text Updates: CID 15033 and 15034**

***TGax Editor: Change the Table 9-322a on D3.2 P160 as shown below:***

|  |  |  |
| --- | --- | --- |
| * Subfields of the HE MAC Capabilities Information field | | |
| Subfield | Definition | Encoding |
| … | … | … |
| UL 2×996-tone RU Support | Indicates support by a STA to receive a TRS Control subfield or a Trigger frame with a User Info field addressed to the STA with the RU Allocation subfield of the TRS Control subfield or the User Info field indicating 2996-tone. This subfield is reserved for an AP (#15033). | Set to 1 if the STA supports reception of a TRS Control subfield with the RU Allocation subfield indicating 2996-tone or a Trigger frame with a User Info field addressed to the STA with the RU Allocation subfield indicating 2996-tone.  Set to 0 otherwise. |
| OM Control UL MU Data Disable RX Support | Indicates whether an AP supports interpretation of the UL MU Data Disable subfield of the OM Control subfield as described in 27.5.3 (UL MU operation). This subfield is reserved for a non-AP STA (#15034) | Set to 1 if supported.  Set to 0 otherwise. |
| … | … | … |

# CID 15885 and 15887

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 15885 | Liwen Chu | 148.48 | Change to "Dynamic Fragmentation Support" | As in the comment | Revised.  Agreed in principle.  Instruction to Editor: Implement the proposed text changes in 11-18/1807r0 for CID 15885. |
| 15887 | Liwen Chu | 154.17 | Change the name to "A-MPSU in Ack-enabled A-MPDU Support" | As in the comment | Revised.  Agreed in principle.  Instruction to Editor: Implement the proposed text changes in 11-18/1807r0 for CID 15887. |
|  |  |  |  |  |  |

**Discussion**

The names of the subfield related to CIDs 15885 and 15887 are confusing. CIDs 15885 and 15887 are agreed in principle and related texts shall be updated.

**Proposed Text Updates: CID 15885**

* HE MAC Capabilities Information field

***TGax Editor: Change the Figure 9-768b on D3.2 P155 as shown below:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B4 | B5 B7 | B8 B9 | B10       B11 | B12       B14 |
|  | +HTC HE Support | TWT Requester Support | TWT Responder Support | Dynamic Fragmentation Support (#15885) | Maximum Number Of Fragmented MSDUs/A-MSDUs Exponent | Minimum Fragment Size | Trigger Frame MAC Padding Duration | Multi-TID Aggregation Rx Support |
| Bits: | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 3 |

…

***TGax Editor: Change the Table 9-322a on D3.2 P156 as shown below:***

|  |  |  |
| --- | --- | --- |
| * Subfields of the HE MAC Capabilities Information field | | |
| Subfield | Definition | Encoding |
| … | … | … |
| Dynamic Fragmentation Support (#15885) | Indicates the level of dynamic fragmentation that is supported by a STA as a recipient. | Set to 0 for no support for dynamic fragmentation.  Set to 1 for support for up to one dynamic fragment that is contained within an MPDU (that is not in an A-MPDU) or S-MPDU, no support for dynamic fragments within an A-MPDU that is not an S-MPDU.  Set to 2 for support for up to one dynamic fragment that is contained within an MPDU (that is not in an A-MPDU) or S-MPDU and support for up to one dynamic fragment for each MSDU, each A-MSDU (if supported by the recipient) and one MMPDU (if present, see 27.10.4 (Multi-TID A-MPDU and ack-enabled A-MPDU)) within an A-MPDU that is not an S-MPDU.  Set to 3 for support for up to one dynamic fragment that is contained within an MPDU (that is not in an A-MPDU) or S-MPDU and support for up to 4 dynamic fragments for each MSDU and for each A-MSDU (if supported by the recipient) within an A-MPDU and up to one dynamic fragment for one MMPDU (if present, see 27.10.4 (Multi-TID A-MPDU and ack-enabled A-MPDU)) in an A-MPDU that is not an S-MPDU. |
| Maximum Number Of Fragmented MSDUs/A-MSDUs Exponent | Indicates the maximum number of fragmented MSDUs and/or A-MSDUs (if supported by the recipient) that the STA is capable of receiving concurrently. | If the Dynamic Fragmentation Support (#15885) subfield is greater than 0:  The maximum number of fragmented MSDUs and/or A-MSDUs, *Nmax*, defined by this field is *Nmax* = 2Maximum Number Of Fragmented MSDUs/A-MSDUs Exponent, except that a value 7 in the Maximum Number Of Fragmented MSDUs/A-MSDUs Exponent subfield indicates that there is no restriction.  Reserved if the Dynamic Fragmentation Support (#15885) subfield is 0. |
| Minimum Fragment Size | Indicates the minimum frame body size in octets of the first fragment of an MSDU, A-MSDU (if supported), or MMPDU that is supported by the recipient STA. | If the Dynamic Fragmentation Support (#15885) subfield is greater than 0:  Set to 0 to indicate no minimum frame body size.  Set to 1 to indicate a minimum frame body size of 128 octets.  Set to 2 to indicate a minimum frame body size of 256 octets.  Set to 3 to indicate a minimum frame body size of 512 octets.  Reserved if the Dynamic Fragmentation Support (#15885) subfield is 0. |
| … | … | … |
| A-MSDU Fragmentation Support | Indicates support for the reception of fragmented A-MSDUs. | If the Dynamic Fragmentation Support (#15885) subfield is not 0:  Set to 1 to indicate support for the receipt of fragmented A-MSDUs.  Set to 0 to indicate that reception of fragmented A-MSDUs is not supported.  Reserved if the Dynamic Fragmentation Support (#15885) subfield is 0. |
| … | … | … |

* Compressed BlockAck variant

***TGax Editor: Change the NOTE of Table 9-30a and 9-30c in D3.2 P93 and P97, respectively:***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| * Fragment Number subfield encoding for the Compressed BlockAck variant | | | | | |
| Fragment Number subfield | | | Fragmentation Level 3 (ON/OFF) | Block Ack Bitmap subfield length (octets) | Maximum number of MSDUs/A-MSDUs that can be acknowledged |
| B3 | B2-B1 | B0 |
| 0 | 0 | 0 | OFF | 8 | 64 |
| 0 | 1 | 0 | Reserved | Reserved |
| 0 | 2 | 0 | 32 | 256 |
| 0 | 3 | 0 | Reserved | Reserved |
| 0 | 0 | 1 | ON | 8 | 16 |
| 0 | 1 | 1 | Reserved | Reserved |
| 0 | 2 | 1 | 32 | 64 |
| 0 | 3 | 1 | Reserved | Reserved |
| 1 | Any | Any |  | Reserved | Reserved |
| NOTE—A Compressed BlockAck frame with B0 of the Fragment Number subfield set to 1 is not sent to an HE STA whose Dynamic (#15885) Fragmentation Support subfield(#16339) in the HE Capabilities element it transmits is not set to 3 (see 27.3 (Fragmentation and defragmentation)). | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| * Fragment Number subfield encoding for the Multi-STA BlockAck variant | | | | | |
| Fragment Number subfield | | | Fragmentation Level 3 (ON/OFF) | Block Ack Bitmap subfield length (octets) | Maximum number of MSDUs/A-MSDUs that can be acknowledged |
| B3 | B2 B1 | B0 |
| 0 | 0 | 0 | OFF | 8 | 64 |
| 0 | 1 | 0 | 16 | 128 |
| 0 | 2 | 0 | 32 | 256 |
| 0 | 3 | 0 | 4 | 32 |
| 0 | 0 | 1 | ON | 8 | 16 |
| 0 | 1 | 1 | 16 | 32 |
| 0 | 2 | 1 | 32 | 64 |
| 0 | 3 | 1 | 4 | 8 |
| 1 | Any | Any |  | Reserved | Reserved |
| NOTE—A Multi-STA BlockAck frame with B0 of the Fragment Number subfield set to 1 can only be sent to an HE STA whose Dynamic (#15885) Fragmentation Support subfield(#16339) in the HE Capabilities element it transmits is 3 (see 27.3 (Fragmentation and defragmentation)). | | | | | |

* Fragmentation and defragmentation
* General

***TGax Editor: Modify the sixth and seventh paragraph of subclause 27.3.1 as follow:***

An HE STA follows the rules defined in 27.3.2 (Dynamic fragmentation) for generating these fragments and the rules defined in 27.3.3 (Dynamic defragmentation) for defragmenting of the received dynamic fragments. In the subclauses 27.3.2 (Dynamic fragmentation) and 27.3.3 (Dynamic defragmentation), the(#17112) HE STA follows the fragmentation level which is indicated in the Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE MAC Capabilities Information field of the HE Capabilities element it trans-mits unless it is overridden by adding an ADDBA Extension element in the ADDBA Request and ADDBA Response frames exchanged during the block ack setup procedure, in which case the HE STA follows the fragmentation level which is indicated in an ADDBA Extension element in the ADDBA Response frames (see the subclause 27.3.3.1 (General)) during the block ack setup procedure.

An HE STA shall set the HE Fragmentation Operation subfield, if present, in the ADDBA Request or ADDBA Response frame to a value that is less than or equal to the value of the Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE Capabilities element it transmits.

* Dynamic fragmentation
* Level 1 dynamic fragmentation

An originator STA may transmit one dynamic fragment of an MSDU, A-MSDU (if supported by the recipient) or MMPDU in an MPDU that is not in an A-MPDU or S-MPDU that is not sent under a block ack agreement to a recipient STA using level 1 dynamic fragmentation if the Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE MAC Capabilities Information field of the HE Capabilities element received from the recipient STA is 1, 2 or 3.

An originator STA may transmit a fragmented MSDU or A-MSDU (if supported by the recipient) under a block ack agreement to a recipient STA using level 1 dynamic fragmentation provided one of the following conditions is met:

* The Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE Capabilities element received from the recipient STA is 1, and for the block ack agreement associated with the TID of the MSDU or A-MSDU, the HE Fragmentation Operation subfield is 1 if the ADDBA Extension element is present in the ADDBA Response frame received from the recipient STA.
* The Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE Capabilities element received from the recipient STA is 2 or 3, and for the block ack agreement associated with the TID of the MSDU or A-MSDU, the ADDBA Extension element is present and the HE Fragmentation Operation subfield is 1 in the ADDBA Response frame received from the recipient STA.
* Level 2 dynamic fragmentation

An originator STA may transmit fragmented MSDUs or A-MSDU (if supported by the recipient) under a block ack agreement to a recipient STA using level 2 dynamic fragmentation provided one of the following conditions is met:

* The Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE Capabilities element received from the recipient STA is 2, and for the block ack agreement associated with the TID of the MSDU or A-MSDU, the HE Fragmentation Operation subfield is 2 if the ADDBA Extension element is present in the ADDBA Response frame received from the recipient STA.
* The Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE Capabilities element received from the recipient STA is 3, and for the block ack agreement associated with the TID of the MSDU or A-MSDU, the ADDBA Extension element is present and the HE Fragmentation Operation subfield is 2 in the ADDBA Response frame received from the recipient STA.
* Level 3 dynamic fragmentation

An originator STA may transmit fragmented MSDUs or A-MSDU (if supported by the recipient) under a block ack agreement or fragmented MMPDU to a recipient STA using level 3 dynamic fragmentation provided the following conditions are met:

* The Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE Capabilities element received from the recipient STA is 3.
* For the block ack agreement associated with the TID of the MSDU or A-MSDU, the HE Fragmentation Operation subfield is 3 if the ADDBA Extension element is present in the ADDBA Response frame received from the recipient STA.
* Dynamic defragmentation
* General

An HE STA shall set the Dynamic Fragmentation Support subfield(#16339)(#15885) in the HE MAC Capabilities Information field of the HE Capabilities element it transmits to 0 if it does not support dynamic fragments. Otherwise, the HE STA shall set the Dynamic Fragmentation Support subfield(#16339)(#15885) as follows:

* Set to 1, 2 or 3 if the STA supports reception of dynamic fragments following the procedure defined in 27.3.2.2 (Level 1 dynamic fragmentation)
* Set to 2 or 3 if the STA supports reception of dynamic fragments following the procedure defined in 27.3.2.3 (Level 2 dynamic fragmentation)
* Set to 3 if the STA supports reception of dynamic fragments following the procedure defined in 27.3.2.4 (Level 3 dynamic fragmentation)

An HE STA shall set dot11HEDynamicFragmentationLevel to the value of Dynamic Fragmentation Support (#15885) subfield of the HE Capabilities element it transmits if it supports reception of dynamic fragments.

* HE acknowledgment procedure
* Negotiation of block ack bitmap lengths

A recipient shall not transmit a BlockAck frame that is a response to a BlockAckReq frame from an originator and that has the LSB in the Fragment Number subfield set to 1 and unless the recipient has received from the originator an HE Capabilities element with the Dynamic Fragmentation Support subfield equal to 3(#16659)(#15885). If the LSB of the Fragment Number subfield of the BlockAck frame is set to 1, then the BA Bitmap fields are re-mapped as defined in 27.3 (Fragmentation and defragmentation).

**Proposed Text Updates: CID 15887**

* HE MAC Capabilities Information field

***TGax Editor: Change the Figure 9-768b on D3.2 P155 as shown below:***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B4 | B5 B7 | B8 B9 | B10       B11 | B12       B14 |
|  | +HTC HE Support | TWT Requester Support | TWT Responder Support | Dynamic Fragmentation Support (#15885) | Maximum Number Of Fragmented MSDUs/A-MSDUs Exponent | Minimum Fragment Size | Trigger Frame MAC Padding Duration | Multi-TID Aggregation Rx Support |
| Bits: | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 3 |

…

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B33 | B34 | B35 | B36 | B37 | B38 | B39       B41 |
|  | QTP Support | BQR Support | SRP Responder | NDP Feedback Report Support | OPS Support | A-MSDU in Ack-enabled A-MPDU Support (#15887) | Multi-TID Aggregation Tx Support |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 3 |

***TGax Editor: Update Tabl 9-322a on D3.2 P160 as shown below:***

|  |  |  |
| --- | --- | --- |
| * Subfields of the HE MAC Capabilities Information field | | |
| Subfield | Definition | Encoding |
| … | … | … |
| A-MSDU in Ack-enabled A-MPDU Support (#15887) | Indicates support by a STA to receive an ack-enabled A-MPDU in which an A-MSDU is carried in a QoS Data frame for which no block ack agreement exists. | Set to 1 if supported.  Set to 0 otherwise. |
| … | … | … |

* A-MSDU operation

***TGax Editor: Update the 10th paragraph of subclause 10.2 on D3.2 P as shown below:***

An HE STA shall not transmit an A-MSDU that is carried in a QoS Data frame for which no block ack agreement exists and that is part of an ack-enabled A-MPDU unless the recipient indicates support for A-MSDU by setting the A-MSDU in Ack-enabled A-MPDU Supported (#15887) subfield in the HE MAC Capabilities Infor-mation field of the HE Capabilities element to 1.