### IEEE P802.11Wireless LANs

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| 11ax D3.0 MAC Comment Resolution for SM Power Save |
| Date: 2018-09-05 |
| Author(s): |
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Abstract

This submission proposes resolutions for comments of TGax Draft D3.0 with the following CIDs:

16595

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Add a capability bit for the HE version of dynamic SM power save to make sure that there is no confusion on which STA supports it
* Rev 2: Remove the basic Trigger frame as the optin to enable the operation

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 D3.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D3.0 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** | **P.L** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 16595 | Po-Kai Huang | 361.01 | 27.14 | SM Power save is one of the important power save operation introduced for SU operation. 11ax enables MU operation, and a similar SM power save operation shall be enabled for 11ax MU operation. | Extend the SM Power save procedure defined in 11.2.6 for MU operation. Proposal will be provided by the commenter. | Revised – Agree in principle of the commenters. We proposa to have a STA enable all Rx chains after receiving a trigger frame of the following variants addressed to the STA: MU-RTS, basic, BSRP, BQRPTGax editor to make the changes shown in 11-18/1415r2 under all headings that include CID 16595 |

**Discussion:** *None.*

**Propose:** Revised for CID 16595 per discussion and editing instructions in 11-18/1415r2.

***TGax editor: change 9.4.2.237.2: (Track change on)***

* HE MAC Capabilities Information field

The format of the HE MAC Capabilities Information field is defined in Figure 9-589ck (HE MAC Capabilities Information field format).

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 B4 | B5 B7 | B8 B9 | B10       B11 | B12       B14 |
|  | +HTC HE Support | TWT Requester Support | TWT Responder Support | Fragmentation Support | 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 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B15     B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 |
|  | HE Link Adaptation Support | All Ack Support | TRS Support | BSR Support | Broadcast TWT Support | 32-bit BA Bitmap Support | MU Cascading Support | Ack-Enabled Aggregation Support |
| Bits: | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B24 | B25 | B26 | B27    B28 | B29 | B30 | B31 | B32 |
|  | Reserved | OM Control Support | OFDMA RA Support | Maximum A-MPDU Length Exponent Extension | A-MSDU Fragmentation Support | Flexible TWT Schedule Support | Rx Control Frame to MultiBSS | BSRP BQRP A-MPDU Aggregation |
| Bits: | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B33 | B34 | B35 | B36 | B37 | B38 | B39       B41 |
|  | QTP Support | BQR Support | SRP Responder | NDP Feedback Report Support | OPS Support | A-MSDU In A-MPDU Support | Multi-TID Aggregation Tx Support |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 3 |

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| --- | --- | --- | --- | --- | --- |
|  | B42 | B43 | B44 | B45 | B46  B47 |
|  | HE Subchannel Selective Transmission Support | UL 2×996-tone RU Support | OM Control UL MU Data Disable RX Support | HE Dynamic SM Power Save | Reserved |
| Bits: | 1 | 1 | 1 | 1(#16595) | 2 |
|  | * HE MAC Capabilities Information field format
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The subfields of the HE MAC Capabilities Information field are defined in Table 9-262z (Subfields of the HE MAC Capabilities Information field).

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| * Subfields of the HE MAC Capabilities Information field
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| --- | --- | --- |
| Subfield | Definition | Encoding |
| (..existing fields..) | (..existing texts..) | (..existing texts..) |
| HE Dynamic SM Power Save Support | Indicates the spatialmultiplexing power savemode after receiving a Trigger frame that is in operationimmediately after(re)association.See 27.14.4. | Set to 0 for no support for HE dynamic SM power save. Set to 1 for support for HE dynamic SM power save.Reserved for an AP. (#16595) |

(..existing texts..)

***TGax editor: change 11.2.6: (Track change on)***

* + 1. SM Power Save

A STA consumes power on all active receive chains, even though they are not necessarily required for the actual frame exchange. The SM power save feature allows a non-AP HT STA in an infrastructure BSS to operate with only one active receive chain for a significant portion of time.

The STA controls which receive chains are active through the PHY-RXCONFIG.request primitive specifying a PHYCONFIG\_VECTOR parameter ACTIVE\_RXCHAIN\_SET that indicates which of its receive chains should be active.The basic rules for a non-HE STA are defined below. Additional rule for HE STA that sets the HE Dynamic SM Power Save Support subfield to 1 in the HE MAC Capabilities Information field of the HE Capabilities element it transmits is defined in 27.14.4 (SM Power save). (#16595)

In dynamic SM power save mode, the STA enables its multiple receive chains when it receives the start of a frame exchange sequence addressed to it. Such a frame exchange sequence shall start with a single-spatial stream individually addressed frame that requires an immediate response and that is addressed to the STA in dynamic SM power save mode. An RTS/CTS sequence may be used for this purpose. The STA shall, subject to its spatial stream capabilities (see 9.4.2.56.4 and 9.4.2.158.3) and operating mode (see 11.42), be capable of receiving a PPDU that is sent using more than one spatial stream a SIFS after the end of its response frame transmission. The STA switches to the multiple receive chain mode when it receives the frame addressed to it and switches back immediately when the frame exchange sequence ends.

NOTE—A STA in dynamic SM power save mode cannot distinguish between an RTS/CTS sequence that precedes a MIMO transmission and any other RTS/CTS and, therefore, always enables its multiple receive chains when it receives the RTS addressed to it.

 (…existing texts….)

***TGax editor: Add 27.14.4 (SM power save): (Track change on)***

* + 1. SM power save

In dynamic SM power save mode (see 11.2.6 (SM Power Save)), a STA that sets the HE Dynamic SM Power Save Support subfield to 1 in the HE MAC Capabilities Information field of the HE Capabilities element it transmits shall follow the dynamic SM power save procedures defined in 11.2.6 (SM Power Save) except that the STA may enable its multiple receive chains when it receives a Trigger frame as described below.The STA enables its multiple receive chains when it receives a Trigger frame that starts a frame excahgne sequence. Such a frame exchange sequence shall satisfy the following conditions:

* The starting Trigger frame is a single-spatial stream frame.
* The starting Trigger frame is from the associated AP or from the AP corresponding to the transmitted BSSID if STA is associated with a nontransmitted BSSID and has indicated support for receiving Control frames with TA set to the transmitted BSSID by setting the Rx Control Frame To MultiBSS subfield to 1 in the HE Capabilities element that the STA transmits.
* The starting Trigger frame has a User Info field with the AID12 subfield equal to the 12 LSBs of the AID of the STA (see 27.5.3.2.1 General) in dynamic SM power save mode and shall be one of the following: a MU-RTS Trigger frame, a BSRP Trigger frame, a BQRP Trigger frame.(#16595)

The STA shall, subject to its spatial stream capabilities (see 9.4.2.56.4, 9.4.2.158.3 and 9.4.2.237) and operating mode (see 11.42 and 27.8), be capable of receiving a PPDU that is sent using more than one spatial stream a SIFS after the end of its response frame transmission. The STA switches to the multiple receive chain mode when it receives the Trigger frame addressed to it and switches back immediately when the frame exchange sequence ends.

NOTE—A Trigger frame always solicits an immediate response.

NOTE—A STA that is in dynamic SM power save mode and sets the HE Dynamic SM Power Save Support subfield to 1 in the HE MAC Capabilities Information field of the HE Capabilities element it transmits cannot distinguish between a Trigger frames that precedes a MIMO transmission and any other Trigger frames that do not precede a MIMO transmission and, therefore, always enables its multiple receive chains when it receives a Trigger frame, which is a MU-RTS Trigger frame, a BSRP Trigger frame, or a BQRP Trigger frame and has a User Info field with the AID12 subfield equal to the 12 LSBs of the AID of the STA. (#16595)