### IEEE P802.11Wireless LANs

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| 11ax D6.0 SM Power Save |
| Date: 2020-02-10 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Po-Kai Huang | Intel Corporation | 2200 Mission College Blvd, Santa Clara, CA 950542200  |  | po-kai.huang@intel.com |
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Abstract

This submission proposes resolutions for the following CIDs:

24038, 24044, 24367

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision based on the offline feedback from Mark.
* Rev 2: Furhter revison based on the offline feedback from Mark.
* Rev 3: Revision based on the discussion in the teleconference call.

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 D6.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D6.0 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** |
| 24038 | Kneckt, Jarkko | 442.46 | 26.14.4 | The MU-BAR Trigger frame should be allowed as the first frame of the HE dynamic SM power save frame exchange sequence. Sometimes a BA may be lost and the transmitter should get a BA to know which frames it should transmit. | Please add MU-BAR to the following text: "The starting Trigger frame is an MU-RTS Trigger frame, MU-BAR, BSRP Trigger frame or BQRP Trigger..." | Rejected – It is not common for the MU-BAR to be the first frame in a TXOP. Most of the STAs implement partial state, and the MU-BAR is usually right after the data transmission to make sure that the record of the reception status can be solicited right away. See 11-16/926r1 that describes the common ways to solicit UL MU ACK, and MU-BAR after data transmission is one of them. Independent MU-BAR at the beginning of the TXOP is not in the list of 16/926r1. |
| 24044 | Seok, Yongho | 442.57 | 26.14.4 | "The STA switches to the multiple receive chain mode if it receives the Trigger frame addressed to it as defined above..."Even though the STA receives the Trigger frame addressed to itself, if it does not send a response frame (because of the CCA status), it is not necessary to switch to the multiple receive chain mode. | Please change as the following:"The STA switches to the multiple receive chain mode after sending a response frame of the received Trigger frame addressed to it as defined above..."Also, apply the similar change on Note 2. | Revised – The sentence below before the cited sentence clarifies that the chain is enabled after the response. *The non-AP HE STA shall, subject to its spatial stream capabilities (see 9.4.2.55.4 (Supported MCS Set field), 9.4.2.157.3 (Supported VHT-MCS and NSS Set field) and 9.4.2.247 (HE Capabilities element)) and operating mode (see 11.41 (Notification of operating mode changes) and 26.9 (Operating mode indication)), 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 text also aligns with the text in baseline as shown below. *The STA shall, subject**to its spatial stream capabilities (see 9.4.2.55.4 (Supported MCS Set field) and 9.4.2.157.3 (Supported VHTMCS and NSS Set field)) and operating mode (see 11.41 (Notification of operating mode changes)), be capable of receiving a PPDU that is sent using more than one spatial stream a SIFS after the end of its response frametransmission. 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.*However, it does not hurt to clarify the situation. We revise the description in 11.2.6as “The STA switches to the multiple receive chain mode if it responds to the frame addressed to it”, the note in 11.2.6 as “, always enables its multiple receive chains if it responds to the RTS addressed to it”, the description in 26.14.4 as “The STA switches to the multiple receive chain mode if it responds to the Trigger frame addressed to it”, the note in 26.14.4 as “always enables its multiple receive chains if it responds to an MU-RTS Trigger frame, BSRP Trigger frame, or BQRP Trigger frame that has a User Info field addressed to it.”. TGax editor to make the changes shown in 11-20/0305r3 under all headings that include CID 24044 |
| 24367 | RISON, Mark | 442.57 | 26.14.4 | "switches back immediately after the frame exchange sequence ends" -- the definition of frame exchange sequence is not clear. Something like data-ack is a frame exchange sequence, so this wording seems to suggest that if the sequence of frames is MU-RTS/BSRP/BQRP-<response>-ack-data-ack within a TXOP, only the ack in the middle is sent using >1SS | State that the dynamic SMPS lasts until the end of the TXOP | Revised – The determination of the end of the frame exchange sequence is described in 11.2.6 as shown below. ***11.2.6 SM power save Insert the following after the 2nd paragraph:*** *The basic rules for a STA are defined below. Additional rules for an HE STA that sets the HE Dynamic SM Power Save subfield to 1 in the HE MAC Capabilities Information field of the HE Capabilities element it transmits in the 2.4 GHz or 5 GHz band, or sets the SM Power Save subfield to 1 in the HE 6 GHz Band Capabilities element it transmits in the 6 GHz band is defined in 26.14.4 (HE dynamic SM power save).**The STA can determine the end of the frame exchange sequence through any of the following: — It receives an individually addressed frame addressed to another STA. — It receives a frame with a TA that differs from the TA of the frame that started the TXOP. — It receives a PPDU and classifies the PPDU as inter-BSS PPDU (see 26.2.2 (Intra-BSS and inter- BSS PPDU classification)). — It receives an HE MU PPDU where the RXVECTOR parameter BSS\_COLOR is the BSS color of the BSS in which the STA is associated, the RXVECTOR parameter does not have any STA\_ID of an RU that identifies the STA as the recipient or one of the recipients of the RU (see 26.11.1 (STA\_ID)), and the BSS Color Disabled subfield in the most recently received HE Operation ele-ment from the AP with which the STA is associated is 0. — The CS mechanism (see 10.3.2.1 (CS mechanism)) indicates that the medium is idle at the TxPIFS slot boundary (defined in 10.3.7 (DCF timing relations)).*We simply add a note to provide the reference as follows. “NOTE 3- The STA determines the end of the frame exchange sequence as described in 11.2.6.”TGax editor to make the changes shown in 11-20/0305r3 under all headings that include CID 24367 |

**Discussion:** *None.*

**Propose:**

***TGax editor: Change 11.2.6 SM power save as follows: (Track change on)***

***Change the 3rd paragraph as follows:***

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 9.4.2.55.4 (Supported MCS Set field) and 9.4.2.157.3 (Supported VHT-MCS and NSS Set field)) and operating mode (see 11.41 (Notification of operating mode changes)), 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 if it responds to the frameaddressed to it and switches back immediately when the frame exchange sequence ends.(#24044)

***Change the note after the 3rd paragraph as follows:***

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 if it responds to the RTS addressed to it.(#24044)

***TGax editor: Change 26.14.4 HE dynamic SM power save as follows: (Track change on)***

**26.14.4 HE dynamic SM power save**

(…existing texts…)

The non-AP HE STA shall, subject to its spatial stream capabilities (see 9.4.2.55.4 (Supported MCS Set field), 9.4.2.157.3 (Supported VHT-MCS and NSS Set field) and 9.4.2.247 (HE Capabilities element)) and operating mode (see 11.41 (Notification of operating mode changes) and 26.9 (Operating mode indication)), 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 if it responds to the Trigger frame addressed to it and switches back immediately after the frame exchange sequence ends.(#24044)

NOTE 1—A Trigger frame always solicits an immediate response.

NOTE 2—A non-AP HE STA that is in dynamic SM power save mode and that sets the HE Dynamic SM Power Save subfield in the HE MAC Capabilities Information field of the HE Capabilities element it transmits to 1 or that sets the SM Power Save subfield in the HE 6 GHz Band Capabilities element it transmits to 1 cannot distinguish between a Trig-ger frames that precedes a MIMO transmission and a Trigger frames that does not precede a MIMO transmission and, therefore, always enables its multiple receive chains if it responds to an MU-RTS Trigger frame, BSRP Trigger frame, or BQRP Trigger frame that has a User Info field addressed to it.(#24044)

NOTE 3- The STA determines the end of the frame exchange sequence as described in 11.2.6.(#24367)