IEEE P802.11  
Wireless LANs

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| **Resolution for CID 5863** |
| **Date:** 2017-07-10 |

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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (1 **CID**):

* Provided the resolutions for CID5863

Revisions:

- Rev 0: Initial version of the document.

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** | **PP.LL** | **Comment** | **Proposed Change** | **Resolution** |
| 5863 | 27.14 | A STA may enter the Doze state for the TXOP duration when it receives a frame which is not intended to it in 11ac Spec. However, if a STA enters the Doze state for a TXOP duration after receiving an OBSS frame, it may miss an intra-BSS frame intended for it. Moreover, neither BSS color nor TXOP duration field is defined in VHT SIG field, a STA cannot distinguish OBSS frame from intra-BSS frame and cannot enter the TXOP PS after receiving only VHT preamble.  In 11ax, since the BSS color is defined, the TXOP PS should be defined for more efficient power save in 11ax.  HE TXOP power save mechanism should be defined as that an HE STA has no intended frame to receive for a TXOP to enter the Doze state, and sleep until the end of the TXOP in 11ax. | Define an HE TXOP PS. | Revised.  Agree in principal.  It needs to be specified in the section describing the normative behaviour.  TGax editor make the changes as shown in 11-17/1070r1 |

**Discussion:**

* **In 11ac spec, the VHT TXOP power save has been defined**
  + A STA may enter the Doze state for the TXOP duration when it receives a frame which is not intended to it
  + However, if a STA enters the Doze state for a TXOP duration after receiving an OBSS frame, it may miss an intra-BSS frame intended for it. Moreover, neither BSS color nor TXOP duration field is defined in VHT SIG field, a STA cannot distinguish OBSS frame from intra-BSS frame and cannot enter the TXOP PS after receiving only VHT preamble.
* **There are several mechanisms for power saving such as Intra PPDU PS, TWT, OMI, etc. in the current 802.11ax spec draft**
  + An HE STA that is in intra-PPDU power save mode may enter the doze state until the end of a received PPDU
    - In this case, the HE STA shall change its state into the Awake state at the end of the PPDU. After all, HE STA should repeat the transition into the Doze and the Awake states in every PPDU for intra-PPDU power save
  + An HE STA may set up an individual TWT agreement for TWT operation and also utilize broadcast TWT operation for power saving
    - Individual TWT operation is based on per STA basis, so a STA without TWT agreement cannot save its power using TWT operation.
    - For TWT operation, AP should have a restriction of scheduling TWT STAs according to TWT SP. In dense environment, AP may need to schedule STAs more dynamically.
* **If defined, HE TXOP Power Save mechanism is helpful for a non-TWT STA to save its power in the Awake state.**
* **In order for a STA to enter the Doze state during the remaining TXOP, the STA has to be informed that it will not be scheduled by the AP for the TXOP. The MU-RTS Trigger frame can be used without defining a new control signaling for this purpose.**

Proposal:

* When there is no matched AID in an intra-BSS MU-RTS frame, the STA may enter the Doze state during the remaining TXOP duration for HE TXOP power save.
* HE TXOP power save can be defined as an optional feature by adding the capability bit in the HE Capabilities element

**Propose:**

Revised for CID 5863 per discussion and editing instructions in 11-17/1070r1.

TGax Editor: Please modify this section as follows:

**9.4.2.237.2 HE MAC Capabilities Information field**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B33 | B34 | B35 | B36 | B37 | B38 | ~~B38~~ B39 |
|  | QTP Support | BQR Support(# 4727) | SR Responder | NDP Feedback Report Support(#6 144) | OPS Support(17 /325r4) | HE TXOP PS Support | Reserved |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | ~~2~~1 |

**Figure 9-589ck—HE MAC Capabilities Information field format**

**…**

**Table 9-262z—Subfields of the HE MAC Capabilities Information field**

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| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| BQR Support | Indicates support by an AP for receiving an (A-)MPDU that contains a BQR in the A-Control subfield and support by a non-AP STA for generating an (A-)MPDU that contains a BQR in the A-Control subfield. | If +HTC-HE Support is 1: Set to 1 if the STA supports the BQR Control field(#4727) functionality. Set to 0 otherwise. Reserved if +HTC-HE Support is 0. |
| SR Responder(#8087) | Indicates support by the STA for the role of SR Responder. | Set to 1 if the STA supports the role of SR Responder. Set to 0 otherwise. |
| NDP Feedback Report Support(# 6144) | Indicates support for a non-AP STA to follow the NDP feedback report procedure and respond to the NDP Feedback Report Poll Trigger frame. | Set to 1 if supported. Set to 0 otherwise. |
| OPS Support(17/ 325r4) | Indicates support for an AP to encode OPS information to TIM element of the FILS Discovery frames or TIM frames as described in 27.14.3.2 (AP operation for opportunistic power save). Indicates support for a non-AP STA to receive the opportunistic power save encoded TIM elements. | Set to 1 if supported. Set to 0 otherwise. |
| HE TXOP PS Support(#5863) | Indicates support for a non-AP STA to enter the doze state until the end of a TXOP which is protected by an Intra-BSS MU-RTS Trigger frame as described in 27.14.4 (HE TXOP Power Save). | Set to 1 if supported. Set to 0 otherwise. |

TGax Editor: Please insert the following text:

**27.14.4 HE TXOP Power Save**

HE TXOP power save is the power save mechanism for an HE STA to enter the doze state until the end of a TXOP which is protected by an Intra-BSS MU-RTS Trigger frame by following the conditions listed in this subclause.

An HE STA shall set the HE TXOP PS Support subfield of its HE Capabilities element it transmits to 1 if its dot11HETXOPPowerSaveOptionActivated is true; otherwise the STA shall set it to 0.

An HE STA with the HE TXOP PS Support subfield of its HE Capabilities element equal to 1 may enter the doze state until the end of a TXOP when the following conditions are met:

* The HE STA receives an intra-BSS MU-RTS Trigger frame that has no User Info field addressed to the STA. That is, any AID12 subfield of User Info field in the MU-RTS Trigger frame is not equal to the AID of the STA and the MU-RTS Trigger frame is sent by the AP with which the STA is associated with or by the AP corresponding to the transmitted BSSID if the STA has indicated support for receiving Control frames with TA set to the Transmitted BSSID (Rx Control Frame To MultiBSS set to 1 in HE Capabilities element).
* PHY-RXSTART.indication primitive is received from the PHY during a NAVTimeout period starting when the MAC receives a PHY-RXEND.indication primitive corresponding to the detection of the MU-RTS Trigger frame. NAVTimeout period is equal to (2 x aSIFSTime) + (CTS\_Time) + aRxPHYStartDelay + (2 x aSlotTime).