IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LB275 CR for CID 20083 | | | | |
| Date: 2023-09-04 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | email |
| Jeongki Kim | Ofinno |  |  | jkim@ofinno.com |
|  |  |  |  |  |

Abstract

This submission proposes resolutions for the following CID for TGbe LB275:

• 20083

**Revisions:**

* Rev 0: Initial version of the document.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Clasue** | **Page/Line** | **Comment** | **Proposed Change** | **Resolution** |
| 20083 | 35.2.1.2.3 | 487.61 | In TXS procedure, while the allocated STA uses the allocated resource, the AP will not try to communicate with STAs, especially in TXS mode 2. An unassigned STA just sets their NAV by the received MU-RTS TXS Trigger frame and will be in awake state. It will consume the power of unassigned STAs unnecessarily. During the TXS allocated time period, if unassigned STA requires lower power consumption (due to lower battery level), the STA should be able to be in doze state during the allocated time. The AP should not transmit a frame to the lower power STA that may be in doze state during the allocated time when the AP is able to send a frame (e.g., when assigned STA returns the remaining resource). Instead of it, AP can send a frame to other STA (e.g., awake STA or legacy STA). Define a method for power saving of unassigned STA in a TXS allocated time period if the unassigned STA requires lower power consumption based on the 22/2183. | Describe in the spec the power saving operation of unassigned STA during the allocated time period of TXS procedure. | Revised  Agree in principle with the comment.  In TXS procedure, an unassigned STA requiring lower power consumption may want to save its power during the time allocated for the other STA. In that sense, we need to define a method for the unassigned STA to save its power.    TGbe editor to make the changes shown in 11-23/xxxxr0 under all headings that include CID 20083 |

**Discussion:**

In TXS procedure, if a STA requires the lower power consumption, the STA may enter the doze state during an TXS time allocated by an AP. The AP should not transmit any frame to the unassigned STA during the allocated TXS time when the AP is available to transmit DL frame during the remaining time of allocated TXS time. Instead of transmission to the unassigned STA in doze state, AP can transmt a frame to other STA (e.g., legacy STA or awake STA) during the remaining time.

**Proposed texts:**

***TGbe editor: Change Figure 9-1001ah (EHT MAC Capabilities Information field format) as follows: (#20083):***

* + - * 1. **EHT MAC Capabilities Information field**

The format of the EHT MAC Capabilities Information field is defined in Figure 9-1001ah (EHT MAC Capabilities Information field format).

B0 B1 B2 B3 B4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EPCS Priority Access Support | EHT OM Control Support | Triggered TXOP Sharing Mode 1 Support | Triggered TXOP Sharing Mode 2 Support | Restricted TWT Support |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Bits: | 1 |  | 1 |  | 1 | 1 | 1 |
|  | B5 | B6 |  | B7 | B8 | B9 | B10 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCS Traffic Description Support | Maximum MPDU Length | Maximum  A-MPDU Length Exponent Extension | EHT TRS Support | TXOP Return Support In TXOP Sharing Mode 2 |

Bits: 1 2 1 1 1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B11 | B12 |  | B13 | B14 |  | B15 |

|  |  |  |  |
| --- | --- | --- | --- |
| Two BQRs Support | EHT Link Adaptation Support | TXS Power Saving Support (#20083) | Reserved |

Bits: 1 2 1 1

**Figure 9-1001ah—EHT MAC Capabilities Information field format**

***TGbe editor: Change Table 9-404m —Subfields of the EHT MAC Capabilities Information field (continued) as follows: (#20083):***

**Table 9-404m—Subfields of the EHT MAC Capabilities Information field *(continued)***

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| Two BQRs Support | For an AP, indicates support for receiving a frame with two BQR Con- trol subfields.  For a non-AP STA, indicates support for generating a frame with two BQR Control subfields. | For an EHT AP:  If the +HTC-HE Support subfield is 1:  Set to 1 to indicate that the AP is capable of receiving a frame with two BQR Con- trol subfields.  Set to 0 otherwise.  Reserved if the +HTC-HE Support sub- field is 0.  For an non-AP EHT STA:  If the +HTC-HE Support subfield is 1:  Set to 1 to indicate that the non-AP EHT STA is capable of transmitting a frame with two BQR Control subfields.  Set to 0 otherwise.  Reserved if the +HTC-HE Support subfield is 0. |
| EHT Link Adaptation Support | Indicates support for link adaptation using the ELA Control subfield. | If the +HTC-HE Support subfield in HE MAC Capabilities Information field in HE Capabili- ties element is equal to 1:  Set to 0 (No feedback) if the STA does not provide EHT MFB.  Set to 2 (Unsolicited) if the STA can receive and provide only unsolicited EHT MFB.  Set to 3 (Solicited and unsolicited) if the STA is capable of receiving and providing EHT MFB in response to EHT MRQ and if the STA can receive and provide unsolic- ited EHT MFB.  The value 1 is reserved.  EHT MFB and EHT MRQ are MFB and MRQ using ELA Control subfield, respectively.  Reserved if the +HTC-HE Support subfield in HE MAC Capabilities Information field in HE Capabilities element is 0. |
| TXS Power Saving Support (#20083) | Indicates support for the TXS power saving mechanism. | For an EHT AP:  Set to 1 to indicate that the AP is capable of not transmitting any frame to an unassigned STA that sets TXS PS Support subfield to 1 and sets TPS Disabling subfield to 0 during allocated TXS time (See 35.2.1.2.2 (AP Behavior)). Set to 0 otherwise.  For a non-AP EHT STA:  Set to 1 to indicate that the STA is capable of entering the doze state during a TXS time that is not allocated to the STA by MU-RTS TXS Trigger frame when the STA sets TPS Disabling subfield to 0. Set to 0 otherwise. |

***TGbe editor: Insert the following paragraphs at the end of subclause 35.2.1.2.1 (General) in the latest version of TGbe Draft: (#20083):***

(#20083) An EHT AP with dot11TXSPowerSaveOptionImplemented equal to true shall set the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 1; otherwise, the EHT AP shall set the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 0.

(#20083) An EHT STA with dot11TXSPowerSaveOptionImplemented equal to true shall set the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 1; otherwise, the EHT STA shall set the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 0.

(#20083) An EHT STA that sets the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 1 may transmit a frame containing a TPS Control subfield to its associated AP that sets the TXS Power Saving Support subfield in the AP’s transmitted EHT Capabilities element to 1.

***TGbe editor: Insert the following subclause 9.2.4.7.12 (TPS Control) after the subclause 9.2.4.7.11 (ELA Control) in the latest version of TGbe Draft: (#20083):***

**9.2.4.7.12 TPS Control** (#20083)

The Control Information subfield in a TPS Control subfield contains information for indicating enabling or disabling of the TXS power save procedure (see 35.2.1.2.3 (Non-AP Behavior)). The format of the subfield is shown in Figure 9-33e (Control Information subfield format in a TPS Control subfield).



**Figure 9-33e – Control Information subfield format in a TPS Control subfield**

The TPS Disabling subfield indicates whether a TXS power save mechanism of a non-AP STA that sends a frame containing the TPS Control subfield is enabled or disabled (see 35.2.1.2.3 (Non-AP Behavior)):

—Set to 0 for enabling a TXS power save mechanism.

—Set to 1 for disabling a TXS power save mechanism.

***TGbe editor: Insert the following paragraph at the end of the subclause 35.2.1.2.2 (AP Behavior) in the latest version of TGbe Draft: (#20083):***

(#20083) If an AP that sets the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 1 transmits an MU-RTS TXS Trigger frame, the AP should not transmit any frame within the allocated time in the MU-RTS TXS Trigger frame to a non-AP STA that sets the TXS Power Saving Support Subfield in its transmitted EHT Capabilities element to 1, sets the TPS Disabling subfield in its transmitted TPS Control subfield to 0, and is not addressed by the MU-RTS TXS Trigger frame.

***TGbe editor: Insert the following paragraph at the end of subclause 35.2.1.2.3 (Non-AP STA Behavior) in the latest version of TGbe Draft: (#20083):***

(#20083) When a non-AP STA that sets the TXS Power Saving Support subfield in its transmitted EHT Capabilities element to 1 and sets the TPS Disabling subfield in its transmitted TPS Control subfield to 0 receives an MU-RTS TXS Trigger frame, if the non-AP STA is not addressed by the MU-RTS Trigger frame, the non-AP STA may enter the doze state until the end of the time allocated in the MU-RTS TXS Trigger frame.

***TGbe editor: Insert the following text after “***dot11RestrictedTWTOptionImplemented***” of Annex C in the latest version of TGbe Draft: (#20083):***

(#20083)dot11TXSPowerSaveOptionImplemented OBJECT-TYPE SYNTAX TruthValue

MAX-ACCESS read-only STATUS current DESCRIPTION

"This is a capability variable.

Its value is determined by device capabilities.

This attribute, when true, indicates the ability of the EHT STA to support the TXS power saving operation. If the attribute is false, the EHT STA does not support the TXS power saving operation."

::= { StationConfigEntry <Last assigned + 1> }

* **Q&A in online or offline discussions**

Q: Looks similar with TXOP power saving. Is it already supported by existing standard?

A: Existing standard does not support MAC based TXOP power saving except 11ac TXOP PS.

Q: Intra-BSS PPDU can cover this?

A: In UL operation, multiple STAs can transmit TB PPDUs in response to a Trigger frame. Other STAs can receive one of the TB PPDUs well and enter the doze state when they receive one of the TB PPDUs. In TXS, only one assigned STA transmits non-TB PPDUs and it’s easy for unassigned STAs to be hidden from the scheduled STA. It can wast the power consumption of the STA requiring lower power consumption.

Q: If an unassigned STA enters the doze state, AP may not transmit a frame to the unassigned STA when a scheduled STA returns the remaining TXS allocated time.

A: It’s the STA’s decision. AP can transmit a frame to other STAs (e.g., legacy STA, scheduled STA, unassigned EHT STA in awake state, etc.). By TPS Control field, the STA can turn on or turn off the TXS power save mechanism flexibly.