IEEE P802.11  
Wireless LANs

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| PDT MAC MLO: NSTR blindness additional rules | | | | |
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Abstract

This submission proposes additional rules to the Medium synchronization recovery procedure in 0132r3 and resolve the following TBDs:

“The MediumSyncDelay timer is a single timer, shared by all EDCAFs within a non-AP STA, which is

initialized with a default TBD value. The STA shall update the timer duration value with the one contained

in the TBD field of the TBD element in the most recent frame received from its associated AP. In addition,

the timer resets to zero when any of the following events occur:

— The STA receives a PPDU with a valid MPDU.

— The STA receives a PPDU whose corresponding RXVECTOR parameter TXOP\_DURATION is not

UNSPECIFIED.

While the MediumSyncDelay timer is running at a STA, it shall perform CCA and shall not transmit a frame that initiates a TXOP except under TBD conditions.”

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 TGbe Draft. The introduction and the explanation of the proposed changes are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

**This document proposes spec text contribution to resolve the TBDs in the spec text corresponding to the following motion that passed in 11be:**

In R1, if during a transmission of a STA (STA-1) of a non-STR non-AP MLD, another STA (STA-2) of the same MLD cannot detect its medium state when required (due to STA-1’s UL transmission interference), STA-2 shall start a MediumSyncDelay timer at the end of STA-1’s transmission, unless the STA-2 ended a transmission at the same time.

* The MediumSyncDelay timer expires after a duration value that is either assigned by AP or a default value in the specification or if at least either of the following events happens:
  + any received PPDU with a valid MPDU,
  + a received PPDU whose corresponding RXVECTOR parameter TXOP\_DURATION is not UNSPECIFIED,

whichever happens first.

* STA-2 shall perform CCA until the MediumSyncDelay timer expires. Additional TBD exceptions may be considered.

NOTE – It is TBD whether STA-2 is required to start the MediumSyncDelay timer if the transmission of STA-1 is shorter than TBD duration.

[Motion 150, #SP373, [92] and [273]]

Discussion:

Propose to use a time duration equal to the maxppdu duration as the default timer value.

**Proposed spec text:**

***TGbe editor: Revise Figure 9-788eg in P115L3 of 11be draft 0.4 as follows:***

**9.4.2.295bMulti-Link element**

**9.4.2.295b.1 General**

|  |  |  |  |
| --- | --- | --- | --- |
| Type | MLD MAC Address Present | Medium Synchronization Delay Information Present | Reserved |

**Bits: 1 1**

**Figure 9-788eg—Multi-Link Control field**

***TGbe editor: Add the following text in P115L35 of 11be draft 0.4:***

The Medium Synchronization Delay Information Present subfield is set to 1 if the Medium Synchronization Delay Information subfield is present in the Common Info field. Otherwise the subfield is set to 0.

***TGbe editor: Revise Figure 9-788eh in P115L59 of 11be draft 0.4 as follows:***

**9.4.2.295b.2 Basic variant Multi-Link element**

|  |  |  |
| --- | --- | --- |
| MLD MAC Address | Medium Synchronization Delay Information | TBD |

Octets: 0 or 6 0 or 2

**Figure 9-788eh—Common Info field of the Basic variant Multi-Link element format**

***TGbe editor: Add the following text in P116L8 of 11be draft 0.4 as follows:***

The condition for the presence of the Medium Synchronization Delay Information subfield in the Common Info field is defined in 35.3.13.7 (Medium synchronization recovery procedure).The format of the Medium Synchronization Delay Information subfield is defined in Figure 9-788ex (Medium Synchronization Delay Information field format).

**B0 B7 B8 B11 B12 B15**

|  |  |  |
| --- | --- | --- |
| Medium Synchronization Duration | Medium Synchronization OFDM ED Threshold | Medium Synchronization Maximum Number of TXOPs |

Bits: 8 4 4

**Figure 9-788ex—** **Medium Synchronization Delay Information field format**

The Medium Synchronization Duration subfield contains the duration value of the MediumSyncDelay timer in units of 32 µs (see 35.3.13.7 Medium synchronization recovery procedure).

The Medium Synchronization OFDM ED Threshold subfield indicates the value of dot11MSDOFDMEDthreshold threshold to be used by a non-AP STA during Medium synchronization recovery and is defined in Table 9-xxy.

**Table 9-xxy Medium Synchronization OFDM ED Threshold subfield**

|  |  |
| --- | --- |
| **Medium Synchronization OFDM ED Threshold subfield** | **Description** |
| 0-10 | The dot11MSDOFDMEDthreshold value, in units of dBm, is  dot11MSDOFDMEDthreshold = –72+ Fval, where Fval is the subfield value |
| 11-15 | Reserved |

The Medium Synchronization Maximum Number of TXOPs subfield contains the value of the maximum number of TXOPs (MSD\_TXOP\_MAX) a non-AP STA is allowed to attempt to initiate while the MediumSyncDelay timer is running at a non-AP STA plus 1, except that the value 15 indicates any number of TXOPs as long as the Medium Sync Delay timer is nonzero.

***TGbe editor: Modify the following text in P213L25 of 11be draft 0.4 as follows:***

**35.3.13.7 Medium synchronization recovery procedure**

**35.3.13.7.1 General**

The MediumSyncDelay timer is a single timer, shared by all EDCAFs within a non-AP STA, which is initialized to aPPDUMaxTime defined in Table 36-68 (EHT PHY characteristics). The STA shall update its MediumSyncDelay timer with the value contained in the Medium Synchronization Duration field, if present, of the Basic variant ML element in the most recent frame received from its associated AP MLD. In addition, the timer resets to zero when any of the following events occur:

— The STA receives a PPDU with a valid MPDU.

— The STA receives a PPDU whose corresponding RXVECTOR parameter TXOP\_DURATION is not UNSPECIFIED.

A non-AP STA affiliated with non-AP MLD that has a non-zero MediumSyncDelay timer that supports to obtain a TXOP:

* Shall transmit an RTS frame as the first frame of any attempt to obtain a TXOP,
* Shall not attempt to initiate more than MSD\_TXOP\_MAX TXOPs,
* Shall use CCA\_ED threshold that is equal to dot11MSDOFDMEDthreshold.

An AP affiliated with an AP MLD may include the Medium Synchronization Delay Information field in a Basic variant ML element carried in an Association Response, Beacon or Probe Response frames. An AP affiliated with an AP MLD shall not include the Medium Synchronization Delay Information field in a Basic variant ML element carried in an Authentication frame. A STA affiliated with a non-AP MLD shall not include the Medium Synchronization Delay Information field in any Basic variant ML element it transmits.

A non-AP STA shall initialize dot11MSDOFDMEDthreshold to -72 dBm and MSD\_TXOP\_MAX to 1 respectively. The non-AP STA affiliated with the non-AP MLD shall set MSD\_TXOP\_MAX and dot11MSDOFDMEDthreshold to the most recent values in the Medium Synchronization Maximum Number of TXOPs and Medium Synchronization OFDM ED Threshold subfields respectively, if they are present in a Basic variant ML element received from its associated AP MLD.

Note- If either the intra-BSS NAV or the inter-BSS NAV is non-zero in the non-AP STA affiliated with the non-AP MLD when it starts the MediumSyncDelay timer, the non-AP STA does not initiate any TXOP and follow the same rules as an HE STA to respond to any RTS or MU-RTS frame until both NAVs expire.

During the aCCAtime (see 36.3.19.6.3 CCA sensitivity for occupying the primary 20 MHz channel) immediately following the end of the transmission event that caused loss of medium synchronization and subsequent initiation of the MediumSyncDelay timer at the non-AP STA, if the received signal strength exceeds the CCA-ED threshold as given by dot11OFDMEDThreshold for the primary 20MHz channel and no start of a PPDU is detected, the non-AP STA should defer for EIFS beginning when the received signal strength falls below the CCA-ED threshold.

**35.3.13.7.2 AP assisted Medium synchronization recovery procedure**

An EHT STA with dot11AAROptionImplemented equals to true shall set the AAR Support subfield in the EHT MAC Capabilities Information field in the EHT Capabilities element it transmits to 1; otherwise the EHT STA shall set the AAR Support subfield to 0.

A non-AP STA with dot11AAROptionImplemented equals to true and affiliated with a non-AP MLD that belongs to a NSTR link pair may transmit the AAR Control subfield in a frame to its associated AP affliated with an AP MLD, which indicates the link identifier of another AP affiliated with the same AP MLD to solicit the other AP to transmit a Trigger frame to the other non-AP STA affiliated with the same non-AP MLD that belongs to the same NSTR link pair. The non-AP STA shall not transmit a frame containing an AAR Control subfield to its associated AP from which it has not received an EHT Capabilities element with the AAR Support subfield of the EHT MAC Capabilities Information field equal to 1.

The other AP affiliated with the AP MLD should transmit a Trigger frame to the other non-AP STA affliated with the non-AP MLD to solicit an UL PPDU if the AP MLD supports reception of the AAR Control subfield and the other AP does not have frame exchanges already scheduled with another STA.

A non-AP STA with dot11AAROptionImplemented equals to false shall not transmit a frame containing an AAR Control subfield to its associated AP.

***TGbe editor: Add the following entry to Table 9-322ao:***

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| AAR Support | For an AP, indicates support for receiving a frame with an AAR Control subfield. For a non-AP STA, indicates support for generating a frame with an AAR Control subfield. | If the +HTC-HE Support subfield is 1:  Set to 1 if the STA supports the AAR Control subfield functionality. Set to 0 otherwise.  Reserved if the +HTC-HE Support subfield is 0. |

***TGbe editor: Modify Table 9-22a as follows:***

* HE variant

(…existing texts…)

|  |  |  |  |
| --- | --- | --- | --- |
| * Control ID subfield values | | | |
| Control ID value | Meaning | Length of the Control Information subfield (bits) | Content of the Control Information subfield |
| 0 | Triggered response scheduling (TRS) | 26 | See 9.2.4.6a.1 (TRS Control) |
| 1 | Operating mode (OM) | 12 | See 9.2.4.6a.2 (OM Control) |
| 2 | HE link adaptation (HLA) | 26 | See 9.2.4.6a.3 (HLA Control) |
| 3 | Buffer status report (BSR) | 26 | See 9.2.4.6a.4 (BSR Control) |
| 4 | UL power headroom (UPH) | 8 | See 9.2.4.6a.5 (UPH Control) |
| 5 | Bandwidth query report (BQR) | 10 | See 9.2.4.6a.6 (BQR Control) |
| 6 | Command and status (CAS) | 8 | See 9.2.4.6a.7 (CAS Control)) |
| 7 | EHT Operating Mode (EHT OM) | 6 | See 9.2.4.6a.8 (EHT OM) |
| 8 | Single response scheduling (SRS) | 10 | See 9.2.4.6a.xxx (SRS Control) |
| 10 | AP assistance requested (AAR) | 20 | See 9.2.4.6a.yyy (AAR Control) |
| 11-14 | Reserved |  |  |
| 15 | Ones need expansion surely (ONES) | 26 | See 10.8 (HT Control field operation) |

***TGbe editor: Please add the following subclause after subclause 9.2.4.6a.xxx (SRS Control ) as follows:***

9.2.4.6a.yyy AAR Control

The Control Information subfield in an AAR Control subfield contains information related to the procedure that allows an AP affiliated with an AP MLD to assist a a non-AP STA affiliated with a non-AP MLD that belongs a NSTR link pair to recover its medium synchronization (see 35.3.13.7.2 (AP assisted Medium synchronization recovery procedure)).

The format of the subfield is shown in Figure 9-22y (Control Information subfield format in an AAR Control subfield).

|  |  |  |
| --- | --- | --- |
|  | B0      B15 | B16 B19 |
|  | Assisted AP Link ID Bitmap | Reserved |
| Bits: | 16 | 4 |
| **Figure 9-22y – Control Information subfield format in an AAR Control subfield** | | |

The Assisted AP Link ID Bitmap subfield indicates the link identifier(s) of an AP affiliated with an AP MLD which is solicited to transmit a Trigger frame to a non-AP STA affiliated with a non-AP MLD that belongs to a NSTR link pair after a frame which contains AAR Control subfield sent by another non-AP STA affiliated with the same non-AP MLD to its associated AP affiliated the same AP MLD. A value of 1 in bit position i of the Link Bitmap subfield means that the link ID i is the link identifier of the solicited AP affiliated with the AP MLD. A value of 0 in bit position i of the Link Bitmap subfield means that the link ID i is not the link identifier of the solicited AP affiliated with the AP MLD.

**Annex C**

**ASN.1 encoding of the MAC and PHY MIB**

**C.3 MIB Detail**

***TGbe editor: Please add the following entry to the list of new MIB objects:***

* dot11AAROptionImplemented