IEEE P802.11Wireless LANs

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| Proposed Resolutions to 11be LB271 A Few CIDs on Medium Sync Recovery |
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Abstract

This submission proposes the resolutions to 11be LB271CIDs 16682 and 16684, both on Medium Sync Recovery.

The page and line numbers refer to those in 11be\_D3.2 [1].

**Introduction**

This submission proposes the resolutions to 11be LB271CIDs 16682 and 16684, both on EMLSR.

The page and line numbers refer to those in 11be\_D3.2 [1].

**Comments:**

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| --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Page.Line | Clause | Comment | Proposed change | Resolution |
| 16673 | Qi Wang | 561.33 | 35.3.16.8.2 | "The default value of dot11MSDOFDMEDthreshold is -72 dBm and the default value of the dot11MSDTXOPMAX is 1, respectively. " When considering other aspects of the medium sync recovery protocol (e.g., -72 dBm ED threshold), there shall not be a limit to dot11MSDTXOPMAX. | Modify the text to "The default value of dot11MSDOFDMEDthreshold is -72 dBm, and there is no restriction on the dot11MSDTXOPMAX by default. " | Revised. Agree with the commenter in principle, and propose to modify the default value to be unlimited. TGbe editor: please incorporate the text change tagged with #16673 in this document.  |
| 16674 | Qi Wang | 560.44 | 35.3.16.8.1 | "The MediumSyncDelay timer is a single timer, shared by all EDCAFs within a STA, whose value is set to dot11MSDTimerDuration. The STA initializes dot11MSDTimerDuration to aPPDUMaxTime defined in Table 36-70 (EHT PHY characteristics)." When considering other aspects of the medium sync recovery protocol (e.g., -72 dBm ED threshold), the default timer value is too long and too restrictive. | Reduce the default/initial MediumSyncDelay timer to a value that is shorter than aPPDUMaxTime defined in Table 36-70 (EHT PHY characteristics) | Revised. Agree with commenter in principle, and propose to reduce the Sync timer duration to the half of max PPDU duration. TGbe editor: please incorporate the text change tagged with #16674 in this document.  |

1. **Discussion**

**CID - 16674**

1. A half of the aPPDUMaxTime represents the average blind time since not all packets are transmitted at the max allowed duration and a device that has lost medium sync may intend to transmit not at the beginning of an ongoing PPDU transmission. Therefore a half of the aPPDUMaxTime is a more suitable time duration for Medium Sync Timer.

A overly conservative Medium Sync Duration will make the 11be NSTR and EMLSR devices have less channel access opportunities than the legacy devices, which results in the undesired performance (e.g., throughput and latency) degradation of the 11be devices relative to the legacy devices.

1. The default value of dot11MSDOFDMEDthreshold is -72 dBm, which is already more conservative than the standard ED threshold value of -62 dBm.
2. As a comparison, NAVSyncDelay, a quantity similar to MediumSyncDelay timer, as described in the 802.11REVme text excerpt below, is set by a STA for itself upon joining a BSS.

%--- Beginning of 802.11REVme D3.0 excerpt----

11.2.3.2 Non-AP STA power management modes

A non-S1G STA that is changing from doze to awake state in order to transmit shall perform CCA until a frame is detected by which it can set its NAV, or until a period of time indicated by the NAVSyncDelay from the MLME-JOIN.request primitive has transpired. An S1G STA that is changing from doze to awake state in order to transmit shall perform CCA until a frame is detected by which it can set its RID or NAV, or until a period of time indicated by the NAVSyncDelay from the MLME-JOIN.request primitive has transpired.

6.5.4.2 MLME-JOIN.request

6.5.4.2.1 Function
This primitive requests synchronization with (#3436)a nonmesh BSS.

6.5.4.2.2 Semantics of the service primitive

The primitive parameters are as follows:

MLME-JOIN.request(

SelectedBSS,

JoinFailureTimeout,

NAVSyncDelay,

OperationalRateSet,

Capability Information,

HT Capabilities,

VHT Capabilities,

DMG Capabilities,

S1G Capabilities,

Extended Capabilities,

20/40 BSS Coexistence,

InterworkingInfo,

AdvertisementProtocolInfo,

HE Capabilities,(11ax)

HE 6 GHz Band Capabilities,(11ax)

EDMG Capabilities,(11ay)

WUR Capabilities,(11ba)

VendorSpecificInfo

)

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| NAVSyncDelay |  Integer | >=0 | Delay (in microseconds) to be used prior to transmitting when changing from doze to awake state and when changing channel(#2079), if no frame is detected by which the network allocation vector (NAV) can be set. |

%--- End of 802.11REVme D3.0 excerpt----

**CID – 16673**

Given that NAVSyncDelay is set by a STA itself, a less conservative default value for dot11MSDTXOPMax should be defined at least.

1. **Proposed resolution:**

***TGbe editor: Please change the 11be spec as shown below. The reference version is 11be\_D3.2.***

**35.3.16.8 Medium access recovery procedure**

**35.3.16.8.1 General**

A non-AP STA affiliated with a non-AP MLD or an AP affiliated with an NSTR mobile AP MLD that operates on an NSTR link pair is considered to have lost medium synchronization when the other STA, which is affiliated with the same MLD and operates on that link pair, transmits a PPDU, except when both STAs ended a transmission at the same time.

A STA that has lost medium synchronization as described above shall start a MediumSyncDelay timer and begin counting down from the end of that transmission if that transmission duration is greater than aMediumSyncThreshold unless its previous MediumSyncDelay timer has not expired. The STA may choose not to (re)start the MediumSyncDelay timer if the transmission duration is less than or equal to aMediumSyncThreshold. The aMediumSyncThreshold is set to 72 μs.

NOTE 1—The value of 72 μs is chosen to cover at least the PPDU lengths of RTS/CTS/Ack frames using non-HT or non-HT duplicate PPDU format with 6 Mb/s data rate, as well as the PPDU lengths of most typical BlockAck frames.

When a non-AP MLD is operating in the EMLSR mode, a non-AP STA affiliated with a non-AP MLD that is operating on one of the EMLSR links is considered to have lost medium synchronization if it is not able to perform CCA during frame exchanges that includes the link switch delays between an AP affiliated with an AP MLD and one of the other non-AP STAs operating on the other EMLSR links, which are affiliated with the same non-AP MLD. The non-AP STA that has lost medium synchronization shall start a MediumSyncDelay timer and begin counting down immediately after returning to the listening operation if the duration of the loss of medium synchronization is greater than aMediumSyncThreshold; otherwise, the non-AP STA may not start the MediumSyncDelay timer.

NOTE 2—The link switch delays include the delay switching from the listening operation to the frame exchanges and the delay switching from the frame exchanges to the listening operation (see 35.3.17 (Enhanced multi-link single radio operation)).

A STA shall not start a MediumSyncDelay timer unless the STA is one of the following:

— a non-AP STA affiliated with a non-AP MLD operating on an EMLSR link or

— a non-AP STA affiliated with a non-AP MLD operating on an NSTR link pair or

— an AP affiliated with an NSTR mobile AP MLD operating on the nonprimary link of an NSTR link pair.

The MediumSyncDelay timer is a single timer, shared by all EDCAFs within a STA, whose value is set to dot11MSDTimerDuration. The STA initializes dot11MSDTimerDuration to (#16674) a half of aPPDUMaxTime defined in Table 36-70 (EHT PHY characteristics). A non-AP STA shall update dot11MSDTimerDuration with the value contained in the Medium Synchronization Delay Information field, if present, of the Basic Multi-Link 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 an MPDU.
* The STA receives a PPDU for which the RXVECTOR parameter TXOP\_DURATION is not UNSPECIFIED.

If a STA that operates on an NSTR link pair has lost medium synchronization, due to transmission by another STA that is affiliated with the same MLD and operates on that link pair, and its previous MediumSyncDelay timer has not expired, then at the end of that transmission it shall continue the previous MediumSyncDelay timer except that the STA shall update the timer value as described above if that transmission is longer than aMediumSyncThreshold.

**35.3.16.8.2 MediumSyncDelay OFDM ED based recovery procedure**

A STA that is capable of obtaining a TXOP while the MediumSyncDelay timer has a nonzero value shall use dot11MSDOFDMEDthreshold instead of dot11OFDMEDThreshold as specified in 36.3.21.6.3 (CCA sensitivity for the primary 20 MHz channel) in order to detect a channel busy condition in the primary 20 MHz channel if the MediumSyncDelay timer has a nonzero value.

If a STA is capable of obtaining a TXOP while the MediumSyncDelay timer has a nonzero value, it shall perform the following when the timer has a nonzero value:

—  If it is a non-AP STA, it shall transmit an RTS frame to its associated AP as the initial frame in an obtained TXOP.

—  If it is an AP affiliated with an NSTR mobile AP MLD, then the AP shall transmit an RTS frame to an associated non-AP STA as the initial frame in an obtained TXOP and follow the rules defined in 35.3.19 (NSTR mobile AP MLD operation).

—  Shall not attempt to initiate a TXOP more than dot11MSDTXOPMax times since the start of the timer.

Otherwise, it shall perform CCA until the MediumSyncDelay timer has expired before it initiates a transmission.

A STA that has a nonzero MediumSyncDelay timer shall not transmit any PPDU using OBSS PD-based spatial reuse operation.

An AP affiliated with an AP MLD may include the Medium Synchronization Delay Information subfield in the Common Info field of the Basic Multi-Link element carried in transmitted (Re) Association Response or Multi-Link Probe Response frames to provide medium synchronization information used by the AP MLD.

The default value of dot11MSDOFDMEDthreshold is – 72 dBm. The default value of (#16673) dot11MSDTXOPMax is 1, for an AP affiliated with an NSTR mobile AP MLD, and 5, for an non-AP STA, respectively. Each non-AP STA affiliated with a non-AP MLD shall set dot11MSDTXOPMax and dot11MSDOFDMEDthreshold to the most recent values carried in the Medium Synchronization Maximum Number Of TXOPs subfield and Medium Synchronization OFDM ED Threshold subfield, respectively, if they are present in the Common Info field of the Basic Multi-Link element received by any non-AP STA affiliated with the same non-AP MLD from its associated AP affiliated with the AP MLD with which the non-AP MLD has performed ML setup.

NOTE—If either the intra-BSS NAV or the basic NAV is nonzero 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 follows the same rules as an HE STA to respond to any RTS or MU-RTS frame until both NAVs expire.

During the aCCAtime (see 36.3.21.6.3 (CCA sensitivity for the primary 20 MHz channel) immediately following the end of the transmission 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 – 62 dBm threshold for the primary 20 MHz channel and no start of a PPDU is detected, the STA should defer for EIFS beginning when the received signal strength falls below the threshold.

**Annex C**

(normative)

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

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dot11MSDTXOPMax OBJECT-TYPE

 SYNTAX Unsigned32 (1..16)

 MAX-ACCESS read-write

 STATUS current

DESCRIPTION
"This is a control variable.
It is written by an external management entity or by the MAC of a non-AP EHT STA upon receiving a Basic Multi-Link element containing a Medium Syn- chronization Maximum Number Of TXOPs field value from the EHT AP with which it is associated. Changes take effect as soon as practical in the implementation.

This attribute indicates the maximum number of TXOPs a STA is allowed to initiate when the MediumSyncDelay timer of the MAC has nonzero value except that the value 16 indicates the STA can initiate any number of TXOPs."

 DEFVAL { 1, for an AP affiliated with an NSTR mobile AP MLD

 5, for an non-AP STA }(#16673)

 ::= { dot11EHTStationConfigEntry 5 }

**References**

[1] IEEE P802.11be™/D3.2, Draft standard for information technology – Telecommunications and information exchange between systems local and metropolitan area networks – Specific requirements Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications, Amendment 9: Enhancements for extremely high throughput (EHT)

Amendment 4: Enhancements for positioning