IEEE P802.11
Wireless LANs

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| CR for Medium sync related CIDs  |
| Date: 2023-04-05 |
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Abstract

This submission proposes resolutions for following CIDs :

16903 18315 17854 16414 16897 16896 16898 16901 16902 16319 15878 16395 16396 15879 17898 15066 18263 16904 15093 15557 ~~15489 17899~~ 16905 15558 16906 16907 15616 16909

Revisions:

* Rev 0: Initial version.

The changes are relative to 11be draft 3.1

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| --- | --- | --- | --- | --- | --- |
| CID | Clause | Page | Comment | Proposed Change | Resolution |
| 16903 |  | 0.00 | dot11MSDTXOPMAX seems a bit shouty | Change to dot11MSDTXOPMax throughout | **Accept.** |
| 18315 | 35.3.16.8.1 | 559.06 | It should be possible to recover not only lost media information but also lost schedule information such as TWT/RTWT. Otherwise, the STA that has lost the schedule information may perform unexpected communication and interfere with the TWT/RTWT operation | Please define recovery procedure for TWT/RTWT such as including TWT/RTWT information in AAR. | **Reject.**The TWT/RTWT information is advertised in a beacon which would also contain other parameters that the STA should monitor (e.g., presence of DL buffered data). The STA needs to organize its UL transmissions so as not to interfere with beacon receptions from associated AP.  |
| 17854 | 35.3.16.8 | 560.01 | A non-AP STA operating on an NSTR link pair may faiil to receive scheduling information such as TWT because of the interference caused by the transmission from other STA affiliated with same non-AP MLD. Such scheduling information also needs to be recovered. | as in the comment. | **Reject.**The TWT/RTWT information is advertised in a beacon which would also contain other parameters that the STA should monitor (e.g., presence of DL buffered data). The STA needs to organize its UL transmissions so as not to interfere with beacon receptions from associated AP.  |
| 16414 | 35.3.16.8 | 560.06 | "A non-AP STA affiliated with a non-AP MLD or an NSTR mobile AP MLD that operates on an NSTR link pair is considered to have lost medium synchronization when the other STA" seems to be incorrect. | Suggest to modify "A non-AP STA affiliated with a non-AP MLD or an NSTR mobile AP MLD that operates on an NSTR link pair is considered to have lost medium synchronization when the other STA ..." as "A non-AP STA affiliated with a non-AP MLD or an AP NSTR mobile AP MLD that operates on an NSTR link pair is considered to have lost medium synchronization when the other STA or AP" | **Revised.** Made changes to clarify we are talking about an AP affiliated with an NSTR AP MLD. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #16414 |
| 16897 | 35.3.16.8.1 | 560.15 | It is not clear what a "transmission event" is. Is this the longer of the two PPDUs or what? | Clarify (also on next page) | **Revised.** Its not clear which two PPDUs are being referred in the comment. Nevertheless, removed first occurrence of “transmission event” to align with the text in next paragraph. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #16897 |
| 16896 | 35.3.16.8.1 | 560.16 | "The aMediumSyncThreshold is set to 72 Âµs." -- PHY characteristics should be in the PHY clause, in a characteristics table | As it says in the comment | **Reject.** The parameter aMediumSyncThreshold is a MAC parameter. |
| 16898 | 35.3.16.8.1 | 560.18 | "ACK" should be "Ack" | As it says in the comment | **Accept.**  |
| 16901 | 35.3.16.8.1 | 560.51 | "The STA receives a PPDU with a valid MPDU." is not clear (what is a "valid MPDU"?) | Change to "The STA receives an MPDU." | **Accept** |
| 16902 | 35.3.16.8.1 | 560.53 | "whose corresponding RXVECTOR parameter TXOP\_DURATION" sounds non-canonical | Change to "for which the RXVECTOR parameter TXOP\_DURATION" | **Accept** |
| 16319 | 35.3.16.8.1 | 560.57 | "a NSTR link pair" is not correct. | Please change as: "an NSTR link pair". | **Accept** |
| 15878 | 35.3.16.8.1 | 560.61 | "As described above" doesn't explain well how to update the timer. During the transmission of interest, is the timer (the "previous MediumSyncDelay") still running? | Add corresponding description. | **Reject.** The timer is still running; there is no spec language saying its not. There is only a single instance of the word “update” before this paragraph in this section, so the reference on how to update is unambiguous.   |
| 16395 | 35.3.16.8.2 | 561.01 | The STAs affiliated with different MLDs can have their respective nonzero MediumSyncDelay timers. For example, when an AP affiliated with an AP MLD can solicit TB PPDUs from multiple MLDs operating on NSTR link pairs, the solicited STAs affiliated with the different MLDs start their MediumSyncDelay timers. In this case, if one of the multiple STAs transmits an RTS frame as the initial frame, all other STAs can reset its timer mistakenly based on the RTS frame, even though there is no response to the RTS frame. | The events which cause the timer to reset to zero need to be clarified. | **Reject.** Addressing this scenario creates more implementation complexity, since the STAs now need to differentiate between RTSs sent under different frame exchange sequence, relative to the value it brings. Baseline MU EDCA rules may largely prevent this scenario. Note: the group discussed a similar scenario in a previous round.  |
| 16396 | 35.3.16.8.2 | 561.01 | If an AP affiliated with an NSTR mobile AP MLD that has a nonzero MediumSyncDelay timer is operating in the non-primary link the AP cannot directly transmit an RTS frame as an initial frame of an obtained TXOP if the other AP affiliated with the same MLD in the primary link has not gained a TXOP for transmission. | The rule of transmiting an RTS frame as an initial frame of an obtained TXOP for an AP affiliated with an NSTR mobile AP MLD that has a nonzero MediumSyncDelay timer needs to be clarified. | **Reject.**The commenter failed to identify an issue with the current text. As the comment states, the transmission on non-primary link is contingent on winning channel access on the primary link. So, in this case the AP MLD may simultaneously transmit a frame in the primary link with same duration as the RTS in the non-primary link.  |
| 15879 | 35.3.16.8.2 | 561.03 | It doesn't make a lot of sense to describe a STA "capable of obtaining a TXOP" here. All 802.11 STAs are capable of so. Is it actually referring to "a STA that wants to obtain a TXOP"? Same problem in the 2nd paragraph. | Change to: A STA that wishes to obtain a TXOP, or change to some proper description. | **Revised.** Agree in principle. Being capable does not necessarily mean the STA will. So, “wants to..” is a simple way to capture the case of a STA that is both capable and wants to obtain a TXOP. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #15879 |
| 17898 | 35.3.16.8.2 | 561.03 | Why would a STA not be capable of obtaining a TXOP? Revise this to "A STA that intends to obtain a TXOP while the ...". Same comment on Line 10. | As in comment | **Revised.** Agree in principle. Being capable does not necessarily mean the STA will. So, “wants to..” is a simple way to capture the case of a STA that is both capable and wants to obtain a TXOP. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #15879 |
| 15066 | 35.3.16.8.2 | 561.10 | "A STA that is capable of obtaining a TXOP" where is this capability defined? If it is already defined, add a reference for clarity otherwise define.When is an STA not capable of obtaining a TXOP? | Provide a definition or clear explanation of "STA capable of obtaining a TXOP...". | **Revised.** Being capable does not necessarily mean the STA will. So, “wants to..” is a simple way to capture the case of a STA that is both capable and wants to obtain a TXOP. Also, removed mention of “capable of..”**TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #15879 |
| 18263 | 35.3.16.8.2 | 561.03 | " 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)"This conservative ED threshold should also be applicable to TXOP responder while MediumSyncDelay timer is running | specify dot11MSDOFDMEDthreshold is used for CCA when responding to RTS or TF with CS required=1, when mediumsyncdelay timer is running | **Reject.** When the STA receives any valid MPDU (including an RTS) STA considers itself to have re-gained medium synchronization. As such, it follows baseline rules in responding to an RTS.  |
| 16904 | 35.3.16.8.2 | 561.18 | "Shall not attempt to initiate more than dot11MSDTXOPMAX since the start of the timer" is not clear since the units are not clear. Also not clear whether restarts count | Change to "Shall not attempt to initiate more than dot11MSDTXOPMAX times since the timer was first started (ignoring any restarts)" | **Revised.** Clarify that the text is about initiating TXOPs. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #15093 |
| 15093 | 35.3.16.8.2 | 561.19 | Missing word "TXOPs" | Add "TXOPs" -->"Shall not attempt to obtain more than dot11MSDTXOPMAX TXOPs since the start of the timer." | **Revised.** Clarify that the text is about initiating TXOPs. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #15093 |
| 15557 | 35.3.16.8.2 | 561.19 | The sentence is grammarly not complete. | Change to:Shall not attempt aquire a TXOP more than dot11MSDTXOPMAX since the start of the timer. | **Revised.** Clarify that the text is about initiating TXOPs. **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #15093 |
| 15489 | 35.3.16.8.2 | 561.29 | Can Medium Synchronization Delay be updated by Beacon frames? | Please clarify it |  |
| 17899 | 35.3.16.8.2 | 561.30 | Change Multi-Link Probe Response to lowercase | As in comment | **Accept (?)****Depends on resolution of 15489** |
| 16905 | 35.3.16.8.2 | 561.33 | "The default value of dot11MSDOFDMEDthreshold is -72 dBm and the default value ofdot11MSDTXOPMAX is 1, respectively." should be in the MIB, not here | Move to C.3, adding DEFVAL lines if missing | **Reject.** The current text is consistent with the default value in Mib variable. Having the description of how the value of those two parameters are set in the same place improves readability.  |
| 15558 | 35.3.16.8.2 | 561.34 | Make the text consistent and add units for the value. | Change to: value of dot11MSDTXOPMAX is 1 TU. | **Reject.** dot11MSDTXOPMAX does not correspond to a time parameter and is in fact unitless.  |
| 16906 | 35.3.16.8.2 | 561.36 | "subfields" should be "subfield" | As it says in the comment | **Revised.****Changed to “subfield”.** **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #16906 |
| 16907 | 35.3.16.8.2 | 561.42 | "Basic NAV" should be "basic NAV" | As it says in the comment | **Revised.****Changed to “**basic NAV**”.** **TGbe editor:** please implement changes as shown in doc 11-23/0605 tagged as #16907 |
| 15616 | 35.3.16.8.2 | 561.46 | The sentence needs to be modified to cover the case of a non-AP STA in the EMLSR mode | As in comment | **Reject.**The commenter failed to identify why the behavior would differ for EMLSR mode.  |
| 16909 | 35.3.16.8.2 | 561.50 | Why is this just a "should"? | Consider changing to "shall" | **Reject.**Compared to baseline typical scenario where EIFS rules apply, there may be false alarms when the received signal strength exceed – 62 dBm corresponding to a non-wifi PPDU transmission. So, its better to let the STA adapt based on the network conditions.  |

***TGbe editor: Please revise*** *35.3.16.8 in draft 3.1* ***as follows):***

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 (#16414) 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 is longer than aMediumSyncThreshold unless its previous MediumSyncDelay timer has not expired; otherwise, the STA may choose not to (re)start the MediumSyncDelay timer (#16897). 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 longer 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 NSTR link pair or

— a non-AP STA affiliated with a non-AP MLD operating on an EMLSR link 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 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 a PPDU with an MPDU.

— The STA receives a PPDU for which the corresponding RXVECTOR parameter TXOP\_DURATION is not

UNSPECIFIED.

If a STA that operates on (#16247)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 wants to obtain (#15879) 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 wants to obtain(#15879) 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 more than dot11MSDTXOPMAX TXOPs (#15093) 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 and the default value of dot11MSDTXOPMAX is 1, 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(#16906) 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 multi-link setup.

NOTE—If either the intra-BSS NAV or the basic (#16907) 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 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 – 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.