IEEE P802.11
Wireless LANs

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| LB230 CR TXOP duration-based RTS/CTS  |
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Abstract

This submission proposes resolutions of comments received from TGax LB230.

(The proposed change is based on TGax Draft 2.1.)

* CIDs: 11483, 11789, 11790, 11791, 12087, 13053, 13055, 13188, 14094, 14228, 14326 (11 CIDs)

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.***

| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| 11789 | 221.21 | 27.2.1 | "In dense environments, management by an AP of RTS usage can help mitigate interference since the AP might have a better view of the interference situation." Suggest better wording. AP has better view that who? Keep it simple at this intro stage. | Replace cited text with "In dense environments, an AP may use RTS to help mitigate interference." | Revised-Agree in principle. Simplify the introduction paragraph. TGax editor makes changes as shown in the as specified in 11-18/0455r0. |
| 11790 | 221.22 | 27.2.1 | "To improve spectrum utilization, RTS usage should be TXOP duration-based, rather than PSDU length-based." This is a bold statement, especially with no stated reason. | Replace cited text with "The use of RTS can be TXOP duration-based or PSDU length-based, TXOP duration-based has been shown to improve spectrum utilization." | Revised-Agree in principle. Remove an uncertain wording.TGax editor makes changes as shown in the as specified in 11-18/0455r0. |
| 13053 | 221.22 | 27.2.1 | "interference situation" - what does it mean? It is ver vague. | define what does "interference situation" mean. | Revised-Agree in principle. Remove an ambiguous wording.TGax editor makes changes as shown in the as specified in 11-18/0455r0. |
| 11791 | 221.26 | 27.2.1 | "An HE AP may set the TXOP Duration RTS Threshold subfield of HE Operation elements it transmits to a value less than 1023 to require the use of dot11TXOPDurationRTSThreshold by its associated STAs for enabling RTS/CTS exchanges." No sure about "it transmits" , also may the use of may. If the HE AP wants to do this it has to set the value. | Replace cited text with " To enable RTS/CTS exchanges and to require the use of dot11TXOPDurationRTSThreshold by its associated STAs, an HE AP sets the TXOP Duration RTS Threshold subfield of HE Operation elements to a value less than 1023." | Revised-The following wording makes some confusion about the use of may. Remove it. “to require the use of dot11TXOPDurationRTSThreshold by its associated STAs…” TGax editor makes changes as shown in the as specified in 11-18/0455r0. |
| 12087 | 221.42 | 27.2.1 | Trigger Frame NAV is not truncated unless the AP transmits CF-END frame after trigger frame failure. Of course, NAV can be truncated by CF-END frame but Trigger Frame NAV cannot be cancelled immediately if the TXOP is not guaranted by preceding frame. It means that failure on transmitting trigger frame as a TXOP initiator cause useless NAV duration causing channel inefficiency. | Add transmitting CF-END frame procedure without back-off after trigger failure. It means that PIFS recovery shall be applied to a trigger frame which initiates a TXOP to prevent transmissionless NAV duration problem when it failed to trigger UL MU PPDU(s). | Rejected- What the comment is saying is always happened wheven a transmission of a frame initiating a TXOP is failed.And, a transmission failure of a frame initiating a TXOP can be caused by a collision. So, a PIFS recovery shall not be used in such case.  |
| 13055 | 221.43 | 27.2.1 | "Use of RTS/CTS exchange to obtain the TXOP" needs to be explained. As far as I am concerned HE STA still uses CSMA/CA to obtain access and TXOP. How does the RTS/CTS exchange obtain a TXOP? | clarify the statement highlighted in the comment | Revised- Agree in principle. Initiating a TXOP with the RTS/CTS is more reasonable wording. TGax editor makes changes as shown in the as specified in 11-18/0455r0. |
| 13188 | 221.30 | 27.2.1 | Clarify that when TXOP Duration RTS Threshold field is set to 1023, the STA defaults to baseline behavior as specified in 10.3.1 | Add a sentence to the end of this paragraph as follows:"The AP may set the TXOP Duration RTS Threshold field to 1023 to not require the use of dot11TXOPDurationRTSThreshold by its associated STAs for enabling RTS/CTS exchanges. In such case, the associated STAs follow the rules defined in 10.3.1 (General)" | Revised- Agree in principle. When TXOP duration-based RTS/CTS exchange is disabled, the associated STAs follow the rules defined in 10.3.1. TGax editor makes changes as shown in the as specified in 11-18/0455r0. |
| 14228 | 221.36 | 27.2.1 | Features described in this subclause are for HE devises, so it is not needed to mention that legacy devises do not support them. | Delete "The dot11TXOPDurationRTSThreshold is not present at a non-HE non-AP STA." | Accepted |
| 14326 | 221.52 | 27.2.2 | TXOP duration-based RTS/CTS is not a well designed mechanism. The threshhold should be in PSDU length rather than the TXOP duration. | as in the comment | Rejected- The commenter is failed to indetify the issue. There is no sufficient reason why the unit of the threshold has to be changed from the TXOP duration to the PSDU length. |
| 14094 | 221.21 | 27.2.1 | The commenter agrees with the principles of this subclause. Furthermore, the transmission power used within the TXOP will have effect on the interference in such dense scenario. As such, the specification should define a way for STAs to determine the need of RTS/CTS based on tx power. | Further define a way to turn RTS/CTS on/off based on the transmission power. | Rejected- A transmission power of a TXOP holder does not have any relationship with the RTS/CTS exchange.Please provide more information how the RTS/CTS exchange is helpful.  |
| 11483 | 221.19 | 27.2.1 | The dot11TXOPDurationRTSThreshold is sent to associated STAs in HE operation element either individually or to all associated STAs. There should be a option to sent to a group of associated STAs, for example type of STAs. | commenter will submit contribution to propose a solution. | Revised- See the discussion part of 11-18/0455r0. TGax editor makes changes as shown in the as specified in 11-18/0455r0. |

**Discussion:**

CID11483 says:

If a TXOP Duration RTS Threshold can be individually signaled for each associated STA, it may be more flexible to control an interference level according to a type of a STA.

Agree in principle.

For addressing this CID, the propose solution is as the following:

If the TXOP Duration RTS Threshold subfield in the most recently received HE Operation element sent by the AP to which a non-AP HE STA is associated is not equal to zero, the non-AP HE STA shall set its dot11TXOPDurationRTSThreshold to a value of the TXOP Duration RTS Threshold subfield. Otherwise, the non-AP HE STA shall not update its dot11TXOPDurationRTSThreshold.

So, the TXOP Duration RTS Threshold subfield value 0 means that the STA just keeps the current dot11TXOPDurationRTSThreshold.

Because an AP can specify an individual TXOP Duration RTS Threshold for each non-AP STA at an association response frame, if the TXOP Duration RTS Threshold specified in a Beacon frame is set to 0, each non-AP STA can keep the individually signalled TXOP Duration RTS Threshold.

***TGax editor: change the sub-clause 27.2.1 as the following:***

* HE channel access
* TXOP duration-based RTS/CTS

~~In dense environments the AP might have a better view of the interference situation in the BSS and can mitigate interference through the management of RTS/CTS usage.(#13052)~~ ~~To improve spectrum utilization, RTS/CTS usage should be TXOP duration-based, rather than PSDU length-based.~~ In an HE BSS, the use of RTS/CTS can be a TXOP duration-based or a PSDU length-based. An HE AP can configure that a non-AP HE STA uses the the TXOP duration-based RTS/CTS exchanges to help mitigate interference in dense environments. (#11789, 11790)

An HE AP may set the TXOP Duration RTS Threshold subfield of HE Operation elements it transmits to a value less than 1023 ~~to require the use of dot11TXOPDurationRTSThreshold by its associated STAs for~~ in order to enable~~ing~~ the TXOP duration-based RTS/CTS exchanges of its associated STAs. The AP may set the TXOP Duration RTS Threshold field to 1023 ~~to not require the use of dot11TXOPDurationRTSThreshold by its associated STAs for~~ in order to disable ~~enabling~~ the TXOP duration-based RTS/CTS exchanges of its associated STAs. (#11791)

If the TXOP Duration RTS Threshold subfield in the most recently received HE Operation element sent by the AP to which a non-AP HE STA is associated is not equal to zero, the ~~A~~ non-AP HE STA(#14217) shall set its dot11TXOPDurationRTSThreshold to a value of the TXOP Duration RTS Threshold subfield ~~in the most recently received HE Operation element sent by the AP to which the STA is associated~~. Otherwise, the non-AP HE STA shall not update its dot11TXOPDurationRTSThreshold. (#11483) ~~The dot11TXOPDurationRTSThreshold is not present at a non-AP non-HE STA(#14217).~~ (#14228)

The TXOP duration-based RTS/CTS exchange ~~operation~~is disabled at a non-AP HE STA when dot11TXOPDurationRTSThreshold is either not present or is equal to 1023. The TXOP duration-based RTS/CTS exchange is enabled at a non-AP HE STA when dot11TXOPDurationRTSThreshold is less than 1023.

When TXOP duration-based RTS/CTS exchange is enabled at a non-AP HE STA, the~~A~~ non-AP HE STA shall use an RTS/CTS exchange to ~~obtain the~~ initiate a (#13055) TXOP when all the following conditions are met:

* The STA intends to transmit individually addressed frames to the HE AP or to a TDLS peer STA
* The TXOP duration is greater than or equal to 32 µs  dot11TXOPDurationRTSThreshold
* ~~dot11TXOPDurationRTSThreshold is not 1023~~

Otherwise, the non-AP HE STA follows the rules defined in 10.3.1 (General). (#13188)