IEEE P802.11
Wireless LANs

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| Misc for HE Operation IE |
| Date: 2017-08-21 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (12 CIDs):

* 4773, 5552, 5553, 5554, 5555, 5556 7382, 7774, 7870, 8355,
* 9664, 9665

Revisions:

* Rev 0: Initial version of the document.

Rev 1: Incorporated suggestion from Yongho (green)

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.***

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 4773 | Alfred Asterjadhi | 91.60 | HE Duration Based does not say much. Replace it with something that gives the idea of a TXOP based duration threshold. Also provide a reference to the subclause where the normative behavior for setting this field is defined. And most importantly where the STA that receives this information updates its MIB variable that controls RTS enablement. | As in comment. | Revised –Agree in principle with the comment. Proposed resolution is to rename the field as TXOP Duration RTS Threshold. And also incorporated the other suggestions, while additionally transferring the normative behaviour in clause 27 inline with the new editorial style guide. TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 4773. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 5552 | Graham Smith | 91.49 | "The Default PE Duration subfield indicates the PE duration in units of 4 ++s, for an HE trigger-based PPDU that is solicited with UL MU Response Scheduling in the A-Control subfield." How does this tie up wit the PETT I don't see how it is used, make a reference to where and how it is used. | Add a reference to where and how this default is used. | Revised –Agree in principle. Proposed resolution accounts for the suggested change by adding the reference to how and where it is used.TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 5552. |
| 5553 | Graham Smith | 91.60 | "The HE Duration Based RTS Threshold field enables..." Should be 'subfield'. | Change "field" to "subfield" | Accepted |
| 5554 | Graham Smith | 91.55 | "...AP requires the non-AP HE STAs..." Associated STAs I assume. | Cited text to read "AP requires non-AP HE STAs that are associated with it..." | Revised –Agree in principle. Proposed resolution accounts for the suggested change. TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 5554. |
| 5555 | Graham Smith | 91.60 | "The HE Duration Based RTS Threshold field enables an HE AP to manage..." This corresponds to dot11DurationRTSThreshold of which there is no mention in this paragraph. | Add reference to dot11DurationRTSThreshold | Revised –Agree in principle. Proposed resolution accounts for the suggested change. TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 5555. |
| 5556 | Graham Smith | 91.60 | dot11DurationRTSThreshold has been introduced as an alternative to the octet based dot11RTSThreshold. I note that "HE" is missing so one implies that the TG felt that duration was a better parameter than octets and this implies it could be for all STAs, not just HE ones. Was this the intention? If so "HE duration based RTS is not correct and it is solely "duration based RTS" and so the question arises, "should this be available for all STAs?" The original RTS Threshold is on a per station basis, I don't think it is advertized or specified by a STA or AP (I need to check that). So in this case is this HE Duration based RTS field something only an AP sends to control its BSS or is it something a STA also sends. Can it be different for a STA and its AP, the opeing sentence seems to indicate it is for AP control? If so, where are the rules or informationa as to ewhere to set it? Needs references. I think this may need some more thinking about. | Add reference to text on how to set the value - is it only for an AP to set? Can a STA set different values to tis AP, what happens if it does? | Revised –Agree in principle with the comment. Proposed resolution is to add a reference to the normative text that controls the behaviour of the STAs, specify that the MIB variable that activates such behaviour is not present in non-HE non-AP STAs, and move the spec text to clause 27 so that it is clear that the feature is HE related (and it is already clear that the STA does not send anything to the AP to make any decision of the likes). TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 5556. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 7382 | Laurent Cariou | 91.55 | TWT operation is efficient for specific types of traffic (with periodic patterns) but not for all. It is not efficient to require all STAs to apply TWT. This should be changed to a recommandation |  | Rejected –The AP uses this field to indicate the STAs that it will not be available outside of the scheduled TWT SPs for communication with the AP. As such the STAs need to be aware of such behaviour otherwise they will be sending packets to an entity that is not available, which would cause useless transmissions over the air, which is not efficient.  |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 7774 | Mark Hamilton | 91.64 | Use 'shall' for normative requirements. | Change "must" to "shall" | Revised –Disagree in principle with the comment. Shall is a normative requirement which cannot be present in clause 9 which includes frame/fields definitions etc. Proposed resolution is to remove the sentence as proposed by other CIDs targeting this paragraph.TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 7774. |
| 7870 | Mark RISON | 91.62 | "which enables the use of RTS/CTS except for values 0 and 1023" -- 0 enables RTS/CTS too | Delete "0 and" in the cited text; also delete the following " The value 0 indicates that RTS/CTS must be used for all frame exchanges." since this follows from the specification of the use of this field | Revised –Agree in principle and incorporated the suggested change.TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 7870. |
| 8355 | Peter Loc | 92.43 | It's not stated clearly that the HE-STAs joining the HE-BSS are required to support the HE-MCS indicated in the Basic HE-MCS and NSS Set for both Rx and Tx. For UL OFDMA and UL MU MIMO, it should be a requirement that HE STAs support the HE-MCS as indicated in the basic HE-MCS and NSS Set for receiving and transmitting. | Modify the statement on lines 43-44: The Basic HE MCS And NSS Set field indicates the HE-MCSs for each number of spatial streams in HE PPDUs that are supported by all HE STAs in the BSS (including IBSS and MBSS) in both Tx and Rx | Revised –Agree in principle. Proposed resolution accounts for the change.TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 8355. |

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| **CID** | **Commenter** | **P.L** | **Comment** | **Proposed Change** | **Resolution** |
| 9664 | Yongho Seok | 91.60 | "The HE Duration Based RTS Threshold field enables an HE AP to manage RTS/CTS usage by HE non-AP STAs that are associated with it."Does the HE Duration Based RTS Threshold field manage the MU-RTS/CTS usage as well?Please clarify it. | As per commnet. | Rejected –The commenter is asking a question. The answer is no because MU RTS frames are generated by APs, while the HE Duration based RTS threshold controls generation of RTS frames generated by non-AP STAs, which do not generate MU RTS frames. No further clarification is needed because it is already clear. |
| 9665 | Yongho Seok | 91.64 | "The value 0 indicates that RTS/CTS must be used for all frame exchanges."First comment is that any normative text is not allowed in Clause 9.Second comment is that all frame exchanges can not use RTS/CTS. The value 0 can be applied only for an HE STA. | As per comment. | Revised –First comment, agree, Removed the sentence. Second comment is solved as well because the sentence is not there anymore. Also please note that it is already clear that the functionality is applicable to HE non-AP STAs only (first sentence of the paragraph).TGax editor to make the changes shown in 11-17/1263r1 under all headings that include CID 9665. |

**Discussion: *None.***

# 9.4.2.238 HE Operation element

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 3178, 4927):***

(#3036)The BSS Color field is an unsigned integer whose value is the BSS Color of the BSS corresponding to the AP, IBSS STA, mesh STA or TDLS STA that transmitted this element and is set as defined in 27.11.4 (BSS\_COLOR).*(#3178, 4927)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 5552):***

The Default PE Duration subfield indicates the Packet Extension (PE) field duration(#8260) in units of 4 μs for an HE TB PPDU that is solicited with an UMRS Control subfield(#7203) and is used as defined in 27.5.2.3 (STA behavior for UL MU operation).*(#5552)* Values 5-7 of the Default PE Duration subfield are reserved.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 5554):***

The TWT Required subfield is set to 1 to indicate that the AP requires its associated non-AP HE STAs*(#5554)* to operate in the role of either TWT requesting STA, as described 27.7.2 (Individual TWT agreements), or TWT scheduled STA, as described in 27.7.3 (Broadcast TWT operation) and set to 0 otherwise.

**TGax Editor: *Change the paragraph below of this subclause as follows and change the name of the field in the HE Operation element from “HE Duration Based RTS Threshold” to “TXOP Duration RTS Threshold” (apply throughout) (#CID 5555, 4773, 5556, 7774, 7870, 9665):***

The TXOP Duration RTS Threshold field enables an HE AP to manage RTS/CTS usage by HE non-AP STAs that are associated with it (see 27.17 (TXOP Duration based RTS/CTS))*(#5555, 5556)*. The TXOP Duration RTS Threshold field contains the TXOP duration RTS threshold in units of 32 us, which enables the use of RTS/CTS except for value 1023.The value 1023 indicates that TXOP duration based RTS is disabled.*(#4773, 5556, 7870, 7774, 9665)*

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 8355):***

The Basic HE MCS And NSS Set field indicates the HE-MCSs for each number of spatial streams in HE PPDUs that are supported by all HE STAs in the BSS (including IBSS and MBSS) in transmit and in receive*(#8355)*. The Basic HE MCS And NSS Set field in defined in Figure 9-589cn.

# 10.3.1 General

Change the 6th paragraph as follows:

The virtual CS mechanism is achieved by distributing reservation information announcing the impending use of the medium. The exchange of RTS and CTS frames prior to the actual Data frame is one means of distribution of this medium reservation information. The RTS and CTS frames contain a Duration field that defines the period of time that the medium is to be reserved to transmit the actual Data frame and the returning Ack frame. A STA receiving either the RTS frame (sent by the originating STA) or the CTS frame (sent by the destination STA) shall process the medium reservation. Thus, a STA might be unable to receive from the originating STA and yet still know about the impending use of the medium to transmit a Data frame. The exchange of MU-RTS and simultaneous CTS responses by HE STAs prior to the actual Data frames is another means of distribution of this medium reservation information.

Change the 12th paragraph as follows:

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 4773, 5556):***

~~The~~ When TXOP duration based RTS is disabled*(#4773, 5556)*, the use of the RTS/CTS mechanism is under control of dot11RTSThreshold. This attribute may be set on a per-STA basis. This mechanism allows STAs to be configured to initiate RTS/CTS either always, never, or only on frames longer than a specified length.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 4773, 5556):***

When TXOP duration based RTS is enabled, the use of the RTS/CTS mechanism is under control of dot11TXOPDurationRTSThreshold. This mechanism requires STAs to use an RTS/CTS exchange for individually addressed frames when the duration of the TXOP is greater than dot11TXOPDurationRTSThreshold as defined in 27.17. *(#4773, 5556)*

# 10.3.2.4 Setting and resetting the NAV

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 4773, 5556):***

**TGax Editor: *Change the paragraph below of this subclause as follows (and reclassify the content as a new subclause in 27 (see below) (#CID 4773, 5556):***

: (#4773, 5556)

# 27.17 TXOP duration based RTS*(#4773, 5556)*

In dense environments, managing RTS usage by an AP can help the overall interference situation since the AP may have better view of the network situation. To improve spectrum utilization, RTS usage should be TXOP duration based, rather than PSDU length based.

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. 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.An HE non-AP STA shall set its dot11TXOPDurationRTSThreshold to the TXOP Duration RTS Threshold subfield in the most recently received HE Operation element sent by the AP to which the STA is associated. The dot11TXOPDurationRTSThreshold is not present at a non-HE non-AP STA.

TXOP duration based RTS operation is disabled at a STA when dot11TXOPDurationRTSThreshold is either not present or is equal to 1023. TXOP duration based RTS is enabled at a STA when dot11TXOPDurationRTSThreshold is less than 1023.

A non-AP STA shall use RTS/CTS exchange to obtain the 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 us \* dot11TXOPDurationRTSThreshold
* dot11TXOPDurationRTSThreshold is not 1023*(#4773, 5556)*

# 10.3.5 Individually addressed MPDU transfer procedure

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 4773, 5556):***

~~A~~ When TXOP duration based RTS is disabled, a STA using the DCF shall use an RTS/CTS exchange for individually addressed frames when the length of the PSDU is greater than the length threshold indicated by dot11RTSThreshold. When TXOP duration based RTS is enabled, a non-AP STA using the DCF or EDCA uses an RTS/CTS exchange as defined in 27.17 (TXOP duration based RTS). *(#4773, 5556)* A STA may also use an RTS/CTS exchange for individually addressed frames when it is necessary to distribute the NAV or when it is necessary to establish protection (see 10.26 (Protection mechanisms)). Otherwise a STA using the DCF shall not use the RTS/CTS exchange.

If dot11RTSThreshold is 0 all MPDUs shall be delivered with the use of RTS/CTS. If dot11RTSThreshold is larger than the maximum PSDU length, all PSDUs shall be delivered without RTS/CTS exchanges except when dot11TXOPDurationRTSThreshold is less than 1023 (see 27.17 (TXOP duration based RTS. *(#4773, 5556)*

NOTE—A non-AP STA that transmits the MPDUs in an HE TB PPDU is exempt from these requirements.

When an RTS/CTS exchange is used, the PPDU containing the PSDU shall be transmitted starting one SIFS after the end of the CTS frame.

NOTE—No regard is given to the busy or idle status of the medium when transmitting this PSDU.

When an RTS/CTS exchange is not used, the PSDU shall be transmitted following the success of the basic access procedure. With or without the use of the RTS/CTS exchange procedure, the STA that is the destination of a Data frame shall follow the acknowledgment procedure.