IEEE P802.11
Wireless LANs

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| Comment resolution for 27.7.1 (Block 4) |
| Date: 2017-05-01 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (11 CIDs):

* 5656, 5963, 7395**,** 7396, 7400, 7618, 7619, 8067, 10277, 8322, 9978

Revisions:

* Rev 0: Initial version of the document (CIDs in green are in editor’s tag).

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** |
| 5656 | Guoqing Li | 180.00 | The implementation of a STA supporting the role of scheduling TWT is different from the role of scheduled STA. The capability indication should separate these two. | Separate these two capabilities, one for scheduling STA and one for scheduled STA | Revised –The conceptual separation of these two capabilities is already there since a TWT scheduled STA is a non-AP STA while a TWT scheduling STA is an AP, as such the capability is already separated. Proposed resolution is the same as 6919 that proposed to specify that a “TWT scheduling STA” is a “TWT scheduling AP”.Note to TGax editor: Instruction is already excecuted in Draft 1.2.TGax editor to replace “TWT scheduling STA” with “TWT scheduling AP” throughout the draft. |
| 5963 | Jarkko Kneckt | 179.60 | A STA should be aware of broadcast TWTs with TWT Flow identifier value 3. The AP may use this type of TWT Flows to organize opportunistic power save for all STAs. It is beneficial that STAs know how long they may be in Doze state and when the TIM or FILS discovery frames will be transmitted. Also a STA should be aware of the timing of hte UL OFDMA random access opportunities. | Please change the text in p.179 l.60: "STAs should be aware of the broadcast TWTs with TWT Flow Type values 2 and 3 in order to knw the Trigger frame transmissions for the UL OFDMA random access and to benefit from the opportunistic power save. The STAs need not be mad aware of other TWT values..." | Revised –This statement discusses whether a STA needs to be aware of TWTs for other STAs (which is not). The requirements of a STA to follow TWTs that are intended to it are describen in the respective subclauses (individual, broadcast, etc). The proposed resolution for CID 7619 that replaces “multiple” with “others” helps clarify this aspect, as such the proposed resolution for this CID is the same as for CID 7619.TGax editor to make the changes shown in 11-17/0298r0 under all headings that include CID 5963. |
| 7395 | Laurent Cariou | 179.49 | TWT operation is complex and defines a very long list of possible implementations and modes of operation. As such, it will be very hard to get interoperability between devices and to rely on consistent and predictable behaviors. The spec should define a limited set of modes of operation that makes more sense for 11ax use cases and define associated expected behaviors. Examples can be: individual TWT for regular traffic (voice), opportunistic power save for congested environment and bursty traffic | Same as comment | Rejected –TWT operation has different flavors to tackle different use cases, each of which has been extensively discussed and agreed upon during the spec development. Please refer to the plethora of presentations that cover each of these use cases, whose concepts are in the SFD and in the current draft. Agree in principle that the behavior has to be consistent and the behavior predictable. The comment resolution process is targeting to address these issues.  |
| 7396 | Laurent Cariou | 180.15 | TWT is efficient only in certain environment conditions and only for some traffic types. It is therefore very unlikely that forcing TWT will be beneficial to all STAs. The TWT required bit set to 1 should therefore be a recommendation rather than a requirement. This feature was agreed at a time where Broadcast TWT was not constraining on the STA side. Now that broadcast TWT has been modified, this makes the requirement on the STA side now more stringent and should be revised. Finally, opportunistic power save has also been defined for congested environments, opportunistic power save should be part of the choices that are required by the TWT required subfield, with individual and Broadcast TWT | Replace "A STA thatsupports TWT and is associated with an AP from which it receives an HE Operation element whose TWTRequired subfield is 1 shall either..." by "A STA thatsupports TWT and is associated with an AP from which it receives an HE Operation element whose TWTRequired subfield is 1 should either ..." and add "participate in opportunistic power save" in the choices after the word "either". |  Revised –Disagree in principle with the comment. TWT has negligible impact from an efficiency perspective (due to incorporation of a TWT element in certain MGMT frames) and is simply used to provide scheduling information that is useful for all STAs that are associated with the AP to know when the trigger frames will be scheduled to be sent by AP. The proposed resolution for this CID is inline with the suggested change by CID 7620 that asks to specify that the AP can require its STAs to use TWT if the AP is itself operating in power save mode. TGax editor to make the changes shown in 11-17/0298r0 under all headings that include CID 7396. |
| 7400 | Laurent Cariou | 179.49 | Broadcast TWT is currently also used just to indicate to any STAs the point in time at which some frames will be transmitted. This is the case for the transmission of trigger frames with OFDMA random access, for the transmission of TIM elements for opportunistic power save. This should be described | Provide description for it | Revised –Agree in principle with the comment, however no description is needed as there are alredy subclauses that provide that description (as such adding more description would be redundant). Proposed resolution is to add references to those subclauses.TGax editor to make the changes shown in 11-17/0298r0 under all headings that include CID 7400. |
| 7618 | Liwen Chu | 179.54 | Add the following sentence: "An HE STA can negotiate broasdcast TWT values, as defined in 10.43 (Target wake time (TWT)), subject tothe additional rules and restrictions that are defined in 27.7.3 (broadcastTWT agreements)." | As in comment | Revised –Agree in principle with the comment. However, no broadcast TWT operation is defined in clause 10.43. Proposed resolution is to specify that the STA can negotiate broadcast TWT values as specified within this subclause.TGax editor to make the changes shown in 11-17/0298r0 under all headings that include CID 7618. |
| 7619 | Liwen Chu | 179.66 | Change the text to "STAs need not be made aware of the TWT values of other STAs or that a TWT service period (SP) can beused to exchange frames with other STAs." | As in comment | Accepted |
| 8067 | Massinissa Lalam | 181.80 | I'm still missing the technical contributions which demonstrate the benefit of having the TWT operation mandatory at an HE AP in a dense deployment context (using the agreed 11ax simulation scenarios for instance). So far, I do not have any technical evidence of why "An HE AP shall set the TWT Responder Support subfields of the Extended Capabilities element and HE Capabilities element to 1.". Please delete this sentence or give sufficient justification of why it should be this way. | As in comment. | Rejected –The comment fails to identify a technical issue. TWT is a protocol that helps STAs that use it to reduce their power consumption. Please refer to:<https://mentor.ieee.org/802.11/dcn/12/11-12-0823-00-00ah-targetwaketime.pptx>, where there is extensive discussions on the power saving benefits of the protocol. TWT was further enhanced to address the 11ax case where STAs are triggered for transmissions by the AP which is a power demanding functionality since the STA has to wait to be triggered by the AP. Due to its properties the protocol also provides scheduling benefits as the AP can allocate the resources to STAs that have similar traffic patterns. Please refer to: <https://mentor.ieee.org/802.11/dcn/15/11-15-0880-01-00ax-scheduled-trigger-frames.pptx>, which specifically discusses the scheduling properties of the protocol. The requirement for an AP to be able to support individual TWT is because UL MU operation is power demanding (as STA needs to stay awake to receive Triggers) and TWT alleviates this, by allowing the STA to negotiate with the AP its target wake times. |
| 10277 | Yusuke Tanaka | 180.15 | "An AP" and "A STA" should be "An HE AP" and "An HE STA". | As commented. | Accepted  |
| 8322 | Peter Ecclesine | 179.64 | There are too many 'SHALL's in clause 27.7 TWT operation text | State what is mandatory and optional in 27.7.1, then remove redundant shalls from 27.7.x | Rejected –The comment fails to identify specific changes that would satisfy the comment. The CRC reviewed the subclause to identify any redundant normative behavior that was out of place and could not find any. Please submit a comment indicating the excessive shalls.  |
| 9978 | Yuchen Guo | 180.02 | "requester STA" should be "requesting STA" | As per comment | Accepted |

**Discussion: *None.***

* General

Target wake times (TWTs) allow STAs to manage activity in the BSS by scheduling STAs to operate at different times in order to minimize contention between STAs and to reduce the required amount of time that a STA in PS mode needs to be awake.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7618, 7400):***

An HE STA can negotiate individual TWT values, as defined in 10.43 (Target wake time (TWT)), subject to the additional rules and restrictions that are defined in 27.7.2 (Individual TWT agreements), can negotiate broadcast TWT values, as defined in 27.7.3 (Broadcast TWT operation), which can be used as defined in 27.7.3.3(Rules for TWT scheduled STA), 27.14.2 (Power save with UL OFDMA-based random access), and 27.14.3(Opportunistic power save in congested environment)*(#7618, 7400)*. An HE AP can deliver broadcast TWT values to non-AP HE STAs(#6256), without requiring that an individual TWT agreement has been established between them, as described in 27.7.3 (Broadcast TWT operation).

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 7619, 5963):***

STAs need not be made aware of the TWT values of other STAs or that a TWT service period (SP) can be used to exchange frames with other STAs*(#7619, 5963)*. Frames transmitted during a TWT SP can be carried in any PPDU format supported by the STAs, including HE MU PPDU, HE TB PPDU, etc.

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 9978):***

An HE STA with dot11TWTOptionActivated equal to true shall set:

* The TWT Requester Support subfield to 1 in the HE Capabilities element that it transmits if it supports operating in the role of a TWT requesting STA*(#9978)*; otherwise set to 0.
* The TWT Responder Support subfield to 1 in the HE Capabilities elements that it transmits if it supports operating in the role of a TWT responding STA; otherwise set to 0.
* The Broadcast TWT Support subfield to 1 in the HE Capabilities element that it transmits if it supports operating in the role of a TWT scheduled STA or in the role of a TWT scheduling AP(#6919); otherwise set to 0.

An HE AP shall set the TWT Responder Support subfields of the Extended Capabilities element and HE Capabilities element to 1.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 10277):***

An HE AP may set the TWT Required subfield to 1 in the HE Operation element it transmits to request TWT participation by all HE STAs that are associated to it and that have declared support for TWT. An HE STA that supports TWT and is associated with an HE AP*(#10277)* from which it receives an HE Operation element whose TWT Required subfield is 1 shall either negotiate individual TWT agreements, as defined in 27.7.2 (Individual TWT agreements), or participate in broadcast TWT operation, as defined in 27.7.3 (Broadcast TWT operation).

NOTE—The AP sets the TWT Required subfield to 1 when it is unavailable outside of TWT SPs (see 27.7.2 (Individual TWT agreements) and 10.43.7 (TWT Sleep Setup).*(#7396)*

* Individual TWT agreements

**TGax Editor: *Change item below of this subclause as follows (#CID 7396):***

An HE STA may negotiate individual TWT agreements with another HE STA as defined in 10.43.1 (TWT overview), except that the STA:

* May set the Responder PM Mode subfield to 1 if it is a TWT responding STA that intends to go to doze state outside of TWT SPs.
* If the TWT responding STA is an AP then it may set the Responder PM Mode subfield to 1 only if all non-AP STAs, which are associated to it, indicate support of TWT in the role of a TWT requester and the AP has set the TWT Required subfield to 1 in the HE Operation element it transmits*(#7396)*; otherwise it shall set it to 0.
* An AP that sets the Responder PM Mode subfield to 1 follows the rules defined in 10.43.7 (TWT Sleep Setup).
* …