IEEE P802.11  
Wireless LANs

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| CC23 Proposed Resolution (Update for) TWT Element | | | | |
| Date: 2016-11-05 | | | | |
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Abstract

This document proposes udpates to CC23 comment resolution on the TWT element.

**REVISION NOTES:**

R0: initial

R1:

25.7.3.1

Changed MPDU references to MMPDU – the TWT IE can only appear in MMPDUs

25.7.3.2

Fixed scheduled STA bit setting

Minor wording changes in the rules of trigger frames during TWT SPs

R2:

CID – added 11-16-1477r2 to the documents needed to resolve the CID in the resolution column

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 “Instruction to 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 LIST:**

NA – updates to previously resolved comments, e.g. 682

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| **CID** | **Commenter** | **Page.Line** | | **clause** | **Comment** | **Suggested change** | **Proposed resolution** |
|  |  |  | |  |  |  |  |
| 682 | Hyunhee Park | 26.43 | 9.4.2.196 | | The TWT operation should be different from the regular TWT operation since a STA needs to receive only the Beacon frame during TWT SP. However, the spec has no text about the indication for negotiation of the first TBTT and listen interval in the TWT element, which needs to be described. | Modify the Figure 9-577ax--Control field format by adding 1-bit TBTT and LI Negotiation subfield and add related text of the TBTT and listen interval Negotiation for broadcast TWT operatoin. | Revise - Tgax editor shall make the changes shown in 11-16-1266r3 and 11-16-1477r2 under all headings that include CID 682 – which do not add a new field, but instead, make it clear that the scheduled STA may include a suggested TBTT value by using the suggest TWT command. |

**Discussion:**

Wihtout some communication between a scheduling STA and a scheduled STA, each of those two entities is unaware of the possible/probable participation in a Broadcast TWT. Some exchange between scheduled STA and scheduling STA is needed in order to make Broadcast TWT useful.

**Proposed changes**

As shown below.

**CID 682**

**TGax Editor: *Change the text as shown:***

9.4.2.196 TWT element

***TGax Editor: Change the figure below as follows, by adding a new subfield Broadcast TWT ID:***

***NOTE TO EDITOR and readers – document author is unable to delete the empty column in the diagram without causing the caption and the text above the diagram to nearly completely disappear – the empty column is intended to simply not exist, but the word program is not cooperating. Even with the insertion, you can see that that the word “figure” is oddly repeated.***

Repeat for each TWT parameter set when Broadcast = 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  | |  | |  |  |  |  | | | | | | | |
|  | Element  ID | | Length | | Control | Request  Type | Target  Wake  Time | | TWT  Group  Assignment | Nominal  Minimum TWT  Wake  Duration | TWT Wake  Interval  Mantissa | Broadcast TWT ID |  | TWT  Channel | NDP  Paging  (optional) |
| Octets: | 1 | | 1 | | 1 | 2 | 8, 2, or 0 | | 9 or 3 or 0 | 1 | 2 | 0 or 1 |  | 0 or 1 | 0 or 4 |
|  | |  | | * TWT element format. | | | | | | | | | | | |

**TGax Editor: *Add a new paragraph at the end of subclause “9.4.2.196 TWT element” as shown:***

The Broadcast TWT ID subfield is present if the Broadcast subfield in the Control subfield has a value of 1, otherwise the Broadcast TWT ID subfield is not present. Within a TWT element that includes a TWT setup command value of Request TWT, Suggest TWT or Demand TWT, the Broadcast TWT ID, if present, indicates a specific Broadcast TWT in which the transmitting STA is requesting to participate. Within a TWT element that includes a TWT setup command value of Accept TWT, Alternate TWT, Dictate TWT or Reject TWT, the Broadcast TWT ID, if present, indicates a specific Broadcast TWT for which the transmitting STA is providing TWT parameters. Within a TWT element that includes a TWT setup command value of TWT Grouping, the Broadcast subfield is 0 and the Broadcast TWT ID, is not present. The value 0 in the Broadcast TWT ID subfield indicates the special broadcast TWT whose membership corresponds to all STAs that are members of the BSS corresponding to the BSSID of the management frame carrying the TWT element.

**TGax Editor: *Modify the ttable of subclause 10.45.1 TWT Overview as shown:***

Table 10‑19b – TWT Setup exchange Command interpretation

|  |  |  |
| --- | --- | --- |
| **Initiating frame** | **Response frame** |  |
| **TWT Setup Command field value within a TWT Setup frame transmitted from first STA to second STA** | **TWT Setup Command field value within a TWT Setup frame transmitted from second STA to first STA** | **TWT condition after the completion of the exchange** |
| Request TWT or Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = don’t care | No frame transmitted | No new active individual TWT agreement exists with the TWT Flow ID corresponding to the Flow ID in the initiating frame. No new active Broadcast individual TWT agreement exists. |
| Request TWT or Demand TWT with Wake TBTT Negotiation subfield = 0 | Accept TWT with Broadcast subfield = 0 | An individual TWT agreement is now active and is using the TWT parameters identified in the initiating frame. The TWT parameters in the response frame match the TWT parameters of the initiating frame. |
| Suggest TWT with Wake TBTT Negotiation subfield = 0 | Accept TWT with Broadcast subfield = 0 | An individual TWT agreement is now active and is using the TWT parameters identified in the response frame. |
| Request TWT or Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 0 | Accept TWT with Broadcast subfield = 1 | This response is not allowed. |
| Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 0 | Alternate TWT or Dictate TWT with Broadcast subfield = 0 | This response is not allowed. |
| Request TWT with Wake TBTT Negotiation subfield = 0 | Alternate TWT with Broadcast subfield = 0 | No active individual TWT agreement exists with the associated TWT Flow ID. The responder is offering an alternative set of parameters vs. those indicated in the initiating frame, as a means of negotiating TWT parameters with the requester. The requesting STA can send a new request with any set of TWT parameters and the responder might entertain the creation of an individual TWT agreement using those parameters. |
| Request TWT with Wake TBTT Negotiation subfield = 0 | Dictate TWT with Broadcast subfield = 0 | No active individual TWT agreement exists with the associated TWT Flow ID. The responder offers an alternative set of parameters vs. those indicated in the TWT request. By selecting “Dictate TWT”, the responder indicates that it is not willing to accept any other TWT parameters for the requesting STA at this time. The requesting STA can send a new request, but will only receive an Accept TWT if it uses the dictated TWT parameters. |
| Request TWT with Wake TBTT Negotiation subfield = 0 | Dictate TWT with Broadcast subfield = 1 | No active individual TWT agreement exists with the associated TWT Flow ID. A broadcast TWT agreement is now active and is using the TWT parameters identified in the response frame, including a Broadcast TWT ID. The broadcast TWT agreement is not necessarily a newly created Broadcast TWT agreement. The responding STA will not create any new individual TWT agreement with the requester at this time. The STA transmitting the initiating frame is not a member of the Broadcast TWT. |
| Request TWT or Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 0 | Reject TWT with Broadcast subfield = 0 | No active individual TWT agreement exists with the associated TWT Flow ID. The responding STA will not create any new individual TWT agreement with the requester at this time. |
| Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 1 | Accept TWT or Alternate TWT or Dictate TWT or Reject TWT with Broadcast subfield = 0 | This response is not allowed. |
| Demand TWT with Wake TBTT Negotiation subfield = 1 | Accept TWT with Wake TBTT Negotiation subfield = 1 and Broadcast subfield = 1 | An active broadcast TWT agreement exists or has been created with the TWT parameters indicated in the initiating frame and the STA transmitting the initiating frame is a member of the Broadcast TWT identified by the Broadcast TWT ID and the TA of the response frame. |
| Suggest TWT with Wake TBTT Negotiation subfield = 1 | Accept TWT with Wake TBTT Negotiation subfield = 1 and Broadcast subfield = 1 | An active broadcast TWT agreement exists or has been created with the TWT parameters indicated in the response frame and the STA transmitting the initiating frame is a member of the Broadcast TWT identified by the Broadcast TWT ID and the TA of the response frame. |
| Request TWT with Wake TBTT Negotiation subfield = 1 | Alternate TWT with Wake TBTT Negotiation subfield = 1 and Broadcast subfield = 1 | No active broadcast TWT agreement has been created with the TWT parameters indicated in the initiating frame. The responder is offering an alternative set of parameters vs. those indicated in the initiating frame, as a means of negotiating TWT parameters with the requester. The requesting STA can send a new request with any set of TWT parameters and the responder might entertain the creation of a new broadcast TWT agreement using those parameters. |
| Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 1 | Alternate TWT with Broadcast subfield = 1 | This response is not allowed. |
| Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 1 | Dictate TWT with Broadcast subfield = 1 | An active broadcast TWT agreement is either created or already exists and is using the TWT parameters identified in the response frame, including a Broadcast TWT ID. The responding STA will not create any new broadcast TWT agreement with the requester at this time |
| Suggest TWT or Demand TWT with Wake TBTT Negotiation subfield = 1 | Reject TWT with Broadcast subfield = 1 | The STA transmitting the initiating frame is a not a member of a Broadcast TWT identified by the Broadcast TWT ID and the TA of the response frame, if such a Broadcast TWT exists. . |
| Accept TWT or Alternate TWT or Dictate TWT or Reject TWT with Wake TBTT Negotiation subfield = 0 | No frame transmitted | This exchange is not allowed. |
| Accept TWT with Wake TBTT Negotiation subfield = 0 and Broadcast subfield = 1 | No frame transmitted | When transmitted by a scheduling STA, a broadcast TWT agreement exists and is using the TWT parameters identified in the initiating frame, including a Broadcast TWT ID.  Not permitted to be transmitted by a scheduled STA. |
| Alternate TWT or Dictate TWT with Wake TBTT Negotiation subfield = 0 and Broadcast subfield = 1 | No frame transmitted | When transmitted by a scheduling STA, the TWT parameters of the existing broadcast TWT agreement identified by the Broadcast TWT ID and the TA of the initiating frame have been updated to the values of the TWT parameters of the initiating frame.  Not permitted to be transmitted by a scheduled STA. |
| Reject TWT with Wake TBTT Negotiation subfield = 0 and Broadcast subfield = 1 | No frame transmitted | When transmitted by a scheduled STA, the scheduled STA membership in the broadcast TWT agreement identified by the Broadcast TWT ID and the RA of the initiating frame frame is terminated.  Not permitted to be transmitted by a scheduling STA. |
| Reject TWT with Wake TBTT Negotiation subfield = 1 and Broadcast subfield = 1 | No frame transmitted | When transmitted by a scheduling STA, the broadcast TWT agreement identified by the Broadcast TWT ID and the TA of the initiating frame frame is terminated.  Not permitted to be transmitted by a scheduled STA. |
| Reject TWT with Wake TBTT Negotiation subfield = 0 and Broadcast subfield = 0 | No frame transmitted | The individual TWT agreement identified by the TA, RA pair of the transmitted frame and with the corresponding TWT Flow ID is terminated. |
| Note 1 - Initiating frames not explicitly indicating Broadcast=1 have Broadcast subfield value of 0.  Note 2 – Request frame settings not listed in the table are not allowed. | | |

**25.7.3 Broadcast TWT operation**

**25.7.3.1 General**

**TGax Editor: *Add a new paragraph at the end of subclause 25.7.3.1 General as shown:***

Each Broadcast TWT is uniquely identified by the tuple (Broadcast TWT ID, MAC address), where Broadcast TWT ID is the value from the Broadcast TWT ID subfield of a TWT parameter set from the TWT element that describes the Broadcast TWT and MAC address is either:

1. the TA of the MMPDU that contained the TWT element when the TWT command value is Accept, Alternate or Dictate
2. the RA of the MMPDU that contained the TWT element when the TWT command value is Request, Suggest or Demand.

When the TWT command value is Reject, the Broadcast TWT is identified by the Broadcast TWT ID value and the TA of the MMPDU that contained the TWT element when the Wake TBTT Negotiation subfield = 0 and by the RA of the MPDU that contained the TWT element when the Wake TBTT Negotiation subfield = 1.

**25.7.3.2 Rules for TWT scheduling STA**

**TGax Editor: *Modify the first paragraph of subclause 25.7.3.2 Rules for TWT scheduling STA as shown:***

A TWT scheduling STA may include a broadcast TWT element in a Beacon frame that is scheduled at a TBTT (see 11.1.3.2 (Beacon generation in non-DMG infrastructure networks)). The TWT scheduling STA shall include one or more TWT parameter sets in the TWT element, and each TWT parameter set may indicate a periodic occurrence of TWTs. The TWT scheduling STA shall set the NDP Paging Indicator subfield to 0, the Broadcast subfield to 1, the Implicit subfield to 1, and the Responder PM Mode subfield to 0 in the TWT element (see 10.45.7 (TWT Sleep Setup)). Each TWT parameter set specifies the TWT parameters of a specific broadcast TWT that are valid within a broadcast TWT SP. Each specific broadcast TWT is identified as indicated in 25.7.3.1 (General). Individual STAs have membership in Broadcast TWTs as the result of negotiation with a scheduling STA as indicated in Table 10-19b (TWT Setup exchange command interpretation).

A TWT scheduled STA may include a TWT element with the value of Wake TBTT Negotiation subfield = 1in (Re)Association Request frames.

A TWT scheduling STA may include a TWT element with the value of Broadcast set to 1 in (Re)Association Response frames.

A TWT scheduling STA should not include a STA’s AID in a User Info field of a Trigger frame transmitted within a Broadcast TWT SP unless the STA has established membership in the Broadcast TWT.