IEEE P802.11
Wireless LANs

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| CC36 comment resolution: Triggered TXOP Sharing |
| Date: 2020-08-20 |
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Abstract

This submission proposes resolutions for multiple comments related to TGbe D1.0 with the following CIDs:

 4823, 5141, 5240, 5903, 5963, 5964,6073, 6074, 6353,  6555, 6649, 6980, 8325

Revisions:

* Rev 0: Initial version of the document.

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 TGbe Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **PP** | **LL** | **Comment** | **Proposed Change** | Resolution |
| 5240 | 243 | 56 | We need a mechanism for how much/which resources (e.g., BW, Required time) a non-AP STA wants to use for peer-to-peer transmission, which would be helpful when an EHT AP allocates time to the non-AP STA and transmits MU-RTS TXS frame | As in the comment | RevisedDiscussion: in 802.11ax, an HE AP solicits the resource requet from associated STAs through BSRP Trigger frame. A STA send the resource request either after receiving a soliciting BSRP Trigger or without AP’s soliciting. The requested resource is carried in QoS Control field or BSR Control field. The QoS Control field is widely used. It is helpful for an EHT AP to know whether an EHT STA request resource for UL TB PPDU or Triggered TXOP sharing and the amount of requested resource for Triggered TXOP sharing. Given that in Trigger TXOP sharing an AP allocates resource in time duration, the requested resource should also be in time duration. The TXOP Duration Requested subfield in 802.11 baseline can be used for the resource request of Triggered TXOP sharing. The BSRP Trigger is used for soliciting the STA’s reqource request, and it is up to the solicited STA to decide which kind of resource is requested. TGbe editor to make changes in 11-21/1509r0 under CID 5240 |
| 5963 | 243 | 53 | The AP needs to know the resource rquirement in order to allocate the time to STA for TXOP sharing. | Add the related text. | RevisedSee CID 5240 |
| 6074 | 243 | 53 | the mechanism to provide the reqource request to AP by a STA for TXOP sharing should be defined. The AP can figure out whther the request is fir TB PPDU or for TXOP sharing. The simple solution could be using QoS Control field to carry the requested medium time for 20MHz BW. | Address the issue raised by the comment. | RevisedSee CID 5240 |
| 6353 | 243 | 55 | It would be benificial if a STA can request from the AP to schedule some time in its TXOP to transmit data. The AP needs to know some information regarding allocated time requested and when needed. Especially in the case of P2P, time request should be sent to the AP | Add a procedure to allow the non-AP STA to request the AP STA to schedule SU triggered based period and indicate requested time and time to schedule that period | RevisedSee CID 5240 |
| 6649 | 243 | 53 | 802.11be D1.0 has defined the Trigger TXOP TXS procedure which allows a AP to grant a STA with its obtained TXOP, but the solution on how the STA notify the duration , buffer length, etc. to the AP in advance is missing. | BSR control frame is the best place to indicate the requested TXOP duration or the length of buffered traffic in granted TXOP case, but there is no reserved bit in BSR, we can consider to signaling these information in a new A-control frame. | RevisedSee CID 5240 |
| 8325 | 245 | 34 | AP doesn't know any P2P transission information, how to allocate the time?Please add some mechanism to improve the scheduling efficency. | as in comment. | RevisedSee CID 5240 |
|  |  |  |  |  |  |
| 5141 | 245 | 62 | A STA that received the Triggered TXOP sharing cannot transmit a PPDU after the CTS frame, because the STA has a nonzero NAV based on the MU-RTS TXS Trigger frame or the previous frame. | Define a rule to ignore NAV for a non-AP STA to utilize the allocated TXOP. | RevisedDiscussion: the STA that is addressed by MU-RTS TXS will not set its NAV per the MU-RTS TXS since the STA is the recipient of the frame. However MU-RTS TXS may not be the first frame of the TXOP where the MU-RTS TXS is the TXOP holder. In this case, the STA’s intra-BSS NAV timer is not 0. This can be addressed by ignoring the intra-BSS NAV when a STA transmit frames within allocated duration by MU-RTS TXS.TGbe editor to make changes in 11-21/1509r0 under CID 5141 |
| 5903 | 246 | 5 | It should be specified which types of frames and settings that can be used during allocation duration.For example TXOP Sharing Mode subfield equal to 2, the peer non-AP STA (which the scheduled STA talks to in the allocation duration) may understand AP as the TXOP holder. The scheduled STA should not initiate a RTS/CTS exchange with the peer STA for hidden node protection within allocation durationFor another example, if the scheduled STA uses control frames with BW signaling TA talking to a peer STA, another STAx in the same BSS may set basic NAV. This prevents AP sending TF to this STAx later in the TXOP. | Specifiy the types/settings of the frames that can be used in the allocation duration | RevisedDiscussion: Not allowing RTS/CTS between scheduled STA and the P2P peer STA is too restrictive. The RTS/CTS may be needed to avoid the interference from the neighbors of the peer STA. The control frame with bandwidth singlaing TA is not the only frame that creates issues in STAx, e.g. VHT PPDU since the p2p peer STA is not HE STA, different BSS color is used between the scheduled STA and P2P peer STA. The general rule should be used: the Duration field should be restricted such that the NAV based on the Duration of frames of TXOP sharing will be 0 at the end of allocated TXOP sharing duration. TGbe editor to make changes in 11-21/1509r0 under CID 5903 |
| 5964 | 243 | 53 | The STA that is invited to join the TXOP sharing P2P transmission and is not associated with the AP may set its NAV per revceived MU-RTS TXOP sharing Trigger frame and can't do the P2P frame exchange. | Solve the issue. | RevisedDiscussion: Generally agree with the commenter. The issue can addressed through: the initiator of P2P frame exchanges notifies the AP address to P2P peer STA. The P2P peer STA ignores the NAV setted by frames from the AP when responding to the P2P initiating STA.TGbe editor to make changes in 11-21/1509r0 under CID 5964 |
| 6073 | 243 | 53 | when a STA does P2P frame exchanges within the TXOP allocated by the AP, its peer STA may not be able to send responding frame. The reason is that the peer STA have non-zero NAV being set by the received frame from the AP. | Address the issue raised by the comment. | RevisedSee CID 5964  |
|  |  |  |  |  |  |
| 4823 | 246 | 59 | Clarify how the scheduled STA can use TXOP protection mechanism to talk to its peer STA | As in comment. | RevisedDiscussion: when part of TXOP is transferred to a STA for P2P frame exchanges, the Data frames, Management frames and the frames assists the transmission of Data frames, Management frames can be transmitted within the allocated time. TGbe editor to make changes in 11-21/1509r0 under CID 4823 |
| 6980 | 246 | 9 | When the non-AP STA transmits P2P PPDU to a peer STA, the PPDU may failed because medium of the peer STA never cleared before. So, it is recommended to allow to use protection mechanism(such as RTS/CTS exchange) between the non-AP STA and the peer STA. | Provide P2P PPDU protection mechanisms for non-AP STA and peer STA. | RevisedSee CID 4823 |
| 6555 | 245 | 32 | For a P2P comunication, how the AP can be aware of the end of the P2P transmission ? | The STA1 may send a CF-END frame to the AP to end the P2P transmission. | RejectedDiscussion: CF-End is dangerous since the the recipient of the CF-End will set its NAV to 0. |

**9.2.4.5 QoS Control field**

**9.2.4.5.1 QoS Control field structure**

***TGbe editor: change Table 9-10 QoS Control field as follows:(***#5240***)***

**Table 9-10—QoS Control field**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Applicable frame (sub)types | Bits 0–3 | Bit 4 | Bits 5–6 | Bit 7 | Bits 8 | Bit 9 | Bit 10 | Bits 11–15 |
| QoS CF-Poll and QoS CF-Ack +CF-Poll frames sent by HC | TID | EOSP | Ack Policy Indicator  | Reserved | TXOP Limit |
| QoS Data +CF-Poll and QoS Data +CF-Ack +CF-Poll frames sent by HC | TID | EOSP | Ack Policy Indicator | A‑MSDU Present | TXOP Limit |
| QoS Data and QoS Data +CF-Ack frames sent by HC | TID  | EOSP  | Ack Policy Indicator | A‑MSDU Present | AP PS Buffer State |
| QoS Null frames sent by HC | TID | EOSP | Ack Policy Indicator | Reserved | AP PS Buffer State |
| QoS Data and QoS Data +CF-Ack frames sent in a nonmesh BSS by non-AP STAs that are not a TPU buffer STA or a TPU sleep STA | TID  | 0  | Ack Policy Indicator | A‑MSDU Present | TXOP Duration Requested |
| TID  | 1  | Ack Policy Indicator | A‑MSDU Present  | Queue Size |
| QoS Null frames sent in a nonmesh BSS by non-AP STAs that are not a TPU buffer STA or a TPU sleep STA | TID | 0 | Ack Policy Indicator | Reserved | TXOP Duration Requested  |
| TID | 1 | Ack Policy Indicator | Reserved | Queue Size |
| QoS Data and QoS Data +CF-Ack frames sent by TPU buffer STAs | TID | EOSP | Ack Policy Indicator | A‑MSDU Present | Reserved |
| QoS Null frames sent by TPU buffer STAs | TID | EOSP | Ack Policy Indicator | Reserved | Reserved |
| QoS Data and QoS Data +CF-Ack frames sent by TPU sleep STAs | TID | Reserved | Ack Policy Indicator | A‑MSDU Present | Reserved |
| QoS Null frames sent by TPU sleep STAs | TID | Reserved | Ack Policy Indicator | Reserved | Reserved |
| All frames sent by mesh STAs in a mesh BSS | TID | EOSP | Ack Policy Indicator | A‑MSDU Present | Mesh Control Present | Mesh Power Save Level | RSPI | Reserved |
| QoS Null sent from npn-AP EHT STA to EHT AP where both EHT STAs transmitted the EHT Capabilitites element with Triggered TXOP Sharing Support field equal to 1. | Channel Width | 0 | Ack Policy Indicator | Reserved | TXOP Duration Requested  |

**9.2.4.5.7 TXOP Duration Requested subfield**

***TGbe editor: change subclause 9.2.4.5.7 as follows:***

(#5240)If transmitted between two STAs where at least of of them did not EHT Capabilitites element with Triggered TXOP Sharing Support field equal to 1, the TXOP Duration Requested subfield indicates the duration, in units of 32 s, that the sending STAdetermines it needs for its next TXOP for the specified TID. The TXOP Duration Requested subfield is set to 0 to indicate that no TXOP is requested for the specified TID in the current SP. The TXOP Duration Requested subfield is set to a nonzero value to indicate a requested TXOP duration in the range 32 s to 8160 s in increments of 32 s. See 10.23.3.5.2 (TXOP requests).

(#5240)If transmitted by the first EHT STA to second EHT STA where both STAs transmitted the EHT Capabilitites element with Triggered TXOP Sharing Support field equal to 1, the TXOP Duration Requested subfield indicates the TXOP sharing duration request, in units of 32 s, that the first EHT STA determines the medium time that it needs under the width indicated by Channel Width subfield in the QoS Control field. The TXOP Duration Requested subfield is set to 0 to indicate that no mediumtime is requested. The TXOP Duration Requested subfield is set to a nonzero value to indicate a requested medium time duration in the range 32 s to 8160 s in increments of 32 s. See 35.2.1.3.x (TXOP sharing duration request).

***TGbe editor: add the following subclause in 9.2.4.5 (#5240)***

**9.2.4.5.x Channel Width subfield**

**The Channel Width subfield, as shown in Table 9-x indicates the channel width under which the medium time is requested for** Triggered TXOP Sharing operation.

**Table 9-x — Channel Width subfield**

|  |  |
| --- | --- |
| Value | Meaning |
| 0 | 20MHz |
| 1 | 40MHz |
| 2 | 80MHz |
| 3 | 160MHz |
| 4 | 320MHz |
| 5 to 7 | Reserved |

9.6.34 EHT Action frame details

9.6.34.1 EHT Action field

***TGbe editor: change Table 9-526m as follows:(#5964)***

**Table 9-526m—EHT Action field values**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 0 | EHT Compressed Beamforming/CQI |
| 1 | EML Operating Mode Notification. |
| 2 | EHT TXOP Sharing Info Notification |
| 3–255 | Reserved |

***TGbe editor: add the following subclause in 9.6.34:(#5964)***

**9.6.34.x EHT TXOP Sharing Info Notificaion frame format**

The EHT TXOP Sharing frame is Used for notifying the BSSID of the associated AP to P2P STA.

**Table 9-526x—EHT TXOP SharingInfo Notification frame Action field values**

|  |  |
| --- | --- |
| **Value** | **Meaning** |
| 1 | Category |
| 2 | EHT Action |
| 3 | BSSID |

The Category field is defined in [Table 9-51 (Category values)](#bookmark61).

The EHT Action field is defined in [Table 9-526m (EHT Action field values)](#bookmark158).

The BSSID filed indicates the BSSID of the associated AP.

**35.2.1.3 Triggered TXOP sharing procedure**

**35.2.1.3.3 Non-AP STA behavior**

***TGbe editor: add the following text at the end of 35.2.1.3.3*:**

(#5141) After sending the CTS solicited by MU-RTS TXS from the associated AP, the STA shall ignore the NAV that is set by the AP within the time allocation signaled in the MU-RTS TXS Trigger frame.

(#5903, 4823) After sending the CTS solicited by MU-RTS TXS, the STA shall set the Duration field of its frame to P2P peer STA with the value that indicates the time no later than the ending time of the PPDU carrying MU-RTS TXS plus the Allocation Duration field in soliciting MU-RTS TXS. Within the allocated time by an MU-RTS TXS Trigger frame with TXOP Sharing Mode subfield equal to 2, the addressed STA by the MU-RTS TXS Trigger frame may transmit QoS Data frames, Management frames and the frames that assists the transmission of QoS Data frames and Management frames, e.g. RTS frame, the frames for sounding.

(#5964) A first STA that transmitted the EHT Capabilities element with the Triggered TXOP Sharing Support subfield equal to 1 to its associated AP and has a second STA as the P2P peer STA shall notify the BSSID of its associated AP through EHT TXOP Sharing Info Notificaion frame. When responding to the frames from the first STA, the second STA may ignore its NAV that is set by the PPDU from the AP.

***TGbe editor: add the following subclause in 35.2.1.3*:** (#5240)

35.2.1.3.x TXOP sharing duration request

If a non-AP STA with dot11EHTTXOPSharingTFOptionImplemented equals to true received the EHT Capabilities element with Triggered TXOP Sharing Support subfield in EHT Capabilities element equl to 1 from its associated AP, the non-AP STA may deliver TXOP sharing duration request to its associated AP to assist the AP in allocating resources for TXOP sharing operation.

After receiving the soliciting BSRP Trigger frame, a non-AP STA with dot11EHTTXOPSharingTFOptionImplemented equals to true may transmit QoS Null frame with **TXOP Duration Requested subfield as defined in 9.2.4.5.7 (TXOP Duration Requested subfield).**

When associated with an AP from which the EHT Capabilities element with Triggered TXOP Sharing Support subfield in EHT Capabilities element equl to 1 is received, an non-AP STA with dot11EHTTXOPSharingTFOptionImplemented equals to true may deliver QoS Null frame with **TXOP Duration Requested subfield as defined in 9.2.4.5.7 (TXOP Duration Requested subfield)** that is not carried in EHT TB PPDU or HE TB PPDU.