IEEE P802.11 Wireless LANs

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| LB 266 Resolution for CIDs related to R-TWT 35.9.5 (Traffic delivery) |
| Date: Oct. 30, 2022 |
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# Abstract

This submission proposes resolutions for following 21 CIDs received for TGbe LB266:

12340, 12460, 10470, 10687, 10690, 10691, 10692, 13037, 13038, 13310, 12768,

13655, 13039, 13309, 13447, 12435, ~~11154~~, 12417, 13061, 13062, ~~10698~~,

Remaining 11 CID to be resolved in r1+:

10691,

10692, 13037, 13038, 13310, 12768,

13655, 13039, 13309, 13447, 12435,

Revisions:

* Rev 0: Initial version of the document. Resolved 8 CIDs in grey.
* Rev 1: further dev resolution based on feedback received. Resolve in 1 misc + 2 sets of changes.
	+ Run SP on CIDs {10691, 10692, 13037, 13038, 13310, 12768} (didn’t PASS)
* Rev 2: revise resolution for the second set of CIDs {13655, 13039, 13309, 13447, 12435}

***TGbe editor: The baseline for this document is 11be D232 and REVme2.0***

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.

# Part 1: 11 CIDs

~~12340, 12460, 10470, 10687, 10690,~~ 10691, 10692, 13037, 13038, 13310, 12768,

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| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 12340 | Guogang Huang | 35.9.2.2 | 511.06 | 11be spec should allow the rTWT STA can transmit frames outside of negotiated TWT SPs. Because assuming that there are multiple links between the rTWT non-AP MLD and rTWT AP MLD. And a rTWT agreement is set up only in one link. In this case, the rTWT TIDs still can be delivered in other links. | As in comment | **Rejected**1) R-TWT operates at the link level (as explained in the resolution to CID 13236), hence its rules, unless explicitly stated, applies to the link where the membership is setup.2) even on the link the R-TWT is setup, following the baseline in TWT, transmitting outside of SP is not forbidden – (‘should’ instead of ‘shall’) as we discussed before.In conclusion, what’s asked in the comment is already allowed, no further change is needed. |
| 12460 | Daniel Verenzuela | 35.9.2.2 | 511.20 | the r-TWT agreement is based in broadcast TWT where it is recommended that scheduled STAs should not transmit outside TWT SP, however for r-TWT only latency sensitive data can or should be transmitted inside the r-TWT SP. Thus, EHT STAs with both latency sensitive and non-sensitive traffic would have problems transmitting non-latency sensitive traffic outside the r-TWT SP if it wants to follow the recommendations. EHT STAs with both traffics should be able to either use part of the r-TWT for latency non-sensitive traffic with lower priority or be allowed to transmit outside r-TWT SP latency non-sensitive traffic. | Modify the recommendations regarding the STAs that should transmit inside and outside the r-TWT SPs. EHT STAs with both latency sensitive and non-sensitive traffic should have a clear recommendation where to transmit each type of traffic. Either to use part of the r-TWT SP to transmit latency non-sensitive traffic with lower priority, or, to separate traffic types inside and outside of the r-TWT SP in terms of latency sensitive and non-sensitive, respectively. The commenter is willing to participate in resolution. | **Rejected**What’s defined in 35.9.5 as of now follows the baseline TWT rule for traffic within or outside SP – recommend to utilize TWT SP as much as possible but doesn’t forbit traffic from being transmitted outside TWT SPs hence ‘should’), and in addition, defines the traffic prioritization rule. These are done with the efficiency of utilizing (R-)TWT SP and flexibility in mind (reflected in the evolution/discussion of 11-21/1802 dev.) These give sufficient guidance on the recommendation side as requested by the comment. |
| 10470 | Yonggang Fang | 35.9.5 | 512.53 | Why a STA of non member of rTWT SP is allowed to access the scheduled rTWT SP (mentioned in Note)? What kind of traffic would be allowed for the non-rTWT SP member? | please clarify in the spec or remove it. | **Rejected**No change is needed in text and provide explanation here:The note is not stating anything new but adds clarity following the same set of rules in the baseline, see 11meD2.0 pp3904, 26.8.2 (Individual TWT agreements) and p3909, 26.8.3.2 (Rules for TWT scheduling AP) (doesn’t forbit AP from trigger non member) and 26.8.3.3 (Rules for TWT scheduled STA).One example to support such a rule is that TWT scheduling AP supports 4ss UL MU-MIMO and there are 2 1ss non-AP member STAs, and 2 1ss non-AP non-member STAs. It serves the interest of TWT members and network performance if AP triggers a UL-MIMO TB PPDU for all four STAs. |
| 10687 | Liangxiao Xin | 35.9.5 | 512.44 | Can a member STA transmit the traffic of non-R-TWT TIDs outside its R-TWT SPs? Can a member STA transmit the traffic of R-TWT TIDs outside its R-TWT SPs? | a member STA shall be able to transmit non R-TWT TIDs outside its R-TWT SPs. | **Rejected**The requested flexibility is already supported by the baseline TWT inherited by R-TWT.  |
| 10690 | Liangxiao Xin | 35.9.5 | 512.44 | Can a R-TWT TID be shared by latency sensitive traffic and regular traffic? If so, how to prevent regular traffic is mapped to the R-TWT TID | Once a TID is a R-TWT TID of any R-TWT, that TID can only be used to transmit latency sensitive traffic | **Rejected**Understood the intention, however there is limited space in TID or a reasonable field in resource-tight MAC layer design while the amount of applications running on top of the stack is at a much larger scale. While 802.11 should design mechanism(s) with reasonable granularity and that allows maximizing the utilization the TID space, there might be solutions needed beyond the L2 and out of scope of 802.11. To the end of the proposed solution in comment, one could use a combination of 802.11 defined tools (e.g. TCLAS element) and stack designed with this rule enforced across layers. |
| 10691 | Liangxiao Xin | 35.9.5 | 512.44 | Can a R-TWT TID be shared by mulitple SCS traffic streams? | A R-TWT TID can only be shared by mulitple SCS traffic stream with the same delay bound | **Rejected**A TID can be shared by multiple SCS traffic streams as 802.11 doesn’t specify any rules to prevent so. The “same delay bound” is vague – a traffic stream requiring 10 msec vs 10.1 msec cannot be served with the same R-TWT schedule? Such enforced limit is not realistic nor necessary, and left to implementation/deployment choice. |
|  |
| 10692 | Liangxiao Xin | 35.9.5 | 512.44 | There is no mechanism for AP to know the buffer status of a R-TWT TID. | need a mechanism such as BSR to report the buffer status of each TID | **Revised** – agree in principle. Current BSR doesn’t support TID specific buffer status report.**TGbe editor: please implement the changes in {this} doc tagged by #10692.** |
| 13037 | Chunyu Hu | 35.9.5 | 512.44 | To support the traffic of r-TWT TIDs to be prioritized within the r-TWT SP, it's necessary to know the buffer status of the peer STAs for the specific TID. Currently such a mechanism is missing or not suffient/direct enough. | Consider new EHT Control to support buffer status report for a specific (set of) TID(s). | **Revised** – agree in principle. Current BSR doesn’t support TID specific buffer status report.**TGbe editor: please implement the changes in {this} doc tagged by #13037.** |
| 13038 | Chunyu Hu | 35.9.5 | 512.44 | Right now the r-TWT member STA doesn't have good way to learn the AP's buffer status for the r-TWT DL TIDs. It would be necessary to know to decide if to stay awake to retrieve those packets when it's close to SP ending time. | Add necessary design and/or procedure. | **Revised** – agree in principle. Current BSR doesn’t support TID specific buffer status report.**TGbe editor: please implement the changes in {this} doc tagged by #10692.** |
| 13310 | Muhammad Kumail Haider | 35.9.5 | 512.44 | Currently there is no specification of TID(s) in a BSRP Trigger frame. However, for achieving better QoS, especially in context of r-TWT, it will be useful for AP to solicit buffer status of specific TID(s) in the BSRP Trigger frame. | Signaling mechanism should be developed (or exisitng signaling modified) to solicit buffer status of specific TIDs. | **Revised** – agree in principle. Current BSR doesn’t support TID specific buffer status report.**TGbe editor: please implement the changes in {this} doc tagged by #10692.** |
| 12768 | Romain GUIGNARD | 4.5.6.3 | 60.37 | The support for predictable latency is based on statistical approach (QoS characteristics) which is well adapted for periodic traffic. The standard should also consider the aperiodic low latency traffic (control command, almost expired time-to-live packets for high reliability traffic). | Please consider signalling such as BSR to inform AP about instantaneous low latency needs. | **Revised** – agree in principle. Current BSR doesn’t support TID specific buffer status report.**TGbe editor: please implement the changes in {this} doc tagged by #10692.** |

## Discussion-1 (TID based buffer status report)

### 1.a) the BSR Control subfield and Queue Size in QoS Control

|  |
| --- |
| The BSR Control subfield is specified in Figure 9-30 (REVme\_D2.0, p617): |
| Table  Description automatically generated |
| Scaling factor: = 0,1,2,3 for {16, 256, 2048, 32768} octets (or 2^{4, 8, 11, 15}), respectively. |
| The queue Size subfield in QoS Control field is defined in 9.2.4.5 (p594-595):* Reports only the queue size for a single TID, and its granularity is within ~2^11 (~2MB).
 |

Functional requirement for designing TID based buffer status report:

* Allow STA to direct report the buffer status of a single TID or the accumulated ones for a set of TIDs.
* Be able to cover the reasonable range of length – at least full range of max A-MPDU len for a single TID
	+ Note-1: HE-variant HT Control supports up to 26 bit content (b6-31).
	+ Note-2: Per Table 36-70 (EHT PHY characteristics), the aPSDUMaxLength = 15,523,200 bytes (~15 MB), requiring upto 24 bits.

Additional design consideration:

* Use the same scaling factor definition as defined in Table 9-33
	+ Note: the Queue Size subfield definition of QoS Control in 9.2.4.5.6 in REVme also refers to Scaling Factor definition in Table 9-33.
* No need to have two sets of buffer values as the one based on AC: All and High.

### 1.b) the BSRP trigger frame

**Question**: current BSRP trigger frame doesn’t have field to allow AP to inquiry the buffer status of a specific TID or a specific set of them. Do we want a new trigger frame variant to do so?

Would like to get group’s input and proceed accordingly.

|  |
| --- |
| P802.11REVme\_D2.0 p674:**9.3.1.22.6 BSRP Trigger frame format**The Trigger Dependent Common Info subfield and Trigger Dependent User Info subfield are not present in the BSRP Trigger frame. |

**9.2.4.6.4 HE variant**

**﻿ *TGbe editor: please modify Table 9-25 – Control ID subfield values as follows:***

**Table 9-25—Control ID subfield values**

|  |  |  |  |
| --- | --- | --- | --- |
| **Control ID value** | **Meaning** | **Length of the Control Information subfield (bits)** | **Content of the Control Information subfield** |
| … | … | … | … |
| 8 | Single response scheduling (SRS) | 10 | See 9.2.4.7.9 (SRS Control) |
| 9 | AP assistance request (AAR) | 20 | See 9.2.4.7.10 (AAR Control) |
| (#10692,13037)10 | TID based Buffer Status Report (TBSR) | 26 | See 9.2.4.7.12 (TBSR Control) |
| 11–14 | Reserved |  |  |
| 15 | Ones need expansion surely (ONES) | 26 | Set to all 1s |

***TGbe editor: please insert the following new subclause after 9.2.4.7.11 (ELA Control):***

## 9.2.4.7.12 TBSR Control (#10692,13037)

**﻿**

The Control Information subfield in a TBSR Control subfield contains buffer status information used for ULMU operation (see 26.5.2 (UL MU operation)). The format of the subfield is shown in Figure 9-xxx (ControlInformation subfield format in a TBSR Control subfield).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B7 | B8 B9 | B10 B25 |
|  | TID Bitmap | Scaling Factor | Queue Size All |
| Bits**:** | 8 | 2 | 16 |

﻿**Figure 9-xxx—Control Information subfield format in a TBSR Control subfield**

The TID Bitmap subfield indicates the TIDs for which the buffer status is reported. Each bit of the TID Bitmap subfield is set to 1 to indicate that the buffer status of the corresponding TID is included in the Queue Size All subfield; and set to 0 otherwise.

﻿﻿The Scaling Factor subfield indicates the unit SF, in octets, of the Queue Size All subfields. The encoding of the Scaling Factor subfield is shown in Table 9-33 (Scaling Factor subfield encoding).

﻿The Queue Size All subfield indicates the amount of buffered traffic, in units of SF octets, for all the TIDs identified by the TID Bitmap subfield that is intended for the STA identified by the receiver address of the frame containing the TBSR Control subfield. If no bit is set to 1 in the TID Bitmap, the Queue Size All subfield is reserved.

﻿The queue size value in the Queue Size All subfield is the total size, rounded up to the nearest multiple of SF octets, of all MSDUs and A-MSDUs buffered at the STA (including the MSDUs or A-MSDUs in the same PSDU as the frame containing the TBSR Control subfield) in the delivery queues used for MSDUs and A-MSDUs with TID(s) that are specified in the TID Bitmap subfield.

﻿A queue size value of 254 in the Queue Size All subfield indicates that the amount of buffered traffic is greater than 254 × SF octets. A queue size value of 255 in the Queue Size All subfields indicate that the amount of buffered traffic is an unspecified or unknown size.

## 9.4.2.313.2 EHT MAC Capabilities Information field

***TGbe editor: please modify Figure 9-1002ae (EHT MAC Capabilities Information field format) as follows:***

The format of the EHT MAC Capabilities Information field is defined in [Figure 9-1002ae (EHT MAC](#bookmark182) [Capabilities Information field format)](#bookmark182).

B0 B1 B2 B3 B4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EPCS Priority Access Support(#13482) | EHT OM Control Support | Triggered TXOP Sharing Mode 1 Support | Triggered TXOP Sharing Mode 2 Support | Restricted TWT Support |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Bits: | 1 |  | 1 |  | 1 | 1 | 1 |
|  | B5 | B6 |  | B7 | B8 | B9 | B10 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SCS Traffic Description Support | Maximum MPDU Length | MaximumA-MPDU Length Exponent Extension | EHT TRS Support | TXOP Return Support In TXOP Sharing Mode 2 |

Bits: 1 2 1 1 1

B11 B12 B13 B15

TBSR Support (#10692,13037)

Two BQRs Support (#13536)

Reserved

Bits: 1 1 3

**Figure 9-1002ae—EHT MAC Capabilities Information field format**

***TGbe editor: please insert a new row after the last row in Table 9-401j –Subfields of the EHT MAC Capabilities Information field as follows:***

**Table 9-401j—Subfields of the EHT MAC Capabilities Information field**

|  |  |  |
| --- | --- | --- |
| **Subfield** | **Definition** | **Encoding** |
| … |  |  |
| TBSR Support (#10692,13037) | For an AP, indicates support for receiving a frame with a TBSR Control subfield.For a non-AP STA, indicates support for transmitting a frame with a TBSR Control subfield. | For an EHT AP:If the +HTC-HE Support subfield is 1:Set to 1 to indicate that the AP is capable of receiving a frame with a TBSR Control subfield.Set to 0 otherwise.Reserved if the +HTC-HE Support sub- field is 0.For a non-AP EHT STA:If the +HTC-HE Support subfield is 1:Set to 1 to indicate that the non-AP EHT STA is capable of transmitting a frame with a TBSR Control subfield.Set to 0 otherwise.Reserved if the +HTC-HE Support subfield is 0. |

***TGbe editor: please insert a new subclause after 35.5.3 (Operation of the two BQR Control subfields) as follows:***

## 35.5.4 EHT buffer status report operation (#10692,13037)

A non-AP EHT STA delivers buffer status reports (BSRs) to assist its AP in allocating UL MU resources as defined in 26.5.5 (Buffer status report operation) and this subclause.

An EHT STA shall set the TBSR Support subfield in the EHT Capabilities element it transmits to 1 if dot11EHTTBSRControlImplemented is true; otherwise the EHT STA shall set the TBSR Support subfield to 0.

An EHT STA with dot11EHTTBSRControlImplemented set to true may report its buffer status for a set of TIDs in the TBSR Control subfield of frames it transmits if the AP has indicated its support in the TBSR Support subfield of its EHT Capabilities element, otherwise the STA shall not report the buffer status in the TBSR Control subfield. The buffer status reported in the TBSR Control field consists of a total queue size for a set of TIDs indicated in the TID bitmap (see 9.2.4.7.12 (TBSR Control)).

**35.8.5 Traffic delivery**

***TGbe editor: please add the following paragraph at the end of 35.8.5:***

(#10692,13037)An R-TWT scheduled STA should assist its AP in allocating resources for the transmission of its UL latency sensitive traffic by including BSRs of the R-TWT UL TID(s) in its transmitted QoS Data frames or QoS Null frames as described in 35.5.4 (EHT buffer status report operation).

**SP-1: Do you support resolve the following CIDs as described in 11-22/1828r1?**

**10692, 13037, 13038, 13310, 12768**

﻿

# Part 2: 10 CIDs

13655, 13039, 13309, 13447, 12435, ~~11154~~, ~~12417, 13061, 13062~~, ~~10698~~,

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Clause** | **Pg/Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 13655 | Rubayet Shafin | 35.9.4 | 512.07 | A restricted TWT schedule is set up in a per-TID based. For trigger-enabled restricted TWT (r-TWT), AP should have the mechanism to trigger a member r-TWT scheduled STA based on the TID corresponding to its latency-sensitive traffic(which TID the AP wants to trigger at a particular time during r-TWT SP can based on AP's scheduling decision). However, this mechanism to only trigger uplink PPDU corresponding to Latency-sensitive traffic, which would be critical for trigger-enabled r-TWT operation, is currently missing in the specification. | Please provide mechanisms, frameworks, and rules for enabling per-TID-based triggering for r-TWT operation. | **Revised**Agree in principle. Please see discussion.**TGbe editor: please implement the changes in {this} doc tagged by #13655.** |
| 13039 | Chunyu Hu | 35.9.5 | 512.44 | Currently AP cannot directly trigger a specific (set of) TID(s) and this reduces the effective of prioritized traffic delivery in r-TWT SPs. | Add necessary design and/or procedure. | **Revised**Agree in principle. Please see discussion.**TGbe editor: please implement the changes in {this} doc tagged by #13039.** |
| 13309 | Muhammad Kumail Haider | ï»¿35.9.5 | 512.44 | r-TWT traffic delivery rules prioritize delivery of r-TWT TIDs during r-SP. However, there is a lack of TID specification in basic Trigger frames and only a preferred AC may be indicated. Signaling mechanism should be provided to enable AP to indicate specific TID(s) in Basic Trigger frames. | as in comment | **Revised**Agree in principle. Please see discussion.**TGbe editor: please implement the changes in {this} doc tagged by #13655.** |
| 13447 | Liwen Chu | 35.9.5 | 512.44 | Clarify that the Prefered AC in Basic Trigger shall be mpped to one of the UL r-TWT TIDs. | As in comment | **Revised**Agree in principle. Please see discussion.**TGbe editor: please implement the changes in {this} doc tagged by #13655.** |
| 12435 | Bo Yang | 35.9.5 | 512.50 | AP can only trigger preferred AC (2 TIDs) based on current structure of trigger frames.If a TID that belongs to the lowest AC, AP has to set the subfield of preferred AC to the lowest AC(AC\_BK). This may lead to a situation that STA a sends data frames from AC\_BK and STA b sends data frames from AC\_VO | Decouple the perferred AC and r-TWT UL TIDs. The spec has said that "shall ensure QoS Data frames of r-TWT TID(s) to be first deliveredduring the r-TWT SPs". Please put a note saying that the subfield of prefered AC indicates the lowest AC OTHER THAN R-TWT UL TIDS that is recommended for aggregation of MPDUs in the A-MPDU contained in the TB PPDU | **Revised**Agree in principle. Please see discussion.**TGbe editor: please implement the changes in {this} doc tagged by #13655.** |
|  |
| ~~11154~~ | Boon Loong Ng | 35.9.5 | 512.44 | If latency-tolerant traffic transmission is allowed during an r-TWT SP, it creates fairness issue for non-members. On the other hand, if an r-TWT member STA finishes transmitting latency sensitive traffic much earlier than r-TWT SP and lantecy-tolerant traffic transmission is prohibited for the remaining portion of the SP, then it can cause channel under utilization for the STA. | There needs to be some rules/procedures describing how to address the r-TWT fairness issue. | **Rejected**The comment fails to identify a valid problem – the part that the comment is raising a concern about is not described accurately, that is, after the R-TWT member STA finishes latency sensitive traffic earlier than R-TWT SP (ending timing), the latency-tolerant traffic transmission \*is not prohibited\*. |
| 12417 | Juseong Moon | 35.9.5 | 512.44 | In r-TWT, reverse direction(RD) defined in base spec shall be supported. However, since r-TWT SP is a limited time duration, It is required to defined a mechanism to ensure retransmission to be prioritized over RD frame transmission. RD operation in r-TWT SP considering data frame priority needs to be defined. | Please describe RD operation in r-TWT. | **Rejected**The comment fails to identify problems to address. There are two parts in comment: 1) “ensure retransmission to be prioritized over RD frame transmission.” I assume retransmission refers to retransmission of frames of R-TWT TID(s). RD frame can be any frame, including one of R-TWT TID(s). These two are not exclusive of each other, and the current traffic priority rule seems to be sufficient. 2) “RD operation in R-TWT SP considering data frame priority” is needed. RD operation is a mechanism improving the medium contention efficiency built on EDCA. It can be certainly used for the medium access during the R-TWT SP and there doesn’t seem to exist any confliction or issue. |
| 13061 | Chittabrata Ghosh | 35.9.5 | 512.46 | "An r-TWT scheduling AP or a member r-TWT scheduled STA that has initiated or participated in a frame exchange during a restricted TWT SP shall ensure QoS Data frames of r-TWT TID(s)to be first delivered during the r-TWT SPs." - "member r-TWT scheduled STA is not defined," might be better to rephrase as "r-TWT scheduled STA that is a member of the current r-TWT SP" | As in comment | **Rejected**There is nothing wrong to use descriptive words in cadence to describe a STA. In this specific case, it helps to write concisely by using ‘member R-TWT scheduled STA” instead of using a noun clause. In the baseline (REVme\_D2.0), both versions of usages are observed, e.g., p258 “the member STAs”, “one member STA”; p3906 and p3909, “member TWT scheduled STAs”; p3908, “TWT scheduled STA that are members of that broadcast TWT.” |
| 13062 | Chittabrata Ghosh | 35.9.5 | 512.49 | "In a trigger-enabled restricted TWT SP, when scheduling the transmission of Trigger frames, the r-TWT scheduling AP shall first trigger member r-TWT scheduled STAs to facilitate them tofirst deliver their QoS Data frames of r-TWT UL TID(s), if any." - 2 normative behaviors are coupled - one that the AP triggers member r-TWT STAs and the STAs prioritizing data of r-TWT UL TIDs over other TIDs | Rephrase the sentence as: "In a trigger-enabled restricted TWT SP, when scheduling the transmission of Trigger frames, the r-TWT scheduling AP shall first trigger member r-TWT scheduled STAs to deliver their QoS Data frames. A member r-TWT scheduled STA shall deliver QoS Data frames of r-TWT UL TID(s), if any when solicited by a Trigger frame with the User Info field addressed to itself." | **Rejected**The second sentence as suggested in the proposed change is covered by the first sentence in the first paragraph of 35.9.5 (re-ordered as 35.8.5 in D2.2) (Traffic Delivery). The current phrasing is describing the requirement for triggered R-TWT SP specifically. Hence no need to rephrase as suggested, nor there is any issue in current description. |
| ~~10698~~ | ~~Liangxiao Xin~~ | ~~35.9.5~~ | ~~512.53~~ | ~~The R-TWT can be destroyed easily by the STAs not supporting R-TWT. It is important to have as many STAs supporting R-TWT as possible in the BSS to have better performance of R-TWT. However, it is not easy to convince a STA to support R-TWT feature if it does not have latency sensitive traffic to transmit.~~ | ~~Add a note that if R-TWT scheduling AP schedule the transmissions of the traffic that is not from R-TWT TIDs during a R-TWT SP, then it should first schedule for the STAs supporting R-TWT then the STAs not supporting R-TWT.~~ | **~~Rejected~~**~~The proposed change doesn’t directly relate to the concern raised by the comment.~~ |

## Discussion-2 (Trigger TID)

In current trigger frame design, the Basic Trigger frame is utilized to schedule UL Data frames. It doesn’t have the flexibility to select any combination of TIDs (subject to ACs) with the format shown below:

|  |
| --- |
|  |

On the other hand, the R-TWT schedule is associated with a set of TIDs indicated by DL/UL TID Bitmaps subfield and associated valid subfields. To best service traffic of R-TWT TIDs, it’s desired to be able to directly trigger frames of a given set of TIDs. Below, we discuss some options to enable this:

**Option-1** **(explicit):** define a new trigger variant using the first currently reserved value (8-15): Basic TID Trigger frame.

The Trigger Dependent User Info for this new type of trigger frame consists of the following subfields {MPDU MU Spacing Factor, TID Aggregation Limit, **TID bitmap**}.

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B1 | B2 B4 | B5 B12 |
|  | MPDU MU Spacing Factor | TID Aggregation Limit | TID Bitmap |
| Bits**:** | 2 | 3 | 8 |

**Figure 9-xxx—Trigger Dependent User Info subfield format in the Basic TID Trigger frame**

**Option-2 (implicit)**: add rules

* for AP to include the AC for at least one of the mapped UL R-TWT TIDs; and
* non-AP STA may ignore the preferred AC if it still has pending frames of R-TWT UL TIDs and the AC specified in the Basic Trigger frame doesn’t correspond to any of the TID, and conform to the specified prioritization rule.

**Option-3**: support both. Option-2 is needed anyways.

SP: which option as described above (11-22/1288r0, Discussion02) do you support as resolution for related CIDs (13655, 13039 etc.)?

* Option 1
* Option 2
* Option 3
* Others
* Abstain

Update Dec. 28, 2022: based on feedback received, went down with option 2.

**35.8.5 Traffic delivery**

An (#11109)R-TWT scheduling AP or a member R-TWT scheduled STA that has initiated or participated in a frame exchange during (#13012)an R-TWT SP shall ensure QoS Data frames of R-TWT TID(s) to be first delivered during the R-TWT SPs.

(#13655)(#13039)In a trigger-enabled R-TWT SP, the following apply:

* When scheduling the transmission of Trigger frames, the R-TWT scheduling AP shall first trigger member R-TWT scheduled STAs to facilitate them to first deliver their QoS Data frames of R-TWT UL TID(s), if any. The AP should set the Preferred AC subfield in the Trigger Dependent User Info field in the Basic Trigger frame to correspond to an AC that is mapped to an R-TWT UL TID until the triggered member STA has delivered all QoS Data frames of R-TWT UL TID(s);
* The triggered member STA follows the rules specified in 26.6.3 (Multi-TID A-MPDU and ack-enabled single-TID A-MPDU) to aggregate MPDUs except that the STA shall first include QoS Data frames (if any) of TID(s) in the R-TWT UL TID(s).

NOTE—The (#11109)R-TWT scheduling AP might still include the 12 LSB of the AID of a STA that is not a member of this R-TWT SP in Trigger frame(s) transmitted in trigger-enabled SPs.