### IEEE P802.11Wireless LANs

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| 11ax D3.0 MAC Comment Resolution for FTM |
| Date: 2018-07-08 |
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Abstract

This submission proposes resolutions for comments of TGax Draft 3.0 with the following CIDs:

15796, 16603, 15797, 15798, 17020, 17021, 17022, 15799, 16598, 17023, 15800, 16599, 16967, 15801, 16600, 15802, 16601, 16966

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Revision for 10.7.6.1 based on the comments from Alfred

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 D3.0 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D3.0 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** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| 15796 | Jonathan Segev | 357.00 | 27.11.6 | Section 27.11.6 SPATIAL\_REUSE describes a TXVector in the occurance its an FTM frame.Spatial reuse special consideration should not consider FTM frames as part of the Tx Vector because these are not measurement/sounding frames but are management frames used for negotiation. HE format for FTM can be used as part of negotiation but not beyond that, using HE format for FTM measurement is not backward compatible and will make existing devices non-standard compliant."An HE STA shall set the TXVECTOR parameter SPATIAL\_REUSE to SRP\_AND\_NON\_SRG\_OBSS\_PD\_ PROHIBITED for a PPDU containing an FTM or NDP Announcement frame and in any frame that is transmitted as a response to an FTM or NDP Announcement frame." P. 357, L.10-13 (D3.0). | Remove the special consideration (L.10-13) for SPATIAL\_REUSE of FTM negotiation frames as FTM frame used for negotiation does not require special consideration for spatial reuse, furthermore an FTM frame used for measurement cannot be transmitted in HE format: "An HE STA shall set the TXVECTOR parameter SPATIAL\_REUSE to SRP\_AND\_NON\_SRG\_OBSS\_PD\_ PROHIBITED for a PPDU containing an FTM or NDP Announcement frame and in any frame that is transmitted as a response to an FTM or NDP Announcement frame." P. 357, L.10-13 (D3.0). | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 16603 | Po-Kai Huang | 357.11 | 27.11.6 | For the FTM description in this section, the description suggests that we will have FTM carried in HE format, which will have the following issues. 1. It is not backward compatible with REVmc STAs (something which is contradicting to the TGaz PAR and CSD), Essentially it will create no2. The longer symbol time of HE format is expected to increase medium usage, which is already a problem of REVmc FTM, 11az mitigate this by using NDP with shorter symbol time from data HE PPDU. REVmc FTM uses long management frames for sounding purposes.3. There is no (range accuracy) performance advantage of using HE format (because REVmc FTM already supports all BWs),the performance is expected to somewhat degrade due to larger number of guard SC.4. Developing a new FTM mode in 11ax is clearly conflicting to the 11ax and 11az charters - the work is already well in progress in 11az.The WG can decide to modify the 11ax PAR to include FTM, however till then, 11az should allow to continue its work without interference from other TG.5. Developing an 11ax variant of FTM will create market confusion because 11az STAs are developing the HE support for FTM already well in progress. | Remove FTM description in this sectioin. Bring the discussion to 11az group to make sure that HE design can be harmonized without conflicting with 11az design. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 15797 | Jonathan Segev | 357.00 | 27.11.6 | Section 27.11.6 SPATIAL\_REUSE describes a TXVector in the occurance its an FTM frame.Spatial reuse special consideration should not consider FTM frames as part of the Tx Vector because these are not measurement/sounding frames but are management frames used for negotiation. Using HE format for FTM measurement frames will make 802.11-2016 STA none standard compliant. "An HE STA with dot11HESRPOptionImplemented set to false may set the TXVECTOR parameter SPATIAL\_ REUSE to SRP\_DISALLOW for any PPDU that is not an HE TB PPDU or an NDP PPDU or a PPDU containing an FTM or NDP Announcement frame and that is not a frame that is transmitted as a response to an FTM or NDP Announcement frame" P.357 L.36,37 | Remove the special consideration (L.10-13) for SPATIAL\_REUSE of FTM negotiation frames as FTM frame used for negotiation does not require special consideration for spatial reuse, furthermore an FTM frame used for measurement cannot be transmitted in HE format: "An HE STA with dot11HESRPOptionImplemented set to false may set the TXVECTOR parameter SPATIAL\_ REUSE to SRP\_DISALLOW for any PPDU that is not an HE TB PPDU or an NDP PPDU or a PPDU containing an FTM or NDP Announcement frame and that is not a frame that is transmitted as a response to an FTM or NDP Announcement frame" | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 15798 | Jonathan Segev | 357.00 | 27.11.6 | Using HE format for FTM measurement frames will make 802.11-2016 STAs implementing FTM non standard compliant, using HE format for FTM negotiation does not require special Spatial Reuse considerations "of any HE PPDU to SRP\_AND\_NON\_SRG\_OBSS\_PD\_ PROHIBITED, unless the HE PPDU contains an NDP, an FTM or an NDP Announcement frame or is a frame that is transmitted as a response to an FTM or NDP Announcement frame." P.357 L48,49 | of any HE PPDU to SRP\_AND\_NON\_SRG\_OBSS\_PD\_ PROHIBITED, unless the HE PPDU contains an NDP, an FTM or an NDP Announcement frame or is a frame that is transmitted as a response to an FTM or NDP Announcement frame." | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 17020 | Yongho Seok | 357.12 | 27.11.6 | "An HE STA shall set the TXVECTOR parameter SPATIAL\_REUSE to SRP\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED for a PPDU containing an FTM or NDP Announcement frame and in any frame that is transmitted as a response to an FTM or NDP Announcement frame."The Format And Bandwidth field (Table 9-272 (Format And Bandwidth field)) in the FTM Parameters element indicates the requested or allocated PPDU format and bandwidth that can be used by Fine Timing Measurement frames in an FTM session.Because Table 9-272 does not have the HE PPDU, the HE PPDU can't be used by Fine Timing Measurement frames in an FTM session. | Please remove the "an FTM or" from the cited sentence. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 17021 | Yongho Seok | 357.36 | 27.11.6 | "An HE STA with dot11HESRPOptionImplemented set to false may set the TXVECTOR parameter SPATIAL\_ REUSE to SRP\_DISALLOW for any PPDU that is not an HE TB PPDU or an NDP PPDU or a PPDU containing an FTM or NDP Announcement frame and that is not a frame that is transmitted as a response to an FTM or NDP Announcement frame."The Format And Bandwidth field (Table 9-272 (Format And Bandwidth field)) in the FTM Parameters element indicates the requested or allocated PPDU format and bandwidth that can be used by Fine Timing Measurement frames in an FTM session.Because Table 9-272 does not have the HE PPDU, the HE PPDU can't be used by Fine Timing Measurement frames in an FTM session. | Please remove the "an FTM or" from the cited sentence. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 17022 | Yongho Seok | 357.48 | 27.11.6 | "If the HESIGA\_Spatial\_reuse\_value15\_allowed subfield of the SR Control field of the most recently received Spatial Reuse Parameter Set element from its associated AP is equal to 0, or if STA has not received a Spatial Reuse Parameter Set element from its associated AP, the STA shall not set the TXVECTOR parameter SPATIAL\_REUSE of any HE PPDU to SRP\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED, unless the HE PPDU contains an NDP, an FTM or an NDP Announcement frame or is a frame that is transmitted as a response to an FTM or NDP Announcement frame."The Format And Bandwidth field (Table 9-272 (Format And Bandwidth field)) in the FTM Parameters element indicates the requested or allocated PPDU format and bandwidth that can be used by Fine Timing Measurement frames in an FTM session.Because Table 9-272 does not have the HE PPDU, the HE PPDU can't be used by Fine Timing Measurement frames in an FTM session. | Please remove the "an FTM" from the cited sentence. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15796. |
| 15799 | Jonathan Segev | 365.00 | 27.15.2 | an FTM frame used for FTM measurement cannot use HE format as legacy STAs will become non standard compliant. There is no need for special handling of ACK frames used for FTM as part of HE more than already existing in 802.11-2016. | Proposed change is to remove the special handing of ACK frame of FTM: "An Ack frame sent as a response to an HE ER SU PPDU or HE SU PPDU containing an FTM frame shall be sent in the same PPDU format as the soliciting PPDU except when the FTM frame is carried in HE SU PPDU and the most recent successfully received PPDU sent by the responding STA to the soliciting STA after association was an HE ER SU PPDU in which case the Control frame shall be carried in HE ER SU PPDU." | Revised –Agree in principle with the commenter. Handing of response to VHT FTM is may be carried in a VHT PPDU ACK to allow for same BW as the eliciting FTM frame, otherwise the accuracy of FTM is suvirely hindered. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15799. |
| 16598 | Po-Kai Huang | 365.43 | 27.15.2 | For the sentence from line 43 to 48, it does not make sense to design FTM response rule in 11ax since we already have a separate 11az group dealing with ranging algorithm. The sentence also suggests that we will have FTM in HE format, which will have the following issues. 1. It is not backward compatible with REVmc STAs (something which is contradicting to the TGaz PAR and CSD)Essentially it will create no2. The longer symbol time of HE format is expected to increase medium usage, which is already a problem of REVmc FTM, 11az mitigate this by using NDP with shorter symbol time from data HE PPDU. REVmc FTM uses long management frames for sounding purposes.3. There is no (range accuracy) performance advantage of using HE format (because REVmc FTM already supports all BWs),the performance is expected to somewhat degrade due to larger number of guard SC.4. Developing a new FTM mode in 11ax is clearly conflicting to the 11ax and 11az charters - the work is already well in progress in 11az.The WG can decide to modify the 11ax PAR to include FTM, however till then, 11az should allow to continue its work without interference from other TG.5. Developing an 11ax variant of FTM will create market confusion because 11az STAs are developing the HE support for FTM already well in progress. | Remove the cited sentence in 11ax draft. Bring the discussion to 11az group to make sure that HE design can be harmonized without conflicting with 11az design. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15799. |
| 17023 | Yongho Seok | 365.43 | 27.15.2 | "An Ack frame sent as a response to an HE ER SU PPDU or HE SU PPDU containing an FTM frame shall be sent in the same PPDU format as the soliciting PPDU except when the FTM frame is carried in HE SU PPDU and the most recent successfully received PPDU sent by the responding STA to the soliciting STA after association was an HE ER SU PPDU in which case the Control frame shall be carried in HE ER SU PPDU."The spec stated the following:"The responding STA shall not use an HE format if the STA indicated VHT or HT-mixed or non-HT format in the initial Fine Timing Measurement frame."Because Table 9-272 (Format And Bandwidth field) does not have the HE PPDU, the HE PPDU can't be used by Fine Timing Measurement frames in an FTM session. | Please remove the cited sentence. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15799. |
| 15800 | Jonathan Segev | 570.00 | 28.3.20 | An FTM management frame used for management signaling does not make use of ToD/ToA. An FTM used for measurement cannot use any of the HE formats as this will make existing 802.11-2016 STAs non-standard compliant. | Recommend removal of the following text: "start immediately if TIME\_OF\_DEPARTURE\_REQUESTED is true, based on the parameters passed in the PHY-TXSTART.request primitive. If all of the following conditions are met: -- if dot11TODImplemented and dot11TODActivated are true or if dot11TimingMsmtActivated is true, -- the TXVECTOR parameter TIME\_OF\_DEPARTURE\_REQUESTED is true, then the PHY shall issue a PHY-TXSTART.confirm(TXSTATUS) primitive to the MAC, forwarding the TIME\_OF\_DEPARTURE corresponding to the time when the first frame energy is sent by the transmitting port and TIME\_OF\_DEPARTURE\_ClockRate parameter within the TXSTATUS vector. If dot11TimingMsmtActivated is true, then the PHY shall forward the value of TX\_START\_OF\_FRAME\_OFFSET in TXSTATUS vector." | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15800. |
| 16599 | Po-Kai Huang | 570.9 | 28.3.20 | For the sentence from line 9 to 28, the description suggests that we will have FTM in HE format, which will have the following issues. 1. It is not backward compatible with REVmc STAs (something which is contradicting to the TGaz PAR and CSD), Essentially it will create no2. The longer symbol time of HE format is expected to increase medium usage, which is already a problem of REVmc FTM, 11az mitigate this by using NDP with shorter symbol time from data HE PPDU. REVmc FTM uses long management frames for sounding purposes.3. There is no (range accuracy) performance advantage of using HE format (because REVmc FTM already supports all BWs),the performance is expected to somewhat degrade due to larger number of guard SC.4. Developing a new FTM mode in 11ax is clearly conflicting to the 11ax and 11az charters - the work is already well in progress in 11az.The WG can decide to modify the 11ax PAR to include FTM, however till then, 11az should allow to continue its work without interference from other TG.5. Developing an 11ax variant of FTM will create market confusion because 11az STAs are developing the HE support for FTM already well in progress. | Remove the cited sentence in 11ax draft. Bring the discussion to 11az group to make sure that HE design can be harmonized without conflicting with 11az design. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15800. |
| 16967 | Xiaogang Chen | 570.9 | 28.3.20 | There are some hooks for FTM which is under discussion in 11az. these hooks are copied from 11ac.they should be removed and wait for 11az to discuss. | remove "Transmission of the PHY preamble may start if TIME\_OF\_DEPARTURE\_REQUESTED is false, and shallstart immediately if TIME\_OF\_DEPARTURE\_REQUESTED is true, based on the parameters passed in thePHY-TXSTART.request primitive.If all of the following conditions are met:-- if dot11TODImplemented and dot11TODActivated are true or if dot11TimingMsmtActivated istrue,-- the TXVECTOR parameter TIME\_OF\_DEPARTURE\_REQUESTED is true,then the PHY shall issue a PHY-TXSTART.confirm(TXSTATUS) primitive to the MAC, forwarding theTIME\_OF\_DEPARTURE corresponding to the time when the first frame energy is sent by the transmittingport and TIME\_OF\_DEPARTURE\_ClockRate parameter within the TXSTATUS vector. If dot11TimingMsmtActivated is true, then the PHY shall forward the value of TX\_START\_OF\_FRAME\_OFFSET inTXSTATUS vector." | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15800. |
| 15801 | Jonathan Segev | 396.50 | 28.2.2 | An FTM management frame used for management signaling does not make use of ToD/ToA. An FTM used for measurement cannot use any of the HE formats as this will make existing 802.11-2016 STAs non-standard compliant. | Remove TIME\_DEPARTURE from table 28-1 | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15801. |
| 16600 | Po-Kai Huang | 396.51 | 28.2.2 | The entry for "TIME\_OF\_DEPARTURE\_RE" suggests that we will have FTM in HE format, which will have the following issues. 1. It is not backward compatible with REVmc STAs (something which is contradicting to the TGaz PAR and CSD), Essentially it will create no2. The longer symbol time of HE format is expected to increase medium usage, which is already a problem of REVmc FTM, 11az mitigate this by using NDP with shorter symbol time from data HE PPDU. REVmc FTM uses long management frames for sounding purposes.3. There is no (range accuracy) performance advantage of using HE format (because REVmc FTM already supports all BWs),the performance is expected to somewhat degrade due to larger number of guard SC.4. Developing a new FTM mode in 11ax is clearly conflicting to the 11ax and 11az charters - the work is already well in progress in 11az.The WG can decide to modify the 11ax PAR to include FTM, however till then, 11az should allow to continue its work without interference from other TG.5. Developing an 11ax variant of FTM will create market confusion because 11az STAs are developing the HE support for FTM already well in progress. | Remove the cited entry in TXVECTOR and RXVECTOR table. Bring the discussion to 11az group to make sure that HE design can be harmonized without conflicting with 11az design. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15801. |
| 15802 | Jonathan Segev |  | 28.3.18.5 | An FTM management frame used for management signaling does not make use of ToD/ToA. An FTM used for measurement cannot use any of the HE formats as this will make existing 802.11-2016 STAs non-standard compliant. | Delete section 28.3.18.5 as FTM management signaling does not use TOD. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15802. |
| 16601 | Po-Kai Huang | 559.52 | 28.3.18.5 | The section refers to design in Annex P. Annex P is an informative annex for a mode of FTM which is completely broken called Differential Time Of Arrival (TDOA). Section 28.3.18.5 refers all modes of FTM to TDOA, this is simply incorrect - this mode is not implementable and not relevant for FTM. 11az tries to fix this TDOA mode, it requires a great level of changes. | Remove section 28.3.18.5. Bring the discussion to 11az group to make sure that the design can be harmonized without conflicting with 11az design. | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15802. |
| 16966 | Xiaogang Chen | 559.52 | 28.3.18.5 | There are some hooks for FTM which is under discussion in 11az. these hooks are copied from 11ac.they should be removed and wait for 11az to discuss. | remove clause "28.3.18.5 Time of Departure accuracy" | Revised –Agree in principle with the commenter. TGax editor please make the changes as shown in 11-18/1181r1 under all headings that include CID 15802. |

**Discussion:** *None.*

**Propose:** Revised for CID 15796 per discussion and editing instructions in 11-18/1181r1.

***TGax editor: Chang 27.11.6 SPATIAL\_REUSE as the following: (Track change on)***

An HE STA shall set the TXVECTOR parameter SPATIAL\_REUSE to SRP\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED for a PPDU containing an ~~FTM or~~ NDP Announcement frame and in any frame that is transmitted as a response to an (#15796)NDP Announcement frame

An HE STA with dot11HESRPOptionImplemented set to false may set the TXVECTOR parameter SPATIAL\_REUSE to SRP\_DISALLOW for any PPDU that is not an HE TB PPDU or an NDP PPDU or a PPDU containing an (#15796)NDP Announcement frame and that is not a frame that is transmitted as a response to an (#15796)NDP Announcement frame.

A non-AP HE STA may set the TXVECTOR parameter SPATIAL\_REUSE of an HE PPDU to SRP\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED if the HESIGA\_Spatial\_reuse\_value15\_allowed subfield of the SR Control field of the most recently received Spatial Reuse Parameter Set element from its associated AP is equal to 1. If the HESIGA\_Spatial\_reuse\_value15\_allowed subfield of the SR Control field of the most recently received Spatial Reuse Parameter Set element from its associated AP is equal to 0, or if STA has not received a Spatial Reuse Parameter Set element from its associated AP, the STA shall not set the TXVECTOR parameter SPATIAL\_REUSE of any HE PPDU to SRP\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED, unless the HE PPDU contains an NDP, (#15796)an NDP Announcement frame or is a frame that is transmitted as a response to an (#15796)NDP Announcement frame.

**Propose:** Revised for CID 15799 per discussion and editing instructions in 11-18/1181r1.

***TGax editor: Change 27.15.2 PPDU format selection as the following: (Track change on)***(…existing texts)

An HE STA shall send Control frames following the rules defined in 10.7.6 (Rate selection for Control
frames)) with the following exceptions:

(…existing texts)

 (#15799)(…existing texts)

***TGax Editor: Change 10.7.6.1 General rules for rate selection for control frames as follows: (Track change on)***

**10.7.6.1 General rules for rate selection for Control frames**

(…existing texts)

The following rules determine whether a Control frame is carried in a non-HT, HT or VHT PPDU:

a) A Control frame shall be carried in an HT PPDU when the Control frame contains an L-SIG duration value (see 10.26.5).

b) A control response frame shall be carried in an HT PPDU when the Control frame is a response to a frame that meets any of the following conditions:

1) The frame eliciting the response included an HT variant HT Control field with the TRQ field equal to 1 and the HT NDP Announcement subfield equal to 0, and this responder set the Implicit Transmit Beamforming Receiving Capable field to 1 in its last transmitted HT Capabilities element; or

2) The frame eliciting the response was an RTS frame carried in an HT PPDU; or

3) The frame eliciting the response was an STBC frame, and the Dual CTS Protection field was equal to 1 in the last HT Operation element received from its AP or transmitted by the STA (see 10.3.2.8).

c) A Control frame may be carried in an HT PPDU when the Control frame meets any of the following conditions:

1) The Control frame contains an HT variant HT Control field with the MRQ subfield equal to 1, or

2) The Control frame contains an HT variant HT Control field with the TRQ field equal to 1.

d) A Control frame may be carried in a VHT PPDU when the Control frame contains an HT Control field.

e) A Control frame shall be carried in an HT PPDU or a VHT PPDU when the Control frame is sent using an STBC frame.

f) A control response frame shall be carried in a VHT PPDU if the eliciting frame was an RTS frame carried in a VHT PPDU that contains an HT Control field with MRQ subfield equal to 1.

g) A control response frame may be carried in a VHT PPDU or HT PPDU if the eliciting frame was a Fine Timing\_Measurement frame carried in a VHT PPDU or HT PPDU respectively. (#15799)

 (…existing texts)

**Propose:** Revised for CID 15800 per discussion and editing instructions in 11-18/1181r1.

***TGax editor: Change 28.3.20 HE transmit procedure as the following: (Track change on)***

(…existing texts)

(#15800)

(…existing texts)

**Propose:** Revised for CID 15801 per discussion and editing instructions in 11-18/1181r1.

***TGax editor: Change 28.2.2 TXVECTOR and RXVECTOR parameters as the following: (Track change on)***

|  |
| --- |
| * TXVECTOR and RXVECTOR parameters
 |
| Parameter | Condition | Value | TXVECTOR | RXVECTOR |
|  | (…existing fields…) |
|  | (#15801) |
|  | (…existing fields…) |

**Propose:** Revised for CID 15802 per discussion and editing instructions in 11-18/1181r1.

***TGax editor: Delete 28.3.18.5 Time of Departure accuracy as the following: (Track change on)***

(#15802)