IEEE P802.11
Wireless LANs

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| Comment resolutions for 27.6.2 |
| Date: 2018-01-05 |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D2.0 with the following CIDs:

* 12511, 12512, 12668, 12941, 13203, 13204, 13205, 13206, 13207, 13208,
* 13209, 13210, 13211, 13212, 13213, 13214, 13215, 13216, 13217,
* (19 CIDs)

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: Minor editorial changes. CID 12511 is deferred pending confirmation from Yongho that the interpretation of 160 MHz also covers the 80+80 MHz support. CID 13203 is deferred since I need to get some feedback from Robert.

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** |
| 12511 | Liwen Chu | 263.50 | it should be described per STA's BW capability. | Fix the issue mentioned in comment. | Revised –Agree in principle with the comment although the text is already tailored in such a way that the description is tied to the STAs BW capability. The proposed resolution clarifies more in detail this aspect. TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 12511. |
| 12512 | Liwen Chu | 264.09 | the name " Triggered MU Beamforming Feedback" should be changed to reflect partial BW sounding. | Fix the issue mentioned in comment. | Revised –Agree with the comment. TGax Editor: Replace “Triggered MU Beamforming Feedback” with “Triggered MU Beamforming Partial BW Feedback” throughout the draft. |
| 12668 | Mark RISON | 263.26 | There is no normative behaviour associated with the SU/MU Beamformee and Triggered SU/MU/CQI fields | Add at the end of 27.6.2 (or in 27.6.3?) wording like "A STA shall not request non-trigger-based SU-type feedback from another STA unless it has received from that STA an HE PHY Capabilities Indication field with the SU Beamformee subfield equal to 1" and "A STA shall not request trigger-based MU-type feedback from another STA unless it has received from that STA an HE PHY Capabilities Indication field with the Triggered MU Beamforming Feedback subfield equal to 1" | Revised –Agree in principle. However the statement needs to be general enough to cover all types of sounding feedback that are optional, all types of sounding parameters that are optional, and also the fact that certain sounding sequences are optional as well. Proposed resolution is to add such statements for all these cases not only for those mentioned by the comment.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 12688. |
| 12941 | Mark RISON |  | It is not clear how missed segments are requested in the SU PPDU case. The problem is that the only way to do this is to send a BRP variant Trigger, but such a trigger would be preceded by an NDPA with only one STA Info, which would confuse the beamformee.This was rejected in D1.0 on the following basis:Segementation of the beamforming feedback is only allowed if the feedback is greater than the beamformer's maximum MPDU length capability. The maximum MPDU length for an HE beamformer is 11,454 octets. Most SU feedback is less than 11,454 octets so the HE beamformee shall send the feedback as one segment. Given that the feedback is sent as one segment in most cases there is no value in allowing a new Trigger frame which solicits missed segments.Nonetheless, a NOTE would be helpful | Add a "NOTE---If an HE beamformer does not successfully receive all feedback segments from the HE beamformee, it cannot use a Beamforming Report Poll variant Trigger frame unless it has another HE beamformee to poll. In this case it can only repeat the entire sequence." | Revised –Agree in principle with the comment. Proposed resolution accounts for the suggested change. Also removed some occurrences of Beamforming Report Poll frames since they are not supposed to be generated by HE STAs under HE sounding sequences.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 12941. |
| 13203 | Robert Stacey | 263.29 | All the statements in the subclause are or should be covered in the frame formats clause. The purpose of the frame formats clause is to assign meaning to bits. This is descriptive: "when a bit is set 1 it means that the STA supports the SU beamformer role." Adding additional shall statements that then say "An SU beamformer shall set the bit to 1" is redundent. | Remove subclause 27.6.2. If anything present here is missing in the the HE Capabilities element field descriptions, add it. | Rejected –Clause 9 describes the meaning and encoding of the fields while clause 27 describes what to do upon receiving certain values of these fields. This is commonly done in REVmd. Proposal is to continue doing what has been done in the past unless we find another way of doing the same thing. Adding an example of such instances from 802.11-2016, in P1347:*“A STA shall not transmit a frame using a value for the CH\_BANDWIDTH parameter of the TXVECTOR that is not supported by the receiver STA, as reported in any HT Capabilities element or VHT Capabilities element received from the intended receiver.”* |
| 13204 | Robert Stacey | 263.33 | What "being an SU beamformer" entails is not defined. | Define what being an SU beamformer entails. If it is initiating a non-TB sounding sequence why do we need to indicate this capability? | Revised –Agree in principle with the comment that some more clarification is needed given the misinterpretation identified in the question asked by the commenter. Proposed resolution is to clarify that an SU beamformer is a STA that supports initiating a sounding sequence to solicit SU type feedback.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13204. |
| 13205 | Robert Stacey | 263.37 | What "being an MU beamformer entails is not defined | Define what being an MU beamformer entails. | Revised –Agree in principle with the comment that some more clarification is needed. Proposed resolution is to clarify that an MU beamformer is a STA that supports initiating a sounding sequence to solicit MU type feedback.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13205. |
| 13206 | Robert Stacey | 263.40 | What "being an SU beamformee" entails is not defined | Define what being an SU beamformee entails. | Revised –Agree in principle with the comment that some more clarification is. Proposed resolution is to clarify that an SU beamformee is a STA that supports generating SU type feedback.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13206. |
| 13207 | Robert Stacey | 263.45 | What "being an MU beamformee" entails is not defined | Define what being an MU beamformee entails. | Revised –Agree in principle with the comment that some more clarification is. Proposed resolution is to clarify that an MU beamformee is a STA that supports generating MU type feedback.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13207. |
| 13208 | Robert Stacey | 263.47 | This bullet has nothing to do with "indicating its role in a sounding sequence, the support for sounding sequences or support for feedback types" as stated in the introductory sentence. | Move elsewhere | Revised –Agree with the comment. Moved elsewhere.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13208. |
| 13209 | Robert Stacey | 263.50 | The first shall statement here makes no sense. A shall statement is not needed on what is supported. A shall statement is needed on what can be transmitted. A shall statement might be needed on how a STA reponds based on what is indicated in the capability field. | Remove the first shall statement. Add a statement to the effect that an HE beamformer shall not send to an HE beamformee and HE NDP PPDU with a bandwidth less than or equal to 80 Mhz and with more than x HE LTF symbols unless the STA has a value greater than or equal to x in its Beamformee <= 80 MHz subfield. | Revised –Shall statements are needed to indicate what is supported or not. Otherwise what is the purpose of them? They need not cover only transmission but also capability of processing information in received frames and acting upon their reception; these statements are covering this part, i..e, capability of processing received frames. Proposed resolution is to add a couple of statements in the end of the subclause that clarify that the beamformer cannot transmit and/or solicit information from the beamformee that this latter one does not actually support.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13209. |
| 13210 | Robert Stacey | 263.52 | Its not the channel width in which it is received (whatever that is) that matters. It is the bandwidth of the HE NDP PPDU (the value indicated in the BW field of HE-SIG-A) that is important. A STA operating with 160 MHz channel width might receive an 80 MHz NDP, in which case it is the Beamformee STS <= 80 MHz that applies. | Rewrite the statement to apply to the what the STA is capable of receiving (and move it to the appropriate subclause). For example, an HE STA that indicates support for channel widths of 80 MHz or greater shall support receiption of an HE NDP PPDU with up to 4 OFDM symbols in the HE LTF field. There is already a statement in the capability field description to the effect that the minimum field value is 3 so remove the NSTS,max requirements. An appropriate behavioral statement for a given Beamformee STS <= 80 MHz subfield setting is something like: an HE beamformee that receives an HE NDP PPDU with bandwidth less than or equal to 80 MHz and that has x OFDM symbols in the HE LTF field shall generate a HE compressed beamforming feedback (see ) provided x is less than or equal to the value indicated by the Beamformee STS <= 80 MHz field. | Revised –Proposed resolution is to clarify that the BW is that of the HE NDP as obtained from the RXVECTOR parameter CH\_BANDWITH, inline with the comment’s suggestion. Please note that while the statement in clause 9 is there it is still not normative behavior. As such a normative statement is needed in clause 27. TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13210. |
| 13211 | Robert Stacey | 263.57 | This statement is not necessary since it can't be tested. The HE beamformer is just advertising what it is capable or transmitting. The field description in the frame formats clause should be sufficient. | Remove the statement. | Rejected –Agree that it can’t be tested, but that is not a technical reason for not having a normative statement for the STA to declare its capabilities in a normative way.  |
| 13212 | Robert Stacey | 263.64 | This statement is not necessary. It is the behavior when the field is set a certain way that is important. For SU-type feedback, the beamformee shall not send feedback with parameters the beamformer doesn't support. For SU-type and MU-type feedback, the beamformer shall not set the Feedback Type And Ng field in the HE NDP Annoucnement frame to a value the beamformee does not support. | Remove the statement. Add statements for restrictions on what can be transmitted based on the recipient capability (if necessary). | Revised –Inline with the other resolutions of this family. Proposed resolution is to maintain the normative behavior of setting such fields (as per baseline) and adding a statement to indicate that the beamformer cannot ask the beamformee to do something that the beamformee does not support.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13212. |
| 13213 | Robert Stacey | 264.04 | This statement is not necessary. It's the behavior when the field is set a certain way that is important. | Remove the statement. Add a statement to the effect that the STA shall not send an HE Compressed Beamforming Report field with codebook x unless the HE beamformer support codebook x as indicated by its Codebook Size subfield. | Revised –Inline with the other resolutions of this family. Proposed resolution is to maintain the normative behavior of setting such fields (as per baseline) and adding a statement to indicate that the beamformer cannot ask the beamformee to do something that the beamformee does not support.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13213. |
| 13214 | Robert Stacey | 264.09 | This statement is not necessary. An HE beamfomer controls what it receives: it sets the Feedback Type And Ng field in the HE NDP Announcement frame appropriately. | Remove the statement. | Revised –Inline with the other resolutions of this family. Proposed resolution is to maintain the normative behavior of setting such fields (as per baseline) and adding a statement to indicate that the beamformer cannot ask the beamformee to do something that the beamformee does not support.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13214. |
| 13215 | Robert Stacey | 264.14 | This statement is not necessary. It's the behavior when the field is set a certain way that is important. | Remove the statement. | Revised –Inline with the other resolutions of this family. Proposed resolution is to maintain the normative behavior of setting such fields (as per baseline) and adding a statement to indicate that the beamformer cannot ask the beamformee to do something that the beamformee does not support.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13215. |
| 13216 | Robert Stacey | 264.18 | This statement is not necessary. The behavior that is important is the restriction on the HE beamformer sending an HE NDP Announcement frame requesting partial bandwidth to an HE beamformee that has not set the Trigger MU Beamforming subfield to 1. And, BTW, this subfield is poorly named. | Remove the statement. | Revised –Inline with the other resolutions of this family. Proposed resolution is to maintain the normative behavior of setting such fields (as per baseline) and adding a statement to indicate that the beamformer cannot ask the beamformee to do something that the beamformee does not support. And renamed the field to reflect the fact that is partial BW related. TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13216. |
| 13217 | Robert Stacey | 264.23 | This statement is not necessary. The behavior that is important is that the HE beamformer not send the HE beamformee an HE NDP Announcement with certain settings in the Feedback Type And Ng field unless the HE beamformee has indicated approriate support for those settings. | Remove the statement. |  Revised –Inline with the other resolutions of this family. Proposed resolution is to maintain the normative behavior of setting such fields (as per baseline) and adding a statement to indicate that the beamformer cannot ask the beamformee to do something that the beamformee does not support.TGax editor to make the changes shown in 11-18/0042r1 under all headings that include CID 13217. |
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**Discussion: *None.***

* Sounding sequences and support

**TGax Editor: *Change the paragraph below of this subclause as follows (#CID 13204, 13205, 13206, 13207, 13208):***

An HE STA indicates its role in a sounding sequence, the support of HE sounding sequences, and the supported type of sounding feedback by setting the subfields of the HE Capabilities element it transmits as follows:

* If a STA supports being an SU beamformer (i.e., supports initiating an HE sounding sequence to solicit SU type feedback)*(#13204)* then it shall set the SU Beamformer subfield to 1; otherwise, set to 0. A non-AP STA may set the SU Beamformer subfield to 1. An AP that sets the MU Beamformer subfield to 1 shall set the SU Beamformer subfield to 1.
* If a STA supports being an MU beamformer (i.e., supports initiating an HE sounding sequence to solicit MU type feedback)*(#13205)* then it shall set the MU Beamformer subfield to 1; otherwise, set to 0. A non-AP STA shall set the MU Beamformer subfield to 0. An AP shall set the MU Beamformer subfield to 1 if it supports transmitting 4 or more spatial streams.
* If a STA supports being an SU beamformee (i.e., supports generating SU type feedback)*(#13206)* then it shall set the SU Beamformee subfield to 1; otherwise, set to 0. A non-AP STA shall set the SU Beamformee subfield to 1. An AP may set the SU Beamformee subfield to 1.
* A non-AP STA shall support being an MU beamformee (i.e., supports generating MU type feedback)*(#13207)*. An AP does not support being an MU beamformee.
* (#13208)

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 12511, 12512, 13210):***

* If a STA is an HE beamformee then it shall use the Beamformee STS  80 MHz to indicate the maximum number of space-time streamsthat the STA supports when receiving an HE NDP whose BW is less than or equal to 80 MHz; otherwise, the Beamformee STS  80 MHz is set to 0. If a STA is an HE beamformee and supports 160 MHz channel widths then it shall use the Beamformee STS 80 MHz to indicate the maximum number of space-time streams that the STA supports when receiving an HE NDP whose BW is greater than 80 MHz; otherwise, the Beamformee STS  80 MHz is set to 0. The BW is obtained from the RXVECTOR parameter CH\_BANDWIDTH of the received HE NDP.
* An HE beamformee shall support an *NSTS, max* of at least 4 for BW  80 MHz.
* An HE beamformee shall support an *NSTS, max* of at least 4 for BW > 80 MHz if the beamformee has indicated support for channel widths that are greater than 80 MHz in the Channel Width Set subfield of the HE Capabilities element that it transmits*(#12511, 13210)*.(#8709, #9305, #10152, #9925)
* If a STA is an HE beamformer then it shall set the Number Of Sounding Dimensions  80 MHz and Number Of Sounding Dimensions 80 MHz subfields to the maximum number of space-time streams, *NSTS,max*, minus one supported for the TXVECTOR parameter NUM\_STS of an HE NDP sent in channel widths less than or equal to 80 MHz and greater than 80 MHz, respectively; otherwise, set to 0.
* If a STA is an HE beamformee then it shall set the Ng = 16 SU Feedback and Ng = 16 MU Feedback subfields to 1 if it supports including in the HE Compressed Beamforming Report field a SU feedback for a tone grouping of 16 and a MU feedback for a tone grouping of 16, respectively; otherwise, set to 0.
* An HE beamformee shall set the Codebook Size (ϕ, ψ) = {4, 2} SU Feedback and Codebook Size (ϕ, ψ) = {7, 5} MU Feedback subfields to 1 if it supports including in the HE Compressed Beamforming Report field a SU feedback of codebook size (ϕ, ψ) = {4, 2} and a MU feedback of codebook size (ϕ, ψ) = {7, 5}, respectively; otherwise, set to 0.
* If an AP is an HE beamformer then it shall set the Triggered MU Beamforming Partial BW*(#12512, 13216)* Feedback subfield to 1 if it supports receiving in the HE Compressed Beamforming Report field a partial bandwidth MU feedback; otherwise, set to 0.
* If a non-AP STA is an HE beamformee then it shall set the Triggered MU Beamforming Partial BW*(#12512, 13216)* Feedback subfield to 1 if it supports including in the HE Compressed Beamforming Report field a partial bandwidth MU feedback; otherwise, set to 0.
* If an AP is an HE beamformer then it shall set the Triggered SU Beamforming Feedback and Triggered CQI Beamforming Feedback subfield to 1 if it supports receiving in the HE Compressed Beamforming Report field SU and CQI feedback, respectively, where the feedback is full and partial bandwidth; otherwise, set to 0.
* If a non-AP STA is an HE beamformee then it shall set the Triggered SU Beamforming Feedback and Triggered CQI Beamforming Feedback subfields to 1 if it supports including in the HE Compressed Beamforming Report field SU and CQI feedback, respectively, where the feedback is full and partial bandwidth; otherwise, set to 0.(#8713)

**TGax Editor: *Insert the paragraph below at the end of this subclause as follows (#CID 12688, 13209, 13212, 13123, 13214, 13215, 13216):***

An HE beamformer shall not request a type of sounding feedback or feedback using sounding parameters that are not supported by the HE beamformee. The HE beamformer shall not solicit sounding feeback using an HE sounding sequence that is not supported by the HE beamformee.*(#12688, 13209, 13212, 13213, 13214, 13215, 13216, 13217)*

**27.6.4 Rules for generating segmented feedback**

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 12941):***

An HE beamformer that fails to receive some or all of the feedback segments of the HE compressed beamforming feedback from the HE beamformee, may solicit the selective retransmission of missing feedback segments by sending a *(#12941)* BRP Trigger frame that indicates in the Feedback Segment Retransmission Bitmap subfield of the User Info field addressed to the HE beamformee the list of feedback segments solicited for retransmission (see 9.3.1.23.2 (Beamforming Report Poll (BRP) variant)).

NOTE – Even if the HE beamformer does not successfully receive all feedback segments from the HE beamformee when using the non-TB sounding sequence, the HE beamformer cannot use a BRP Trigger frame to request retransmission of the feedback segments. In this case the HE beamformee can only repeat the entire non-TB sounding sequence.*(#12941)*

An HE beamformer that fails to receive the first feedback segment (identified by the First Feedback Segment field set to 1), may solicit the selective retransmission of the missing feedback segments assuming the HE compressed beamforming feedback is split into 8 feedback segments. The HE beamformer may also solicit the retransmission of all feedback segments by setting all of the bits in the Feedback Segment Retransmission Bitmap subfield to 1 in the User Info field addressed to the HE beamformee.

An HE beamformee that transmits HE compressed beamforming feedback including the HE Compressed Beamforming Report information and any MU Exclusive Beamforming Report information in response to a BRP Trigger frame shall either transmit only the feedback segments indicated in the Feedback Segment Retransmission Bitmap field in *(#12941)* the User Info field of the BRP Trigger frame addressed to the HE beamformee or transmit all the feedback segments available at the HE beamformee, excluding the feedback segments that do not exist at the HE beamformee.

**27.6.3 Rules for HE sounding protocol sequences**

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 12941):***

A non-AP HE beamformee that receives a broadcast HE NDP Announcement frame from the HE beam-former with which it is associated and that contains the HE beamformee's 11 LSBs of the AID in any of the STA Info fields and also receives an HE NDP a SIFS after the HE NDP Announcement frame shall compute the HE compressed beamforming feedback using the feedback type, *Ng* and codebook size indicated in the received HE NDP Announcement frame. The HE beamformee shall transmit the HE TB PPDU its HE compressed beamforming feedback in response to a BRP Trigger frame that contains the 11 LSBs of the AID of the HE beamformee in any of the User Info fields following the rules defined in 27.5.3.3 (STA behavior for UL MU operation).*(#12941)* If the HE NDP Announcement frame has the TA field set to the transmitted BSSID, and the HE beamformee is a non-AP STA associated to a nontransmitted BSSID that supports receiving Control frames with TA set to the transmitted BSSID, then the HE compressed beamforming feedback sent in response shall have the RA field set to either the nontransmitted BSSID or the transmitted BSSID.

**TGax Editor: *Change the paragraphs below of this subclause as follows (#CID 12941):***

An HE beamformer that sends a BRP Trigger frame shall set the Feedback Segment Retransmission Bitmap fields of the BRP Trigger frame to all ones except when the HE beamformer intends to solicit the retransmission of segmented feedback as defined in 27.6.4 (Rules for generating segmented feedback).*(#12941)*