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Wireless LANs

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| Proposed Draft Text (PDT-Joint): Spatial Stream and MIMO Protocol Enhancement Part 2 | | | | |
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Abstract

This submission proposed the draft text on spatial stream and MIMO protocol enhancement part 2 for TGbe D0.2.

This document is based on P802.11ax D8.0 section 26.7 HE sounding protocol.

Puncturing related texts are deleted.

Retransmission related texts are deleted.

Yellow highlighted texts are TBD.

Rev 1: change section 36 to 35. Add Lei and Genadiy’s comments.

Rev 2: updated during meeting

Rev 3: Partial BW Info related text provided by Rui Cao. Few more text to resolve comments from members.

Rev 4: updated during conference call

Rev 5: updated PHY capability subfields name

Rev 6: updated based on offline discussion, i.e. referring NDP-A bandwidth and Partial BW Info for feedback.

35.X EHT sounding protocol

35.X.1 General

Transmit beamforming and DL MU-MIMO require knowledge of the channel state to compute a steering matrix that is applied to the transmit signal to optimize reception at one or more receivers. EHT STAs use the EHT sounding protocol to determine the channel state information. The EHT sounding protocol provides explicit feedback mechanisms, defined as EHT non-trigger-based (non-TB) sounding and EHT trigger-based (TB) sounding, where the EHT beamformee measures the channel using a training signal (i.e., an EHT sounding NDP) transmitted by the EHT beamformer and sends back a transformed estimate of the channel state. The EHT beamformer uses this estimate to derive the steering matrix.

The EHT beamformee returns an estimate of the channel state in an EHT compressed beamforming/CQI report carried in one or more EHT Compressed Beamforming/CQI frames. There are three types of EHT compressed beamforming/CQI report:

* SU feedback: The EHT compressed beamforming/CQI report consists of an EHT Compressed Beamforming Report field
* MU feedback: The EHT compressed beamforming/CQI report consists of an EHT Compressed Beamforming Report field and EHT MU Exclusive Beamforming Report field
* CQI feedback: The EHT compressed beamforming/CQI report consists of an EHT CQI Report field

NOTE—Use of EHT TB sounding does not necessarily imply MU feedback. EHT TB sounding is also used to obtain SU feedback and CQI feedback.

The EHT compressed beamforming/CQI report is carried in a single EHT Compressed Beamforming/CQI frame if the resulting frame is less than or equal to 11 454 octets in length (see 35.X.3 (Rules for EHT sounding protocol sequences)). Otherwise, the EHT beamforming feedback is segmented and each segment is carried in an EHT Compressed Beamforming/CQI frame.

An EHT beamformer shall support a maximum MPDU length for the EHT compressed beamforming/CQI report that is the minimum of 11 454 octets and the maximum length of the EHT compressed beamforming/CQI report that the EHT beamformer intends to solicit from its EHT beamformees.

35.X.2 EHT sounding protocol(#24009)

An SU beamformer is an EHT STA that sets the SU Beamformer subfield in the EHT PHY Capabilities Information field in(#Ed) the EHT Capabilities element it transmits to 1.

An SU beamformee is an EHT STA that sets the SU Beamformee subfield in the EHT PHY Capabilities Information field in the EHT Capabilities element it transmits to 1. A non-AP EHT STA shall set the SU Beamformee subfield to 1. An EHT AP may set the SU Beamformee subfield to 1.

An MU beamformer is an EHT AP that sets the MU Beamformer subfield in the EHT PHY Capabilities Information field in the EHT Capabilities element it transmits to 1. An EHT AP that indicates support for 4 or more spatial streams in the Tx EHT-MCS Map ≤ 80 MHz subfield in the Supported EHT-MCS And NSS field in the EHT Capabilities element shall set the MU Beamformer subfield to 1. A non-AP EHT STA shall set the MU Beamformer subfield to 0. An MU beamformer is also an SU beamformer and shall set the SU Beamformer subfield to 1.

NOTE—A non-AP STA might use the setting of the MU Beamformer subfield to determine the AP with which it will associate.(#24504)

A non-AP EHT STA shall support operation as an MU beamformee. An EHT AP does not support operation as an MU beamformee.

The term EHT beamformer refers to both the SU beamformer and MU beamformer. The term EHT beamformee refers to both the SU beamformee and MU beamformee.

The type of feedback (SU, MU or CQI) solicited by an EHT beamformer from an EHT beamformee is indicated in the Feedback Type And Ng and Codebook subfields in the STA Info field identifying the EHT beamformee in the EHT NDP Announcement frame as defined in Table 9-31a (Feedback Type And Ng subfield and Codebook Size subfield encoding for HE TB sounding) and Table 9-31b (Feedback Type And Ng subfield and Codebook Size subfield encoding for HE non-TB sounding)(#24511).

The bandwidth (partial or full) of the feedback solicited by an EHT beamformer from an EHT beamformee depends on the Partial BW Info subfield in the STA Info field identifying the EHT beamformee in the EHT NDP Announcement frame and the bandwidth of the EHT NDP Announcement frame. The bandwidth of EHT NDP Announcement frame and the EHT NDP frame shall be same.

An SU beamformer may solicit partial bandwidth or full bandwidth SU feedback from an SU beamformee in an EHT non-TB sounding sequence. In partial bandwidth non-TB sounding sequence case, the Puncturing Channel Information fields in U-SIG shall indicate same puncturing pattern as in the Partial BW Info subfield in the EHT NDP Announcement frame.

An SU beamformer may solicit partial bandwidth or full bandwidth SU feedback from an SU beamformee in an EHT TB sounding sequence if the SU beamformee indicates support by setting the Triggered SU Beamforming Feedback subfield in the EHT PHY Capabilities Information field in the EHT Capabilities element it transmits to 1.

An MU beamformer may solicit partial bandwidth or full bandwidth MU feedback from an MU beamformee in an EHT TB sounding sequence. An MU beamformer shall not solicit MU feedback in an EHT non-TB sounding sequence.

An MU beamformer may solicit partial bandwidth or full bandwidth CQI feedback from an MU beamformee in an EHT TB sounding sequence if the MU beamformee indicates support by setting the Triggered CQI Beamforming Feedback subfield to 1.

An MU beamformer may solicit partial bandwidth or full bandwidth CQI feedback from an MU beamformee in an EHT non-TB sounding sequence if the MU beamformee indicates support by setting the Non-Triggered CQI Beamforming Feedback subfield to 1.

An EHT beamformer shall not send an EHT NDP Announcement frame that initiates an EHT TB sounding sequence with a STA Info field identifying an EHT beamformee if the STA Info field and the PHY Capabilities Information field in the EHT Capabilities element most recently received from the EHT beamformee meet any of the following conditions (see Table 9-31a (Feedback Type And Ng subfield and Codebook Size subfield encoding for HE TB sounding)):

* The Feedback Type And Ng and Codebook Size subfield in the STA Info field indicates SU and *Ng* = 16, and the Ng = 16 SU Feedback subfield in the EHT PHY Capabilities Information field is 0
* The Feedback Type And Ng and Codebook Size subfield in the STA Info field indicates MU and *Ng* = 16, and the Ng = 16 MU Feedback subfield in the EHT PHY Capabilities Information field is 0
* The Feedback Type And Ng and Codebook Size subfield in the STA Info field indicates SU, the Codebook Size subfield indicates codebook resolution (ϕ, ψ) = {4, 2} and the Codebook Size (ϕ, ψ) ={4, 2} SU Feedback subfield in the EHT PHY Capabilities Information field is 0
* The Feedback Type And Ng and Codebook Size subfield in the STA Info field indicates MU, the Codebook Size subfield in the STA Info field indicates codebook resolution (ϕ, ψ) = {7, 5} and the Codebook Size (ϕ, ψ) ={7, 5} MU Feedback subfield in the EHT PHY Capabilities Information field is 0
* The Feedback Type And Ng and Codebook Size subfield in the STA Info field indicates CQI and the Triggered CQI Beamforming Feedback subfield in the EHT PHY Capabilities Information field is 0
* The Feedback Type And Ng and Codebook Size subfield indicates SU and the Triggered SU Beamforming Feedback subfield in the EHT PHY Capabilities Information field is 0

An EHT beamformee indicates the maximum number of EHT-LTF symbols it can receive in a 20 MHz, 40 MHz or 80 MHz EHT sounding NDP in the Beamformee SS ≤ 80 MHz subfield in the PHY Capabilities Information field in the EHT Capabilities element it transmits.

An EHT beamformee shall set the Beamformee SS ≤ 80 MHz subfield to indicate a maximum number of EHT-LTF symbols of 4 or greater.

An EHT beamformee indicates the maximum number of EHT-LTF symbols it can receive in a 160 MHz EHT sounding NDP in the Beamformee SS = 160 MHz subfield in the PHY Capabilities Information field in the EHT Capabilities element it transmits.

An EHT beamformee indicates the maximum number of EHT-LTF symbols it can receive in a 320 MHz EHT sounding NDP in the Beamformee SS = 320 MHz subfield in the PHY Capabilities Information field in the EHT Capabilities element it transmits.

An EHT beamformer shall not transmit a 20 MHz, 40 MHz or 80 MHz EHT sounding NDP with a TXVECTOR parameter NUM\_STS that is greater than the maximum number of EHT-LTF symbols indicated in the Beamformee SS ≤ 80 MHz subfield of any STA identified by a STA Info field in the preceding EHT NDP Announcement frame.

An EHT beamformer shall not transmit a 160 MHz MHz EHT sounding NDP with a TXVECTOR parameter NUM\_STS that is greater than the maximum number of EHT-LTF symbols indicated in the Beamformee SS = 160 MHz subfield of any STA identified by a STA Info field in the preceding EHT NDP Announcement frame.

An EHT beamformer shall not transmit a 320 MHz MHz EHT sounding NDP with a TXVECTOR parameter NUM\_STS that is greater than the maximum number of EHT-LTF symbols indicated in the Beamformee SS = 320 MHz subfield of any STA identified by a STA Info field in the preceding EHT NDP Announcement frame.

An EHT beamformer indicates the maximum number of EHT-LTF symbols it might transmit in a 20 MHz, 40 MHz or 80 MHz EHT sounding NDP in the Number Of Sounding Dimensions ≤ 80 MHz subfield.

An EHT beamformer indicates the maximum number of EHT-LTF symbols it might transmit in a 160 MHz EHT sounding NDP in the Number Of Sounding Dimensions = 160 MHz subfield.

An EHT beamformer indicates the maximum number of EHT-LTF symbols it might transmit in a 320 MHz EHT sounding NDP in the Number Of Sounding Dimensions = 320 MHz subfield.

An EHT beamformer shall not transmit a 20 MHz, 40 MHz or 80 MHz EHT sounding NDP where the number of EHT-LTF symbols exceeds the value indicated in the Number Of Sounding Dimensions ≤ 80 MHz subfield.

An EHT beamformer shall not transmit an 160 MHz EHT sounding NDP where the number of EHT-LTF symbols exceeds the value indicated in the Number Of Sounding Dimensions = 160 MHz subfield.

An EHT beamformer shall not transmit an 320 MHz EHT sounding NDP where the number of EHT-LTF symbols exceeds the value indicated in the Number Of Sounding Dimensions = 320 MHz subfield.

An EHT beamformer may solicit partial BW feedback from one or more EHT beamfomees with operating channel width smaller than the bandwidth of the EHT NDP Announcement frame and sounding NDP.

A 320 MHz EHT beamformer shall not send a 320 MHz EHT NDP Announcement frame solicit partial BW feedback from an EHT beamfomee with 20 MHz operating channel width.

A EHT NDP Announcement frame of bandwidth larger than 40 MHz shall not include an EHT beamfomee with 40 MHz operating channel width.

A 20 MHz operating EHT beamformee may support partial BW feedback solicited with an EHT NDP Announcement frame and an EHT sounding NDP of bandwidth of 40 MHz, 80 MHz and 160 MHz.

A 40 MHz operating EHT beamformee shall support partial BW feedback solicited with an EHT NDP Announcement frame and an EHT sounding NDP of 40 MHz bandwidth.

An 80 MHz operating EHT beamformee shall support partial BW feedback solicited with an EHT NDP Announcement frame and an EHT sounding NDP of bandwidth of 40 MHz, 80 MHz, 160 MHz and 320 MHz.

A 160 MHz operating EHT beamformee shall support partial BW feedback solicited with an EHT NDP Announcement frame and an EHT sounding NDP of bandwidth of 40 MHz, 80 MHz, 160 MHz and 320 MHz.

A 320 MHz operating EHT beamformee shall support partial BW feedback solicited with an EHT NDP Announcement frame and an EHT sounding NDP of bandwidth of 40 MHz, 80 MHz, 160 MHz and 320 MHz.

35.X.3 Rules for EHT sounding protocol sequences

(#24010)An EHT non-TB sounding sequence is initiated by an EHT beamformer with an individually addressed EHT NDP Announcement frame comprising exactly one STA Info field, followed after SIFS by an EHT sounding NDP. The EHT beamformee responds after SIFS with an EHT Compressed Beamforming/CQI frame.

The AID11 subfield of the STA Info field shall be set to the AID of the STA identified by the RA field of the EHT NDP Announcement frame, or to 0 if the STA identified by the RA field is a mesh STA, AP or IBSS STA.

An example of an EHT non-TB sounding sequence with a single EHT beamformee is shown in Figure X1 (An illustration of EHT non-TB sounding).

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| Figure X1 - An illustration of EHT non-TB sounding(#24010) |

An EHT beamformer that initiates the EHT non-TB sounding sequence shall transmit the EHT NDP Announcement frame with a single STA Info field, the STA Info field having a value in the AID11 field other than 2047(#24474) and with the AID11 field in that STA Info field set to the AID of the STA identified by the RA field or to 0 if the STA identified by the RA field is a mesh STA, AP or IBSS member STA.

An EHT beamformer may initiate an EHT non-TB sounding sequence with an EHT beamformee to solicit SU or CQI feedback.

(#24012)An EHT TB sounding sequence is initiated by an EHT beamformer with a broadcast EHT NDP Announcement frame with two or more STA Info fields, followed after a SIFS by an EHT sounding NDP followed after a SIFS by a BFRP Trigger frame. Each EHT beamformee responds after a SIFS with an EHT Compressed Beamforming/CQI frame.

An example of an EHT TB sounding sequence with more than one EHT beamformee is shown in Figure X2 (An illustration of EHT TB sounding).

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| Figure X2 An illustration of EHT TB sounding(#24012) |

An EHT beamformer that initiates an EHT TB sounding sequence shall transmit the EHT NDP Announcement frame with two or more STA Info fields and the RA field set to the broadcast address.

An EHT beamformer may initiate an EHT TB sounding sequence to solicit SU, MU or CQI feedback.

An EHT beamformer may initiate an EHT TB sounding sequence to solicit a feedback variant only if the feedback variant is computed based on parameters supported by the EHT beamformee; otherwise the EHT beamformer shall not solicit a feedback variant computed based on parameters not supported by the EHT beamformee (see 35.X.2 (EHT sounding protocol)).

(#24013)An EHT AP with dot11MultiBSSIDImplemented equal to true shall not send an EHT NDP Announcement frame with the TA field set to the transmitted BSSID to a non-AP STA that is associated with an AP corresponding to a nontransmitted BSSID(#24108) in the multiple BSSID set unless the AP has received from the non-AP STA an EHT Capabilities element with the Rx Control Frame To MultiBSS subfield in the EHT MAC Capabilities Information field equal to 1.

An AP that transmits an EHT NDP Announcement frame identifying EHT STAs shall set the TA field of the frame to the MAC address of the AP, unless dot11MultiBSSIDImplemented is true and the EHT NDP Announcement frame identifies STAs from at least two different BSSs of the multiple BSSID set, in which case, the AP shall set the TA field of the frame to the transmitted BSSID. If the EHT NDP Announcement frame is transmitted in a non-HT duplicate PPDU then the TA field of the EHT NDP Announcement frame is a bandwidth signaling TA (see 10.6.6.6 (Channel Width selection for Control frames)).

An EHT beamformer that transmits an EHT NDP Announcement frame to an EHT beamformee that is an AP, TDLS peer STA, mesh STA or IBSS STA, shall include one STA Info field in the EHT NDP Announcement frame and shall set the AID11 field in the STA Info field of the frame to 0.

An EHT beamformer that is an AP and that transmits an EHT NDP Announcement frame to one or more EHT beamformees shall set the AID11 field in the STA Info field identifying a non-AP STA to the 11 LSBs of the AID of the non-AP STA.

An EHT NDP Announcement frame shall not include multiple STA Info fields that have the same value in the AID11 subfield.

In an EHT TB sounding sequence, a STA Info field in the EHT NDP Announcement frame that solicits SU or MU feedback indicates the subcarrier grouping, *Ng*, codebook size and the number of columns, *Nc*, to be used by the EHT beamformee identified by the STA Info field for the generation of the SU or MU feedback.

In an EHT non-TB sounding sequence where the STA Info field in the EHT NDP Announcement frame solicits SU feedback, the subcarrier grouping, *Ng*, codebook size and the number of columns, *Nc*, used for the generation of the SU feedback are determined by the EHT beamformee. In an EHT TB sounding sequence, a STA Info field in the EHT NDP Announcement frame that solicits CQI feedback indicates the *Nc* to be used by the EHT beamformee identified by the STA Info field for the generation of the CQI feedback.

In an EHT non-TB sounding sequence where the STA Info field in the EHT NDP Announcement frame solicits CQI feedback, the *Nc* used for the generation of the CQI feedback is determined by the EHT beamformee.

An EHT beamformer that has initiated an EHT TB sounding sequence may send another BFRP Trigger frame in the same TXOP as shown in Figure X2 (An illustration of EHT TB sounding). The EHT beamformer uses the additional BFRP Trigger frames to solicit EHT compressed beamforming/CQI reports from EHT beamformees not addressed in a previous BFRP Trigger frame. An EHT beamformer shall not transmit a BFRP Trigger frame that identifies a STA identified in the EHT NDP Announcement frame of an EHT TB sounding sequence unless it is in the same TXOP as the EHT TB sounding sequence.

An EHT beamformer that transmits an EHT NDP Announcement frame as part of an EHT TB sounding sequence shall set the Nc subfield of the STA Info field to indicate a value less than or equal to the minimum of:

* The maximum number of supported spatial streams according to the corresponding EHT beamformee’s Rx EHT-MCS Map ≤ 80 MHz, Rx EHT-MCS Map = 160 MHz, and Rx EHT-MCS Map = 320 MHz subfields in the Supported EHT-MCS And NSS Set field in(#Ed) the EHT Capabilities element sent by the EHT beamformee.
* The maximum number of supported spatial streams according to the Rx NSS subfield value in the most recently received Operating Mode Notification frame, Operating Mode Notification element with the Rx NSS Type subfield equal to 0, or OM Control subfield sent by the corresponding EHT beamformee (see 35.X (Operating mode indication)).
* The maximum *Nc* indicated by the Max Nc subfield in the EHT PHY Capabilities Information field in(#Ed) the EHT Capabilities element sent by the EHT beamformee.

An EHT beamformer that transmits an EHT NDP Announcement frame shall set the Partial Bandwidth Info subfield in a STA Info field to indicate the feedback subcarrier indices, of the solicited EHT compressed beamforming/CQI report (see 9.3.1.19 (VHT/HE/EHT NDP Announcement frame format)).

The EHT beamformer shall set the TXVECTOR parameter CH\_BANDWIDTH or CH\_BANDWIDTH\_IN\_NON\_HT, the Partial BW Info subfield of the EHT NDP Announcement frame, depending on the operating channel width, as defined in Table X (Settings for BW, Partial BW Info subfield in EHT NDP Announcement frame).



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| **Table X- Settings for BW, Partial BW Info subfield in EHT NDP Announcement frame** | | | |
| **Operating channel width of the EHT beamformee (MHz)** | **Bandwidth of EHT NDP Announcement frame** | **Feedback RU/MRU Size** | **Partial BW Info subfield values** |
| 20, 40, 80, 160, 320 | 20 MHz | 242 | 010000000 |
| 20, 40, 80, 160, 320 | 40 MHz | 242 | 010000000, 001000000 |
| 484 | 011000000 |
| 20, 80, 160, 320 | 80 MHz | 242 | 010000000, 001000000, 000100000, 000010000 |
| 484 | 011000000, 000110000 |
| 484+242 | 011100000, 011010000, 010110000, 001110000 |
| 996 | 011110000 |
| 20, 80, 160, 320 | 160 MHz | 242 | 010000000, 001000000, 000100000, 000010000, 000001000, 000000100, 000000010, 000000001 |
| 484 | 011000000, 000110000, 000001100, 000000011 |
| 484+242 | 011100000, 011010000, 010110000, 001110000, 000001110, 000001101, 000001011, 000000111 |
| 996 | 011110000, 000001111 |
| 996+484 | 011111100, 011110011, 011001111, 000111111 |
| 996+484+242 | 011101111, 011011111, 010111111, 001111111, 011111110, 011111101, 011111011, 011110111 |
| 2x996 | 011111111 |
| 80, 160, 320 | 320 MHz | 484 | 110000000, 101000000, 100100000, 100010000, 100001000, 100000100, 100000010, 100000001 |
| 996 | 111000000, 100110000, 100001100, 100000011 |
| 996+484 | 111100000, 111010000, 110110000, 101110000, 100001110, 100001101, 100001011, 100000111 |
| 2x996 | 111110000, 100001111, |
| 2x996+484 | 111111000, 111110100, 111101100, 111011100, 100111110, 100111101, 100111011, 100110111 |
| 3x996 | 111111100, 111110011, 111001111, 100111111 |
| 4x996 | 111111111 |

The EHT beamformer shall use a lowest *scidx(0)*, which is the lower bound of the *scidx(0)* indicated by Partial BW Info subfield of a STA Info field that is equal to the maximum of:

* The minimum subcarrier index located within the channel width indicated in the VHT Operation Information field of either the HE Operation element or the VHT Operation element, whichever is present, and within the channel width indicated in the HT Operation element
* The minimum subcarrier index located within the channel width indicated in the most recently received Operating Mode Notification frame, Operating Mode Notification element with the Rx NSS Type subfield equal to 0, or OM Control subfield sent by the corresponding EHT beamformee (see 35.X (Operating mode indication))

The EHT beamformer shall use a highest *scidx(Ns*– 1*)*, which is the upper bound of the *scidx(Ns*– 1*)* indicated by Partial BW Info subfield of a STA Info field that is equal to the minimum of:

* The maximum subcarrier index located within the channel width indicated in the VHT Operation Information field of either the HE Operation element or the VHT Operation element, whichever is present, and within the channel width indicated in the HT Operation element
* The maximum subcarrier index located within the channel width indicated in the most recently received Operating Mode Notification frame, Operating Mode Notification element with the Rx NSS Type subfield equal to 0, or OM Control field sent by the corresponding EHT beamformee (see 35.X (Operating mode indication))

(#24511)(#24511)In an EHT non-TB sounding sequence soliciting SU feedback, B26 (in the Feedback Type And Ng subfield), the Codebook Size subfield, and the Nc subfield in the STA Info field of the EHT NDP Announcement frame are reserved.

In an EHT non-TB sounding sequence soliciting CQI feedback, the Nc subfield in an EHT NDP Announcement frame is reserved.

An EHT beamformee that receives an EHT NDP Announcement frame soliciting SU feedback as part of an EHT non-TB sounding sequence shall generate an EHT compressed beamforming/CQI report for SU feedback with *Nc* in the range 1 to 8, *Ng* = 4 or *Ng* = 16, and codebook size (ϕ, ψ) = {4, 2} or (ϕ, ψ) = {6, 4}. The EHT beamformee shall transmit the EHT compressed beamforming/CQI report a SIFS after the EHT sounding NDP.

An EHT beamformee that receives an EHT NDP Announcement frame soliciting CQI feedback as part of an EHT non-TB sounding sequence shall generate an EHT compressed beamforming/CQI report for CQI feedback with *Nc* determined by the EHT beamformee.

An EHT beamformee that receives an EHT NDP Announcement frame soliciting CQI feedback as part of an EHT TB sounding sequence shall generate an EHT compressed beamforming/CQI report for CQI feedback with *Nc* determined by the EHT beamformer. An EHT beamformee that receives an EHT NDP Announcement frame from an EHT beamformer with which it is associated and that contains the EHT beamformee’s MAC address in the RA field (indicating a non-TB sounding sequence) and also receives an EHT sounding NDP a SIFS after the EHT NDP Announcement frame shall transmit its EHT compressed beamforming/CQI report a SIFS after the EHT sounding NDP. The TXVECTOR parameter CH\_BANDWIDTH for the PPDU containing the EHT compressed beamforming/CQI report shall be set to indicate a bandwidth not wider than that indicated by the RXVECTOR parameter CH\_BANDWIDTH of the EHT sounding NDP.

An EHT beamformee that receives an EHT NDP Announcement frame as part of an EHT TB sounding sequence with a STA Info field identifying it soliciting SU or MU feedback shall generate an EHT compressed beamforming/CQI report using the feedback type, *Ng*, codebook size, and *Nc* indicated in the STA Info field. If the EHT beamformee then receives a BFRP Trigger frame with a matching STA Info field, the EHT beamformee transmits an EHT TB PPDU containing the EHT compressed beamforming/CQI report following the rules defined in 26.5.2.3 (Non-AP STA behavior for UL MU operation). If the EHT NDP Announcement frame has the TA field set to the transmitted BSSID, and the EHT beamformee is a non-AP STA associated with an AP corresponding to a nontransmitted BSSID(#24108) that supports receiving Control frames with TA field set to the transmitted BSSID, then the EHT compressed beamforming/CQI report sent in response shall have the RA field set to as defined in 26.5.2.3.5 (RA field for frames carried in an HE TB PPDU).

NOTE—A non-AP EHT beamformee that transmits an OM Control subfield with the UL MU Disable field set to 1 does not respond to BFRP Trigger frames (see 35.X (Operating mode indication)).

An EHT beamformee that is a non-AP STA that transmits an EHT Compressed Beamforming/CQI Report shall set the Partial BW Info subfield of the EHT MIMO Control field to indicate the range of subcarriers for which compressed beamforming/CQI information is provided. The Partial BW Info subfield shall be set to the value of the Partial BW Info subfield of NDP Announcement frame for the EHT beamformee.

An EHT beamformee that transmits EHT compressed beamforming feedback shall include neither the EHT Compressed Beamforming Report information nor the EHT MU Exclusive Beamforming Report information if the transmission duration of the PPDU carrying the EHT Compressed Beamforming Report information and any EHT MU Exclusive Beamforming Report information would exceed the maximum PPDU duration.(#24496)

The Sounding Dialog Token Number field in the EHT MIMO Control field shall be set to the same value as the Sounding Dialog Token Number field in the corresponding EHT NDP Announcement frame.

An EHT beamformer that sends a BFRP Trigger frame shall set the Feedback Segment Retransmission Bitmap fields of the BFRP Trigger frame to all 1s.

NOTE—The BFRP Trigger frame contains one or more User Info fields, each of which identifies an EHT beamformee.

The SNR per subcarrier computation should be done on at least 4 subcarriers in a 26-tone RU.

35.X.4 Rules for generating segmented feedback

If the EHT compressed beamforming/CQI report solicited by the EHT beamformer would result in an EHT Compressed Beamforming/CQI frame that exceeds 11 454 octets in length, then the EHT compressed beamforming/CQI report shall be split into up to 8 feedback segments. Each feedback segment shall be included in a separate EHT Compressed Beamforming/CQI frame and shall contain successive portions of the EHT compressed beamforming/CQI report. Each feedback segment shall be of equal length except the last feedback segment that may be smaller. Each EHT Compressed Beamforming/CQI frame that includes a feedback segment that is not the last feedback segment shall have a length of 11 454 octets. Each feedback segment is identified by the value of the Remaining Feedback Segments subfield and the First Feedback Segment subfield in the EHT MIMO Control field as defined in 9.4.1.67a (EHT MIMO Control field); the other nonreserved subfields of the EHT MIMO Control field shall be the same for all feedback segments. All feedback segments shall be sent in a single A-MPDU contained in a PPDU and shall be included in the A-MPDU in the descending order of the Remaining Feedback Segments subfield values.

An EHT beamformer that sends a BFRP Trigger frame to retrieve an EHT compressed beamforming/CQI report from an EHT beamformee, shall solicit all possible feedback segments by setting all of the bits in the Feedback Segment Retransmission Bitmap subfield to 1 in the User Info field identifying the EHT beamformee.

An EHT beamformer, that fails to receive some or all of the feedback segments of the EHT compressed beamforming/CQI report from the EHT beamformee, shall not use a BFRP Trigger frame to request retransmission of the feedback segments. In this case, the EHT beamformer may repeat the entire sounding sequence.

35.X.5 EHT sounding NDP transmission

The TXVECTOR parameters for an EHT sounding NDP shall be set as follows:

* FORMAT is set to EHT\_MU
* APEP\_LENGTH is set to 0
* EHT\_LTF\_TYPE is set to either 2xEHT-LTF or 4xEHT-LTF
* If EHT\_LTF\_TYPE is 2xEHT-LTF, then GI\_TYPE is set to either 0u8s\_GI or 1u6s\_GI
* If EHT\_LTF\_TYPE is 4xEHT-LTF, then GI\_TYPE is set to 3u2s\_GI
* NUM\_STS indicates two or more spatial streams if the Feedback Type field in the EHT MIMO Control field of the preceding EHT NDP Announcement frame indicates either SU or MU, or one or more spatial streams if the Feedback Type field in the EHT MIMO Control field of the preceding EHT NDP Announcement frame indicates CQI. See below for additional constraints on NUM\_STS.
* CH\_BANDWIDTH is set to the same value as the TXVECTOR parameter CH\_BANDWIDTH in the preceding EHT NDP Announcement frame.
* SPATIAL\_REUSE is set to PSR\_AND\_NON\_SRG\_OBSS\_PD\_PROHIBITED (see 26.11.6 (SPATIAL\_REUSE))
* BSS\_COLOR is set to the value indicated in the BSS Color subfield of the HE Operation element received or transmitted by the EHT AP
* TXOP\_DURATION set to either 127 or a value defined in Equation (X)

(X)

where

*D*EHT\_NDPA is the value of the Duration/ID field in the MAC header of the preceding EHT NDP Announcement frame

TXTIME is the transmission time of an EHT sounding NDP defined in Equation (35-97)

The Supported EHT-MCS and NSS Set field in(#Ed) the EHT Capabilities element transmitted by the transmitter and the receiver of the EHT sounding NDP do not affect the values used for the NUM\_STS parameter for the TXVECTOR of an EHT sounding NDP.

The destination of an EHT sounding NDP is equal to the RA of the immediately preceding EHT NDP Announcement frame.

The source of an EHT sounding NDP is equal to the TA of the immediately preceding EHT NDP Announcement frame.

---- End of text proposal ----

