IEEE P802.11
Wireless LANs

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| Full Text of 11ah Subclauses 9.30.3 and 9.33.5(11mcD3.0 subclauses 9.31.3 and 9.34.5) |
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Abstract

11ahD2.0 includes proposals to insert text change instructions directly into some subclauses of the 802.11 Std text – instead of changing the text to create the actual normative statements for those subclauses. These 11ah proposals apply to subclauses 9.30.3 (11mcD3.0 9.31.3) and 9.33.5 (llmcD3.0 9.34.5).

This document proposes to replace those two 11ah subclauses with amendment text -- and also adds a another subclause and a few editorial corrections:

1. This document proposes two new subclauses -- 9.30.4 and 9.33.7 (in 11mc these would be 9.31.4 and 9.34.7) that contain all current 11ah modifications of the subclauses 9.30.3 and 9.33.5.
2. The redlines shown in this document are differences from the VHT versions of the same material. With respect to 11mcD3.0: all of the material in the proposed 9.31.4 and 9.34.7 will be new to the 11mc draft, so each subclause will appear in the 11ah draft as a submission of a completely new subclause.
3. Of course none of the subclause pointers are live in this document; the new pointers (and the old pointers in new proposed text) need to be added to the text of the 11ah amendment.
4. 11ah D2.0 talks about a “SIG Compressed Beamforming frame”, but no such frame is defined. Is this intended or not? (Under the assumption that it is intended, the name “VHT Compressed Beamforming frame” is changed to “S1G Compressed Beamforming frame” in this proposal.
5. 11ah D2.0 includes a new subclause 9.33.7. This document proposes that this be changed to subclause 9.33.8 (in 11mcD3.0 it would be 9.34.8).

**{The following replacement for 11ahD2.0 subclause 9.30.3 is based on the equivalent 11mcD3.0 text (9.31.3).}**

**9.31.4 Link adaptation using the S1G variant HT Control field**

The behavior described in this subclause is specific to the S1G variant HT Control field.

A STA that supports S1G link adaptation using the S1G variant HT Control field shall set the S1G Link Adaptation Capable subfield in the S1G Capabilities Info field in the S1G Capabilities element to Unsolicited or Both, depending on its specific link adaptation feedback capability. A STA shall not send an MRQ to STAs that have not set the S1G Link Adaptation Capable subfield to Both in the S1G Capabilities Info field of the S1G Capabilities element. A STA whose S1G Link Adaptation Capable subfield of the S1G Capabilities Info field of the S1G Capabilities element is either set to Unsolicited or Both may transmit unsolicited MFB in any frame that contains an S1G variant HT Control field.

The MFB requester or MFB responder that is an S1G STA shall set the S1G subfield in the VHT variant HT Control field to 1. Otherwise the value of the S1G field shall be reserved.

An S1G STA shall not transmit a +HTC Control frame to another S1G STA that does not support VHT link adaptation.

An S1G STA that is an MFB requester shall set the TXVECTOR parameter RESPONSE\_INDICATION to NORMAL\_RESPONSE if it intends to elicit link adaptation feedback in the immediate control response frame. Otherwise, it shall not set the TXVECTOR parameter RESPONSE\_INDICATION to Normal Response, unless it is permitted to do so as described in 9.23 (Block acknowledgment (block ack)), 9.3.2.9 (Ack procedure), and 9.42 (Target wake time (TWT)).

An S1G STA that is an MFB responder may transmit a +HTC Control frame as an immediate response to an eliciting frame for which the RXVECTOR parameter RESPONSE\_INDICATION is equal to NORMAL\_RESPONSE. The +HTC Control Response frame shall be one of the following:

* +HTC Ack frame if the eliciting frame requires an Ack frame as a response (see 9.3.2.9 (Ack procedure))
* +HTC BlockAck or +HTC BAT frame if the eliciting frame requires a BlockAck or BAT frame as a response (see 9.23 (Block acknowledgment (block ack)))
* +HTC TACK or +HTC STACK frame if the eliciting frame requires a TACK or STACK frame as a response (see 9.45 (Bi directional TXOP))

Otherwise, the S1G STA shall not transmit a +HTC Control response frame.

The MFB requester may set the MRQ field to 1 in the S1G variant HT Control field of a frame to request a STA to provide link adaptation feedback. In each request the MFB requester shall set the MSI/STBC field to a value in the ranges 0 to 6, 0 to 2, or 0 to 3, depending on the settings in the Unsolicited MFB and STBC fields (see 8.2.4.6.3 (VHT variant)). The choice of MSI value is implementation dependent.

The appearance of more than one instance of an S1G variant HT Control field with the MRQ field equal to 1 within a single PPDU shall be interpreted by the receiver as a single request for link adaptation feedback.

An MFB responder that has set the S1G Link Adaptation Capable subfield to Both in the S1G Capabilities Info field of the S1G Capabilities element shall support both of the following:

* Computation and feedback of the MFB estimate on the receipt of an MFB request (MRQ equal to 1 in the S1G variant HT Control field) in a PPDU that is not an S1G NDP Announcement frame
* Computation and feedback of the MFB estimate on the receipt of an MFB request (MRQ equal to 1 in the S1G variant HT Control field) in an S1G NDP Announcement frame and the receipt of S1G NDPs (see 9.34 (Null data packet (NDP) sounding)) if this STA set the SU Beamformee Capable subfield of the S1G Capabilities Info field of the S1G Capabilities element to 1

On receipt of an S1G variant HT Control field with the MRQ field equal to 1, an MFB responder computes the VHT-MCS, NUM\_STS, and SNR estimates based on the PPDU carrying the MRQ or, in the case of an S1G NDP Announcement frame carrying the MRQ, based on the subsequent S1G NDP. The MFB responder labels the result of this computation with the MSI value from the S1G variant HT Control field in the received frame carrying the MRQ. The MFB responder may include the received MSI value in the MFSI field of the corresponding response frame. In the case of a delayed response, this allows the MFB requester to associate the MFB with the soliciting MRQ.

An MFB responder that sends a solicited MFB shall set the Unsolicited MFB subfield in the S1G variant HT Control field to 0.

The MFB responder may send a solicited response frame with any of the following combinations of VHT-MCS, NUM\_STS, and MFSI:

* VHT-MCS = 15, NUM\_STS = 7 in the MFB subfield, and VHT-MCS = 15, NUM\_STS = 3 and MFSI = 7 in an S1G PPDU: no information is provided for the immediately preceding request or for any other pending request. This combination is used when the responder is required to include an S1G variant HT Control field due to other protocols that use this field (e.g., the Reverse Direction Protocol) and when no MFB is available. It has no effect on the status of any pending MRQ.
* VHT-MCS = 15, NUM\_STS = 7 in the MFB subfield, and VHT-MCS = 15, NUM\_STS = 3 and MFSI in the range 0 to 6 in an S1G PPDU: the responder is not now providing, and will never provide, feedback for the request that had the MSI value that matches the MFSI value.
* VHT-MCS = valid value, NUM\_STS = valid value in the MFB subfield, MFSI in the range 0 to 6: the responder is providing feedback for the request that had the MSI value that matches the MFSI value.

An MFB responder that discards or abandons the MFB estimates computed in response to an MRQ may indicate that it has done so by setting the VHT-MCS to 15 and NUM\_STS to 7 in the MFB subfield in the next frame addressed to the MFB requester that includes the S1G variant HT Control field. The value of the MFSI is set to the value of the MSI/STBC subfield of the frame that contains an MRQ for which the computation was abandoned, regardless of whether the MSI/STBC subfield contains an MSI or a Compressed MSI and STBC Indication subfields.

The STA receiving MFB may use the received MFB to compute the appropriate VHT-MCS, SNR, and NUM\_STS.

A STA sending unsolicited MFB feedback using the S1G variant HT Control field shall set the Unsolicited MFB subfield to 1.

Unsolicited VHT-MCS, NUM\_STS, BW, and SNR estimates reported in the MFB subfield of an S1G variant HT Control field sent by a STA are computed based on the most recent PPDU received by the STA that matches the description indicated by the GID-L, GID-H, Coding Type, STBC Indication, and FB Tx Type fields in the same S1G variant HT Control field.

In an unsolicited MFB response the GID-L, GID-H, Coding Type, STBC Indication, FB Tx Type, and BW fields are set according to the RXVECTOR parameters of the received PPDU from which the VHT-MCS, SNR, BW, and NUM\_STS are estimated, as follows:

* If the VHT-MCS, SNR, BW, and NUM\_STS are estimated from an S1G MU PPDU, then the GID-L field is set to the 3 least significant bits and the GID-H field to the 3 most significant bits of the parameter GROUP\_ID.
* If the VHT-MCS, SNR, BW, and NUM\_STS are estimated from an SU PPDU, then the GID-L field and GID-H field are set to all 1s.
* The Coding Type field is set to 0 if the parameter FEC\_CODING is equal to BCC\_CODING and set to 1 if equal to LDPC\_CODING.
* The STBC Indication field is set to 1 if the parameter STBC is equal to 1 and set to 0 if the STBC parameter is equal to 0.
* The FB TX Type field is set to 1 if the parameter BEAMFORMED is equal to 1 and set to 0 if equal to 0.
* The BW field shall indicate a bandwidth equal to or less than the bandwidth indicated by the parameter CH\_BANDWIDTH.

In an MFB response solicited by an MRQ that was not carried in an S1G NDP Announcement frame, the MFB is computed based on RXVECTOR parameters CH\_BANDWIDTH, GROUP\_ID, NUM\_STS, FEC\_CODING, BEAMFORMED, and STBC of the received PPDU that carried the MRQ and might additionally be based on other factors that are not part of the RXVECTOR. The NUM\_STS subfield of the MFB subfield of S1G variant HT Control field shall be set to an equal or smaller value than the RXVECTOR parameter NUM\_STS of the received PPDU that triggered the MRQ.

If the MFB is in the same MPDU as an S1G Compressed Beamforming frame, the MFB responder shall estimate the recommended MFB under the assumption that the beamformer will use the steering matrices contained therein for performing an SU beamformed transmission. In this case the value of the NUM\_STS field in the MFB subfield of the S1G variant HT Control field shall be the same as the value of the Nc Index field in the VHT MIMO Control field of the S1G Compressed Beamforming frame and, if the MFB is unsolicited, the Coding Type shall be set to BCC and the FB Tx Type shall be set to 0. Additionally, MFB estimate shall be based on the bandwidth indicated by the Channel Width subfield of the VHT MIMO Control field of the S1G Compressed Beamforming frame. In this case the SNR and BW subfields are reserved and set to 0.

If an unsolicited MFB is not in the same MPDU as an S1G Compressed Beamforming frame, the NUM\_STS subfield of the MFB subfield of the S1G variant HT Control field shall be set to an equal or smaller value than the RXVECTOR parameter NUM\_STS of the received PPDU from which the MFB parameters are estimated.

If the MFB requester sends the MRQ in an S1G NDP Announcement frame, then the MFB responder shall include the corresponding MFB in (all of) the S1G Compressed Beamforming frame(s) sent in response to the same S1G NDP Announcement frame and NDP sequence.

If the value of the NUM\_STS subfield of the MFB field (solicited or unsolicited) is a smaller value than the RXVECTOR parameter NUM\_STS of the received PPDU on which the MFB is based, the MFB responder shall estimate the recommended VHT-MCS under the assumption that the MFB requester will transmit the first *NSTS* space-time streams in the corresponding PPDU carrying MRQ. If the MFB is based on an SU PPDU the first *NSTS* space-time streams correspond to columns 1, ..., *NSTS* of the spatial mapping matrix *Q*. If the MFB is based on an S1G MU PPDU, then for the user *u* the first *NSTS* space-time streams correspond to columns *Mu*+1, ..., *Mu*+*NSTS,u* of the spatial mapping matrix *Q* (*Mu* is defined in 24.3.9.11.1 (Transmission in S1G format)).

An S1G NDP Announcement frame that contains multiple STA Info fields and that contains an S1G format of HT Control field with the MRQ subfield equal to 1 solicits an MFB response from all the STAs listed in the STA Info fields.

When the MFB requester sets the MRQ subfield to 1 and sets the MSI/STBC subfield to a value that matches the MSI/STBC subfield value of a previous request for which the responder has not yet provided feedback, the responder shall discard or abandon the computation for the MRQ that corresponds to the previous use of that MSI/STBC subfield value and start a new computation based on the new request.

A STA may respond immediately to a current request for MFB with a frame containing an MFSI field value and an MFB field value that correspond to a request that precedes the current request.

Bidirectional request/responses are supported. A STA may act as both the MFB requester for one direction of a duplex link and the MFB responder for the other direction and include both an MRQ and an MFB in the same S1G variant HT Control field.

**{The following replacement for 11ahD2.0 subclause 9.33.5 is based on the equivalent 11mcD3.0 text (subclause 9.34.5).}**

**9.34.7 S1G sounding protocol**

**9.34.7.1 General**

Transmit beamforming and DL-MU-MIMO require knowledge of the channel state to compute a steering matrix that is applied to the transmitted signal to optimize reception at one or more receivers. The STA transmitting using the steering matrix is called the VHT beamformer and a STA for which reception is optimized is called an S1G beamformee. An explicit feedback mechanism is used where the S1G beamformee directly measures the channel from the training symbols transmitted by the S1G beamformer and sends back a transformed estimate of the channel state to the S1G beamformer. The S1G beamformer then uses this estimate, perhaps combining estimates from multiple S1G beamformees, to derive the steering matrix.

If dot11S1GSUBeamformerOptionImplemented is true, a STA shall set the SU Beamformer Capable field in the S1G Capabilities element to 1. If dot11S1GSUBeamformeeOptionImplemented is true, a STA shall set the SU Beamformee Capable field in the S1G Capabilities element to 1.

If dot11S1GMUBeamformerOptionImplemented is true, a STA shall set the MU Beamformer Capable field in the S1G Capabilities element to 1. If dot11S1GMUBeamformeeOptionImplemented is true, a STA shall set the MU Beamformee Capable field in the S1G Capabilities element to 1.

If dot11S1GMUBeamformerOptionImplemented is true, a STA shall set dot11S1GSUBeamformerOptionImplemented to true. If dot11S1GMUBeamformeeOptionImplemented is true, a STA shall set dot11S1GSUBeamformeeOptionImplemented to true.

A STA is an S1G SU-only beamformer if it sets the SU Beamformer Capable field to 1 but sets the MU Beamformer Capable field to 0 in transmitted S1G Capabilities elements. A STA is an SU-only beamformee if it sets the SU Beamformee Capable field to 1 but sets the MU Beamformee Capable field to 0 in transmitted S1G Capabilities elements.

If dot11S1GSUBeamformerOptionImplemented is false, a STA shall not act in the role of an S1G beamformer. If dot11S1GSUBeamformeeOptionImplemented is false, a STA shall not act in the role of an S1G beamformee.

**9.34.7.2 Rules for S1G sounding protocol sequences**

An S1G beamformer shall initiate a sounding feedback sequence by transmitting an S1G NDP Announcement frame followed by an S1G NDP after a SIFS. The S1G beamformer shall include in the S1G NDP Announcement frame one STA Info field for each S1G beamformee that is expected to prepare S1G Compressed Beamforming feedback and shall identify the S1G beamformee by including the S1G beamformee’s AID in the AID subfield of the STA Info field. The S1G NDP Announcement frame shall include at least one STA Info field.

NOTE―A STA that transmits an S1G NDP Announcement frame to a DLS or TDLS peer STA obtains the AID for the peer STA from the DLS Setup Request, DLS Setup Response, TDLS Setup Request, or TDLS Setup Response frame.

An S1G beamformer shall not transmit either an S1G NDP Announcement+HTC frame or a Beamforming Report Poll+HTC frame that contains an HT variant HT Control field.

An S1G NDP shall be transmitted only following a SIFS after an S1G NDP Announcement frame. An S1G NDP Announcement frame shall be followed by an S1G NDP after SIFS.

An S1G beamformer that has not received from a STA an S1G Capabilities element or where the last S1G Capabilities element received from the STA has the SU Beamformee Capable field set to 0 shall not transmit either of the following:

* An S1G NDP Announcement frame addressed to the STA or that includes the STA’s AID in one of the STA Info fields
* A Beamforming Report Poll frame to the STA

An S1G beamformer that transmits an S1G NDP Announcement frame to an S1G SU-only beamformee shall include only one STA Info field in the S1G NDP Announcement frame and set the Feedback Type subfield of the STA Info field to SU.

If the S1G NDP Announcement frame includes more than one STA Info field, the RA of the S1G NDP Announcement frame shall be set to the broadcast address. If the S1G NDP Announcement frame includes a single STA Info field, the RA of the S1G NDP Announcement frame shall be set to the MAC address of the S1G beamformee.

An S1G NDP Announcement frame shall not include two or more STA Info fields with same value in the AID subfield.

An S1G beamformer that transmits an S1G NDP Announcement frame to an S1G beamformee that is an AP, mesh STA or STA that is a member of an IBSS, shall include a single STA Info field in the S1G NDP Announcement frame and shall set the AID field in the STA Info field to 0.

An S1G NDP Announcement frame with more than one STA Info field shall not carry an S1G variant HT Control field, unless all the STAs listed in the AID field of the STA Info fields have set +HTC-S1G Capable to 1 in the S1G Capabilities Info field.

An S1G beamformer that transmits an S1G NDP Announcement frame with more than one STA Info field should transmit any Beamforming Report Poll frames used to retrieve S1G Compressed Beamforming feedback from the intended S1G beamformees in the same TXOP. If the duration of the TXOP that contained the S1G NDP Announcement frame has insufficient duration to accommodate the transmission of all of the feedback reports, the S1G beamformer may poll for the remaining S1G Compressed Beamforming feedback in subsequent TXOPs.

NOTE—The transmission of the S1G NDP Announcement, S1G NDP, S1G Compressed Beamforming, and Beamforming Report Poll frames is subject to the rules in 9.22.2.7 (Multiple frame transmission in an EDCA TXOP).

An S1G beamformer that sets the Feedback Type subfield of a STA Info field to MU shall set the Nc Index subfield of the same STA Info field to a value equal to or less than the minimum of both the following:

* The maximum number of supported spatial streams according to the corresponding S1G beamformee’s Rx S1G-MCS Map subfield in the Supported S1G-MCS and NSS Set field
* The maximum number of supported spatial streams according to the Rx NSS subfield value in the Operating Mode field of the most recently received Operating Mode Notification frame or Operating Mode Notification element with the Rx NSS Type subfield equal to 0 from the corresponding S1G beamformee

A non-AP S1G beamformee that receives an S1G NDP Announcement frame from an S1G beamformer with which it is associated or has an established DLS or TDLS session and that contains the S1G beamformee's AID in the AID subfield of the first (or only) STA Info field and also receives an S1G NDP a SIFS after the S1G NDP Announcement frame shall transmit the PPDU containing its S1G Compressed Beamforming feedback a SIFS after the S1G NDP. An S1G beamformee that is an AP, mesh STA, or STA that is a member of an IBSS, that receives an S1G NDP Announcement frame with the RA matching its MAC address and the AID subfield of the only STA Info field set to 0, and that also receives an S1G NDP a SIFS after the S1G NDP Announcement frame shall transmit the PPDU containing its S1G Compressed Beamforming feedback a SIFS after the S1G NDP. The TXVECTOR parameter CH\_BANDWIDTH of the PPDU containing the S1G Compressed Beamforming feedback shall be set to indicate a bandwidth not wider than that indicated in the

RXVECTOR parameter CH\_BANDWIDTH of the received S1G NDP frame. A STA ignores received S1G NDP Announcement, S1G NDP, and Beamforming Report Poll frames if dot11S1GSUBeamformeeImplemented is false.

An S1G beamformee shall indicate the maximum number of space-time streams it can receive in an S1G NDP in the Beamformee STS Capability field. If the beamformee is a non-AP STA, this shall also be the maximum total number of space-time streams that the STA can receive in an S1G MU PPDU.

An example of the S1G sounding protocol with a single S1G beamformee is shown in Figure 9-51 (Example of the sounding protocol with a single S1G beamformee).

**{ In this figure replace every instance of “VHT” with “S1G”. }**

**Figure 9-53—Example of the sounding protocol with a single S1G beamformee**

A non-AP S1G beamformee that receives an S1G NDP Announcement frame from an S1G beamformer with which it is associated or has an established DLS or TDLS session and that contains the S1G beamformee’s AID in the AID subfield of a STA Info field that is not the first STA Info field shall transmit its S1G Compressed Beamforming feedback a SIFS after receiving a Beamforming Report Poll with RA matching its MAC address and a non-bandwidth signaling TA obtained from the TA field matching the MAC address of the S1G beamformer. If the RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT of the received Beamforming Report Poll frame is valid, the TXVECTOR parameter CH\_BANDWIDTH of the PPDU containing the S1G Compressed Beamforming feedback shall be set to indicate a bandwidth not wider than that indicated by the RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT of the Beamforming Report Poll frame; otherwise, the TXVECTOR parameter CH\_BANDWIDTH of the PPDU containing S1G Compressed Beamforming feedback shall be set to indicate a bandwidth not wider than that indicated by the RXVECTOR parameter CH\_BANDWIDTH of the Beamforming Report Poll frame.

An example of the S1G sounding protocol with more than one S1G beamformee is shown in Figure 9-7 (Example of dual CTS mechanism (STBC initiator)).

**{ In this figure replace every instance of “VHT” with “S1G”. }**

**Figure 9-54—Example of the sounding protocol with more than one S1G beamformee**

The RA field of the S1G Compressed Beamforming frame(s) of the S1G Compressed Beamforming feedback shall be set to a non-bandwidth signaling TA obtained from the TA field of the S1G NDP Announcement frame or the Beamforming Report Poll frame to which this S1G Compressed Beamforming feedback is a response.If the S1G Beamformee is transmitting S1G Compressed Beamforming frame(s) a SIFS after the S1G NDP, then the S1G Compressed Beamforming frame(s) shall include the S1G Compressed Beamforming Report information and, for the case of MU feedback, the MU Exclusive Beamforming Report information.

An S1G beamformee that transmits an S1G Compressed Beamforming frame shall set the Feedback Type field in the S1G MIMO Control field to the same value as the Feedback Type field in the corresponding STA Info field in the S1G NDP Announcement frame. If the Feedback Type field indicates MU, the STA shall send an S1G Compressed Beamforming frame with the Nc Index field value in the S1G MIMO Control field equal to the minimum of all the following:

* The Nc Index field value in the corresponding STA Info field in the S1G NDP Announcement frame
* The maximum number of supported spatial streams according to its Rx S1G-MCS Map subfield in the Supported S1G-MCS and NSS Set field
* The maximum number of supported spatial streams according to its Rx NSS subfield value in the Operating Mode field of the Operating Mode Notification frame or Operating Mode Notification element transmitted most recently by the S1G beamformee

If the Feedback Type indicates SU, the Nc Index field value in the S1G MIMO Control field is determined by the S1G beamformee.

The Nr Index field in the S1G MIMO Control field shall be set to the same value as the RXVECTOR parameter NUM\_STS of the corresponding S1G NDP. The Nc Index field shall not be set to a value larger than the Nr Index value in the S1G MIMO Control field. An S1G beamformee shall set the value of the Channel Width subfield in the S1G MIMO Control field of an S1G Compressed Beamforming frame to the same value as the RXVECTOR parameter CH\_BANDWIDTH of the corresponding S1G NDP frame.

An S1G beamformee shall not include MU Exclusive Beamforming Report information in S1G Compressed Beamforming feedback if the Feedback Type subfield in the MIMO Control field of the S1G Compressed Beamforming frame(s) indicates SU. An S1G beamformee shall include both S1G Compressed Beamforming Report information and MU Exclusive Beamforming Report information in S1G Compressed Beamforming feedback if the Feedback Type subfield in the MIMO Control field of the S1G Compressed Beamforming frame(s) indicates MU.

An S1G beamformee that transmits S1G Compressed Beamforming feedback shall include neither the S1G Compressed Beamforming Report information and nor the MU Exclusive Beamforming Report information if the transmission duration of the PPDU carrying the S1G Compressed Beamforming Report information and any MU Exclusive Beamforming Report information would exceed the maximum PPDU duration.

The value of the Sounding Dialog Token Number subfield in the S1G MIMO Control field shall be set to the same value as the Sounding Dialog Token Number subfield in the Sounding Dialog Token field in the corresponding S1G NDP Announcement frame.

NOTE 1—The S1G beamformer can use the sounding dialog token in the S1G Compressed Beamforming frame(s) of the S1G Compressed Beamforming feedback to associate the feedback with a prior S1G NDP Announcement frame and thus compute the delay between sounding and receiving the feedback. The S1G beamformer can use this delay time when making a decision regarding the applicability of the feedback for the link.

NOTE 2—Recovery in the case of a missing response to an S1G NDP Announcement or Beamforming Report Poll frame follows the rules for multiple frame transmission in an EDCA TXOP (see 9.22.2.7 (Multiple frame transmission in an EDCA TXOP)).

S1G Compressed Beamforming feedback is comprised of the S1G Compressed Beamforming Report information (see Table 8-75 (S1G Compressed Beamforming Report information)) and the MU Exclusive Beamforming Report information (see Table 8-78 (MU Exclusive Beamforming Report information)). Subclause 8.6.23.2 (S1G Compressed Beamforming frame format) specifies how S1G Compressed

Beamforming feedback is converted into an S1G Compressed Beamforming frame, and it also specifies the rules for the presence or absence of the two fields listed here.

In a frame transmitted by a TVHT STA, the TVHT Compressed Beamforming Report field replaces the VHT Compressed Beamforming Report field.

In a frame transmitted by a TVHT STA, the TVHT MU Exclusive Beamforming Report field replaces the MU Exclusive Beamforming Report field.

**9.34.7.3 Rules for fragmented feedback in S1G sounding protocol sequences**

S1G Compressed Beamforming feedback shall be transmitted in a single S1G Compressed Beamforming frame unless the result would be an S1G Compressed Beamforming frame that exceeds the S1G beamformer's maximum MPDU length capability.

NOTE 1—The S1G beamformee might therefore have to transmit an MPDU that is bigger than the S1G beamformee is capable of receiving.

If S1G Compressed Beamforming feedback would result in an S1G Compressed Beamforming frame that exceeds the S1G beamformer’s maximum MPDU length capability, the S1G Compressed Beamforming feedback shall be split into up to 8 feedback segments, with each feedback segment sent in a different S1G

Compressed Beamforming frame and containing successive portions of the S1G Compressed Beamforming feedback consisting of the S1G Compressed Beamforming Report information followed by any MU Exclusive Beamforming Report information. Each of the feedback segments except the last shall contain the maximum number of octets allowed by the S1G beamformer’s maximum MPDU length capability. The last feedback segment may be smaller. Each feedback segment is identified by the value of the Remaining Feedback Segments subfield and the First Feedback Segment subfield in the S1G MIMO Control field as defined in 8.4.1.47 (S1G MIMO Control field); the other nonreserved subfields of the S1G MIMO Control field shall be the same for all feedback segments. All feedback segments shall be sent in a single A-MPDU and shall be included in the A-MPDU in the descending order of the Remaining Feedback Segments subfield values.

NOTE 2—The feedback segments of an S1G Compressed Beamforming report are not MSDU/MMPDU fragments and can be included in an A-MPDU as described in this subclause.

An S1G beamformer, in its first attempt to retrieve S1G Compressed Beamforming feedback from an S1G beamformee that is not the one indicated by the first STA Info field, shall transmit a Beamforming Report Poll frame to poll all possible feedback segments of the S1G Compressed Beamforming feedback from the S1G beamformee, by setting all the bits in the Feedback Segment Retransmission Bitmap field of the Beamforming Report Poll frame to 1.

If anS1G beamformer fails to receive some or all feedback segments of S1G Compressed Beamforming feedback, the S1G beamformer may, subject to the condition on S1G SU-only beamformees described at the end of this subclause, request a selective retransmission of missing feedback segments by transmitting a Beamforming Report Poll frame with the Feedback Segment Retransmission Bitmap field set as described in 8.3.1.21 (Beamforming Report Poll frame format) to indicate the feedback segments requested for retransmission. If the S1G beamformer fails to receive the feedback segment with the First Feedback Segment field set to 1, the S1G beamformer may request a selective retransmission of missing feedback segments assuming the S1G Compressed Beamforming feedback is split into 8 feedback segments. The S1G beamformer may also request the retransmission of all feedback segments by setting all the bits in the Feedback Segment Retransmission Bitmap field of the Beamforming Report Poll frame to 1.

An S1G beamformee that transmits S1G Compressed Beamforming feedback including the S1G Compressed Beamforming Report information and any MU Exclusive Beamforming Report information in response to a Beamforming Report Poll frame shall either transmit only the feedback segments indicated in the Feedback Segment Retransmission Bitmap field in the Beamforming Report Poll frame excluding the indicated feedback

segments that do not exist at the S1G beamformee or transmit all the feedback segments that exist at the S1Gbeamformee disregarding the Feedback Segment Retransmission Bitmap field in the Beamforming Report Pollframe.

An S1G beamformer shall not transmit a Beamforming Report Poll frame to an S1G SU-only beamformee unless the S1G beamformer has received at least one feedback segment of the S1G Compressed Beamforming feedback from the S1G beamformee in the current frame exchange sequence. In a frame transmitted by a TVHT STA, the TVHT Compressed Beamforming Report field replaces the S1G Compressed Beamforming Report field.

In a frame transmitted by a TVHT STA, the TVHT MU Exclusive Beamforming Report field replaces the MU

Exclusive Beamforming Report field.

**{ 11ahD2.0 includes a new subclause 9.33.7 (Transmission of an S1G NDP Sounding Frame). It is proposed that the number of this subclause be changed to 9.33.8 (in 11mcD3.0 this will be 9.34.8). }**