IEEE P802.11
Wireless LANs

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| Proposed Draft Text: Additional Changes to Sounding FB |
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Abstract

This submission contains additional text changes for section 35.5.2 (EHT sounding protocol) of 802.11be Draft 1.1.

# Introduction

Section 35.5.2 (EHT sounding protocol) was significantly updated with text proposed in 11-21/0886r3 [2]. Upon further review, some additional changes are needed. This submission discusses the changes and proposes the appropriate text modifications.

# Additional changes

This section discusses the changes that are proposed. Instructions to the Editor are given in the next section.

## Missing SU feedback BW modes

The text currently only lists the following modes for SU feedback with non-TB sounding (i.e., only cases where the BFee operating bandwidth equals to NDPA bandwidth):

* In an EHT non-TB sounding sequence, a 20 MHz operating EHT beamformee shall support SU feedback for 242-tone RU solicited with an EHT NDP Announcement frame of bandwidth of 20 MHz.
* In an EHT non-TB sounding sequence, a 40 MHz operating EHT beamformee shall support SU feedback for 484-tone RU solicited with an EHT NDP Announcement frame of bandwidth of 40 MHz.
* In an EHT non-TB sounding sequence, an 80 MHz operating EHT beamformee shall support SU feedback for 996-tone RU and 484+242-tone MRU (if the MRU is full bandwidth feedback) solicited with an EHT NDP Announcement frame of bandwidth of 80 MHz.
* In an EHT non-TB sounding sequence, a 160 MHz operating EHT beamformee shall support SU feedback for 2x996-tone RU and 996+484-tone and 996+484+242-tone MRUs (if the MRUs are full bandwidth feedback) solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz.
* In an EHT non-TB sounding sequence, a 320 MHz operating EHT beamformee shall support SU feedback for 4x996-tone RU and 2x996+484-tone, 3x996-tone, and 3x996+484-tone MRU (if the MRUs are full bandwidth feedback) solicited with an EHT NDP Announcement frame of bandwidth of 320 MHz.

This leaves out several BW modes that should be supported to be consistent with e.g., 802.11ax. The text proposal below adds the missing modes.

## Partial feedback for non-TB CQI.

Currently 802.11be Draft 1.1 states ([1], page 333, line 45):



This is not consistent with the definition of Non-Triggered CQI Feedback, as in e.g., Table 9-322ar:



Nor is it consistent with the equivalent section of 802.11ax-2021 (page 377):



The text proposal below makes the required correction.

## Overview table

There are a total of six different sounding feedback modes (optional and mandatory) and four capability bits to determine which options are supported. The text proposal adds a table to provide a concise overview of all the various modes and their respective supported RU/MRUs.

# Text proposal – Editor instructions

NOTE: all changes are relative to 802.11be Draft 1.1.

On Page 335, line 39, make the following changes:

In an EHT non-TB sounding sequence, a 40 MHz operating EHT beamformee shall support SU feedback for the following combinations of RU size and NDP announcement BW:

* 242-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 20MHz
* 484-tone RU feedback solicited with an EHT NDP Announcement frame of bandwidth of 40 MHz.

Page 335, line 58, make the following changes:

In an EHT non-TB sounding sequence, an 80 MHz operating EHT beamformee shall support SU feedback for the following combinations of RU/MRU size and NDP announcement BW:

* 242-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 20MHz
* 484-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 40MHz
* 484+242-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 80 MHz with 20 MHz puncturing
* 996-tone RU ~~and 484+242-tone MRU~~ feedback ~~(if the MRU is full bandwidth feedback)~~ solicited with an EHT NDP Announcement frame of bandwidth of 80 MHz.

Page 336, line 25, make the following changes:

In an EHT non-TB sounding sequence, a 160 MHz operating EHT beamformee shall support SU feedback for the following combinations of RU/MRU size and NDP announcement BW:

* 242-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 20MHz
* 484-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 40MHz
* 484+242-tone MRU solicited with an EHT NDP Announcement frame of bandwidth of 80 MHz with 20 MHz puncturing
* 996-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 80MHz
* 996+484-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz with 40 MHz puncturing.
* 996+484+242-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz with 20 MHz puncturing.
* 2x996-tone RU~~, and 996+484-tone and 996+484+242-tone MRUs~~ feedback ~~(if the MRUs are full bandwidth feedback)~~ solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz.

Page 337, line 1, make the following changes:

In an EHT non-TB sounding sequence, a 320 MHz operating EHT beamformee shall support SU feedback for the following combinations of RU/MRU size and NDP announcement BW:

* 242-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 20MHz
* 484-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 40MHz
* 484+242-tone MRU solicited with an EHT NDP Announcement frame of bandwidth of 80 MHz with 20 MHz puncturing
* 996-tone RU feedback solicited with an EHT NDP announcement frame of bandwidth of 80MHz
* 996+484-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz with 40 MHz puncturing.
* 996+484+242-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz with 20 MHz puncturing.
* 2x996-tone RU feedback solicited with an EHT NDP Announcement frame of bandwidth of 160 MHz.
* 2x996+484-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 320 MHz with 80 + 40 MHz puncturing.
* 3x996-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 320 MHz with 80 MHz puncturing.
* 3x996+484-tone MRU feedback solicited with an EHT NDP Announcement frame of bandwidth of 320 MHz with 40 MHz puncturing.
* 4x996-tone RU. ~~and 2x996+484-tone, 3x996-tone, and 3x996+484-tone MRU~~ feedback ~~(if the MRUs are full bandwidth feedback)~~ solicited with an EHT NDP Announcement frame of bandwidth of 320 MHz.

Page 333, Line 45, make the following changes:

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.

At the end of subclause 35.5.2 (page 337, line 40), add the following text and table:

Table xyz1 summarizes the supported sounding BW for the various sounding modes and feedback types.

**Table xyz1 – Summary of supported RU/MRU sizes for Sounding Feedback**

|  |  |  |
| --- | --- | --- |
| **Operating channel width of the EHT beamformee (MHz)** | **Sounding feedback modes** | **Bandwidth of EHT NDP Announcement frame (MHz)** |
| 20 | 40 | 80 | 160 | 320 |
| 20  | Mandatory for SU feedback (non-TB sounding) | 242 | N/A |
| Optional for CQI feedback (non-TB sounding) – NOTE 1 |
| Mandatory for MU feedback (TB sounding)  |
| Optional for MU feedback (TB sounding) – NOTE 2 | N/A | 242 | 242 | 242 | N/A |
| Optional for SU feedback (TB sounding) – NOTE 3 | 242 | 242 | 242 | 242 | N/A |
| Optional for CQI feedback (TB sounding) – NOTE 4 |
| 40 | Mandatory for SU feedback (non-TB sounding) | 242 | 484 | N/A |
| Optional for CQI feedback (non-TB sounding) – NOTE 1 |
| Mandatory for MU feedback (TB sounding)  |
| Optional for MU feedback (TB sounding) – NOTE 2 | N/A | 242 | N/A |
| Optional for SU feedback (TB sounding) – NOTE 3 | 242 | 242, 484 | N/A |
| Optional for CQI feedback (TB sounding) – NOTE 4 |
| 80 | Mandatory for SU feedback (non-TB sounding) | 242 | 484 | 484+242(F), 996 | N/A |
| Optional for CQI feedback (non-TB sounding) – NOTE 1 |
| Mandatory for MU feedback (TB sounding)  | 242 | 484 | 484+242(F), 996 | 484+242(F), 996 | 996 |
| Optional for MU feedback (TB sounding) – NOTE 2 | N/A | 242 | 242, 484, 484+242(P) | 242, 484, 484+242(P) | 484 |
| Optional for SU feedback (TB sounding) – NOTE 3 | 242 | 242, 484 | 242, 484, 484+242 996 | 242, 484, 484+242, 996 | 484, 996 |
| Optional for CQI feedback (TB sounding) – NOTE 4 |
| 160 | Mandatory for SU feedback (non-TB sounding) | 242 | 484 | 484+242(F), 996 | 996+484(F), 996+484+242(F), 2x996 | N/A |
| Optional for CQI feedback (non-TB sounding) – NOTE 1 |
| Mandatory for MU feedback (TB sounding)  | 242 | 484 | 484+242(F), 996 | 996+484(F), 996+484+242(F), 2x996 | 996+484(F), 2x996 |
| Optional for MU feedback (TB sounding) – NOTE 2 | N/A | 242 | 242, 484, 484+242(P) | 242, 484, 996, 484+242(P), 996+484(P) | 484, 996, 996+484(P) |
| Optional for SU feedback (TB sounding) – NOTE 3 | 242 | 242, 484 | 242, 484, 484+242, 996 | 242, 484, 996, 484+242, 996+484, 996+484+242, 2x996 | 484, 996, 996+484, 2x996 |
| Optional for CQI feedback (TB sounding) – NOTE 4 |
| 320 | Mandatory for SU feedback (non-TB sounding) | 242 | 484 | 484+242(F), 996 | 996+484(F), 996+484+242(F), 2x996 | 2x996+484(F), 3x996(F), 3x996+484(F), 4x996 |
| Optional for CQI feedback (non-TB sounding) – NOTE 1 |
| Mandatory for MU feedback (TB sounding)  | 242 | 484 | 484+242(F), 996 | 996+484(F), 996+484+242(F), 2x996 | 2x996+484(F), 3x996(F), 3x996+484(F), 4x996 |
| Optional for MU feedback (TB sounding) – NOTE 2 | N/A | 242 | 242, 484, 484+242(P) | 242, 484, 996, 484+242(P),996+484(P) | 484, 996, 996+484, 2x996, 2x996+484(P), 3x996+484(P), 3x996(P) |
| Optional for SU feedback (TB sounding) – NOTE 3 | 242 | 242, 484 | 242, 484, 484+242, 996 | 242, 484, 996, 484+242, 996+484, 996+484+242, 2x996 | 484, 996, 996+484, 2x996, 2x996+484, 3x996, 3x996+484, 4x996 |
| Optional for CQI feedback (TB sounding) – NOTE 4 |
| NOTE 1: Supported if the Non-Triggered CQI Feedback subfield in EHT Capabilities element is set to 1.NOTE 2: Supported if the Triggered MU Beamforming Partial BW Feedback subfield in EHT Capabilities element is set to 1.NOTE 3: Supported if the Triggered SU Beamforming Feedback subfield in EHT Capabilities element is set to 1.NOTE 4: Supported if the Triggered CQI Feedback subfield in EHT Capabilities element is set to 1.NOTE 5: “(F)” right after the MRU indicates MRU sizes where the feedback represents Full bandwidth feedback. “(P)” right after the MRU indicates MRU sizes where the feedback represents Partial bandwidth feedback. If no explicit indication is added, both (F) and (P) are implied.NOTE 6: Each value in the table only indicates the size of a feedback RU/MRU, not the location of the RU/MRU. This includes all possible feedback RU/MRUs of the same size within the beamformee’s operating BW. |

# References

[1] P802.11be Draft 1.1

[2] Proposed changes to sounding FB, 11-21/0886r3