IEEE P802.11
Wireless LANs

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| Proposed Draft Text for Sensing-Responder-to-Sensing-Responder Sounding |
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Abstract

This document contains proposed draft text on sensing-responder-to-sensing-responder (SR2SR) sounding that aims to resolve the following comments received in CC40: 156, 380, 467, 495, and 787.

R0: Initial version

R1: Revisions accommodating to the progress of Sensing TF formats and Sensing NDP formats

R2: Revisions according to online/offline discussions (highlighted in yallow color); adding proposed resolution to 6 CIDs

**Introduction**

The following two straw polls on SR2SR sounding in document 22-1368r4 were supported by unanimous consent.

1. **Do you agree with the following?**
	* **Add a Sensing-Responder-to-Sensing-Responder (SR2SR) sounding phase to the TB sensing measurement instance.**
	* **In an SR2SR sounding phase, there is one SR2SR sensing transmitter and one or more SR2SR sensing receivers. The AP shall transmit an SR2SR Sensing TF to the SR2SR sensing responders.**
		+ **The SR2SR Sensing TF assigns the roles of the SR2SR sensing responders.**
		+ **An SIFS time after receiving the TF, the SR2SR sensing transmitter shall respond with an SR2SR Sensing NDP. The SR2SR NDP is the HE Ranging NDP (i.e., an HE SU PPDU without the Data field).**
		+ **Upon receiving of the NDP, each SR2SR sensing receiver measures the CSI.**
	* **During a reporting phase, the Report subvariant of the Sensing TF is transmitted by the AP to solicitate transmissions of sensing measurement report frames by the STAs whose roles are SR2SR sensing receivers in one or more of the SR2SR sounding phases.**
2. **Do you agree with the following?**
	* **The SR2SR Sensing trigger frame (TF) is a variant of the Passive Sounding Ranging TF.**
		+ **The Trigger Dependent Common Info subfield has 2 bytes and one of the reserved bits (B4) is used to indicate ranging/sensing.**
		+ **The SR2SR sensing TF has two or more User Info fields.**
		+ **One of the User Info fields is addressed to the SR2SR sensing transmitter and the other User Info field(s) are addressed to the SR2SR sensing receiver(s).**
		+ **One reserved bit (e.g., B12) of each User Info field is used to indicate the role of the corresponding SR2SR responder.**
			- **If the bit is 0, the responder is assigned as the SR2SR sensing transmitter;**
			- **If the bit is 1, the responder is assigned as an SR2SR sensing receiver.**
		+ **The inclusion of the AID/USID of the SR2SR sensing transmitter, Measurement Setup ID, and Measurement Instance ID is TBD.**

The following agreements on the Sensing SR2SR sounding TF format were reached at the ad hoc call on Oct. 19:

1. **The measurement setup ID and measurement instance ID are contained in the Trigger Dependent Common Info subfield using some of the reserved bits B5 – B15.**
2. **For the User Info field addressed to the SR2SR sensing transmitter, whether to keep the subfields I2R Rep, SS Allocation/RA-RU Information, and UL Target Receive Power is for further discussion.**
3. **The User Info field addressed to an SR2SR sensing receiver contains the AID/USID of the SR2SR sensing transmitter and does not contain the subfields I2R Rep, SS Allocation/RA-RU Information, and UL Target Receive Power.**

Based on the above agreements, the document proposes text for the Sensing SR2SR sounding trigger frame format and the SR2SR sounding phase.

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| **CID** | **Clause**  | **Page** | **Line** | **Comment** | **Proposed Change** |
| 156 | 11.21.18.6 | 68 | 22 | Details of Responder-to-Responder sensing mode is missing. | Define Responder-to-Responder sensing mode |
| 380 | 11.21.18.6 | 68 | 22 | The details of R2R sensing operating are missing, e.g., how to schdule R2R sensing, How to trasmit NDP in terms of R2R sensing | As in the comment. |
| 467 | 11.21.18.6 | 68 | 22-23 | Detail operational procedure for responder-to-responder sensing is needed. | As in the comment. |
| 495 | 11.21.18.6 | 68 | 22 | This sensing responder to sensing responder sounding needs more details on setup, parameters negotiation, timing for NDP Tx/Rx between non-AP STA responders, etc. Also some illustrating figures related to this procedure will be helpful for readers. | Define required procedures, parameters to support this feature as in comment. |
| 787 | 11.21.18.6 | 68 | 22 | Assuming the sensing responder transmits TB NDP PPDUs as response to a TF from AP, its not clear how other sensing responder can measure NDP transmitted by another responder STA | Either delete this sentence or define the procedure using TB sensing for Responder-to-responder sensing. |

**Proposed resolution**: Revised

**Proposed Text**

*TGbf Editor: Please change Clause 9.3.1.22.11 (Sensing Trigger variant) as follows.*

**9.3.1.22.11 Sensing Trigger variant**

The format of the Trigger Dependent Common Info field for Sensing Poll, Sensing Sounding, and Sensing Report Trigger frame is shown in Figure 9-xxx (Trigger Dependent Common Info subfield for the Sensing Poll, Sensing Sounding, and Sensing Report Trigger frame).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 B7 |
|  | Sensing Trigger Subtype | Sensing | Reserved |
| Bits: | 4 | 1 | 3 |

**Figure 9-xxx - Trigger Dependent Common Info subfield format for the Sensing Poll, Sensing Sounding, and Sensing Report Trigger frame**

The format of the Trigger Dependent Common Info subfield of the Sensing SR2SR Sounding Trigger frame is shown in Figure 9-aaa (Trigger Dependent Common Info subfield format of the Sensing SR2SR Sounding Trigger frame). The Measurement Setup ID subfield contains a value in the range of 0 to 7 which identifies the measurement setup ID. The Measurement Instance ID subfield contains a value in the range of 0 to 63 which identifies the measurement instance ID.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 | B5 B7 | B8 B13 | B14 B15 |
|  | Sensing Trigger Subtype | Sensing | MeasurementSetupID | MeasurementInstanceID | Reserved |
| Bits: | 4 | 1 | 3 | 6 | 2 |

**Figure 9-aaa—Trigger Dependent Common Info subfield format for the Sensing SR2SR Sounding Trigger frame**

The Sensing Trigger Subtype subfield value in the Trigger Dependent Common Info field of the Sensing Trigger frame, see Table 9-xxxx (Sensing Trigger subtype field encoding), signals the Sensing Trigger frame subvariants which can be one of four frame types: Sensing Poll, Sensing Sounding, Sensing Report, and Sensing SR2SR Sounding Trigger frame. The Sensing subfield indicates whether the Trigger frame is a Sensing Trigger variant. The Sensing subfield is set to 1 in the Sensing Trigger variant. Otherwise, it is set to 0.

The value of the Sensing Trigger Subtype subfield for the Sensing Trigger frame variant is defined in Table 9-xxxx.

**Table 9-xxxx — Sensing Trigger Subtype field encoding**

|  |  |
| --- | --- |
| **Sensing Trigger Subtype field value** | **Sensing Trigger frame variant** |
| 0 | Sensing Poll |
| 1 | Sensing Sounding |
| 2 | Sensing Threshold-Based Report Poll |
| 3 | Sensing Report |
| 4 | Sensing SR2SR Sounding |
| 5-15 | Reserved |

*TGbf Editor: Please insert the following new Clause 9.3.1.22.11.x (Sensing SR2SR Sounding Trigger frame).*

**9.3.1.22.11.x Sensing SR2SR Sounding Trigger frame**

The Sensing SR2SR Sounding Trigger frame contains one Transmitter User Info field and one or more Receiver User Info fields. The format of the Transmitter User Info field is defined in Figure 9-bbb (Transmitter User Info field for Sensing SR2SR Sounding Trigger frame).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B11 | B12 | B13 B20 | B21 B23 | B24 B25 | B26 B31 | B32 B38 | B39 |
|  | AID12/USID12 | Tx/Rx | Reserved | SR2SR Rep | Reserved | SSAllocation /RA-RU Information | UL Target Receive Power | Reserved |
| Bits | 12 | 1 | 8 | 3 | 2 | 6 | 7 | 1 |

1. Figure 9-bbb—Transmitter User Info field for Sensing SR2SR Sounding Trigger frame

The Transmitter User Info field in the Sensing SR2SR Sounding Trigger frame follows the definition of the User Info field in the Sensing Sounding Trigger frame except that the former contains the Tx/Rx subfield, which indicates the role of the addressed SR2SR sensing responder in the current SR2SR sounding phase. The Tx/Rx subfield in the Transmitter User Info filed is set to 0.

The format of the Receiver User Info field is defined in Figure 9-ccc (Receiver User Info field for Sensing SR2SR Sounding Trigger frame).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B11 | B12 | B13 B24 | B25 B39 |
|  | AID12/USID12 | Tx/Rx | Tx AID12/USID12 | Reserved |
| Bits | 12 | 1 | 12 | 15 |

1. Figure 9-ccc—Receiver User Info field for Sensing SR2SR Sounding Trigger frame

The AID12/USID12 subfield is identical to the corresponding subfield in the Sensing Poll Trigger frame.

The Tx/Rx subfield indicates the role of the addressed SR2SR sensing responder in the current SR2SR sounding phase. The Tx/Rx subfield in a Receiver User Info field is set to 1.

The Tx AID12/USID12 subfield indicates the AID/USID of the SR2SR sensing transmitter in the current SR2SR sounding phase. The value of the Tx AID12/USID12 subfield is the same as the value of the AID12/USID12 subfield in the Transmitter User Info field.

*TGbf Editor: Please change Clause 11.55.1.5.2.1 (Genarl) as follows.*

11.55.1.5.2.1 General

TB sensing measurement instance is the trigger-based variant of a sensing measurement instance. It is applicable to scenarios where an AP is the sensing initiator, and one or more non-AP STAs are the sensing responders. It includes one or more of the following phases: Polling phase, NDPA sounding phase, Trigger frame (TF) sounding phase, SR2SR sounding phase, and reporting phase.

A sensing availability window is a period of time during which an AP and one or more STAs are assigned to participate in TB sensing measurement instance(s). All TB sensing measurement instances shall take place within a sensing availability window. Each sensing availability window may consist of one or more TXOPs, and each TXOP may consist of one or more TB sensing measurement instances.

The reporting phase of a TB sensing measurement instance has two variants: The basic reporting phase (see 11.55.1.5.2.5 (Reporting phase)), and the threshold-based reporting phase (see 11.55.1.5.2.5.2 (Thresholdbased reporting phase)).

The TB sensing measurement instance initiated by an AP optionally allows a sensing responder to measure an NDP transmitted by another sensing responder, as described in 11.55.1.5.2.x (SR2SR Sounding phase).

*TGbf Editor: Please insert the following new Clause 11.55.1.5.2.x (SR2SR Sounding phase).*

11.55.1.5.2.x SR2SR sounding phase

In the SR2SR sounding phase, the AP transmits a Sensing SR2SR Sounding Trigger frame to solicit NDP transmission from one non-AP STA, on which one or more non-AP STAs perform sensing measurement. The SR2SR sounding phase may be present in a TB sensing measurement instance if

* one non-AP STA that is an SR2SR sensing transmitter in this SR2SR sounding phase and that is not assigned to be polled or has responded in the polling phase, and
* at least one non-AP STA that is an SR2SR sensing receiver in this SR2SR sounding phase and that is not assigned to be polled or has responded in the polling phase.

Implementation of SR2SR sounding phase is optional. When supported, the AP shall transmit a Sensing SR2SR Sounding Trigger frame to one non-AP STA that is an SR2SR sensing transmitter and one or more non-AP STAs that are SR2SR sensing receivers, and are not assigned to be polled or have responded in the polling phase of the TB sensing measurement instance to solicit SR2SR NDP transmission. The Sensing SR2SR Sounding Trigger frame shall allocate spatial resources for the SR2SR NDP transmission covering the full bandwidth. The SR2SR NDP may be transmitted with more than one spatial stream. The non-AP STA indicated as an SR2SR sensing transmitter by a Transmitter User Info field in a Sensing SR2SR Sounding Trigger frame shall transmit an SR2SR NDP a SIFS after receiving the Sensing SR2SR Sounding Trigger frame. Any non-AP STA indicated as an SR2SR sensing receiver by a Receiver User Info field in the Sensing SR2SR Sounding Trigger frame shall perform sensing measurement on the SR2SR NDP sent by the SR2SR sensing transmitter.

Note - The AP may be one of the sensing receivers and perform sensing measurement on the SR2SR NDP.

When a PPDU bandwidth is less than or equal to 160 MHz, the format of the SR2SR NDP in the SR2SR sounding phase of a TB sensing measurement instance is an HE Ranging NDP, as described in 27.3.18a.1 (HE Ranging NDP).

In an SR2SR sounding phase, 320 MHz operation is not supported.

**SP:** Do you agree to the resolutions provided in the document 11-22/1917r3for the following CIDs:156, 380, 467, 495, and 787 for inclusion in the latest 11bf draft?