IEEE P802.11
Wireless LANs

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| --- |
| Short SSW Format For Unassociated STAs Text |
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Abstract

This document proposes 11ay draft specification text to enable use of Short SSW by unassociated STAs during CBAP as described in 11-17-0916-02-00ay.

*Note to the editor: instructions starting with “In D0.35” imply that the change is respect to Draft P802.11ay\_D0.35 as opposed to the default Std 802.11-2016.*

9. Frame formats

9.5.1 Sector Sweep field

*In D0.35, modify figure 48 as follows:*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 B9 | B10 B15 | B16 B17 | B18 | B19 B21 | B22 | ~~B22~~ B23 |
|  | Direction | CDOWN | Sector ID | DMG Antenna ID | Quasi-omni TX | PCP/AP Coverage Parameter | RX Unassociated Short SSW | Reserved |
| Bits: | 1 | 9 | 6 | 2 | 1 | 3 | 1 | ~~2~~1 |

*In D0.35, insert the following paragraph at the end of 9.5.1:*

The RX Unassociated Short SSW subfield is set to 1 to indicate that the EDMG STA supports reception of Short SSW packets from unassociated STAs during the CBAP. Otherwise it is set to 0.

10.38 DMG beamforming

10.38.1 General

*In D0.35, modify the first paragraphs as follows:*

Beamforming (BF) is a mechanism that is used by a pair of STAs to achieve the necessary DMG link budget for subsequent communication. BF training is a bidirectional sequence of BF frame or Short SSW packet transmissions that uses sector sweep and provides the necessary signaling to allow each STA to determine appropriate antenna system settings for both transmission and reception. After the successful completion of BF training, BF is said to be established. A BF frame is an SSW frame, a DMG Beacon frame, an SSW-Feedback frame, an SSW-Ack frame or a BRP frame. Figure 10-59 gives an example of the beamforming training procedure. Short SSW packets are only used between EDMG STAs.

10.38.2 Sector-level sweep (SLS) phase

10.38.2.1 General

*In D0.35, insert the following paragraph after the second paragraph (ending “as part of a sector sweep”):*

An EDMG STA that supports reception of Short SSW packets from unassociated STAs during CBAP periods shall set the RX Unassociated Short SSW subfield in the Sector Sweep field to 1 within transmitted DMG Beacon frames.

10.38.2.2.2 Initiator TXSS

*Insert the following paragraph after the fourth paragraph:*

An initiator that is not associated to the responder may use Short SSW packets during the initiator TXSS if it has received a DMG Beacon frame from the responder with the RX Unassociated Short SSW subfield in the Sector Sweep field set to 1. In this case, the initiator shall set the Addressing Mode field to 0, Source AID and Destination AID fields to random values between [0, 255] and the Unassociated field to 1. The Source AID and Destination AID fields values shall not change between Short SSW packets transmitted within the same initiator TXSS.

10.38.2.3.2 Responder TXSS

*Insert the following paragraph after the third paragraph:*

A responder that has transmitted a DMG Beacon frame with the RX Unassociated Short SSW subfield in the Sector Sweep field set to 1 and that receives a Short SSW packet as part of an ISS with the Direction field set to 0 and the Unassociated field set to 1 during the CBAP, shall initiate a responder TXSS using Short SSW packets following the completion of the ISS. In this case, the responder shall set the Source AID field and Destination AID field in transmitted Short SSW packets to the values of the Source AID field and Destination AID field, respectively, in the received Short SSW packets during the ISS.

*Modify the new eighth paragraph as follows:*

The responder shall set the Sector Select field and the DMG Antenna Select field in each transmitted SSW

frame to the value of the Sector ID field and DMG Antenna ID field, respectively, of the frame received with the best quality during the ISS. The responder shall set the Short SSW Feedback field in each transmitted Short SSW packet to the value of the CDOWN field of the Short SSW packet that was received with best quality during the preceding initiator TXSS. The determination of which frame is received with best quality is implementation dependent and beyond the scope of this standard. The responder shall set the SNR Report field in transmitted SSW frames to the SNR measured for the frame indicated by the Sector Select field and DMG Antenna Select field.

*Insert the following paragraph after the new ninth paragraph:*

If the initiator transmitted Short SSW packets with the Unassociated field set to 1 during the ISS, it shall match the transmitted Source AID field and Destination AID field values with the received Source AID field and Destination AID field values, respectively, in the received Short SSW packets during the RSS to determine if it is the intended recipient of the RSS.

10.38.2.4 Sector sweep (SSW) feedback

*Modify the fourth paragraph and insert new paragraphs as follows:*

When responder TXSS comprising of SSW frames was performed during the preceding RSS, the initiator shall set the Sector Select field and the DMG Antenna Select field in the SSW-Feedback frame it transmits to the value of the Sector ID field and DMG Antenna ID field, respectively, of the frame received with the best quality during the responder TXSS. The determination of which frame is received with the best quality is implementation dependent and beyond the scope of this standard. In addition, the initiator shall set the SNR Report field to the SNR measured for the frame received by the sector and DMG antenna indicated by the Sector Select field and DMG Antenna Select field. The SSW-Feedback frame shall be transmitted through the sector identified by the value of the Sector Select field and DMG Antenna Select field received from the responder during the preceding responder TXSS.

When responder TXSS comprising of Short SSW packets was performed during the preceding RSS, the initiator shall set the EDMG Extension Flag subfield to 1, the Sector Select and Sector Select MSB subfields to represent the value of the CDOWN field within the Short SSW packet that was received with best quality during the responder TXSS, and the DMG Antenna Select subfield to the value of the RF Chain ID field within the Short SSW packet that was received with best quality during the responder TXSS in the SSW-Feedback frame. The determination of which frame is received with the best quality is implementation dependent and beyond the scope of this standard. In addition, the initiator shall set the SNR Report field to the SNR measured for the packet received by the sector and DMG antenna indicated by the Sector Select, Sector Select MSB and DMG Antenna Select fields. The SSW-Feedback frame shall be transmitted through the sector identified by the value of the Short SSW Feedback field received from the responder during the preceding responder TXSS.

10.38.2.5 SSW ack

*Modify the second paragraph and insert a new paragraph as follows:*

When a responder TXSS is performed during an RSS, the responder shall transmit an SSW-Ack frame to the initiator to perform an SSW ack procedure. The SSW-Ack frame shall be transmitted through the sector identified by the value of the Sector Select field and the DMG Antenna Select field received from the initiator in the last SSW-Feedback frame if the RSS comprised of SSW frames and by the value of the Sector Select field, Sector Select MSB field and the DMG Antenna Select field received from the initiator in the last SSW-Feedback frame if the RSS comprised of Short SSW packets.

When an initiator TXSS comprising of Short SSW packets with the Unassociated field set to 1 is performed during the ISS, the Sector Select field, Sector Select MSB field and DMG Antenna Select field in the SSW-Ack frame are ignored.

30.9 EDMG Beamforming

30.9.1 Short SSW packet

30.9.1.1 General

*In D0.35, modify figure 95 as follows:*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Packet Type  | Direction  | Addressing Mode | Source AID  | Destination AID  | CDOWN  | RF Chain ID  | Short Scrambled BSSID | ~~Reserved~~Unassociated | FCS  |
| Bits: | 2  | 1  | 1  | 8  | 8  | 11  | 2  | 10 | 1 | 4  |

*In D0.35, modify Table 48 as follows:*

|  |  |
| --- | --- |
| **Field**  | **Definition**  |
| Packet Type  | Indicates the type of the packet. Possible values: 0: Short SSW 1-3: Reserved  |
| Direction  | Indicates the direction of the transmission. The Direction field is set to 0 to indicate that the frame is transmitted by the beamforming initiator and set to 1 to indicate that the frame is transmitted by the beamforming responder.  |
| Addressing Mode  | If set to 0, this indicates ~~whether~~that the Destination AID field contains an individual address. Otherwise, the Destination AID field contains a group address. In case ~~on~~of an individual address, the SU-MIMO beamforming training is used. Otherwise, the MU-MIMO beamforming training is used.  |
| Source AID  | In an ISS, c~~C~~ontains the AID of the STA that transmits the Short SSW packet, except if the transmitting STA is a PCP or an AP in which case this field contains the BSS AID (see 9.4.2.251) or the transmitting STA is not associated to intended recipient in which case this field contains a random value in the range of 0 to 255. In an RSS, contains the AID of the STA that transmits the Short SSW packet, except if the transmitting STA is a PCP or an AP in which case this field contains the BSS AID (see 9.4.2.251) or the transmitting STA is not associated to the intended recipient in which case this field contains the value contained in the Source AID field in the received Short SSW packet during the preceding ISS.  |
| Destination AID  | In an ISS, c~~C~~ontains the AID of the STA addressed by the Short SSW packet, except if the addressed STA is a PCP or an AP in which case this field contains the BSS AID (see 9.4.2.251) or the transmitting STA is not associated to the intended recipient in which case this field contains a random value in the range of 0 to 255. In an RSS, contains the AID of the STA that transmits the Short SSW packet, except if the transmitting STA is a PCP or an AP in which case this field contains the BSS AID (see 9.4.2.251) or the transmitting STA is not associated to the intended recipient in which case this field contains the value contained in the Destination AID field in the received Short SSW packet during the preceding ISS. |
| CDOWN  | A down-counter indicating the number of remaining Short SSW packet transmissions and LBIFSs to the end of the TXSS/RXSS across all antennas. This field is set to 0 in the last Short SSW packet transmission.  |
| RF Chain ID  | Identifies the RF chain the transmitter is currently using for this transmission.  |
| Short Scrambled BSSID  | The content of this field is defined in 30.9.1.2.  |
| Unassociated | Indicates whether the transmitting STA is associated to the intended recipient. This field is set to 1 if the transmitting STA is not associated to the intended recipient. Otherwise it is set to 0. |
| Setup Duration  | Specifies the duration, in microseconds, of the setup subphase that starts following the Short SSW packet transmission with CDOWN field equal to 0.  |
| Short SSW Feedback  | In an RSS, contains the value of the CDOWN field of the Short SSW packet that was received with best quality in the immediately preceding sector sweep. The determination of which packet was received with best quality is implementation dependent. ~~This field is reserved when transmitted as part of an ISS.~~  |
| FCS  | The four MSBs of the FCS  |

**References:**

1. Draft P802.11ay\_D0.35.pdf
2. IEEE Std 802.11-2016