IEEE P802.11
Wireless LANs

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| Beam Tracking Corrections |
| Date: 2010-11-10 |
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Abstract

This document proposes corrections to the beam tracking procedure.

**Beam Tracking**

Current receive beam tracking requires that the responder decode an aggregated BRP packet and change the transmission of the next packet within SIFS. This poses tough processing requirements on the responder, which can be avoided by using earlier information from previous beam refinement operation.

For Transmit beam tracking all the initiator needs to do is set the beam tracking bits and add TRN-T fields. The responding STA may respond by aggregating the response. The originator may allocate time for the responder by inserting a reverse direction grant, thus enabling the transmission of feedback un-aggregated.

***TGad editor: edit the text in 9.35.7 as follows:***

A STA (beam tracking initiator) may request a peer STA (beam tracking responder) to perform receive beam tracking by setting the TXVECTOR parameter BEAM\_TRACKING\_REQUEST to Beam Tracking Requested, TRN-LEN to the number of requested TRN fields as described in 21.10.2.2.3 and packet type to TRN-R-PACKET, in a transmitted packet. Otherwise, the BEAM\_TRACKING\_REQUEST parameter shall be set to Beam Tracking Not Requested.

A beam tracking responder that receives a packet with the Beam Tracking Request field in the PLCP header equal to 1 (corresponding to the BEAM\_TRACKING\_REQUEST parameter in the RXVECTOR set to Beam Track Requested) and the Packet type bit in the PLCP header set to 0, (corresponding to PACKET-TYPE field in the RXVECTOR set to TRN-R-PACKET) shall follow the rules described in 21.10.2.2 and shall include a beam refinement AGC field and TRN-R subfields appended to the following packet transmitted to the initiator. The value of TRN-LEN in the following packet form the responder to the initiator shall equal the value of the TRN-LEN in the RXVECTOR of the packet from the initiator.

A beam tracking initiator requesting transmit beam tracking shall set the BEAM\_TRACKING\_REQUEST parameter in the TXVECTOR to Beam Tracking Requested, the Packet type to TRN-T-PACKET, TRN-LEN to the number of TRN fields as described in 21.10.2.2.3 and append an AGC field and TRN-T subfields to the packet. The Beam track responder may append the feedback to any packet from the responder to the initiator. The initiator may allocate time for the feedback using reverse direction grant. The feedback type shall be the same as the feedback type in the last beam refinement frame that was transmitted from the initiator to the responder with a TX-TRN-REQ set to 1. If the responder have never received a beam refinement frame from the initiator with TX-TRN-REQ set to 1, it shall respond with all fields of the FBCK-TYPE set to 0 and set the BS-FBCK to the best sector.

***TGad Editor: replace figure 21-13 in D5.0 with the following figure:***



***TGad Editor: Update table 21-13 as follows:***

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| --- | --- | --- | --- |
| **Field Name** | **Number of bits** | **Start Bit** | **Description** |
| Scrambler Initialization | 7 | 0 | bits X1-X7 of the initial scrambler state.  |
| MCS | 5 | 7 | Index into the Modulation and Coding Scheme table |
| Length | 18 | 12 | Number of data octets in the PSDU. Range 0-262143. |
| Additional PPDU | 1 | 30 | Contains a copy of the parameter ADD-PPDU from the TXVECTOR. A value of 1 indicates that this PPDU is immediately followed by another PPDU with no IFS or preamble on the subsequent PPDU. A value of 0 indicates that no additional PPDU follows this PPDU.  |
| Packet type |  1 | 31 | Corresponds to TXVECTOR parameter PACKET-TYPEIf Beam Tracking Request is set to 0 then0 indicates TRN-R packet1 indicates TRN-T packetIf Beam Tracking Request is set to 1 then0 indicates a receiver beam tracking request (see 9.35.7)1 indicates a transmit beam tracking request. Packet type is reserved when Training Length field is 0. |
| Training Length | 5 | 32 | Corresponds to TXVECTOR parameter TRN-LEN.If Beam Tracking Request is set to 0, then training length indicates the length of the training field. The use of this field is defined in subclause . A value of zero indicates that this packet does not have any training field. If Beam Tracking Request is set to 1, then if Packet type is set to 1, then the field indicates the length of the training field. If the packet type is set to 0, then the field indicates the length of the training field requested for receive training. |
| Aggregation | 1 | 37 | Set to 1 to indicate that the PPDU in the data portion of the packet contains an A-MPDU; otherwise, set to 0. |
| Beam Tracking Request | 1 | 38 | Corresponds to TXVECTOR parameter BEAM\_TRACKING\_REQUESTSet to 1 to indicate the need for beam tracking (9.35.7); otherwise, set to 0. |
| Tone Pairing Type  | 1 | 39 | Set to 0 to indicate Static Tone Pairing (21.5.3.2.4.6.2);Set to 1 to indicate Dynamic Tone Pairing (21.5.3.2.4.6.3).Only valid if MCS field value is in the range of 13-17; otherwise reserved. |
| DTP Indicator  | 1 | 40 | Bit flip used to indicate DTP update.Only valid when the Tone Pairing Type field is 1 and the MCS field value is in the range of 13-17; otherwise reserved. |
| Last RSSI | 4 | 41 | Contains a copy of the parameter LAST\_RSSI from the TXVECTOR. When set to 0, this field reserved and ignored by the receiver.The value is an unsigned integer: * Values of 2-14 represent power levels (-71+value×2) dBm.
* A value of 15 represents a power greater than or equal to -42 dBm.
* A value of 1 represents a power less than or equal to -68 dBm.
* Value of 0 indicates that the previous packet was not received a SIFS period before the current transmission.
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| SIFS response  | 1  | 45 | See . |
| Reserved | 2 | 46 | Set to 0, ignored by receiver |
| HCS | 16 | 48 | Header check sequence. Definition of this field calculation is in 21.5.3.1.3.  |

***TGad Editor: Modify table 21-17 as follows:***

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| --- | --- | --- | --- |
| **Field Name** | **Number of Bits** | **Start Bit** | **Description** |
| Scrambler Initialization | 7 | 0 | Bits X1-X7 of the initial scrambler state. |
| MCS | 5 | 7 | Index into the Modulation and Coding Scheme table |
| Length | 18 | 12 | Number of data octets in the PSDU.Range 0-262143 |
| Additional PPDU | 1 | 30 | Contains a copy of the parameter ADD-PPDU from the TXVECTOR. A value of 1 indicates that this PPDU is immediately followed by another PPDU with no IFS or preamble on the subsequent PPDU. A value of 0 indicates that no additional PPDU follows this PPDU. |
| Packet Type | 1 | 31 | Corresponds to TXVECTOR parameter PACKET-TYPEIf Beam Tracking Request is set to 0 then0 indicatesTRN-R packet1 indicates TRN-T packetIf Beam Tracking Request is set to 1 then0 indicates a receiver beam tracking request (see 9.35.7)1 indicates a transmit beam tracking request. Packet type is reserved when Training Length field is 0. |
| Training Length | 5  | 32 | Corresponds to TXVECTOR parameter TRN-LEN.If Beam Tracking Request is set to 0, then training length indicates the Length of the training field. The use of this field is defined in 21.10.2.2.3. A value of 0 indicates that no training field is present in this PPDU.If Beam Tracking Request is set to 1, then if Packet type is set to 1, then the field indicates the length of the training field. If the packet type is set to 0, then the field indicates the length of the training field requested for receive training. |
| Aggregation | 1 | 37 | Set to 1 to indicate that the PPDU in the data portion of the packet contains an A-MPDU;otherwise, set to 0. |
| Beam Tracking Request | 1 | 38 | Corresponds to TXVECTOR parameter BEAM\_TRACKING\_REQUESTSet to 1 to indicate the need for beam tracking (9.35.7); otherwise, set to 0. |
| Last RSSI | 4 | 39 | Contains a copy of the parameter LAST\_RSSI from the TXVECTOR. When set to 0, this field reserved and ignored by the receiver.The value is an unsigned integer: * Values of 2-14 represent power levels (-71+value×2) dBm.
* A value of 15 represents a power greater than or equal to -42 dBm.
* A value of 1 represents a power less than or equal to -68 dBm.

Value of 0 indicates that the previous packet was not received a SIFS period before the current transmission. |
| SIFS response  | 1  | 43 | See Table 62. |
| Reserved | 4 | 44  | Set to 0, ignored by the receiver |
| HCS | 16 | 48 | Header check sequence |