IEEE P802.11  
Wireless LANs

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| First Path BF text | | | | |
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|  |  |  |  |  |

Abstract

This document proposes text for LOS BF training.

Changes based on D0.5

**Discussion**:

For location application, it is desired that range (time of flight) and direction (angle of arrival and angle of departure) measurement are performed on a line of sight (LOS) path, rather than on non line of sight paths. When location meausrements are performed on non line of sight paths the resulting location estimates are wrong. Sometimes the LOS path is blocked and attenuated, so a the beamforming training protocol chooses an NLOS path for communications. To solve this problem, we propose to enable a mode of BF training in which training looks for the First path rather than the best path. To this we need:

1. Add a field to the EDMG BRP request element indicating that the procedure is a First Path training procedure.
2. Add a bit to the EDMG-A header indicating that the TRN field is for First Path training – this is needed because the processing may done at the PHY level.
3. Add text to support this procedure.
4. Add a capability bit for this feature.

***TGay Editor: Add a field to the EDMG BRP request element (9.4.2.255):***

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B7 | B8 B15 | B16 B23 | B24 B31 | B32 B39 | B40 B50 | B51 B52 | B53 B56 | B57 B58 |
|  | Element ID | Length | Element ID Extension | L-RX | L-TX-RX | TX Sector ID | EDMG TRN-Unit P | EDMG TRN-Unit M | EDMG TRN-Unit N |
| Bits: | 8 | 8 | 8 | 8 | 8 | 11 | 2 | 4 | 2 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B59 | B60 | B61 B69 | B70 B75 | B76 B83 | B84 | B85 B87 |
|  | TXSS-REQ | TXSS-REQ-RECIPROCAL | TXSS-SECTORS | BRP CDOWN | TX Antenna Mask | First Path Training | Reserved |
| Bits: | 1 | 1 | 9 | 6 | 8 |  | 4 |

1. —EDMG BRP Request element format

***TGay Editor: Add the following text at the end of the 9.4.2.255 P38L29:***

The LOS training field indicates that the BRP procedure is designated as LOS training procedure.

***TGay Editor Add the following subfield to the EDMG BRP field***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B1 | B2 B9 | B10 | B11 | B12 | B13 | B14 |
|  | Initiator | L-RX | TX-FBCK-REQ | TX-Train-Response | RX-Train-Response | TX -TRN-OK | TXSS-FBCK-REQ |
| bits: | 1 | 8 | 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B15 B26 | B27 B38 | B39 B41 | B42 | B43 | B44 B48 | B49 B50 | B51 B54 |
|  | TX sector ID | Best Sector FB | Best-FBCK Antenna Id | MID Extention | BRP-TXSS-OK | L-RX-TX | TRN-U P | TRN-U M |
| bits: | 12 | 12 | 3 | 1 | 1 | 5 | 2 | 4 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B55 B56 | B57 | B58 | B59 B67 | B68 B73 | B74 B81 | B82 | B83 B88 |
|  | TRN-U N | TXSS-REQ | TXSS-REQ-RECIPROCAL | TXSS-SECOTRS | BRP CDOWN | TX Antenna Mask | First Path Training | Reserved |
| bits: | 2 | 1 | 1 | 9 | 6 | 8 | 1 | 6 |

***TGay Editor: Add the LOS Training subfield to the list of subfields referenced to 9.4.2.255***

***TGay Editor Add the following field to the table TXVECTOR and RXVECTOR parameters***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| First Path-Training | FORMAT is EDMG | When set to 1, indicates that the TRN field appended to this packet should be used for First Path BF training.  When set to 0 indicates that TRN field appended to this packet should be used for best performance BF traiing. | Y | Y |

***TGay Editor: Add the following field to table 24-*** ***EDMG-Header-A field structure and definition for a SU PPDU***

|  |  |  |  |
| --- | --- | --- | --- |
| First Path Training | 1 | 96 | When set to 1, indicates that the TRN field appended to this packet should be used for First Path BF training.  When set to 0 indicates that TRN field appended to this packet should be used for best performance BF training. |

***TGay Editor: Add the following field to table 23-*** ***EDMG-Header-A2 subfield definition***

|  |  |  |  |
| --- | --- | --- | --- |
| LOS Traiing | 1 | 4 | When set to 1, indicates that the TRN field appended to this packet should be used for First Path BF training.  When set to 0 indicates that TRN field appended to this packet should be used for best performance BF training. |

***TGay Editor: Add the following subfield to figure 23 Beamforming capability field format***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B4 | B5 | B6 | B7 | B8 | B9 | B10 B15 |
|  | Requested BRP SC Blocks | MU-MIMO Supported | UL MU-MIMO Supported | SU-MIMO Supported | Grant Required | First Path  Trainig Supported | Reserved |
| Bits: | 5 | 1 | 1 | 1 | 1 | 1 | 6 |

***TGay Editor: Add the following text at the end of 9.4.2.250.2 (P28L17)***

A STA sets the First Path training supported subfield to 1 to indicate it supports the First Path beamforming training procedure defined in 10.38.9.6

***TGay Editor: Add the following text at the end 10.38.9.5 (P103L20)***

10.38.9.6 First Path beamforming training.

A STA request First Path beamforming training by setting the First Path Training subfield to 1 in a BRP frame with setup or in a BRP training request. A STA shall not send First Path beamforming trainig to a STA that has not set the First Path Training Supported to 1 in the beamforming capabilities field. A STA that receives a First Path training response shall set the First Path training subfield to 1 in its response frame if it has set the First Path training Supported to 1 in the beamforming capabilities field.

In a BRP transaction that started with a request for First Path beamforming training, all the frames shall have the First Path training subfield set to 1 and all the frames that carry TRN field shall have the First Path\_trainig field in the TXVECTOR set to 1. In such a transaction all TX and RX training shall be directed towards finding the First Path path and not the best path. How a STA directs the training towards the First Path path is implementation dependent.