IEEE P802.11
Wireless LANs

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| MLME interface for beamforming training |
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Abstract

This submission describes proposed additions to the MLME SAP to allow the SME to invoke the beamforming training mechanisms described in IEEE P802.11ad/D5.0. This submission represents an alternate proposal to that described in IEEE 802.11-12/0021r0 [1].

Insert the following subclause

**6.3.93 DMG beamforming**

**6.3.93.1 General**

This subclause describes the management procedures associated with DMG beamforming.

**6.3.93.2 MLME-BF-TRAINING.request**

**6.3.93.2.1 Function**

This primitive requests that beamforming training occur with a peer DMG STA.

**6.3.93.2.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BF-TRAINING.request(

 PeerSTAAddress,

 RequestBRP

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerSTAAddress | MACAddress | Any valid individual MAC address | Specifies the address of the peer MAC entity with which to perform beamforming training. |
| RequestBRP | Boolean | True, false | If true, BRP is performed as part of the beamforming training.If false, only SLS is performed. |

**6.3.93.2.3 When generated**

This primitive is generated by the SME to request that beamforming training be performed with a peer DMG STA.

**6.3.93.2.4 Effect on receipt**

On receipt of this primitive, the MLME will invoke the MAC sublayer beamforming training procedures defined in 9.35.

**6.3.93.3 MLME-BF-TRAINING.confirm**

**6.3.93.3.1 Function**

This primitive reports the outcome of a requested beamforming training procedure.

**6.3.93.3.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BF-TRAINING.confirm(

 PeerSTAAddress,

 ResultCode

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerSTAAddress | MACAddress | Any valid individual MAC address | Specifies the address of the peer MAC entity with which beamforming training was performed or attempted. |
| ResultCode | Enumeration | SUCCESS, TIMEOUT  | Indicates the result of the beamforming procedure. |

**6.3.93.3.3 When generated**

This primitive is generated by the MLME to report the result of beamforming training with a peer DMG STA.

**6.3.93.3.4 Effect on receipt**

The SME is notified of the result of the procedure.

**6.3.93.4 MLME-BF-TRAINING.indication**

**6.3.93.4.1 Function**

This primitive indicates that beamforming training with a peer DMG STA, and at the request of that peer, has completed.

**6.3.93.4.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BF-TRAINING.indication(

 PeerSTAAddress

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerSTAAddress | MACAddress | Any valid individual MAC address | Specifies the address of the peer MAC entity with which beamforming training was performed. |
| ResultCode | Enumeration | SUCCESS, TIMEOUT  | Indicates the result of the beamforming procedure. |

**6.3.93.4.3 When generated**

This primitive is generated by the MLME to indicate successful completion of a beamforming training procedure requested by a peer DMG STA.

**6.3.93.4.4 Effect on receipt**

The SME is notified of the result of the procedure.

Insert the following subclause

**10.38 DMG beamforming training**

Upon receipt of an MLME-BF-TRAINING.request primitive, a DMG STA shall undertake beamforming training with the STA indicated by the PeerSTAAddress parameter according to the procedures defined in 9.35. This training shall start with the SLS, and shall include the BRP if and only if the RequestBRP parameter of the MLME-BF-TRAINING.request is true.

A DMG STA receiving MLME-BF-TRAINING.request may act as either initiator or responder in the beamforming training.

If the STA indicated by the PeerSTAAddress parameter of a received MLME-BF-TRAINING.request primitive is a PCP or AP of a BSS in which a DMG STA is a member, the DMG STA receiving MLME-BF-TRAINING.request may perform beamforming training during the A-BFT as described in 9.35.5. Alternatively, the DMG STA receiving MLME-BF-TRAINING.request may use an SP or a TXOP to perform ISS as described in 9.35.2.2.

A DMG STA receiving MLME-BF-TRAINING.request shall issue MLME-BF-TRAINING.confirm on completion of the requested beamforming training, or on timeout as specified in 9.35.

A DMG STA that performs beamforming training with a peer STA at the request of the peer STA shall issue MLME-BF-TRAINING.indication on completion of that beamforming training, or on timeout as specified in 9.35.

Figure 10-40 illustrates an example of the beamforming training procedure in the DTT for a case where the DMG STA receiving MLME-BF-TRAINING.request acts as initiator.



**Figure 10-40 – Beamforming training procedure in the DTT**

Figure 10-41 illustrates an example of the beamforming training procedure in the context of a non-PCP/non-AP STA joining an infrastructure BSS or PBSS. In this scenario, MLME-BF-TRAINING.request is issued by the STA wishing to associate in order that the link be trained to a degree that will allow the over-the-air exchanges necessary for association to succeed.



**Figure 10-41 – Beamforming training when joining an infrastructure BSS or PBSSReferences:**

[1] MLME interface for BF, Carlos Cordeiro and Solomon Trainin, IEEE 802.11-12/0021r0