IEEE P802.11
Wireless LANs

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| DMG Beamforming MLME |
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Abstract

This submission proposes changes to primitives defined in 6.3.95 (DMG beamforming) necessary to support EDMG BF procedures, in addition of changes to 11.38 (DMG beamforming). The contribution uses 802.11-2016 as reference.

*Discussion: Changes below (added text is underlined) are necessary both to allow the request/confirmation/indication of new BRP procedures/features defined in 802.11ay and to enable the request/confirmation/indication of individual BRP flows. Unprotected DMG Action field value equal to 1 (BRP) only.*

6.3.95 DMG beamforming

6.3.95.1 General

6.3.95.2 MLME-BF-TRAINING.request

6.3.95.2.2 Semantics of the service primitive

The primitive parameters are as follows:

MLME-BF-TRAINING.request(

PeerSTAAddress,

RequestBRP,

BRPRequest,

DMGBeamRefinement,

EDMGPartialSLS,

EDMGBRPRequest

)

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| --- | --- | --- | --- |
| **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, the beam refinement protocol (BRP) is performed as part of the beamforming training. If false, only sector-level sweep (SLS) is performed. |
| BRPRequest | A set of information subfields | As defined in 9.5.4 | Specifies the parameters of a BRP request |
| DMGBeamRefinement | A set of elements | As defined in 9.4.2.130 | Zero or more elements |
| EDMGBRPRequest | A set of elements | As defined in 9.4.2.255 | Zero or more elements |
| EDMGPartialSLS | A set of elements | As defined in 9.4.2.258 | Zero or more elements |

6.3.95.3 MLME-BF-TRAINING.confirm

6.3.95.3.2 Semantics of the service primitive

The primitive parameters are as follows:

MLME-BF-TRAINING.confirm(

PeerSTAAddress,

ResultCode,

DMGBeamRefinement,

MeasFeedback,

EDMGMeasFeedback

)

|  |  |  |  |
| --- | --- | --- | --- |
| **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, BF-TIMEOUT | Indicates the result of the beamforming procedure. |
| DMGBeamRefinement | A set of elements | As defined in 9.4.2.130 | Zero or more elements |
| MeasFeedback | A set of elements | As defined in 9.4.2.136 | Zero or more elements |
| EDMGMeasFeedback | A set of elements | As defined in 9.4.2.253 | Zero or more elements |

6.3.95.4 MLME-BF-TRAINING.indication

6.3.95.4.2 Semantics of the service primitive

The primitive parameters are as follows:

MLME-BF-TRAINING.indication(

PeerSTAAddress,

ResultCode,

DMGBeamRefinement,

MeasFeedback,

EDMGMeasFeedback

)

|  |  |  |  |
| --- | --- | --- | --- |
| **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, BF-TIMEOUT | Indicates the result of the beamforming procedure. |
| DMGBeamRefinement | A set of elements | As defined in 9.4.2.130 | Zero or more elements |
| MeasFeedback | A set of elements | As defined in 9.4.2.136 | Zero or more elements |
| EDMGMeasFeedback | A set of elements | As defined in 9.4.2.253 | Zero or more elements |

**11.38 DMG beamforming**

Upon receipt of an MLME-BF-TRAINING.request primitive, a STA shall undertake beamforming training with the STA indicated by the PeerSTAAddress parameter according to the procedures defined in 10.38. ~~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 primitive is true.~~ Beamforming training may consist of an SLS not followed by a BRP, an SLS followed by a BRP, or a BRP as defined by the MLME-BF-TRAINING.request primitive. An SLS shall include a BRP if and only if the RequestBRP parameter of the MLME-BF-TRAINING.request primitive is true.

If the MLME-BF-TRAINING.request primitive is used to request a BRP, the parameter BRPRequest parameter shall be included. The information subfields within BRPRequest are used to request and configure DMG beamforming procedures. The indication of whether the requested BRP procedure shall use short BRP frames is also defined in BRPRequest. If the primitive is used to request an EDMG beamforming procedure, the MLME-BF-TRAINING.request primitive shall also include the parameter EDMGBRPRequest. The MLME-BF-TRAINING.request primitive may also include the parameter DMGBeamRefinement that may be used to request and configure both DMG and EDMG beamforming procedures. If the primitive is used to request a partial sector level sweep, it shall also contain the parameter EDMGPartialSLS.

A STA receiving MLME-BF-TRAINING.request primitive 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 an AP or PCP of a BSS in which a STA is a member, the STA receiving the MLME-BFTRAINING.request primitive may perform beamforming training during the A-BFT as described in 10.38.5. Alternatively, the STA receiving the MLME-BF-TRAINING.request primitive may use an SP or a TXOP to perform ISS as described in 10.38.2.2.

A STA receiving the MLME-BF-TRAINING.request primitive shall issue an MLME-BF-TRAINING.confirm primitive on completion of the requested beamforming training or on timeout as
specified in 10.38.

A STA that performs beamforming training with a peer STA at the request of the peer STA shall issue an MLME-BF-TRAINING.indication primitive on completion of that beamforming training, or on timeout as specified in 10.38.

Both MLME-BF-TRAINING.confirm and MLME-BF-TRAINING.indication primitives shall include one or more of the following feedback-related parameters if ResultCode is equal to SUCCESS: DMGBeamRefinement, MeasFeedback, and EDMGMeasFeedback. The presence of these elements in the primitive depends on the specific DMG or EDMG beamforming procedure that was executed.

Figure 11-51 illustrates an example of the beamforming training procedure in the DTI for a case where the STA receiving the MLME-BF-TRAINING.request primitive acts as initiator.

Figure 11-52 illustrates an example of the beamforming training procedure in the context of a non-AP and non-PCP STA joining an infrastructure BSS or PBSS. In this scenario, the MLME-BF-TRAINING.request primitive is issued by the STA attempting to associate in order that the link be trained to a degree that allows the over-the-air exchanges necessary for association to succeed.

**SP/M**: Do you agree to include the text changes proposed in 18/0147r0 into the 802.11ay draft spec?