IEEE P802.11
Wireless LANs

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| MLME interface for BF |
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Abstract

This document defines the MLME interface for BF.

CID6001

*Insert the following subclause*

**6.3.91 DBand beamforming**

**6.3.91.1 General**

This subclause describes the management procedures associated with DBand beamforming.

**6.3.91.2 MLME-ISS.request**

**6.3.91.2.1 Function**

This primitive requests initiation of an ISS with a peer STA.

**6.3.91.2.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-ISS.request(

BFResponderAddress,

AntennaList,

SectorListEntriesPerAntenna,

IsInitiatorTXSS,

isResponderTXSS,

RXSSLength,

RXSSTxRate

)

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| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFResponderAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA with which to perform ISS.  |
| AntennaList | Ordered set of integers | Each antenna ID is selected from the valid antenna range supported by the station | Specifies an ordered list of antenna IDs that are used when performing the ISS. |
| SectorListEntriesPerAntenna | Ordered set of integers | Each sector ID is selected from the valid sector range for a given antenna | Contains one entry for each antenna in AntennaList. Each entry specifies an ordered list of sector IDs that are used to perform the ISS. |
| IsInitiatorTXSS | Integer | As defined in 8.4a.5 | Specifies whether the ISS starts with an initiator TXSS or an initiator RXSS. |
| IsResponderTXSS | Integer | As defined in 8.4a.5 | Specifies whether the RSS starts with a responder TXSS or a responder RXSS. |
| RXSSLength | Integer | As defined in 8.4a.5 | Valid only if at least one of isInitiatorTXSS or isResponderTXSS is equal to 0. Specifies the total number of receive sectors combined over all receive DBand antennas. |
| RXSSTxRate | Integer | As defined in 8.4a.5 | Valid only if the RXSSLength is valid and the value of the RXSSLength is greater than 0. Specifies the modulation used for the frames transmitted as part of an RXSS. |

**6.3.91.2.3 When generated**

This primitive is generated by the SME to request that an ISS be initiated with another STA.

**6.3.91.2.4 Effect on receipt**

On receipt of this primitive, the MLME attempts to transmit at least one ScS frame to a specified STA.

**6.3.91.3 MLME-ISS.indication**

**6.3.91.3.1 Function**

This primitive indicates the reception of an ScS frame that was received as part of an ISS.

**6.3.91.3.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BF.indication(

BFInitiatorAddress,

CDOWN,

AntennaID,

SectorID,

RXSSLength,

ReceivedSNR

)

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| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFInitiatorAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA from which the frame was received.  |
| CDOWN | Integer | As defined in 8.4a.1 | Down-counter indicating the number of remaining frame transmissions. |
| AntennaID | Integer | Selected from the valid antenna range supported by the station | Specifies the antenna ID through which the frame was received. |
| SectorID | Integer | Selected from the valid sector range for a given antenna | Specifies the sector ID through which the frame was received. |
| RXSSLength | Integer | As defined in 8.4a.1 | Specifies the length of an RXSS as required by the initiator. |
| ReceivedSNR | Integer | 0-100 | The signal to noise ratio of the received ScS frame, in dB. |

**6.3.91.3.3 When generated**

This primitive is generated by the MLME when a valid ScS frame is received as part of an ISS.

**6.3.91.3.4 Effect on receipt**

On receipt of this primitive, the SME operates as specified in 9.35.

**6.3.91.4 MLME-RSS.request**

**6.3.91.4.1 Function**

This primitive requests initiation of an RSS with a peer STA.

**6.3.91.4.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-RSS.request(

BFInitiatorAddress,

AntennaList,

SectorListEntriesPerAntenna,

AntennaSelect,

SectorSelect,

ReceivedSNR

)

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| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFInitiatorAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA with which to initiate RSS.  |
| AntennaList | Ordered set of integers | Each antenna ID is selected from the valid antenna range supported by the station | Specifies an ordered list of antenna IDs that are used when performing the RSS. |
| SectorListEntriesPerAntenna | Ordered set of integers | Each sector ID is selected from the valid sector range for a given antenna | Contains one entry for each antenna in AntennaList. Each entry specifies an ordered list of sector IDs that are used when performing the RSS. |
| AntennaSelect | Integer | As defined in 8.4a.3 | Specifies the antenna ID selected by the responder. |
| SectorSelect | Integer | As defined in 8.4a.3 | Specifies the sector ID selected by the responder. |
| ReceivedSNR | Integer | As defined in 8.4a.3 | The signal to noise ratio, in dB, of the ScS frame corresponding to SectorSelect and AntennaSelect.  |

**6.3.91.4.3 When generated**

This primitive is generated by the SME to request that an RSS be initiated with another STA.

**6.3.91.4.4 Effect on receipt**

On receipt of this primitive, the MLME attempts to transmit at least one ScS frame to a specified STA.

**6.3.91.5 MLME-RSS.indication**

**6.3.91.5.1 Function**

This primitive indicates the reception of an ScS frame that was received as part of an RSS.

**6.3.91.5.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BF.indication(

BFResponderAddress,

CDOWN,

AntennaID,

SectorID,

AntennaSelect,

SectorSelect,

ReportedSNR

)

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| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFResponderAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA from which the frame was received.  |
| CDOWN | Integer | As defined in 8.4a.1 | Down-counter indicating the number of remaining frame transmissions. |
| AntennaID | Integer | Selected from the valid antenna range supported by the station | Specifies the antenna ID through which the frame was received. |
| SectorID | Integer | Selected from the valid sector range for a given antenna | Specifies the sector ID through which the frame was received. |
| AntennaSelect | Integer | As defined in 8.4a.3 | Specifies the antenna ID selected by the responder. |
| SectorSelect | Integer | As defined in 8.4a.3 | Specifies the sector ID selected by the responder. |
| ReportedSNR | Integer | As defined in 8.4a.3 | The signal to noise ratio, in dB, of the ScS frame corresponding to SectorSelect and AntennaSelect. |

**6.3.91.5.3 When generated**

This primitive is generated by the MLME when a valid ScS frame is received as part of an RSS.

**6.3.91.5.4 Effect on receipt**

On receipt of this primitive, the SME operates as specified in 9.35.

**6.3.91.6 MLME-BFFeedback.request**

**6.3.91.6.1 Function**

This primitive requests initiation of an ScS Feedback with a peer STA.

**6.3.91.6.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BFFeedback.request(

BFResponderAddress,

AntennaID,

SectorID,

AntennaSelect,

SectorSelect,

ReceivedSNR,

BRPRequestParams,

BeamformedLinkMaintenance

)

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| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFResponderAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA to transmit the ScS-Feedback frame. |
| AntennaID | Integer | The antenna ID is selected from the valid antenna range supported by the station | Specifies the antenna through which to transmit the ScS-Feedback frame. |
| SectorID | Integer | The sector ID is selected from the valid sector range for a given antenna | Specifies the sector through which to transmit the ScS-Feedback frame |
| AntennaSelect | Integer | As defined in 8.4a.3 | Specifies the antenna ID selected by the initiator. |
| SectorSelect | Integer | As defined in 8.4a.3 | Specifies the sector ID selected by the initiator. |
| ReceivedSNR | Integer | As defined in 8.4a.3 | The signal to noise ratio, in dB, of the ScS frame corresponding to SectorSelect and AntennaSelect.  |
| BRPRequestParams | Sequence of octets | As defined in 8.4a.4. | Specifies the parameters for the BRP execution. |
| BeamformedLinkMaintenance | Sequence of octets | As defined in 8.4a.6. | Specifies the parameters for beamformed link maintenance. |

**6.3.91.6.3 When generated**

This primitive is generated by the SME to request that an ScS Feedback be initiated with another STA.

**6.3.91.6.4 Effect on receipt**

On receipt of this primitive, the MLME attempts to transmit an ScS-Feedback frame to a specified STA.

**6.3.91.7 MLME-BFFeedback.indication**

**6.3.91.7.1 Function**

This primitive indicates the reception of an ScS-Feedback frame.

**6.3.91.7.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BFFeedback.indication(

BFInitiatorAddress,

AntennaID,

SectorID,

AntennaSelect,

SectorSelect,

ReportedSNR,

BRPRequestParams,

BeamformedLinkMaintenance

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFInitiatorAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA from which the frame was received.  |
| AntennaID | Integer | Selected from the valid antenna range supported by the station | Specifies the antenna ID through which the frame was received. |
| SectorID | Integer | Selected from the valid sector range for a given antenna | Specifies the sector ID through which the frame was received. |
| AntennaSelect | Integer | As defined in 8.4a.3 | Specifies the antenna ID selected by the initiator. |
| SectorSelect | Integer | As defined in 8.4a.3 | Specifies the sector ID selected by the initiator. |
| ReportedSNR | Integer | As defined in 8.4a.3 | The signal to noise ratio, in dB, of the ScS frame corresponding to SectorSelect and AntennaSelect. |
| BRPRequestParams | Sequence of octets | As defined in 8.4a.4. | Specifies the parameters for the BRP execution. |
| BeamformedLinkMaintenance | Sequence of octets | As defined in 8.4a.6. | Specifies the parameters for beamformed link maintenance. |

**6.3.91.7.3 When generated**

This primitive is generated by the MLME when a valid ScS-Feedback frame is received.

**6.3.91.7.4 Effect on receipt**

On receipt of this primitive, the SME operates as specified in 9.35.

**6.3.91.8 MLME-BFAck.request**

**6.3.91.8.1 Function**

This primitive requests initiation of an ScS Ack with a peer STA.

**6.3.91.8.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BFAck.request(

BFInitiatorAddress,

AntennaID,

SectorID,

AntennaSelect,

SectorSelect,

ReceivedSNR,

BRPRequestParams,

BeamformedLinkMaintenance

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFInitiatorAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA to transmit the ScS-Ack frame. |
| AntennaID | Integer | The antenna ID is selected from the valid antenna range supported by the station | Specifies the antenna through which to transmit the ScS-Ack frame. |
| SectorID | Integer | The sector ID is selected from the valid sector range for a given antenna | Specifies the sector through which to transmit the ScS-Ack frame |
| AntennaSelect | Integer | As defined in 8.4a.3 | Specifies the antenna ID selected by the responder. |
| SectorSelect | Integer | As defined in 8.4a.3 | Specifies the sector ID selected by the responder. |
| ReceivedSNR | Integer | As defined in 8.4a.3 | The signal to noise ratio, in dB, of the frame corresponding to SectorSelect and AntennaSelect.  |
| BRPRequestParams | Sequence of octets | As defined in 8.4a.4 | Specifies the parameters for the BRP execution. |
| BeamformedLinkMaintenance | Sequence of octets | As defined in 8.4a.6 | Specifies the parameters for beamformed link maintenance. |

**6.3.91.8.3 When generated**

This primitive is generated by the SME to request that an ScS Ack be initiated with another STA.

**6.3.91.8.4 Effect on receipt**

On receipt of this primitive, the MLME attempts to transmit an ScS-Ack frame to a specified STA.

**6.3.91.9 MLME-BFAck.indication**

**6.3.91.9.1 Function**

This primitive indicates the reception of an ScS-Ack frame.

**6.3.91.9.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BFAck.indication(

BFResponderAddress,

AntennaID,

SectorID,

AntennaSelect,

SectorSelect,

ReportedSNR,

BRPRequestParams,

BeamformedLinkMaintenance

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| BFResponderAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA from which the frame was received.  |
| AntennaID | Integer | Selected from the valid antenna range supported by the station | Specifies the antenna ID through which the frame was received. |
| SectorID | Integer | Selected from the valid sector range for a given antenna | Specifies the sector ID through which the frame was received. |
| AntennaSelect | Integer | As defined in 8.4a.3 | Specifies the antenna ID selected by the initiator. |
| SectorSelect | Integer | As defined in 8.4a.3 | Specifies the sector ID selected by the initiator. |
| ReportedSNR | Integer | As defined in 8.4a.3 | The signal to noise ratio, in dB, of the frame corresponding to SectorSelect and AntennaSelect. |
| BRPRequestParams | Sequence of octets | As defined in 8.4a.4. | Specifies the parameters for the BRP execution. |
| BeamformedLinkMaintenance | Sequence of octets | As defined in 8.4a.6. | Specifies the parameters for beamformed link maintenance. |

**6.3.91.9.3 When generated**

This primitive is generated by the MLME when a valid ScS-Ack frame is received.

**6.3.91.9.4 Effect on receipt**

On receipt of this primitive, the SME operates as specified in 9.35.

**6.3.91.10 MLME-BRP.request**

**6.3.91.10.1 Function**

This primitive requests transmission of a Beam Refinement (BRP) frame to a peer STA.

**6.3.91.10.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BRP.request(

PeerAddress,

AntennaID,

SectorID,

DialogToken,

BRPRequestParams,

BeamRefinement,

ChannelMeasurementFeedbackList

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA to transmit the BRP frame. |
| AntennaID | Integer | The antenna ID is selected from the valid antenna range supported by the station | Specifies the antenna through which to transmit the frame. |
| SectorID | Integer | The sector ID is selected from the valid sector range for a given antenna | Specifies the sector through which to transmit the frame. |
| DialogToken | Integer | 0-127 | Specifies a unique number to identify the BRP transaction. |
| BRPRequestParams | Sequence of octets | As defined in 8.4a.4 | Specifies the parameters for the BRP execution. |
| BeamRefinement | Sequence of octets | As defined in 8.4.2.132 | A DBand Beam Refinement element specifying the BRP parameters. |
| ChannelMeasurementFeedbackList | Sequence of octets | As defined in 8.4.2.138 | A list of Channel Measurement Feedback elements specifying the channel measurements. |

**6.3.91.10.3 When generated**

This primitive is generated by the SME to request that a BRP frame be transmitted to another STA.

**6.3.91.10.4 Effect on receipt**

On receipt of this primitive, the MLME attempts to transmit a BRP frame to a specified STA.

**6.3.91.11 MLME-BRP.indication**

**6.3.91.11.1 Function**

This primitive indicates the reception of a BRP frame.

**6.3.91.11.2 Semantics of the service primitive**

The primitive parameters are as follows:

MLME-BRP.indication(

PeerAddress,

AntennaID,

SectorID,

DialogToken,

BRPRequestParams,

BeamRefinement,

ChannelMeasurementFeedbackList

)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| PeerAddress | MAC Address | Any valid individual MAC address | Specifies the MAC address of the STA from which the BRP frame was received. |
| AntennaID | Integer | The antenna ID is selected from the valid antenna range supported by the station | Specifies the antenna through which the frame was received. |
| SectorID | Integer | The sector ID is selected from the valid sector range for a given antenna | Specifies the sector through which the frame was received. |
| DialogToken | Integer | 0-127 | Specifies a unique number that identifies the BRP transaction. |
| BRPRequestParams | Sequence of octets | As defined in 8.4a.4 | Specifies the parameters for the BRP execution. |
| BeamRefinement | Sequence of octets | As defined in 8.4.2.132 | A DBand Beam Refinement element specifying the BRP parameters. |
| ChannelMeasurementFeedbackList | Sequence of octets | As defined in 8.4.2.138 | A list of Channel Measurement Feedback elements specifying the channel measurements. |

**6.3.91.11.3 When generated**

This primitive is generated by the MLME when a valid BRP frame is received.

**6.3.91.11.4 Effect on receipt**

On receipt of this primitive, the SME operates as specified in 9.35.