**7.1.20.3 MLME-DSME-INFO**

**7.1.20.3.1 DSME-Primitives for requesting DSME information**

MLME-DSME-INFO defines how a device can request DSME information. All DSME-devices shall provide an interface for these DSME information request primitives.

**7.1.20.3.2 MLME-DSME-INFO.request**

**7.1.20.3.2.1 General**

The MLME-DSME-INFO.request primitive allows a Source device to request the timestamp and the parameters of its DSME from the Destination device or a device to request the parameters of superframe structure stored by Connection Device.

**7.1.20.3.2.2 Semantics**

The semantics of the MLME-DSME-INFO.request primitive is as follows:

MLME-DSME-INFO.request (

DstAddrMode,

1. DstAddr,
2. INFO,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex

)

Table 78r specifies the parameters for the MLME-DSME-INFO.request primitive.

**Table 78r—MLME-DSME-INFO.request parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** |
| DstAddrMode | Integer | 0x02-0x03 | The addressing mode of the Destination device to which the request is intended. This parameter can take one of the following values:  0x02 = 16-bit short address,  0x03 = 64-bit extended address. |
| DstAddr | DeviceAddress | As specified by the DstAddrMode parameter | The address of the Destination device to which the request is intended. |
| INFO | Integer | 0x00-0x-1 | The type of DSME information which are requested by the device.  0x00 = timestamp and parameters of DSME-GTS  0x01 = parameters of superframe structure |
| SecurityLevel | Integer | 0x00-0x07 | The security level to be used (see Table 136 in 7.6.2.2.1). |
| KeyIdMode | Integer | 0x00-0x03 | The mode used to identify the key to be used (see Table 96 in 7.6.2.2.2). This parameter is ignored if the SecurityLevel parameter is set to 0x00. |
| KeySource | Set of 0, 4, or 8 octets | As specified by the KeyIdMode parameter | The originator of the key to be used (see 7.6.2.4.1). This parameter is ignored if the KeyIdMode parameter is ignored or set to 0x00. |
| KeyIndex | Integer | 0x01-0xff | The index of the key to be used (see 7.6.2.4.2). This parameter is ignored if the KeyIdMode parameter is ignored or set to 0x00. |

**7.1.20.3.2.3 Appropriate usage**

The MLME-DSME-INFO.request primitive is generated by the next higher layer of a Source device and issued to its MLME when the timestamp and the parameters of its DSME-GTS or the parameters of superframe structure are to be requested.

**7.1.20.3.2.4 Effect on receipt**

On receipt of the MLME-DSME-INFO.request primitive, the MLME of the device generates and sends an DSME information request command (see 7.3.11).

If the SecurityLevel parameter is set to a valid value other than 0x00, indicating that security is required for this frame, the MLME shall set the Security Enabled subfield of the Frame Control field to one. The MAC sublayer shall perform outgoing processing on the frame based on the DstAddress, SecurityLevel, KeyIdMode, KeySource, and KeyIndex parameters, as described in 7.5.8.2.1. If any error occurs during outgoing frame processing, the MLME shall discard the frame and issue the MLME-DSME-INFO.confirm primitive with the error status returned by outgoing frame processing.

If the DSME information request command cannot be sent due to a CSMA-CA algorithm failure, the MLME shall issue the MLME-DSME-INFO.confirm primitive with a status of CHANNEL\_ACCESS\_FAILURE.

If the MLME successfully transmits an DSME information request command, the MLME expects an acknowledgment in return. If an acknowledgment is not received, the MLME shall issue the MLME-DSME-INFO.confirm primitive with a status of NO\_ACK (see 7.5.6.4). If an acknowledgment is received, the MLME shall wait for the DSME information reply command.

If an DSME information reply command is received, the MLME of the source device shall issue the MLME-DSME-INFO.confirm primitive with a status of SUCCESS.

And if an DSME information reply command is not received within macMaxFrameTotalWaitTime CAP symbols in a beacon-enabled PAN, or symbols in a non-beacon-enabled PAN, the MLME of the source device shall issue the MLME-DSME-INFO.confirm primitive with a status of NO\_DATA.

If any parameter in the MLME-DSME-INFO.request primitive is not supported or is out of range, the MLME shall issue the MLME-DSME-INFO.confirm primitive with a status of INVALID\_PARAMETER.

**7.1.20.3.3 MLME-DSME-INFO.confirm**

**7.1.20.3.3.1 General**

The MLME-DSME-INFO.confirm primitive reports the results of a request for the timestamp and the DSME-GTS parameters or the superframe structure parameters.

**7.1.20.3.3.2 Semantics**

The semantics of the MLME-DSME-INFO.confirm primitive is as follows:

MLME-DSME-INFO.confirm (

INFO,

1. DSME-GTSCharacteristics,
2. Timestamp,
3. BeaconOrder,
4. SuperframeOrder,
5. Multi-superframeOrder,

status

)

Table 78s specifies the parameters for the MLME-DSME-INFO.confirm primitive.

**Table 78s – MLME-DSME-INFO.confirm parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid Range** | **Description** |
| INFO | Integer | 0x00-0x01 | The type of DSME information to be reported.  0x00 = timestamp and DSME-GTS parameters  0x01 = superframe structure parameters |
| DSME-GTSCharacteristics | DSME-GTSCharacteristics | See 7.3.10.2 | The characteristic of the DSME GTS. |
| Timestamp | Integer | 0x000000-0xffffff | The time, in symbols, at which the DSME information reply command (see 7.3.11) was transmitted.  This parameter is considered valid only if the value of the status parameter is SUCCESS. The symbol boundary is described by macSyncSymbolOffset (see Table 127 in 7.4.2).  This is a 24-bit value, and the precision of this value shall be a minimum of 20 bits, with the lowest 4 bits being the least significant. |
| BeaconOrder | Integer | 0-15 | The parameters of superframe structure stored by Connection Device. Also see 7.5.10.1.1 for the explanation, |
| SuperframeOrder | Integer | 0-15 |
| Multi-superframeOrder | Integer | 0-15 |
| Status | Enumeration | SUCCESS, CHANNEL\_ACCESS\_FAILURE, NO\_ACK, NO\_DATA, COUNTER\_ERROR, FRAME\_TOO\_LONG, UNAVAILABLE\_KEY, UNSUPPORTED\_SECURITY or INVALID\_PARAMETER. | The status of the DSME information request. |

**7.1.20.3.3.3 When generated**

The MLME-DSME-INFO.confirm primitive is generated by the MLME and issued to its next higher layer in response to an MLME-DSME-INFO.request primitive. If the INFO parameter is set to 0x00, parameters BeaconOrder, SuperframeOrder and Multi-superframeOrder will be ignored, and the DSME-GTS Characteristics Type field of the DSME-GTS Characteristics parameter shall be set to Restart (see Table 84b). If the INFO parameter is set to 0x01, parameters DSME-GTSCharacteristics and Timestamp will be ignored.

**7.1.20.3.3.4 Appropriate usage**

On receipt of the MLME-DSME-INFO.confirm primitive the next higher layer is notified of the result of its request of DSME parameters.

**7.1.20.3.4 MLME-DSME-INFO.indication**

**7.1.20.3.4.1 General**

The MLME-DSME-INFO.indication primitive is used to indicate the reception of a DSME information request.

**7.1.20.3.4.2 Semantics**

The semantics of the MLME-DSME-INFO.indication primitive are as follows:

MLME-DSME-INFO.indication (

DeviceAddress,

INFO,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex

)

Table 78t specifies the parameters for the MLME-DSME-INFO.indication primitive.

**Table 78t—MLME-DSME-INFO.indication parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| DeviceAddress | Device address | An extended 64-bit IEEE address | The address of the device requesting DSME-GTS information. |
| INFO | Integer | 0x00-0x01 | The type of DSME information which are requested.  0x00 = timestamp and DSME-GTS parameters  0x01 = superframe structure parameters |

**7.1.20.3.4.3 When generated**

The MLME-DSME-INFO.indication primitive is generated by the MLME of the Destination device or the Connection Device and issued to its next higher layer to indicate the reception of a DSME information request command.

**7.1.20.3.4.4 Appropriate usage**

When the next higher layer of the Destination device or the Connection Device receives the MLME-DSME-INFO.indication primitive, it issues the MLME-DSME-INFO.response primitive to its MLME with the INFO parameter set to the appropriate value.

**7.1.20.3.5 MLME-DSME-INFO.response**

**7.1.20.3.5.1 General**

The MLME-DSME-INFO.response primitive is used to initiate a response to a MLME-DSME-INFO.indication primitive.

**7.1.20.3.5.2 Semantics**

The semantics of the MLME-DSME-INFO.response primitive are as follows:

MLME-DSME-INFO.response (

DeviceAddress,

INFO,

Timestamp,

DSME-GTSCharacteristics,

BeaconOrder,

SuperframeOrder,

Multi-superframeOrder,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex

)

Table 78u specifies the parameters for the MLME-DSME-INFO.response primitive.

**Table 78u—MLME-DSME-INFO.response parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Valid range** | **Description** |
| INFO | Integer | 0x00-0x01 | The type of DSME information to be issued.  0x00 = timestamp and DSME-GTS parameters  0x01 = superframe structure parameters |
| DeviceAddress | Device address | An extended 64-bit IEEE address. | The address of the device requesting DSME-GTS information. |
| Timestamp | Integer | 0x000000-0xffffff | The time, in symbols, at which the DSME information reply command (see7.3.12.6) was transmitted.  The symbol boundary is described by macSyncSymbolOffset (see Table 86 in 7.4.1).  This is a 24-bit value, and the precision of this value shall be a minimum of 20 bits, with the lowest 4 bits being the least significant. |
| DSME-GTSCharacteristic | DSME-GTSCharacteristics | See 7.3.12.4.3 | The characteristics of the DSME-GTS between Source device and Destination device. This value is correct only when DSME-GTSCharacteristics Type subfield is 110. Otherwise, it indicates that Source device’s request for DSME-GTS information is fail. |
| BeaconOrder | Integer | 0-15 | The parameters of superframe structure stored by Connection Device. Also see 7.5.10.1.1 for the explanation. |
| SuperframeOrder | Integer | 0-15 |
| Multi-superframeOrder | Integer | 0-15 |

**7.1.20.3.5.3 Appropriate usage**

The MLME-DSME-INFO.response primitive is generated by the next higher layer of a Destination device or a Connection Device and issued to its MLME in order to respond to the MLME-DSME-INFO.indication primitive. If MLME-DSME-INFO.response primitive is issued by the Destination device, the INFO parameter is set to 0x00 and parameters BeaconOrder, SuperframeOrder and Multi-superframeOrder will be ignored. If MLME-DSME-INFO.response primitive is issued by the Connection Device, the INFO parameter is set to 0x01 and parameters DSME-GTSCharacteristics and Timestamp will be ignored.

**7.1.20.3.5.4 Effect on receipt**

On receipt of the MLME-DSME-INFO.response primitive, the MLME generates a DSME information reply command.

**7.2.4.2.1.14 DSME Information Request**

The DSME Information Request Information Element is 1 bit in length and is formatted as shown in Figure 54uu and as described in 7.3.11.5.

|  |
| --- |
| bit: 1 |
| Info Type |

**Figure 54uu – DSME Information request Information Element**

**7.2.4.2.1.15 DSME Information Reply**

The DSME Information reply Information Element varies in length and is formatted as shown in Figure 54u and as described in 7.3.11.6.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **bit: 1** | **Octets: 3** | **Variable** | **bit: 4** | **4** | **4** |
| Info Type | Timestamp | DSME Characteristics | Beacon Order | Superframe Order | Multi-Superframe Order |

**Figure 54u—DSME Information reply Information Element**

**7.3.11.5 DSME information request command**

The DSME information request command is used by the device that is requesting the timestamp and the DSME-GTS parameters or the superframe structure parameters.

The DSME information request command shall be formatted as illustrated in Figure 65o.

This command is mandatory for DSME-devices.

|  |  |  |
| --- | --- | --- |
| **Octets: (see 7.2.2.4.1)** | **1** | **bit: 1** |
| MHR fields | Command Frame Identifier (see Table 82) | Info Type |

**Figure 65o - DSME information request command format**

The Destination Addressing Mode and the Source Addressing Mode subfields of the Frame Control field shall both be set to three (i.e., 64-bit extended addressing).

The Frame Pending subfield of the Frame Control field shall be set to zero and ignored upon reception, and the Acknowledgment Request subfield of the Frame Control field shall be set to one.

The Source PAN Identifier subfield shall contain the value of *macPANId*, and the Source Address subfield shall contain the value of *macShortAddress*.

The Destination PAN Identifier subfield shall contain the identifier of the PAN to which to request for DSME information, and the Destination Address subfield shall contain the address of the Destination device or the Connection Device to which the DSME information request command frame is being sent. The Info Type subfield shall be set to 0 if DSME-GTSCharacteristics and timestamp are being requested, or 1 if superframe structure parameters are being requested.

**7.3.11.6 DSME information reply command**

The DSME information reply command frame is used by a destination device that is replying the timestamp and the DSME-GTS information to the source device, or a Connection Device that is replying the superframe structure parameters.

The DSME information reply command frame shall be formatted as illustrated in Figure 65p.

This command is mandatory for DSME-devices.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Octets: (see 7.2.2.4.1)** | **1** | **bit: 1** | **3** | **variable** | **bit: 4** | **4** | **4** |
| MHR fields | Command Frame Identifier (see Table 82) | Info Type | Timestamp | DSME-GTSCharacteristics (see 7.3.11.4.3) | Beacon Order | Superframe Order | Multi-superframe Order |

**Figure 65p - DSME information reply command format**

The Destination Addressing Mode and the Source Addressing Mode subfields of the Frame Control field shall both be set to three (i.e., 64-bit extended addressing).

The Frame Pending subfield of the Frame Control field shall be set to zero and ignored upon reception, and the Acknowledgment Request subfield of the Frame Control field shall be set to one.

The Source PAN Identifier subfield shall contain the value of *macPANId*, and the Source Address subfield shall contain the value of *macShortAddress*.

The Destination PAN Identifier subfield shall contain the identifier of the PAN to which to reply the DSME information, and the Destination Address subfield shall contain the address of the requesting device. If Info Type subfield is set to 0, subfields Beacon Order, Superframe Order and Multi-superframe Order will be ignored and DSME-GTSCharacteristics field is correct only when DSME-GTSCharacteristics Type subfield is 110. If Info Type subfield is set to 1, subfields Timestamp and DSME-GTSCharacteristics will be ignored.