# 7.1.20.1 MLME-DSME-GTS

MLME-SAP DSME-GTS management primitives define how DSME-GTSs are requested and maintained. A device wishing to use these primitives and DSME-GTSs in general will already be tracking the beacons of its coordinator.

# 7.1.20.1.1 MLME-DSME-GTS.request

This primitive allows a device to send a request to allocate new DSME-GTSs or to deallocate, or change existing DSME-GTSs.

# 7.1.20.1.1.1 Semantics of the service primitive

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

MLME-DSME-GTS.request (

DSME-GTSCharacteristics,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex

)

Table 78n specifies the parameters for the MLME-DSME-GTS.request primitive.

Table 78n— MLME-DSME-GTS.request parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| DSME-GTSCharacteristics | DSME-GTS Characteristics | See 7.3.11.4.3 | The characteristics of the DSME-GTS requested by the next higher layer. |
| SecurityLevel, | Integer | 0x00–0x07 | The security level to be used (see Table 95). |
| KeyIdMode, | Integer | 0x00–0x03 | The mode used to identify the key to be used (see Table 96). 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. |

# 7.1.20.1.1.2 Appropriate Usage

The MLME-DSME-GTS.request primitive is generated by the next higher layer of a device and issued to its MLME to request the allocation of new DSME-GTSs or to request the deallocation or change of existing DSME-GTSs.

# 7.1.20.1.1.3 Effect on receipt

On receipt of the MLME-DSME-GTS.request primitive for DSME-GTS, the MLME of the device attempts to generate a DSME-GTS handshake command frame (see 7.3.11.4) with the DSME-GTS Characteristics field set the same as the DSME-GTSCharacteristics parameter. Then the MLME of the device shall send it to the Destination address which is indicated in the DSME-GTS Descriptor subfield of the DSME-GTSCharacteristics parameter.

If *macShortAddress* is equal to 0xfffe or 0xffff, the device is not permitted to request a DSME-GTS allocation. In this case, the MLME issues the MLME-DSME-GTS.confirm primitive containing a status of NO\_SHORT\_ADDRESS.

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 DSME-GTSCharacteristics, 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-GTS.confirm primitive with the error status returned by outgoing frame processing.

If the DSME-GTS handshake command frame cannot be sent due to the channel condition, the MLME shall issue the MLME-DSME-GTS.confirm primitive with a status of CHANNEL\_ACCESS\_FAILURE.

If the DSME-GTS handshake command frame with Handshake Type 00 (request) is being sent, the source device shall wait for at most an *macResponseWaitTime* symbols, if no DSME-GTS handshake command frame with Handshake Type 01 (reply) from the destination device appears within this time, the MLME of the source device shall notify the next higher layer of the failure by the MLME-DSME-GTS.confirm primitive with a status of NO\_DATA.

# 7.1.20.1.2 MLME-DSME-GTS.indication

This primitive reports the reception of a DSME-GTS handshake command with handshake subtype 01 (reply) or 10 (notify).

# 7.1.20.1.2.1 Semantics of the service primitive

The semantics of the MLME-DSME-GTS.indication primitive is as follows:

MLME-DSME-GTS.indication (

DeviceAddress,

DSME-GTSCharacteristics,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex

)

Table 78.o specifies the parameters for the MLME-DSME-GTS.indication primitive.

Table78o— MLME-DSME-GTS.indication parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| Device Address | Device Address | 0x0000–0xfffd | The 16-bit short address of the Source device of the DSME-GTS handshake command. |
| DSME-GTSCharacteristics | DSME-GTS Characteristics | See 7.3.11.4.3. | If the handshake subtype of this parameter is 10 (notify), this parameter indicates the characteristics of the DSME-GTS that is being allocated, deallocated, notified as duplication, or changed.  If the handshake subtype of this parameter is 01 (reply), this parameter indicates the characteristics of the DSME-GTSs that are available for allocation. |
| SecurityLevel, | Integer | 0x00–0x07 | The security level purportedly used by the received MAC command frame (see Table 95). |
| KeyIdMode, | Integer | 0x00–0x03 | The mode used to identify the key purportedly used by the originator of the received frame (see Table 96). 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 purportedly used by the originator of the received frame (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 purportedly used by the originator of the received frame (see 7.6.2.4.2). This parameter is ignored if the KeyIdMode parameter is ignored or set to 0x00. |

# 

# 7.1.20.1.2.2 When generated

This primitive is generated by the MLME of a device and issued to its next higher layer to indicate the reception of a DSME-GTS handshake command with the Handshake Type 01 (reply), 10 (notify), or 10 (confirm). The DSME-GTSCharacteristics parameter shall be set the same as the DSME-GTSCharactersitics.

If the DSME-GTS Handshake Type of the received command is 10 (notify) or 11 (confirm), the MLME of the device shall update its macSAB according to the DSME-GTS SAB Specification of the command.

If the DSME-GTS Handshake Type of the received command is 10 (notify) and the Destination address in the DSME-GTS descriptor matches *macShortAddress*, the MLME of the device shall generate a DSME-GTS handshake command with the Handshake Type 11 (confirm). The Destination address in the MHR of the generated command shall be set to the broadcast short address (i.e., 0xffff). The Destination address in the DSME-GTS descriptor of the generated command shall be set to the Source Address of the received command. And then, the MLME of the device shall send the generated command frame.

# 7.1.20.1.2.3 Appropriate usage

On receipt of the MLME-DSME-GTS.indication primitive, the next higher layer is notified of the reception of a DSME-GTS handshake command. If the DSME-GTS Handshake Type is 01 (reply), the next higher layer shall issue a MLME-DSME-GTS.response primitive.

# 7.1.20.1.3 MLME-DSME-GTS.response

This primitive allows the next higher layer of a device to respond to the MLME-DSME-GTS.indication primitive.

# 7.1.20.1.3.1 Semantics

The semantics of the MLME-DSME-GTS.response primitive is as follows:

MLME-DSME-GTS.response (

DSME-GTSCharacteristics,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex  
 )

Table 78p specifies the parameters for the MLME-DSME-GTS.response primitive.

Table 78p— MLME-DSME-GTS.response parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| DSME-GTSCharacteristics | DSME-GTS Characteristics | See 7.3.11.4.3 | The characteristics of the DSME-GTS that is being allocated, deallocated, notified as duplication, or changed. |
| SecurityLevel, | Integer | 0x00–0x07 | The security level to be used (see Table 95). |
| KeyIdMode, | Integer | 0x00–0x03 | The mode used to identify the key to be used (see Table 96). 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. |

# 7.1.20.1.3.2 Appropriate usage

The MLME-DSME-GTS.response primitive is generated by the next higher layer of a coordinator and issued to its MLME in order to respond to the MLME-DSME-GTS.indication primitive. The DSME-GTS Handshake Type of the DSME-GTSCharacteristics parameter shall be set to 10 (notify). The Destination address subfield in the DSME-GTSCharacteristics parameter shall be set to the DeviceAddress of the MLME-DSME-GTS.indication primitive.

# 7.1.20.1.3.2 Effect on receipt

On receipt of the MLME-DSME-GTS.response primitive, the MLME of the device shall generate a DSME-GTS handshake command frame (see 7.3.11.4) with the DSME-GTS Characteristics field set the same as the DSME-GTSCharacteristics parameter of the primitive. And then, the MLME of the device shall broadcast it to its one-hop neighbors.

# 7.1.20.1.4 MLME-DSME-GTS.confirm

This primitive reports the result of a request to allocate new DSME-GTSs or to deallocate or change existing DSME-GTSs.

# 7.1.20.1.4.1 Semantics

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

MLME-DSME-GTS.confirm (

DSME-GTSCharacteristics,

Status,

SecurityLevel,

KeyIdMode,

KeySource,

KeyIndex  
 )

Table 78q specifies the parameters for the MLME-DSME-GTS.confirm primitive.

Table 78q— MLME-DSME-GTS.confirm parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| DSME-GTSCharacteristics | DSME-GTS Characteristics | See 7.3.11.4.3 | The characteristics of the DSME-GTS that is allocated, deallocated, notified as duplication, or changed. |
| Status | Enumeration | SUCCESS,  DENIED, NO\_SHORT\_ADDRESS, CHANNEL\_ACCESS\_FAILURE,  NO\_ACK,  NO\_DATA, COUNTER\_ERROR, FRAME\_TOO\_LONG, UNAVAILABLE\_KEY, UNSUPPORTED\_SECURITY, or INVALID\_PARAMETER | The status of the DSME-GTS request. |
| SecurityLevel, | Integer | 0x00–0x07 | The security level to be used (see Table 95). |
| KeyIdMode, | Integer | 0x00–0x03 | The mode used to identify the key to be used (see Table 96). 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. |

# 7.1.20.1.4.3 When generated

If the request for allocation, deallocation, duplication notification, or change of DSME-GTSs was successful, this primitive shall return a status of SUCCESS with the DSME-GTSCharacteristics Type subfield of the DSME-GTSCharacteristics parameter set accordingly. Otherwise, the status parameter shall indicate the appropriate error code. The reasons for these status values are fully described in are fully described in 7.1.7.1.3 and subclauses referenced by 7.1.7.1.3.

# 7.1.20.1.4.4 Effect on receipt

On receipt of the MLME-DSME-GTS.confirm primitive, the next higher layer is notified of the result of its request to allocate, deallocate, or change a DSME-GTS. If the request was successful, the status parameter shall indicate a successful DSME-GTS operation, and the MLME of the device shall generate a DSME-GTS handshake command frame with the Handshake Type subfield set to 10 (notify) and the information contained in the DSME-GTSCharacteristics parameter in this primitive. Otherwise, the status parameter shall indicate the error.

# 7.1.20.1.5 DSME management message sequence charts

Figure 39a illustrates the sequence of messages necessary for successful DSME-GTS allocation. Figure 39b illustrates the sequence of messages necessary for successful DSME-GTS deallocation.



Figure 39.a ―Message sequence chart for DSME-GTS allocation



Figure 39.b ―Message sequence chart for DSME-GTS deallocation

# 7.5.10.4 DSME-GTS allocation and management

DSME-GTS allows a DSME capable device to operate on the channel within a portion of the superframe that is dedicated (on the PAN) exclusively to that device. A DSME-GTS shall be allocated by the collaboration of the source device and the destination device before use, and it shall be used only for communications between the source device and the destination device.

A DSME-GTS shall be deallocated when it is no longer required. A DSME-GTS can be deallocated by the collaboration of the source device and the destination device at any time. A data frame transmitted in a DSME-GTS shall use only short addressing.

The management of DSME-GTSs shall be undertaken by both of the destination device and the source device. To facilitate DSME-GTS management, the destination device and the source device shall be able to store all the information necessary to manage DSME-GTSs. For each DSME-GTS, the destination device and the source device shall store an entry in *macACT* table (see Table 87a in 7.5.10.8).

If a data frame is received during a DSME-GTS and an acknowledgment is requested, the destination device shall transmit the acknowledgment frame as usual. Similarly, the source device shall be able to receive an acknowledgment frame during the DSME-GTS it requested.

The MLME of the source device can get the timestamp and the parameters of its DSME-GTSs from the destination device (see 7.5.10.4.x).

# 7.5.10.4.1 DSME-GTS allocation

A DSME‑device is instructed to request the allocation of a new through the MLME-GTS.request primitive, with DSME-GTS characteristics set according to the requirements of the intended application and DSME-GTSFlag set to TRUE.

To request the allocation of a new DSME-GTS, the MLME of the Source device shall send a DSME-GTS handshake command (see ) to the Destination device. The Characteristics Type subfield of the DSME-GTS Characteristics field shall be set to one (DSME-GTS allocation) and the Handshake Type subfield shall be set to zero (DSME-GTS request). The DSME-GTS Length subfield of the DSME-GTSDescriptor field shall be set according to the desired characteristics of the required DSME-GTS. The DSME-GTS SAB Specification subfield shall be set according to the current allocation status of all one-hop neighborhoods of the Source device and the preferences of the device. The zeroes ('0') in the SAB sub-block indicate the candidate slots for allocation among vacant slots and the ones ('1') indicates unavailable slots or unwanted slots..

The Destination device can also allocate a DSME-GTS based on the knowledge of current channel condition, i.e. when channel condition is bad, different slots of a DSME-GTS may use different channels. If the Destination device decides to allocate the DSME-GTSs, it shall configure the SAB Specification subfield of DSME allocation based on the Destination device’s knowledge of channel quality. If DSME-GTS allocation with different slots in different channels approved at the Source device successfully, the Source device and the Destination device shall exchange Data frames according to GTSs and channels specified in SAB.

On receipt of an DSME handshake command frame indicating an DSME-GTS allocation request, the Destination device shall notify the next higher layer using MLME-DSME-GTS.indication. The next higher layer may determine the DSME-GTS allocation and issue a MLME-DSME-GTS.response indicating the decision. Alternatively, the next higher layer may solicitate the decision to the MAC layer and issue a MLME-DSME-GTS.reponse with the status parameter set to MAC\_DECISION in which case, the MLME of the device shall first check if there is available capacity in the current multi-superframe.

When the Destination device determines whether capacity is available for the requested DSME-GTS, it shall generate a DSME-GTS descriptor (see 7.3.10.2) with the requested specifications and the 16-bit short address of the requesting source device. If the DSME was allocated successfully, the destination device shall set the DSME-GTS Slot Identifier subfield in the DSME descriptor to the multi-superframe slot at which the allocated DSME-GTS begins from, the DSME-GTS Length subfield in the DSME-GTS descriptor to the length of the DSME-GTS and the Destination address to the address of the source device. In addition, the destination device shall notify the next higher layer of the newly allocated DSME-GTS. This notification is achieved when the MLME of the destination device issues the MLME-GTS.indication primitive (7.1.7.3) with the characteristics of the allocated DSME-GTS and the DSME-GTSFlag set to TRUE. If there was not sufficient capacity to allocate the requested DSME-GTS, the DSME-GTS Slot Identifier shall be set to zero and the length set to the largest DSME-GTS length that can currently be supported.

The Destination device shall then include the DSME-GTS descriptor in its DSME-GTS handshake command frame and broadcast it to its one-hop neighbors. The Characteristics Type subfield of the DSME-GTS Characteristics field shall be set to one (DSME-GTS allocation) and the Handshake Type subfield shall be set to one (DSME-GTS reply).The DSME SAB Specification subfield shall be set to represent the newly allocated slots.

The Destination device can also allocate a DSME-GTS based on the knowledge of current channel condition, i.e. when channel condition is bad, different slots of a DSME-GTS may use different channels. If the Destination device decides to allocate the DSME-GTSs, it shall configure the SAB Specification subfield of DSME allocation based on the Destination device’s knowledge of channel quality. If DSME-GTS allocation with different slots in different channels approved at the Source device successfully, the Source device and the Destination device shall exchange Data frames according to GTSs and channels specified in SAB.

On receipt of a DSME handshake command frame indicating an DSME-GTS allocation reply, the device shall process the DSME-GTS descriptor.

If the address in the Device Short Address subfield of the DSME-GTS descriptor does not correspond to *macShortAddress* of the device, the device updates its SAB to reflect the neighbor’s newly allocated DSME-GTS.

If the newly allocated DSME-GTS is conflicting with the a DSME-GTS which is allocated to the device, the device shall send an DSME-GTS handshake command frame to the origin device of the DSME-GTS handshake reply command frame. The Characteristics Type subfield of the DSME-GTS Characteristics field set to three (DSME-GTS duplicate allocation notification) and the Handshake Type subfield set to two (DSME-GTS notify), with the DSME-GTS Slot Identifier subfield in the DSME-GTS descriptor set to the multi-superframe slot at which the DSME-GTS duplicate allocated, the DSME-GTS Length subfield in the DSME-GTS descriptor to the length of the duplicate allocated DSME-GTS and the Device short address to the address of the device for which the DSME-GTS allocation replied.

If the address in the Device Short Address subfield of the DSME-GTS descriptor corresponds to *macShortAddress* of the device, the MLME of the device shall then notify the next higher layer of whether the DSME-GTS allocation request was successful. This notification is achieved when the MLME issues the MLME-GTS.confirm primitive with a status of SUCCESS (if the DSME-GTS Slot Identifier in the DSME-GTS descriptor was greater than zero) or DENIED (if the DSME-GTS Slot Identifier in the DSME-GTS descriptor was equal to zero or if the length did not match the requested length). After that, the Source device shall broadcast an DSME-GTS handshake command frame to all its one-hop neighbors. The Characteristics Type subfield of the DSME-GTS Characteristics field shall be set to one (DSME-GTS allocation) and the Handshake Type subfield shall be set to two (DSME-GTS notify), with the DSME-GTS Slot Identifier subfield in the DSME-GTS descriptor set to the value of the multi-superframe slot at which the new allocated DSME-GTS begins, the DSME-GTS Length subfield in the DSME-GTS descriptor to the length of the allocated DSME-GTS and the Destination address to the address of the destination device. The DSME-GTS SAB Specification subfield shall be set to represent the newly allocated slots.

On receipt of an DSME-GTS handshake command frame indicating an DSME-GTS allocation notify, the device shall process the DSME-GTS descriptor. The device updates its SAB to reflect the neighbor’s newly allocated DSME-GTS. If the newly allocated DSME-GTS conflicts with the device’s known DSME, the device shall send an DSME-GTS handshake command frame to the origin device of the DSME-GTS handshake notify command frame. The Characteristics Type subfield of the DSME-GTS Characteristics field shall be set to three (DSME-GTS duplicate allocation notification) and the Handshake Type subfield shall be set to two (DSME-GTS notify), with the DSME-GTS Slot Identifier subfield in the DSME-GTS descriptor set to the multi-superframe slot at which the DSME-GTS duplicate allocated, the DSME-GTS Length subfield in the DSME-GTS descriptor to the length of the duplicate allocated DSME-GTS and the Destination address to the address of the device which sent the DSME-GTS allocation notify.

On receipt of an DSME-GTS handshake command frame indicating an DSME-GTS duplicate allocation notification, the device shall reallocate the DSME-GTS (see 7.5.10.3).

An example of DSME-GTS allocation is shown in Figure 73k.



Figure 73.k—An example of DSME-GTS allocation procedure

# 7.5.10.4.2 DSME-GTS deallocation

The DSME‑Source device is instructed to request the deallocation of an existing DSME-GTS through the MLME-GTS.request primitive (see ) using the characteristics of the DSME-GTS it wishes to deallocate. The Destination device can request the deallocation of an existing DSME-GTS if a deallocation request from the next higher layer, or the expiration of the DSME-GTS. From this point onward, the DSME-GTS to be deallocated shall not be used by the device, and its stored characteristics shall be reset.

When an DSME-GTS deallocation is initiated by the next higher layer of the device, the MLME shall receive the MLME-GTS.request primitive with the DSME-GTS Flag set to TRUE, the Characteristics Type subfield of the DSME-GTS Characteristics parameter set to zero ( deallocation) and the DSME-GTS Length subfield set according to the characteristics of the DSME-GTS to deallocate.

When an DSME-GTS deallocation is due to the DSME-GTS expiring, the MLME shall notify the next higher layer of the change. This notification is achieved when the MLME issues the MLME-GTS.indication primitive with the DSME-GTS Flag set to TRUE, the DSME-GTS Characteristics to the characteristics of the deallocated and the Characteristics Type subfield set to one.

In the case of any the deallocation of an existing DSME-GTS, the MLME shall send the DSME-GTS handshake command (see 7.3.10) to the corresponding device (the Source or Destination of which the DSME-GTS to be deallocated). The Characteristics Type subfield of the DSME-GTS Characteristics field shall be set to zero (DSME-GTS deallocation), and the Handshake Type subfield shall be set to zero (DSME-GTS request). The DSME-GTS Length subfield of the DSME-GTS Descriptor shall be set according to the characteristics of the DSME-GTS to deallocate. The DSME-GTS SAB Specification subfield shall be set according to the current allocation status of all one-hop neighborhoods of the device request to deallocate the DSME-GTS.

After sending the DSME-GTS handshake request command frame, the device shall wait for at most *anDSMERequestWaitingTime* symbols, if no DSME-GTS handshake reply command frame appears within this time, the MLME of the device shall notify the next higher layer of the failure. This notification is achieved when the MLME issues the MLME-GTS.confirm primitive (see 7.1.7.2) with a status of NO\_DATA. Then the device shall determine whether stop using its DSME-GTS by the procedure described in 7.5.10.4.

On receipt of an DSME-GTS handshake command frame indicating an DSME-GTS deallocation request, the device shall attempt to deallocate the DSME-GTS.

If the DSME-GTS characteristics contained in the command do not match the characteristics of a known DSME-GTS, the device shall ignore the request.

If the DSME-GTS characteristics contained in the DSME-GTS request command match the characteristics of a known DSME-GTS, the MLME of the device shall deallocate the specified DSME-GTS, update its SAB and notify the next higher layer of the change. This notification is achieved when the MLME issues the MLME-GTS.indication primitive (see 7.1.7.3) with the DSME-GTS Flag set to TRUE, the DSME-GTS Characteristics parameter containing the characteristics of the deallocated DSME-GTS and the Characteristics Type subfield set to one. Then, the device shall broadcast an DSME-GTS handshake command to its one-hop neighbors. The Characteristics Type subfield of the DSME-GTS Characteristics field of the DSME-GTS handshake command shall be set to zero (DSME-GTS deallocation), and the Handshake Type subfield shall be set to one (DSME-GTS reply). The DSME-GTS Length subfield in the DSME-GTS descriptor to the length of the successfully deallocated DSME-GTS and the Device Short Address to the address of the device request deallocate DSME-GTS. The DSME-GTS SAB Specification subfield shall be set to represent the slots status after successful deallocation.

On receipt of an DSME-GTS handshake command indicating an DSME-GTS deallocation reply, the device shall process the DSME-GTS descriptor.

If the address in the Device Short Address subfield of the DSME-GTS descriptor does not correspond to *macShortAddress* of the device, the device updates its SAB to reflect all the neighbor’s deallocated DSME-GTS.

If the address in the Device Short Address subfield of the DSME-GTS descriptor corresponds to *macShortAddress* of the device, the MLME of the device shall then notify the next higher layer of whether the DSME-GTS deallocation request was successful. This notification is achieved when the MLME issues the MLME-GTS.confirm primitive with a status of SUCCESS (if the length in the DSME-GTS descriptor matched the requested deallocation length) or DENIED (if the length in the DSME-GTS descriptor did not match the requested deallocation length). Then, the device shall broadcast an DSME-GTS handshake command to all its one-hop neighbors. The Characteristics Type subfield of the DSME-GTS Characteristics field shall be set to zero (DSME-GTS deallocation) and the Handshake Type subfield shall be set to two (Notify), with the DSME-GTS Slot Identifier subfield and the DSME-GTS Length subfield in the DSME-GTS descriptor set to the identifier and the length of the DSME-GTS deallocated respectively.

On receipt of an DSME-GTS handshake command indicating an DSME-GTS deallocation notify, the device shall process the DSME-GTS descriptor. The device updates its SAB to reflect the neighbor’s deallocated DSME-GTS.

# 7.5.10.4.3 DSME-GTS reallocation

A DSME-device shall reallocate DSME-GTSs when the duplicate allocation occurs. Also, a DSME-device may reallocate DSME-GTSs when the link quality of the allocated DSME-GTSs is bad.

To reallocate a DSME-GTS, a device shall deallocate the DSME-GTS (see 7.5.10.6) and then allocate a new DSME-GTS (see 7.5.10.5).

# 7.5.10.4.4 DSME-GTS change

The Destination device allocates the DSME-GTSs to the Source device according to the first-come-first-served basis. If the Destination device receives a DSME-GTS handshake allocation request command from a source device with a higher priority of data transmission when there is no available DSME-GTSs, the Destination device shall reduce part or all of the DSME-GTSs which are being used for the lower priority data transmission and allocate the reduced DSME-GTSs for the higher priority data transmission. If the Destination device receives more than one DSME-GTS handshake allocation request command with the same priority of data transmission, the Destination device shall allocate the DSME-GTSs according to the first-come-first-served basis.

After the higher priority data transmission in the DSME-GTSs is finished, if there are no more DSME-GTS handshake allocation request commands with higher priority of data transmission are received, the Destination device shall restart the DSME-GTSs for the lower priority data transmission which were reduced previously. Otherwise, the higher priority data transmission shall use the DSME-GTSs first. If the lower priority data transmission has been suspended for 2\*n multi-superframes, n is defined in 1.1, the Destination device shall allocate the next available DSME-GTSs to the corresponding Source device (see x in x.x).

The procedure of DSME-GTS change shall be initiated when a Destination device wants to reduce or restart the allocated DSME-GTSs through the MLME-GTS.request primitive (see ).

When an DSME-GTS change is initiated by the next higher layer of the Destination device, the MLME shall receive the MLME-GTS.request primitive with the DSME-GTS Flag set to TRUE, the DSME-GTS Characteristics Type subfield of the DSME-GTS Characteristics parameter set accordingly (i.e., 101 for DSME-GTS Reduce or 110 for DSME-GTS Restart)

To request the change of an existing DSME-GTS, the MLME of the Destination device shall send the DSME-GTS handshake request command frame (see 7.3.10) to the Source device. The DSME-GTS Characteristics Type subfield of the DSME-GTS Characteristics field shall be set accordingly (i.e., 101 for DSME-GTS Reduce or 110 for DSME-GTS Restart), and other subfields set according to the characteristics of the DSME-GTS which the Destination device requests the Source device to change its original DSME-GTS to.

The DSME-GTS handshake request command frame for DSME-GTS change contains an acknowledgment request (see ), and the Source device shall confirm its receipt of DSME-GTS handshake change request command frame by sending an acknowledgment frame to the destination device.

On receipt of the acknowledgment from the source device, the MLME of the Destination device shall notify the next higher layer of the DSME-GTS change. This notification is achieved when the MLME issues the MLME-GTS.confirm primitive (see ) with a status of SUCCESS, the DSME-GTS Flag set to TRUE, the Characteristics Type subfield of the DSME-GTS Characteristics parameter set to 101 for DSME Reduce or 110 for DSME-GTS Restart accordingly, and other subfields set according to the characteristics of the DSME-GTS which the Destination device requests the Source device to change its original DSME-GTS to.

On receipt of an DSME-GTS handshake request command frame for DSME-GTS change from the destination device, the Source device shall immediately change its DSME-GTS according to the DSME-GTS Characteristics field in the DSME-GTS handshake change request command frame. Then the MLME of the Source device shall notify the next higher layer of the change. This notification is achieved when the MLME issues the MLME-GTS.indication primitive (see ) with an DSME-GTSCharacteristics parameter set according to the characteristics of the DSME-GTS which the Destination device requests the Source device to change its original DSME-GTS to.

# 7.5.10.4.5 DSME-GTS expiration

The MLME of the device shall attempt to detect when a device has stopped using an DSME-GTS using the following rules:

The MLME of the device shall perform DSME-GTS deallocation when a DSME-GTS has expired (i.e., a device has stopped using the DSME-GTS).

The MLME of the Destination device of DSME-GTS shall assume that the source device is no longer using its DSME-GTS if a data frame is not received from the source device in the DSME-GTS at least every 2\**n* multi-superframes, where *n* is defined below.

The MLME of the Source device of DSME-GTS shall assume that the destination device is no longer using its DSME-GTS if an acknowledgement frame is not received from the destination device at least every 2\**n* multi-superframes, where *n* is defined below. If the data frames sent in the DSME-GTS do not require acknowledgment frames, the MLME of the source device will not be able to detect whether the destination device is using the corresponding DSME-GTS.

The value of *n* is defined as follows:

*n = 2(8-macBeaconOrder) 0 ≤ macBeaconOrder ≤ 8*

*n = 1 9 ≤ macBeaconOrder ≤ 14*

**Table 87a—Allocation Counter Table (*macACT*) Description**

| Field | Type | Valid Range | Description |
| --- | --- | --- | --- |
| Direction | Integer | 0-1 | The direction of the allocated DSME-GTS.  0 : Transmission (TX), 1: Reception (RX) |
| Source / Destination Address | Device address | 0x0000–0xfffd | The 16-bit short address of the device that is the source (if RX) or the destination of the allocated DSME-GTS. |
| Counter | Integer | 0x0000–0xffff | An idle counter, in other word, the number of beacon intervals since the allocated DSME-GTS was used. |
| LinkQuality | Integer | 0x0000-0xffff | The link quality of the allocated DSME-GTS. |

# 7.5.10.5 DSME-GTS retrieve synchronization