**IEEE P802.15**

**Wireless Personal Area Networks**

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| Source | Wun-Cheol Jeong, Chang-Sub Shin, Tae-Joon Park, Hoyong Kang | E-Mail:  [wjeong@etri.re.kr] |
| Re: |  | |
| Abstract | This document proposes technical specification of Low Energy Common Discovery MAC for 802.15.8 PAC. | |
| Purpose | This document describes the functional behaviour and technical specification of Low Energy Common Discovery (LECD) MAC protocol. | |
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# Overview

The 802.15.8 specification shall be developed according to the P802.15.8 Peer Aware Communication (PAC) project authorization request (PAR), document number 15-12-0063r2 and Five Criteria (5c), document number 15-12-0064r1, which were approved by the IEEE-SA in March of 2012.

# Definitions

# Abbreviations and acronyms

CS Channel Sampling

LESD Low Energy Sommon Discovery

MLME MAC sublayer Management Entity

MLSDE MAC sublayer Service Discovery Entity

PAN Personal Area Network

PD PAC Device

PLME PHY layer Management Entity

# General descriptions

This clause provides the basic framework of PDs. The framework serves as a guideline in developing the functionalities of PDs and their interactions specified in detail in the subsequent clauses.

## Concepts and architecture

## Topology

## Reference model

# MAC layer

## MPDU structure

## Multiple access

e.g. Contention-based access, Contention-free access

## Synchronization procedure

## Discovery procedure

### Low Energy Service Discovery (LESD) protocol

Some PDs in a PAC WPAN may have multiple PHYs for PAC services. They shall either join an existing PAC WPAN among WPANs operating in different channels (or frequency bands) or start new PAC WPAN to initiate PAC service. To join an existing PAN, PD needs to search services available and frequency channels in use. PDs may use LESD to discover PAC service of interest and operating channel for communication if *macLESDenabled* is true.

In this sub-clause, operation of LESD protocol is described. Figure 1 illustrates state transition of LESD protocol. If *macLESDcapable* is TRUE and a PD wishes to use LESD protocol, *macLESDenabled* is set to TRUE. The PD with *macLESDenabled* of TRUE shall perform passive LESD scan as described in 5.4.1.1. If service of interest is discovered, the PD switches to channel sampling (CS) state as described in 5.4.1.3 to help neighboring PDs to discover the service and save energy consumption devoted to service discovery procedure. Meanwhile, the PD joins the PAC WPAN discovered during passive LESD scan.

If the PD fails to discover the service during passive LESD scan, PD performs an active LESD scan as described in 5.4.1.2. During active scan, the PD broadcasts LESD request command (as described in 5.4.2.1) to neighbor PDs. If LESD response commands are received, the sender PD updates corresponding MAC PIB attributes and reports the reception of command frame to the higher layer. Also, MAC sublayer broadcasts LESD notification command so that PDs nearby are notified of the service available. The neighbor PDs may not send LESD request command if LESD response commands received or LESD notification commands received contain Service ID field that the PDs are searching for. If the PD fails to receive response command or notification command for at most *macLESDResponseWaitTime*, the PD broadcast LESD request command again. The PD repeatedly attempts to send LESD request command if the number of retrial does not exceed *macMaxLESDRequestRetries*. When service of interest is discovered, the PD switches to channel sampling (CS) state to help neighboring PDs to discover the service and save energy consumption devoted to service discovery procedure.

If the PD fails to discover the service during active LESD scan, the PD starts new PAC WPAN. Meanwhile, the PD switches to channel sampling (CS) state to notify neighboring PDs that new service is available by response to the LESD request command. Details of each state are described in the following sub-clauses.

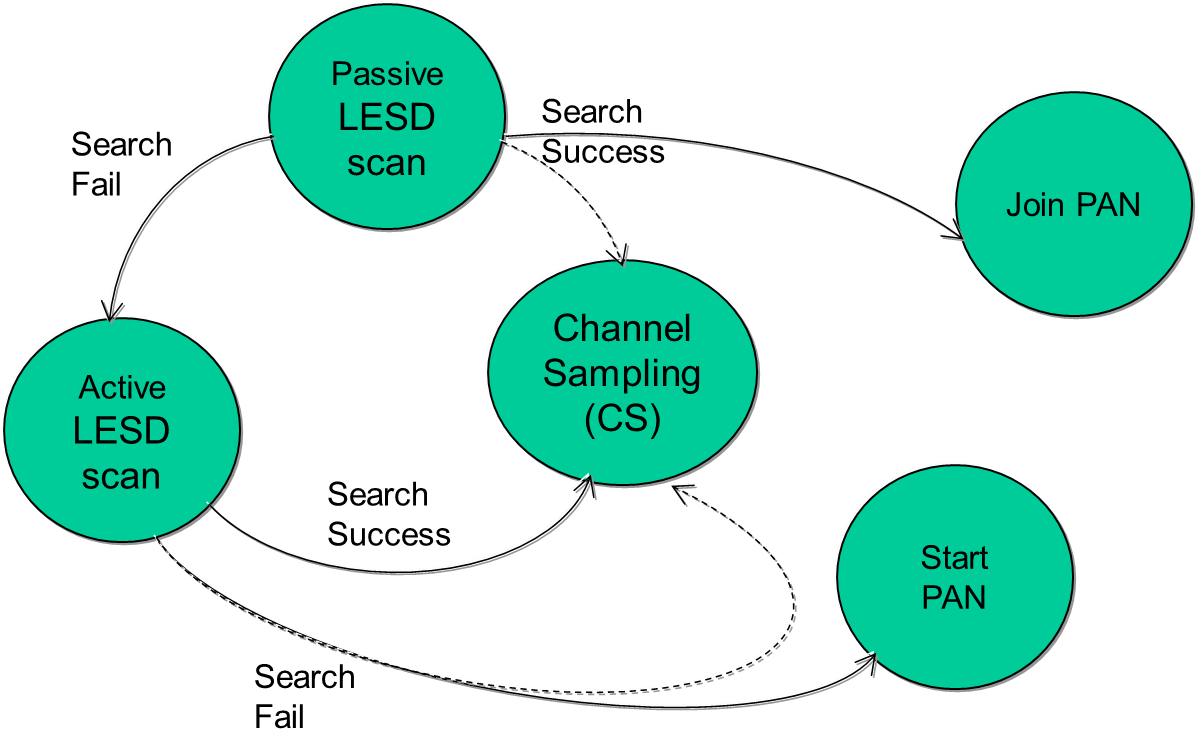


Figure 1—LESD state diagram

#### Passive LESD scan

LESD-enabled PDs (i.e., *macLESDenbaled* is TRUE) shall be capable of performing passive scan. A PD is instructed to begin a channel scan for service discovery through the MLSDE-LESD-SCAN.request primitive as described in 5.4.3.1. The next higher layer should submit a scan request for PAC services to discover specified by ServiceID over the channel specified by LESDChannelID.

On the receipt of SCAN.request primitive, the MLSDE of the PD shall update *macServiceID* to the value of ServiceID parameter and *macAvailableChannelID* to the value of AvailableChannelID parameter. For the duration of the scan, LESD PHY shall not attempt to decode frame being received and discard it whose SFD and preamble are not relevant to the LESD response or LESD notification command frame. The MAC sublayer shall discard all frames received whose Service ID field do not match to *macServiceID*. Otherwise, MLSDE of the PD shall report that LESD response command frame via MLSDE-LESD.confirm primitive as described in 5.4.3.6, or indicate LESD notification command frame via MLSDE-LESD-NOTIFY.indication primitive as described in 5.4.3.4.

PD performs passive LESD scan for at most *macCSInterval*. The results of the scan shall be reported to the higher layer via the MLSDE-LESD-SCAN.confirm primitive as described in 5.4.3.2.

If PD successfully discovers the PAC service and channel IDs in use for the service, the higher layer may wish to join the PAN by issuing MLME-ASSOCIATE primitives. While the PD attempts to join the PAN, MLSDE is instructed to switch to CS state by the higher layer via MLSDE-LESD-CS.request primitive as described in 5.4.3.8.

If PD does not discover the PAC service when it completes the passive LESD scan, PD may search the service by performing an active LESD scan procedure described in xxx.

Figure 2 illustrates the message sequence chart for passive LESD scan.

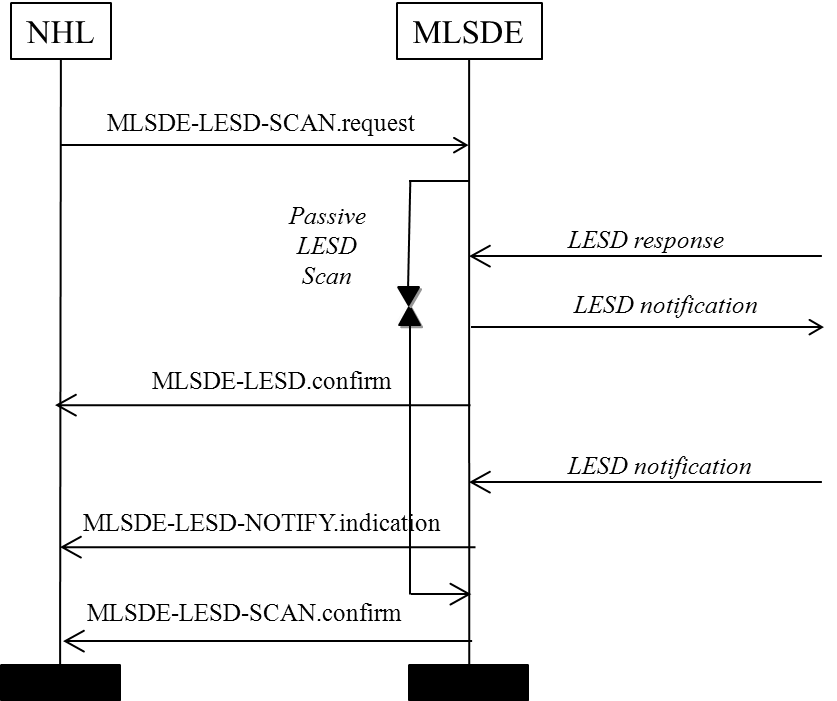


Figure 2—Passive LESD scan message sequence chart

#### Active LESD scan

If PD fails to discover the PAC service during passive LESD scan, the device attempts to search the service using active LESD scan. The higher layer commences active LESD scan by issuing MLSDE-LESD.request primitive as described in 5.4.3.3. On the receipt of MLSDE-LESD.request primitive, MLSDE generates LESD request command as described in 5.4.2.1 and attempts to broadcast the command frame via CSMA-CA algorithm.

On the receipt of LESD request command frame, MLSDE of the neighboring PDs shall discard the frame if the Service ID field does not match to the *macServiceID*. Otherwise, MLSDE shall report the reception of the command frame to the higher layer via MLSDE-LESD.indication primitive as described in 5.4.3.4.

In response to MLSDE-LESD.indication primitive, the higher layer of the neighboring PD shall issue MLSDE-LESD.response primitive as described in 5.4.3.5 to MLSDE. On the receipt of the primitive, MLSDE shall generate LESD response command frame as described in 5.4.2.2 and broadcast it via CSMA-CA algorithm.

On the receipt of the response command frame, MLSDE of PDs shall discard the frame if the Service ID field does not match to the *macServiceID*. If the value of Service ID field of the LESD response command matches to *macServiceID*, MLSDE updates *macCommunicationChannelID* with the value of CommunicationChannelID field in the received command, and issues MLSDE-LESD.confirm primitive as described in 5.4.3.6 to the higher layer to report the reception of the command frame.

Also, MLSDE generates LESD notification command as described in 5.4.2.3 and broadcast it, so that the neighboring PDs that wish to discover the PAC service with ServiceID of interest can locate the service.

If a PD receives LESD notification with the Service ID field matching to *macServiceID*, MLSDE of the device updates *macCommunicationChannelID* with the value of CommunicationChannelID field in the received notification command.

If the PD does not receive response command frame for at most *macLESDResponseWaitTime* after sending LESD request command, MLSDE shall increase *macNumLESDRequestRetries* and broadcast LESD request command if *macNumLESDRequestRetries* does not exceed *macMaxLESDRequestRetries.* If *macNumLESDRequestRetries* exceeds *macMaxLESDRequestRetries.*, MLSDE reports to the higher layer that active LESD scan does not complete successfully by issuing MLSDE-SCAN.confirm with the Status parameter of EXCEED\_NUM\_TRIAL.

If a PD does not discover the PAC service successfully, the higher layer may initiate the PAN by issuing MLME-START primitives. While the PD attempts to start the PAN, MLSDE is instructed to switch to CS state by the higher layer via MLSDE-LESD-CS.request primitive as described in 5.4.3.8.

Figure 3 illustrates the message sequence chart for active LESD scan.

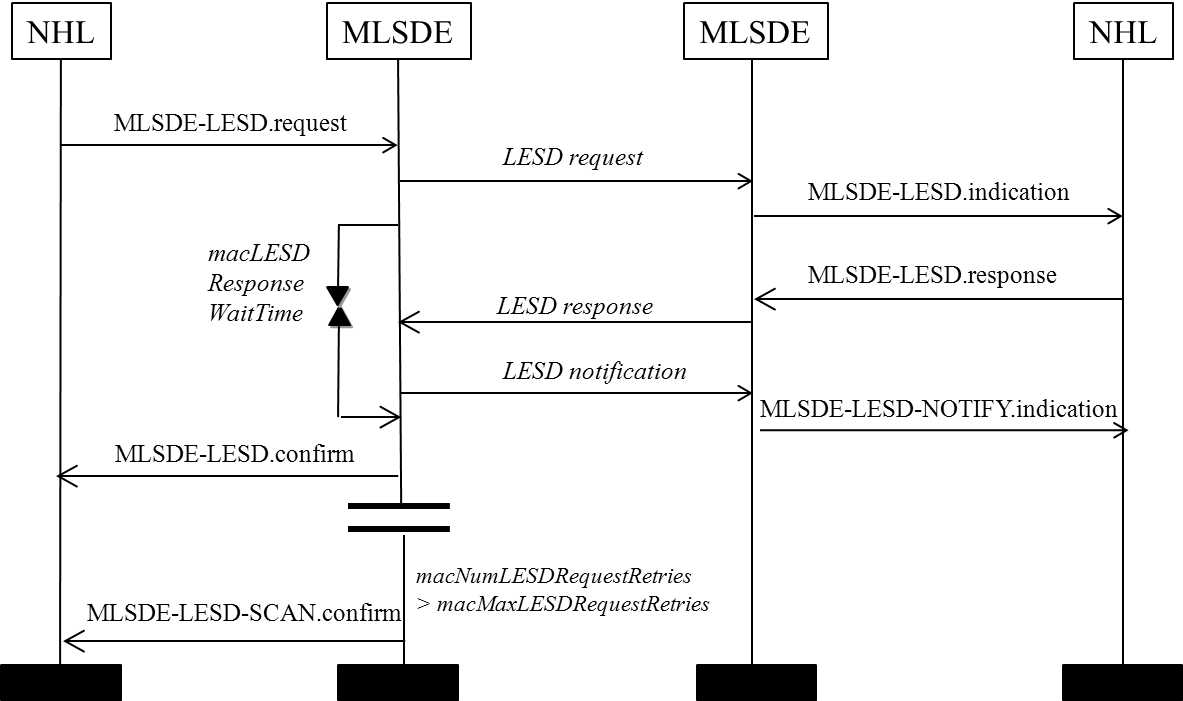


Figure 3—Active LESD scan message sequence chart

#### Channel Sampling (CS)

Channel Sampling (CS) procedure allows PDs to save the energy devoted to service discovery. For PDs that discover the PAC service successfully, the higher layer initiate CS procedure by issuing MLSDE-CS.request primitive described in 5.4.3.8.

On the receipt of MLSDE-CS.request primitive, MLSDE shall set the *macLESDdone* to TRUE and updates the MAC PIB attributes, *macCSInterval* and *macCSDuration* with the values of CSInterval parameter and CSDuration parameter of the primitive. The device is instructed to sample the channel every *macCSInterval* with the duration of *macCSDuration*. During *macCSDuration*, PD waits LESD request command containing service ID field matching to *macServiceID*. If LESD request command is not received during *macCSDuration*, the PD shall turn off its radio as illustrated in Figure 4.

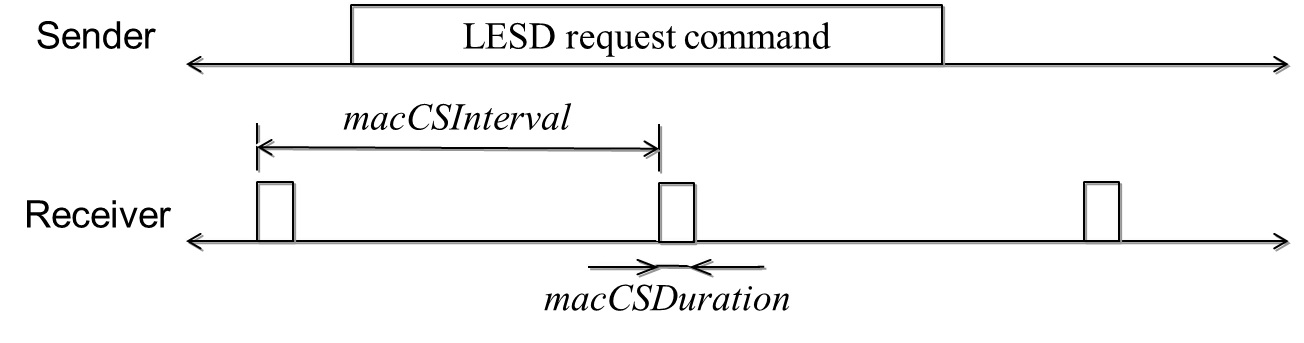


Figure 4—Illustraton of Channel Sampling Procedure

On the receipt of LESD request command frame, MLSDE of the recipient PDs shall discard the frame if the Service ID field does not match to the *macServiceID*. Otherwise, MLSDE shall report the reception of the command frame to the higher layer via MLSDE-LESD.indication primitive.

In response to MLSDE-LESD.indication primitive, the higher layer of the neighboring PD shall issue MLSDE-LESD.response primitive to MLSDE. On the receipt of the primitive, MLSDE shall generate LESD response command frame and broadcast it via CSMA-CA algorithm. PD shall enable the receiver until the transmission of LESD response command is completed.

Figure 5 illustrates the message sequence chart for CS procedure.

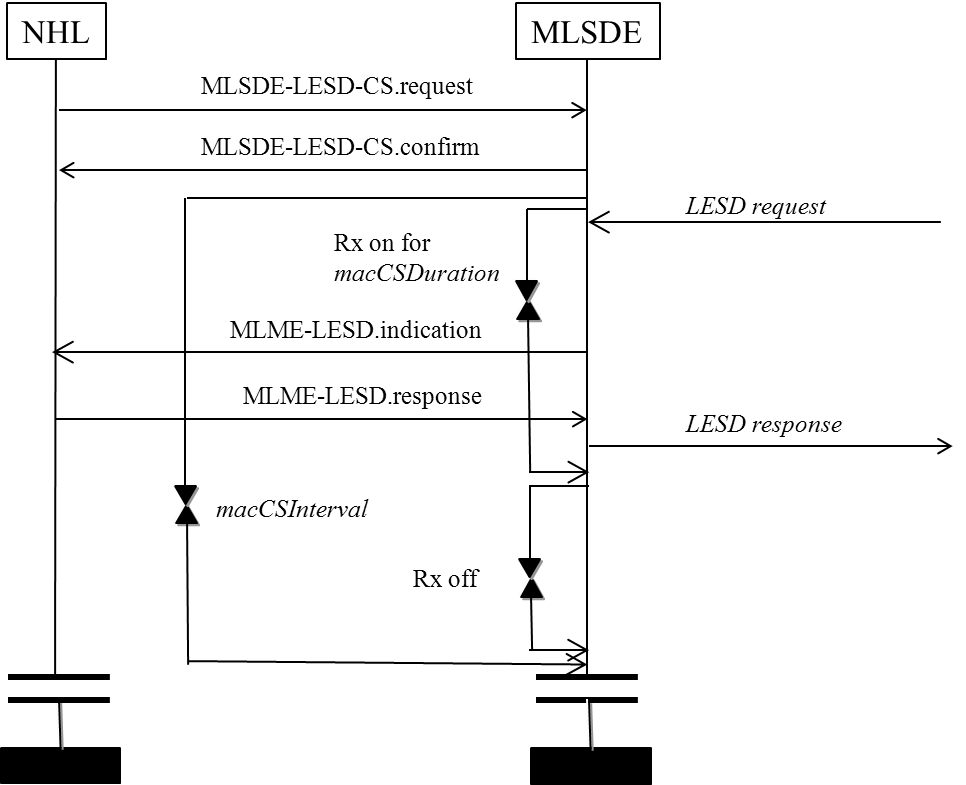


Figure 5—message sequence chart for CS procedure

### LESD MAC command frames

#### LESD request command

The LESD request command allows a PD to request service discovery to neighboring PDs to response service and RF channels matches to the requesting PD. The LESD request command shall be formatted as illustrated in Figure 6.

| Octets: | 1 | 1 |
| --- | --- | --- |
| MHR fields | Service ID | Available Channel ID |

Figure 6—LESD request command format

#### MHR field

#### Service ID field

The Service ID field shall indicate the ID of PAC service that the PD wishes to search. The value of this field is set to the value of ServiceID parameter of MLSDE-LESD.request primitive as described in 5.4.3.3.

#### Available Channel ID field

The Available Channel ID field shall indicate the channel numbers of the PD is capable of use. The value of this field is set to the value of AvailableChannelID parameter of MLSDE-LESD.request primitive as described in 5.4.3.3.

#### LESD response command

The LESD response command allows a PD to reply the result of a LESD request. The LESD response command shall be formatted as illustrated in Figure 7.

| Octets: | 1 | 1 |
| --- | --- | --- |
| MHR fields | Service ID | Communication Channel ID |

Figure 7—LESD response command format

#### MHR field

#### Service ID field

The Service ID field shall indicate the service ID of the WPAN that the PD is associated with. The value of this field is set to the value of Service ID parameter of MLSDE-LESD.response primitive as described in 5.4.3.5.

#### Communication Channel ID field

The Communication Channel ID field shall indicate the operating channel number for the PAC service of the WPAN that the PD is associated with. The value of this field is set to the value of CommunicationChannelID parameter of MLSDE-LESD.response primitive as described in 5.4.3.5.

#### LESD notification command

The LESD notification command allows a PD to announce the result of its service discovery request to the neighboring PDs. The LESD request command shall be formatted as illustrated in Figure 8.

| Octets: | 1 | 1 |
| --- | --- | --- |
| MHR fields | Service ID | Communication Channel ID |

Figure 8—LESD request command format

#### MHR field

#### Service ID field

The Service ID field shall indicate the service ID of the PAC service. The value of this field is set to the value of Service ID field of LESD response command as described in 5.4.2.2.

#### Communication Channel ID field

The Communication Channel ID field shall indicate the operating channel number for the PAC service. . The value of this field is set to the value of Communication Channel ID field of LESD response command as described in 5.4.2.2.

### LESD MAC Primitives

#### MLSDE-LESD-SCAN.request

This primitive allows a LESD-enabled PD (i.e., macLESDenabled is TRUE) to perform a passive scan for PAC service discovery.

The semantics of this primitive are:

MLSDE‑LESD-SCAN.request (

ServiceID,

LESDChannelID,

AvailableChannelID

)

Table 1 specifies the parameters for the MLSDE‑LESD-SCAN.request primitive.

Table 1—MLSDE‑LESD-SCAN.request parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| ServiceID | Integer | 0x0-0xf | PAC service ID to search. |
| LESDChannelID | Integer | 0x0000-0xffff | Channel number for service discovery. |
| AvailableChannelID | Set of octets | 0x0000-0xffff for each element | List of channel numbers that PD is capable of use. |

The MLSDE-LESD-SCAN.request primitive is generated by the higher layer of a PD and issued to its MLSDE to perform a passive scan.

On receipt of the MLSDE‑LESD-SCAN.request primitive, the MLSDE of the device shall update MAC PIB attributes *macLESDChannelID*, *macServiceID* and *macAvailableChannelID* to the values of LESDChannelID, ServiceID parameter and AvailableChannelID parameter respectively. Then, MLSDE shall set a timer for *macCSInterval* and turn the radio on to perform the passive scan on the channel specified by *macLESDChannelID*.

#### MLSDE-LESD-SCAN.confirm

This primitive reports the results of the LESD scan request to the higher layer of the device.

The semantics of this primitive are:

MLSDE‑LESD-SCAN.confirm (

Status

)

Table 2 specifies the parameters for the MLSDE‑LESD-SCAN.confirm primitive.

Table 2—MLSDE‑LESD-SCAN.confirm parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| Status | Enumeration | SUCCESS, SCAN\_IN\_PROGRESS, INVALID\_PARAMETER | The result of the passive LESD scan request. |

If LESD response commands or LESD notification commands with Service ID parameter matching to *macServiceID* are received during the scan duration, MLSDE shall generate corresponding primitives and report the reception of the commands to the higher layer. When timer for passive scan expires, MLSDE shall set the Status parameter to SUCCESS and report the completion of scan procedure to the higher layer via MLSDE-LESD-SCAN.confirm primitive.

If PD does not receive a LESD response command or a LESD notification commands with Service ID parameter matching to *macServiceID* until the timer for passive scan expires, MLSDE shall set the Status parameter to NO\_SERVICE\_FOUND and report the completion of scan procedure to the higher layer via MLSDE-LESD-SCAN.confirm primitive.

If the MLSDE receives the MLSDE-LESD-SCAN.request primitive while performing a previously initiated scan operation, the MLSDE shall not perform the passive scan and the status parameter will be set to SCAN\_IN\_PROGRESS.

#### MLSDE-LESD.request

This primitive allows a LESD-enabled PD (i.e., macLESDenabled is TRUE) to request a service discovery.

The semantics of this primitive are:

MLSDE‑LESD.request (

ServiceID,

AvailableChannelID

)

Table 3 specifies the parameters for the MLSDE‑LESD.request primitive.

Table 3—MLSDE‑LESD.request parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| ServiceID | Integer | 0x0-0xf | PAC service ID to search. |
| AvailableChannelID | Set of octets | 0x0000-0xffff for each element | List of channel numbers that PD is capable of use. |

The MLSDE-LESD.request primitive is generated by the higher layer of a PD to initiate active scan and issued to its MLSDE to discover PAC service specified by ServiceID parameter.

On receipt of the MLSDE‑LESD.request primitive, the MLSDE of the device shall update MAC PIB attributes *macServiceID* and *macAvailableChannelID* to the values of ServiceID parameter and AvailableChannelID parameter respectively. MLSDE shall generate LESD request command as described in 5.4.2.1 and broadcast the command frame. Then, MLSDE shall increase *macMaxLESDRequestRetries* by one and set a timer for *macLESDResponseWaitTime* to wait for a LESD response command frame.

#### MLSDE-LESD.indication

This primitive reports the reception of a LESD request command.

The semantics of this primitive are:

MLSDE‑LESD.indication (

ServiceID,

AvailableChannelID,

)

Table 4 specifies the parameters for the MLSDE‑LESD.request primitive.

Table 4—MLSDE‑LESD.indication parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| ServiceID | Integer | 0x0-0xf | PAC service ID to search. |
| AvailableChannelID | Set of octets | 0x0000-0xffff for each element | List of channel numbers that PD is capable of use. |

On receipt of LESD request command, the MLSDE shall check the value of Service ID field of the command. If the value matches to the *macServiceID* of the PD, the MLSDE shall generate MLSDE-LESD.indication primitive and notify the reception of the command. If the value does not match to the *macServiceID* of the PD, the MLSDE discard the received command.

On receipt of the MLSDE‑LESD.indication primitive, the higher layer may issue MLSDE-LESD.response primitive to MLSDE if the value of ServiceID parameter matches to *macServiceID* of the recipient PD.

#### MLSDE-LESD.response

This primitive allows the next higher layer of a device to respond to the MLSDE‑LESD.indication primitive.

The semantics of this primitive are:

MLSDE‑LESD.response (

PANID

ServiceID,

CommunicationChannelID

)

Table 5 specifies the parameters for the MLSDE‑LESD.response primitive.

Table 5—MLSDE‑LESD.response parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| PANId | Integer | 0x0000–0xffff | The PAN identifier used by the PD. |
| ServiceID | Integer | 0x0-0xf | The Service ID of the PAC WPAN that the PD is associated with. |
| CommunicationChannelID | Set of octets | 0x0000-0xffff for each element | List of channel numbers in use at the PAC WPAN that the PD is associated with. |

The MLSDE‑LESD.response primitive is generated by the next higher layer and issued to its MLSDE.

On receipt of the MLSDE‑LESD.response primitive, the MLSDE of the device shall update the MAC PIB attribute *macCommunicationChannelID* with the value of CommunicationChannelID parameter. Then MLSDE shall generate a LESD response command frame as described in 5.4.2.2 and broadcast the command to the neighbor PDs.

#### MLSDE-LESD.confirm

This primitive reports the results of the LESD request to the higher layer of the device.

The semantics of this primitive are:

MLSDE‑LESD.confirm (

PANID,

ServiceID,

CommunicationChannelID,

Status

)

Table 6 specifies the parameters for the MLSDE‑LESD.request primitive.

Table 6—MLSDE‑LESD.confirm parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| PANId | Integer | 0x0000–0xffff | The PAN identifier used in the PAC WPAN |
| ServiceID | Integer | 0x0-0xf | PAC service ID used in the PAC WPAN |
| CommunicationChannelID | Set of octets | 0x0000-0xffff for each element | List of channel numbers used in the PAC WPAN. |
| Status | Enumeration | SUCCESS, TRANSACTION\_EXPIRED, INVALID\_PARAMETER | The result of the LESD request. |

On receipt of a LESD response command, the MLSDE shall check the value of Service ID field of the command. If the value matches to the *macServiceID* of the PD, the MLSDE shall update the MAC PIB attribute *macCommunicationChannelID* with the value of Communication Channel ID field in the command and generate MLSDE-LESD.confirm primitive with the Status parameter of SUCCESS and report the results of the LESD request to the higher layer. Then, MLSDE shall generate LESD notification command as described in 5.4.2.3 and broadcast it to neighboring PDs. If the value of Service ID field of the LESD response command received does not match to the *macServiceID* of the PD, the MLSDE discard the received command.

The MLSDE of the PD shall set the value of Status to TRANSACTION\_EXPIRED and report to the higher layer if the LESD response command with Service ID field matching to the *macServiceID* is not received for at most *macLESDResponseWaitTime* after the PD sends LESD request command. The value of Status parameter shall be set to INVALID\_PARAMETER otherwise.

#### MLSDE-LESD-NOTIFY.indication

This primitive reports the reception of a LESD notification command.

The semantics of this primitive are:

MLSDE‑LESD-NOTIFY.indication (

PANID

ServiceID,

CommunicationChannelID,

)

Table 7 specifies the parameters for the MLSDE‑LESD-NOTIFY.indication primitive.

Table 7—MLSDE‑LESD-NOTIFY.indication parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| PANId | Integer | 0x0000–0xffff | The PAN identifier used in the PAC WPAN |
| ServiceID | Integer | 0x0-0xf | PAC service ID used in the PAC WPAN |
| CommunicationChannelID | Set of octets | 0x0000-0xffff for each element | List of channel numbers used in the PAC WPAN. |

This primitive is generated by the MLSDE of a device and issued to its next higher layer upon the reception of a LESD notification command frame with Service ID field matching to *macServiceID* of the PD. If the value of the Service ID field of the LESD notification command does not match, MLSDE discard the command.

On receipt of the MLSDE‑LESD-NOTIFY.indication primitive, the higher layer is notified of the reception of a LESD notification command. The higher layer may be informed the PAC service and channel numbers in use among the PDs nearby.

#### MLSDE-LESD-CS.request

This primitive allows the PD to initiate CS procedure.

The semantics of this primitive are:

MLSDE‑LESD-CS.request (

PANID,

CSInterval,

CSDuration

ServiceID,

CommunicationChannelID,

)

Table 8 specifies the parameters for the MLSDE‑LESD-CS.request primitive.

Table 8—MLSDE‑LESD-CS.request parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| PANId | Integer | 0x0000–0xffff | The PAN identifier to be used by the device. |
| CSInterval | Integer | 0x0000-0xffff | Time duration that PD alternates sampling the channel and sleeping as illustrated in Figure 4. |
| CSDuration | Integer | 0x0000-0xffff | Time duration that PD listens to on the channel specified by *macLESDChannelID*. |
| ServiceID | Integer | 0x0-0xf | PAC service ID to be used. |
| CommunicationChannelID | Set of octets | 0x0000-0xffff for each element | Channel numbers to be used. |

This primitive is generated by the next higher layer to the MLSDE when a PD discovers the PAC service successfully or if it does not discovery the service through passive and active LESD scan.

On the receipt of the primitive, the MLSDE of the PD shall update the corresponding MAC PIB attributes. The *macLESDdone* is set to TRUE and *macPANID*, *macCSInterval*, *macCSDuration*, *macServiceID*, *macCommunicationChannelID* are updated respectively as the values of PANID, CSInterval, CSDuartion, ServiceID, CommunicationID parameters.

#### MLSDE-LESD-CS.confirm

This primitive reports the results of the LESD-CS request to the higher layer of the device.

The semantics of this primitive are:

MLSDE‑LESD-CS.confirm (

Status

)

Table 9 specifies the parameters for the MLSDE‑LESD.request primitive.

Table 9—MLSDE‑LESD-CS.confirm parameters

| Name | Type | Valid Range | Description |
| --- | --- | --- | --- |
| Status | Enumeration | SUCCESS, FAILURE, INVALID\_PARAMETER | The result of the LESD CS request. |

The MLSDE shall generate MLSDE-LESD-CS.confirm primive with the Status parameter of SUCCESS if it successfully updates the MAC PIB attributes with the values of corresponding parameters of MLSDE-LESD-CS.request primitive as described in 5.4.3.8.

If the MLSDE receives the MLSDE-LESD-CS.request primitive while performing other LESD MAC operation, the MLSDE shall not perform CS procedure and report the result to the higher layer via MLSDE-LESD-CS.confirm primitive with the status parameter of FAILURE. The value of Status parameter shall be set to INVALID\_PARAMETER otherwise.

### LESD MAC constants and PIB attributes

#### LESD MAC constants

#### LESD MAC PIB attributes

Table 10—MAC PIB attributes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute | Type | Range | Description | Default |
| macLESDcapable | Boolean | TRUE or FALSE | If TRUE, the device is capable of functionality specific to LESD. | Implementation  specific |
| macLESDenabled | Boolean | TRUE or FALSE | If TRUE, the device is using functionality specific to LESD. | Implementation  specific |
| macPANID | Integer | 0x0000-0xffff | The identifier of the PAN on which the PD is operating. If this value is 0xffff, the device is not associated. | 0xffff |
| *macServiceID* | Integer | 0x0-0xf | PAC service ID used in the PAC WPAN. | 0xf |
| *macAvailableChannelID* | Integer | 0x0000-0xfffff for each elemets | List of channel numbers that PD is capable of use. | - |
| *macLESDResponseWaitTime* | Integer | 0x0000-0xffff | The maximum time that a device shall wait for a LESD response command to be available following a LESD request command frame. | - |
| *macCSInterval* | Integer | 0x0000-0xffff | Time duration that PD alternates sampling the channel and sleeping as illustrated in Figure 4. | - |
| *macCSDuration* | Integer | 0x0000-0xffff | Time duration that PD listens to on the channel specified by *macLESDChannelID*. | - |
| *macCommunicationChannelID* | Integer | 0x0000-0xffff | List of channel numbers in use at the PAC WPAN | - |
| *macLESDChannelID* | Integer | 0x0000-0xffff | The channel number to use for LESD procedure. | - |
| *macLESDdone* | Boolean | TRUE or FALSE | Indicates if PAC service specified by *macServiceID* is found. TRUE if the service is found; FALSE otherwise. |  |
| *macMaxLESDRequestRetries* | Integer | 0x00-0xff | The maximum number of retries to send LESD request command | 10 |
| *macNumLESDRequestRetries* | Integer | 0x00-0xff | The number of retries to send LESD request command | 0 |