BT122 Dual Mode API Reference

This document contains the Silicon Labs Bluetooth Dual Mode Stack version 1.4 API reference for the BGAPI serial protocol, BGLIB C API, and BGScript scripting language.

A short overview of the Silicon Labs Bluetooth Dual Mode Stack and SDK, and included tools, is also presented here.

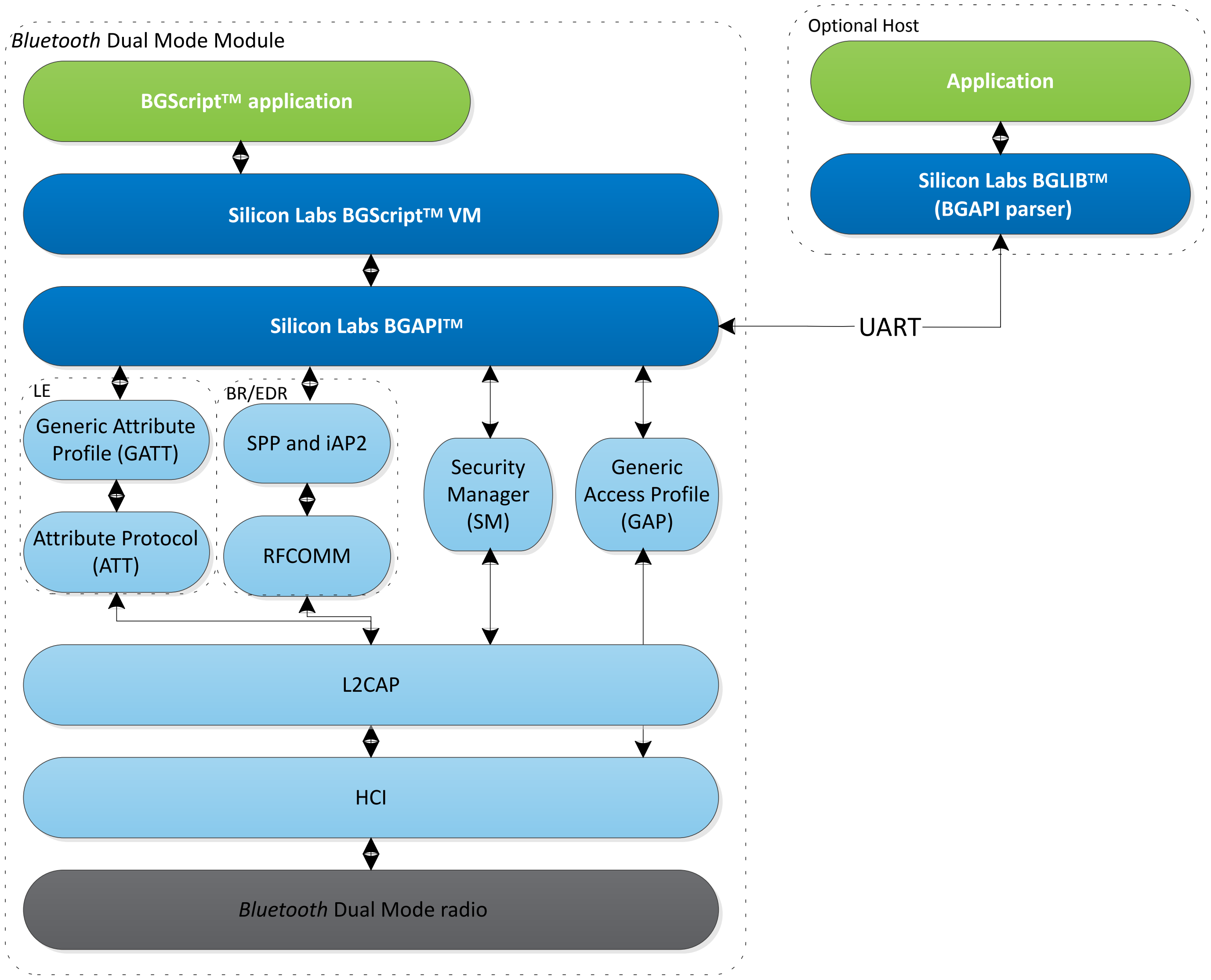
Table of Contents

1. Silicon Labs Bluetooth Dual Mode Software

This section contains a short description of the Silicon Labs Bluetooth Dual Mode software, the components, APIs, and tools it includes.

1.1 Silicon Labs Bluetooth Dual Mode Stack

The main components of the Silicon Labs Bluetooth Dual Mode and stack are shown in the figure below. The figure shows the layers the Bluetooth Dual Mode stack as well also shows the APIs that can be used to interface to the Silicon Labs Bluetooth Dual Mode Stack.


Bluetooth Dual Mode Module
BGScript™ application
Silicon Labs BGScript™ VM
Silicon Labs BGAPI™
LE
Generic Attribute Profile (GATT)
Attribute Protocol (ATT)
BR/EDR
SPP and iAP2
RFCOMM
Security Manager (SM)
Generic Access Profile (GAP)
L2CAP
HCI
Bluetooth Dual Mode radio
Optional Host
Application
Silicon Labs BGLIB™ (BGAPI parser)
UART

Key features of the Silicon Labs Bluetooth Dual Mode stack include:

- Bluetooth 4.2 Dual Mode compatible
  - Bluetooth GAP and Security Manager
  - Bluetooth SPP and Apple iAP profiles
  - GATT over BR profile
  - Any GATT based Bluetooth Low Energy profile
- High performance features
  - 6 simultaneous BR/EDR connections
  - 7 simultaneous LE connections
  - 1 x BR/EDR and 6 x LE connections simultaneously
  - Up to 1 Mbps throughput over SPP
  - Up to 250 kbps throughput over iAP2

1.2 Silicon Labs Bluetooth Dual Mode SDK

The Silicon Labs Bluetooth Dual Mode SDK is a software development kit, which enables the device and software vendors to develop applications on top of the Silicon Labs's Bluetooth Dual Mode hardware and stack software.

The Bluetooth Dual Mode SDK supports multiple development models and the application developers can decide whether the application software runs on a separate host (a low power MCU) or whether they want to make fully standalone devices and execute their code on the MCU embedded in the Silicon Labs Bluetooth Dual Mode modules.

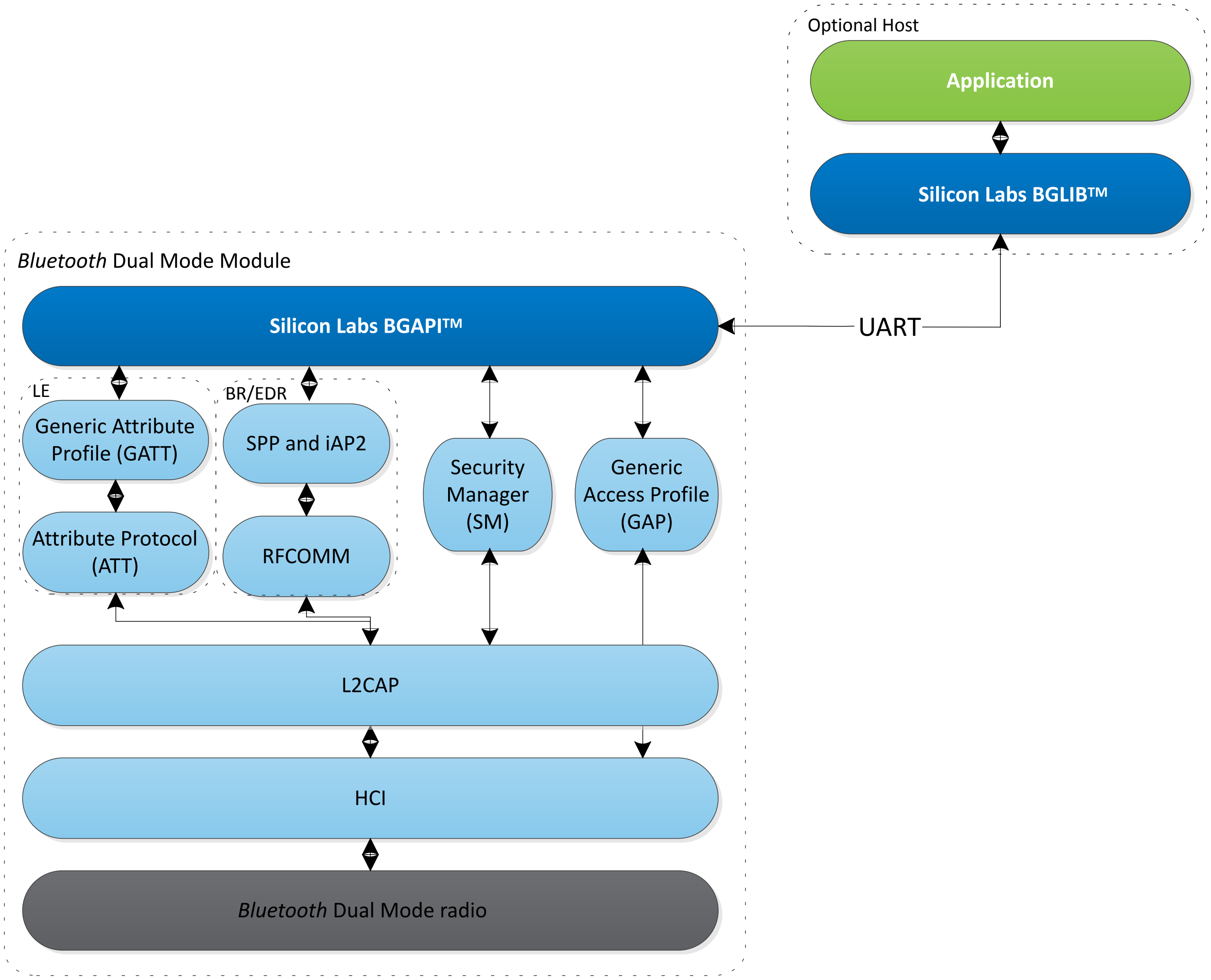
The SDK also contains documentation, tools for compiling the firmware, installing it into the hardware and lot of example applications speeding up the development process.

The Silicon Labs Bluetooth Dual Mode SDK includes the following APIs, components and tools:

- **The Bluetooth Dual Mode stack** as described in the previous chapter.
- **BGAPI**™ is a binary serial protocol API to the Silicon Labs Bluetooth Dual Mode stack over UART interface. BGAPI is target for users, who want to use both Bluetooth BR/EDR and LE functionality and use all the features in the Bluetooth Dual Mode stack form an external host such as a low power MCU.
- **BGLIB**™ is a host library for external MCUs and implements a reference parser for the BGAPI serial protocol. BGLIB is delivered in C source code as part of the Bluetooth Dual Mode SDK and it can be easily ported to various processor architectures.
- **BGScript**™ interpreter and scripting language allow applications to be developed into the Bluetooth Dual Mode modules built-in MCU. It allows simple end user applications or enhanced functionality to be developed directly into the Bluetooth Dual Mode module which means no external host MCU is necessarily needed. BGScript applications can be executed at the same time as the BGAPI is used, allowing the possibility to implement some functionality on the Bluetooth module and some on the host.
- **Profile Toolkit**™ is a simple XML based description language which can be used to easily and quickly develop GATT based service and characteristic databases for the Bluetooth Dual Mode module.
- **BGBuild compiler** is a free-of-charge compiler that compiles the Bluetooth Dual Mode Stack, the BGScript application and the Bluetooth GATT services into the firmware binary that can be installed to the Bluetooth Dual Mode modules.
- **BGTool** is a graphical user interface application and a developer tool, which allows the Bluetooth Dual Mode module to be controller over the host interface using the BGAPI serial protocol. BGTool is a useful tool for testing the Bluetooth Dual Mode module and evaluating it's functionality and APIs.
- **DFU Tools** are also included as part of the SDK allowing the firmware to be updated over the UART interface.

1.3 BGAPI™ serial protocol API

The BGAPI serial protocol allows external hosts to interface to the Bluetooth Dual Mode modules over UART interface. The BGAPI serial protocol is a lightweight and well defined binary protocol which allows command and data to be sent to the Bluetooth Dual Mode module and it also provides a way to receive responses and events and data from the module.



The BGAPI provides access to the following layers in the *Bluetooth* Dual Mode Stack:

- **BT GAP** - BT GAP provides access to basic Bluetooth BR/EDR features, like device discovery and connection establishment.
- **LE GAP** - LE GAP provides access to basic Bluetooth LE features, like device advertisement, discovery and connection establishment.
- **Security manager** - Security manager is used to configure the local devices security features and establish secure connections
- **RFCOMM** - RFCOMM provides basic serial data transmission over Bluetooth BR/EDR.
- **iAP** - iAP provides basic serial data transmission to Apple iOS devices using Bluetooth BR/EDR. iAP is only available to Apple MFI licenses and not included in the standard SDK.
- **Hardware** - Access to local hardware features and interfaces like I2C, GPIO and ADC
- **Persistent Store** - A data storage that allows data to be stored to and read from the internal flash
- **System** - Local device's status and management functions

1.4 BGLIB™ Host Library

The BGLIB host library is a reference implementation of the BGAPI serial protocol parser and it's provided in an ANSI C source code in the Bluetooth Dual Mode SDK. It abstracts the complexity of the BGAPI serial protocol and instead provides high level C functions and call-back handlers to the application developer, which makes the application development easier and faster.

The BGLIB library can be ported to various host systems ranging from low cost MCUs to devices running Linux, Windows or OSX.

```
/* Function to open RFCOMM connection */
void dumo_cmd_bt_rfcomm_open(   bd_addr address,
                                uint8 streaming_destination,
                                uint8 uuid_len,
                                const uint8* uuid_data);

/* Callback handler*/
struct dumo_msg_bt_rfcomm_open_rsp_t
{
 uint16 result,
 uint8 endpoint
}

/* Response handler */
void dumo_rsp_bt_rfcomm_open(
 const struct dumo_msg_bt_rfcomm_open_rsp_t *msg
)
```

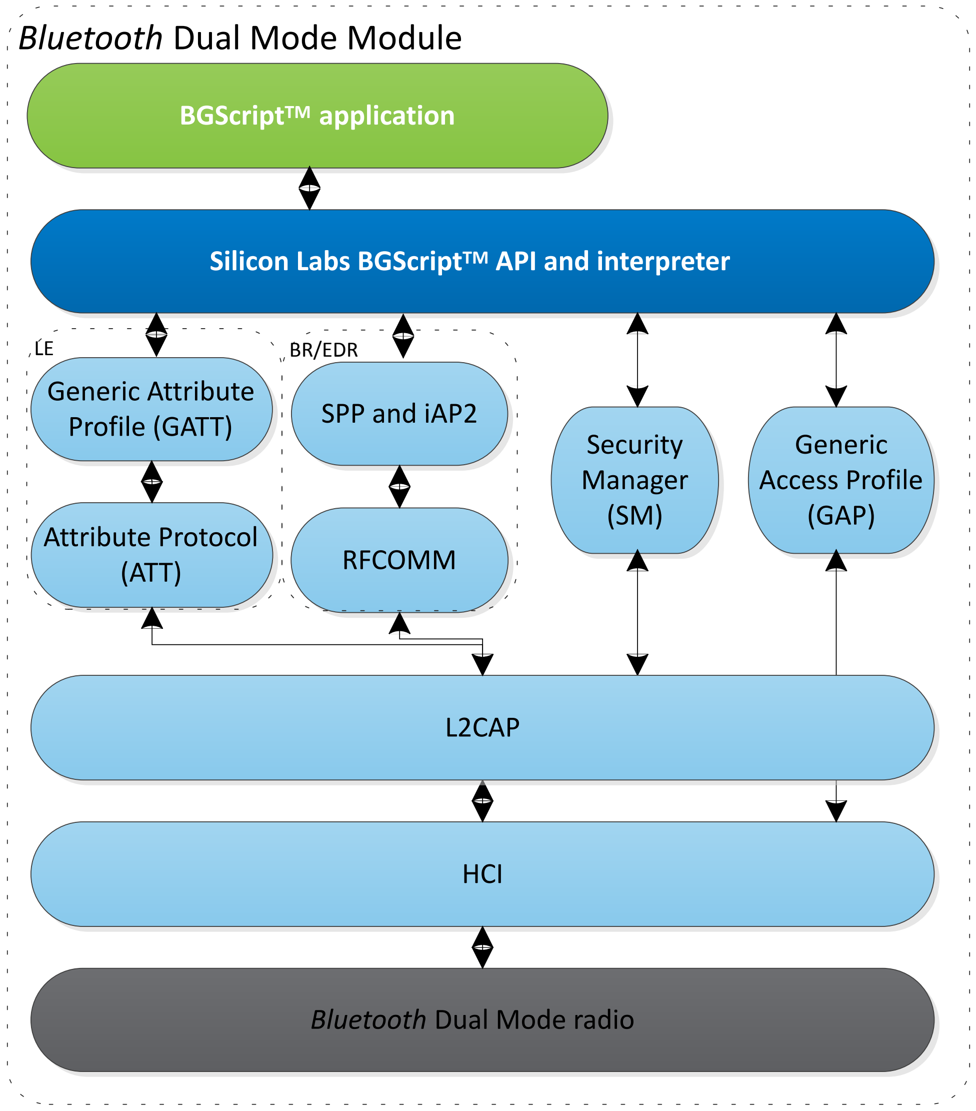
1.5 BGScript™ Scripting Language

BGScript is a simple BASIC-style programming language that allows end-user applications to be embedded to the Silicon Labs Bluetooth Dual Mode modules. Although being a simple and easy-to-learn programming language BGScript does provide features and functions to create fairly complex and powerful applications and it provides access to all the same APIs as the BGAPI serial protocol.

BGScript is fully event based programming language and code execution is started when events such as system start-up, Bluetooth connection, I/O interrupt etc. occur.

BGScript applications are developed with Silicon Labs's free-of-charge Bluetooth Dual Mode SDK and the BGScript applications are executed in the BGScript Virtual Machine (VM) that is part of the Silicon Labs Bluetooth Dual Mode software. The Bluetooth Dual Mode SDK comes with all the necessary tools for code editing and compilation and also the needed tools for installing the complied firmware binary to the Silicon Labs Bluetooth Dual Mode modules.

BGScript applications can also be used at the same time as BGAPI and they can be for example used to automate some simple actions.


Bluetooth Dual Mode Module
BGScript™ application
Silicon Labs BGScript™ API and interpreter
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L2CAP
HCI
Bluetooth Dual Mode radio

```
# Boot event listener - Generated when the module is started
event system_boot(major, minor, patch, build, bootloader, hw)

    # Start a software timer
    call hardware_set_soft_timer(1000, 0, 0)

end

# System initialized event listener - Generated when the module is
# ready to be used
event system_initialized(addr)

    # Enable bonding mode
    call sm_set_bondable_mode(1)

    # Start RFCOMM server for SPP
    call bt_rfcomm_start_server(2, 0)

    # Make device visible via both BT BR/EDR and LE
    call bt_gap_set_mode(1, 1, 0)
    call le_gap_set_mode(2, 2)

    # Set local device friendly name for Bluetooth BR/EDR
    call system_set_local_name(14, "Dual Mode Demo")

end
```

1.6 BGAPI™ vs BGScript™

This section describes the differences between using BGAPI and BGScript. In brief the difference is:

- BGScript is our custom scripting language used for on-module applications. BGScript applications only run on Silicon Labs modules and dongles.
- BGAPI is a custom serial protocol used to externally control the modules over the host interface and BGLIB is an ANSI C reference implementation of the BGAPI serial protocol and only runs outside of our modules and dongles.

So the main difference between BGScript and BGLIB is that BGScript allows you to run an application right on the Bluetooth module, whereas BGLIB uses the BGAPI serial protocol API to send commands and receive events from an external device - typically a micro-controller. Note however that BGScript and BGLIB implement the exact same functionality. Every BGScript command, response, and event has a counterpart in the BGAPI serial protocol and BGLIB host library.

One other thing to keep in mind is that BGScript has some performance penalties compared to external API control due to the fact that BGScript is an interpreted scripting language and requires extra overhead in order to use. It makes the Bluetooth module do the work that could otherwise be done elsewhere. If you are trying to achieve maximum performance or you have an application which is fairly complex (lots of fast timers, interrupts, or communicating with many external sensors over I2C for example), it is often a good idea to use a small external microcontroller and BGLIB/BGAPI instead.

Question	BGAPI™	BGScript™
An external host needed?	Yes	No
Host interface	UART	No separate host needed
Bluetooth API	BGAPI or BGLIB APIs	BGScript API
Peripheral interface APIs and support	Host dependent (*	APIs for UART, I2C, GPIO, ADC and PS store
Custom peripheral interface drivers	Can be developed to the host	Peripheral drivers are part of the Silicon Labs *Bluetooth* Dual Mode stack
RAM available for application	Host dependent	Application dependent.
Flash available for application	Host dependent	Application dependent.
Execution speed	Host dependent	Application dependent.
Application development SDK	Host dependent + BGAPI and BGLIB	Silicon Labs *Bluetooth* Dual Mode SDK
Bluetooth firmware / application updates	DFU over UART	DFU over UART

*) The *Bluetooth* Dual Mode modules peripheral interfaces are still available via BGAPI commands and can be used to extend the host MCUs I/Os.

1.7 Profile Toolkit™

The *Bluetooth* Low Energy profile toolkit is a simple set of tools, which can used to describe GATT based service and characteristic databases used with Bluetooth Low Energy and GATT over BR profiles. The profile toolkit consists of a simple XML based description language and templates, which can be used to describe the services and characteristics and their properties in a devices GATT database.

The GATT database developed with the Profile Toolkit is included as part of the device's firmware when the firmware is compiled.

```
<gatt>

    <service uuid="1800">

        <description>Generic Access Service</description>

        <characteristic uuid="2a00">
            <properties read="true" const="true" />
            <value>Demo</value>
        </characteristic>

        <characteristic uuid="2a01">
            <properties read="true" const="true" />
            <value type="hex">0</value>
        </characteristic>

    </service>

</gatt>
```

1.8 BGBuild compiler

The BGBuild compiler is a simple compiler that is used to build firmware images for the Bluetooth Dual Mode modules. The BGBuild compiler compiles the Bluetooth Dual Mode stack, the GATT database and optionally also a BGScript application into a single firmware binary image that can be installed into a Bluetooth Dual Mode module.

1.9 DFU tools

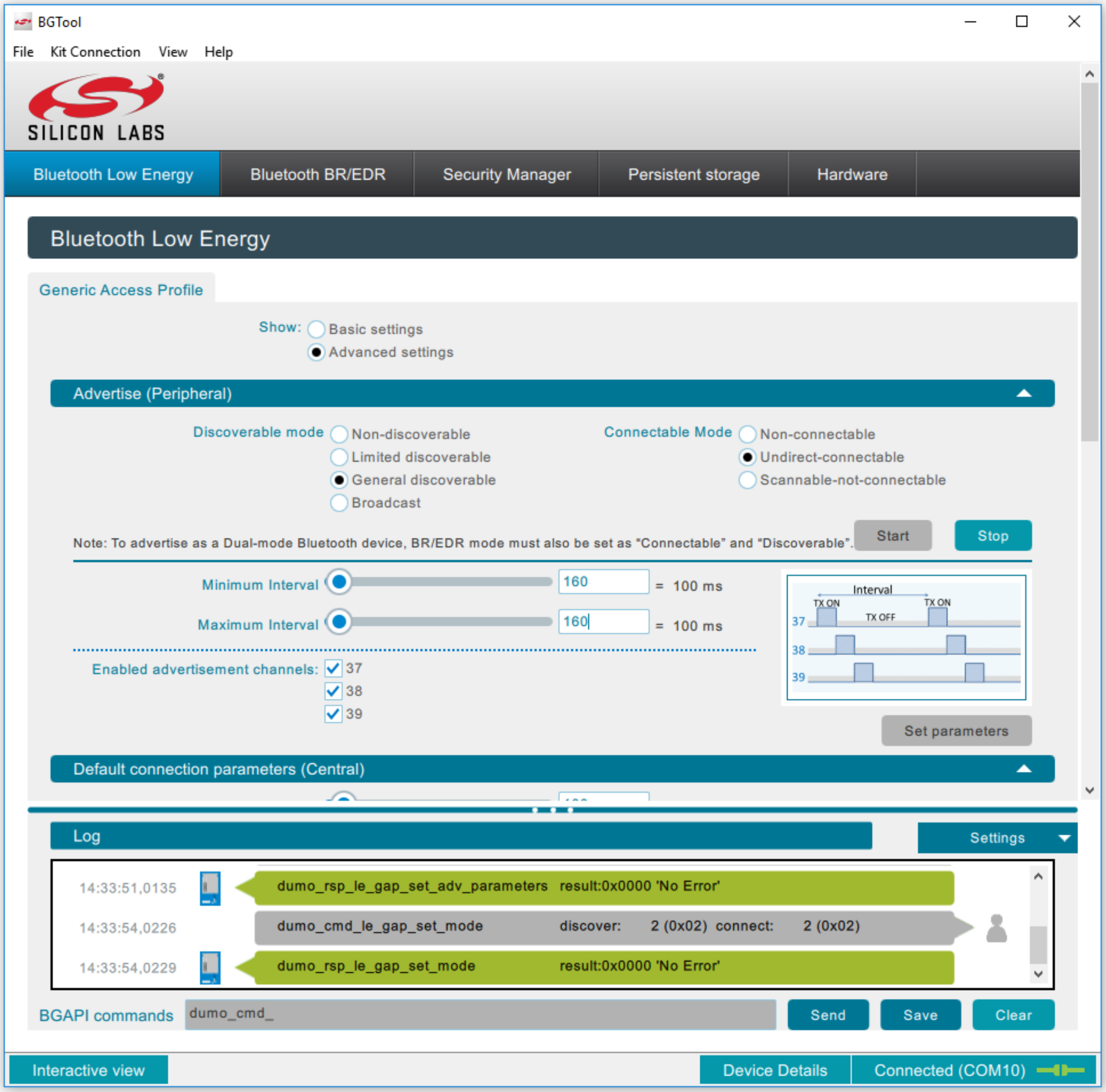
The Device Firmware Update (DFU) protocol is an open serial protocol that can be used to perform field updates to the Bluetooth Dual Mode modules. DFU protocol allows any firmware image generated with the BGBuild compiler to be installed into a Bluetooth Dual Mode Module.

The Bluetooth Dual Mode SDK contains command line binaries versions and source code for the DFU protocol and tools.

DFU protocol and available commands are described in the API reference document.

1.10 BGTool

The BGTool application can be used to test and evaluate the Bluetooth Dual Mode module and issue BGAPI commands to it over the UART host interface.



Show: Basic settings [✓ Advanced settings]

Discoverable mode: Non-discoverable, Limited discoverable, [✓ General discoverable], Broadcast

Connectable Mode: Non-connectable, [✓ Undirect-connectable], Scannable-not-connectable

Note: To advertise as a Dual-mode Bluetooth device, BR/EDR mode must also be set as "Connectable" and "Discoverable".

Minimum Interval 160 = 100 ms

Maximum Interval 160 = 100 ms

Enabled advertisement channels: ✓ 37 ✓ 38 ✓ 39

```
14:33:51,0135  dumo_rsp_le_gap_set_adv_parameters  result:0x0000 'No Error'
14:33:54,0226  dumo_cmd_le_gap_set_mode            discover:    2 (0x02)  connect:    2 (0x02)
14:33:54,0229  dumo_rsp_le_gap_set_mode            result:0x0000 'No Error'
```

BGAPI commands: dumo_cmd_

2. Data types

Data types used in the documentation are shown in the table below. Unless otherwise noted, all multi-byte fields are in little endian format.

Table 2.1. Data types

Name	Length	BGScript equivalent	Description
errorcode	2 bytes	Number	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
int16	2 bytes	Number	Signed 16-bit integer
bd_addr	6 bytes	Array of 6 bytes	Bluetooth address
uint16	2 bytes	Number	Unsigned 16-bit integer
int32	4 bytes	Number	Signed 32-bit integer
uint32	4 bytes	Number*	Unsigned 32-bit integer
link_id_t	2 bytes	Number	Link ID
int8	1 byte	Number	Signed 8-bit integer
uint8	1 byte	Number	Unsigned 8-bit integer
uint8array	1 - 256 bytes	Array	Variable length byte array. First byte is the length of the array.
dbm	1 byte	Number	Signal strength
connection	1 byte	Number	Connection handle
service	1 byte	Number	GATT service handle. This value is normally received from the gatt_service event.
characteristic	1 byte	Number	GATT characteristic handle. This value is normally received from the gatt_characteristic event
descriptor	1 byte	Number	The handle of the GATT characteristic descriptor
uuid	1 byte	Number	Characteristic UUID, first byte is the length of UUID and rest is UUID in little-endian format
att_errorcode	1 byte	Number	Attribute protocol error code. Values: • **0:** No error • Non-zero: see error codes
att_opcode	1 byte	Number	Attribute opcode which informs the procedure from which attribute the value was received

(*) The script's internal number type is a signed 32-bit integer. This means large unsigned 32-bit integers in the BGAPI will be represented with negative numbers in the script. This is a known limitation.

3. API Reference

3.1 Connection management for Bluetooth BR/EDR (bt_connection)

These commands and events are related to Bluetooth BR/EDR connection management and provide the means to open, close and monitor Bluetooth BR/EDR connections.

3.1.1 bt_connection commands

3.1.1.1 cmd_bt_connection_get_rssi

Get RSSI value of a connection.

Table 3.1. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x05	method	Message ID
4	uint8	connection	BR/EDR Connection, LE Connection or RFCOMM handle

Table 3.2. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_connection_get_rssi(connection)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_connection_get_rssi(uint8 connection);

/* Response id */
dumo_rsp_bt_connection_get_rssi_id

/* Response structure */
struct dumo_msg_bt_connection_get_rssi_rsp_t
{
  uint16 result
}
```

Table 3.3. Events Generated

Event	Description
bt_connection_rssi_value	RSSI value of a connection.

3.1.1.2 cmd_bt_connection_list

This command can be used to list all RFCOMM and HID connections and check parameters of each connection.

Table 3.4. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x00	method	Message ID

Table 3.5. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_connection_list()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_connection_list();

/* Response id */
dumo_rsp_bt_connection_list_id

/* Response structure */
struct dumo_msg_bt_connection_list_rsp_t
{
  uint16 result
}
```

Table 3.6. Events Generated

Event	Description
bt_connection_parameters	This event indicates the details of a single RFCOMM or HID connection. This event can be triggered when needed with bt_connection_list. For HID connections only fields address, powermode, role and encryption contain valid information.
bt_connection_list_complete	This event indicates that all connections have been listed.

3.1.1.3 cmd_bt_connection_read_clock

Read Bluetooth Clock of a connection/piconet. For detailed information, see Bluetooth Specification 4.2, vol. 2, part E, section 7.5.6 (Read Clock Command).

Table 3.7. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x06	method	Message ID
4	uint8	connection	Connection endpoint handle or rfcomm handle. Zero to read local Bluetooth Clock.

Table 3.8. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_connection_read_clock(connection)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_connection_read_clock(uint8 connection);

/* Response id */
dumo_rsp_bt_connection_read_clock_id

/* Response structure */
struct dumo_msg_bt_connection_read_clock_rsp_t
{
  uint16 result
}
```

Table 3.9. Events Generated

Event	Description
bt_connection_clock_value	Bluetooth Clock of a connection/piconet.

3.1.1.4 cmd_bt_connection_set_role

This command can be used to set the Bluetooth connection local role. Note that this may not be possible if the remote device is the Central and does not allow role changes.

Table 3.10. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x03	method	Message ID
4	uint8	endpoint	Endpoint handle
5	uint8	role	Bluetooth connection local role

Table 3.11. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_connection_set_role(endpoint,role)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_connection_set_role(uint8 endpoint, uint8 role);

/* Response id */
dumo_rsp_bt_connection_set_role_id

/* Response structure */
struct dumo_msg_bt_connection_set_role_rsp_t
{
  uint16 result
}
```

Table 3.12. Events Generated

Event	Description
bt_connection_parameters	This event indicates the details of a single RFCOMM or HID connection. This event can be triggered when needed with bt_connection_list. For HID connections only fields address, powermode, role and encryption contain valid information.

3.1.1.5 cmd_bt_connection_set_sniff

This command can be used to set the sniff parameters for a connection. Please see BLUETOOTH SPECIFICATION Version 4.2 [Vol 2] Part E chapter 7.2.2 for more information regarding the use of the related parameters.

Table 3.13. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x09	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x02	method	Message ID
4	uint8	endpoint	Bluetooth connection endpoint handle
5-6	uint16	max	Maximum sniff interval. • Range: 0x0004 to 0xfffe • Only even values are valid • Sniff interval = 0.625ms x max • Time range 2.5 ms to 40959 ms
7-8	uint16	min	Minimum sniff interval. • Range: 0x0002 to 0xfffe • Only even values are valid • Sniff interval = 0.625ms x min • Time range 1.25 ms to 40959 ms
9-10	uint16	attempt	Number of baseband receive slots for sniff attempt. • Range: 0x0001 to 0x7fff • Time range 0.625 ms to 40959 ms
11-12	uint16	timeout	Number of baseband receive slots for sniff timeout. • Range: 0x0000 to 0x7fff • Time range 0.0 ms to 40959 ms

Table 3.14. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_connection_set_sniff(endpoint,max,min,attempt,timeout)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_connection_set_sniff(uint8 endpoint, uint16 max, uint16 min, uint16 attempt, uint16 timeout);

/* Response id */
dumo_rsp_bt_connection_set_sniff_id

/* Response structure */
struct dumo_msg_bt_connection_set_sniff_rsp_t
{
  uint16 result
}
```

Table 3.15. Events Generated

Event	Description
bt_connection_parameters	This event indicates the details of a single RFCOMM or HID connection. This event can be triggered when needed with bt_connection_list. For HID connections only fields address, powermode, role and encryption contain valid information.

3.1.1.6 cmd_bt_connection_set_supervision_timeout

This command can be used to set the connection supervision timeout.

Table 3.16. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x04	method	Message ID
4	uint8	endpoint	Bluetooth connection endpoint handle
5-6	uint16	supervisiontimeout	Supervision timeout defines how long, in multiples of 0.625 ms, the connection can be without any activity before being disconnected. Note that this command has no effect if the local device is not the Central of the connection. Range: 0x0001 - 0xffff. Default value: 0x7D00 (20 seconds)

Table 3.17. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_connection_set_supervision_timeout(endpoint,supervisiontimeout)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_connection_set_supervision_timeout(uint8 endpoint, uint16 supervisiontimeout);

/* Response id */
dumo_rsp_bt_connection_set_supervision_timeout_id

/* Response structure */
struct dumo_msg_bt_connection_set_supervision_timeout_rsp_t
{
  uint16 result
}
```

3.1.2 bt_connection events

3.1.2.1 evt_bt_connection_clock_value

Bluetooth Clock of a connection/piconet.

Table 3.18. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x05	method	Message ID
4	uint8	connection	Connection endpoint handle or zero when reading local clock. NOTE: this is always a connection handle regardless whether clock was requested by RFCOMM or connection handle.
5-8	uint32	clock	Bluetooth Clock of the device requested.
9-10	uint16	accuracy	Maximum Bluetooth Clock error in +- 0.3125 ms units. 0xFFFF means unknown.

BGScript event

```
event bt_connection_clock_value(connection,clock,accuracy)
```

C Functions

```
/* Event id */
dumo_evt_bt_connection_clock_value_id

/* Event structure */
struct dumo_msg_bt_connection_clock_value_evt_t
{
  uint8 connection,
  uint32 clock,
  uint16 accuracy
}
```

3.1.2.2 evt_bt_connection_closed

This event indicates that a connection was closed.

Note: This event corresponds to the Bluetooth connection (not the endpoint) between two devices closing. Once all open endpoints have closed, either side may close the connection. Thus the reason parameter may be either remote_user_terminated or connection_terminated_by_local_host independent of which side closed the last endpoint.

Table 3.19. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x01	method	Message ID
4-5	uint16	reason	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	connection	Bluetooth connection handle

BGScript event

```
event bt_connection_closed(reason,connection)
```

C Functions

```
/* Event id */
dumo_evt_bt_connection_closed_id

/* Event structure */
struct dumo_msg_bt_connection_closed_evt_t
{
  uint16 reason,
  uint8 connection
}
```

3.1.2.3 evt_bt_connection_list_complete

This event indicates that all connections have been listed.

Table 3.20. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x00	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x03	method	Message ID

BGScript event

```
event bt_connection_list_complete()
```

C Functions

```
/* Event id */
dumo_evt_bt_connection_list_complete_id

/* Event structure */
struct dumo_msg_bt_connection_list_complete_evt_t
{
}
```

3.1.2.4 evt_bt_connection_opened

This event indicates that a new connection was opened.

Table 3.21. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x09	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x00	method	Message ID
4-9	bd_addr	address	Bluetooth address of the remote device in little endian formats
10	uint8	central	Bluetooth role of the local device. Values: • **0:** Peripheral • **1:** Central
11	uint8	connection	Bluetooth connection handle
12	uint8	bonding	Bonding handle of the remote device • **0xff:** No bonding • **Other:** Bonding handle

BGScript event

```
event bt_connection_opened(address,central,connection,bonding)
```

C Functions

```
/* Event id */
dumo_evt_bt_connection_opened_id

/* Event structure */
struct dumo_msg_bt_connection_opened_evt_t
{
  bd_addr *address,
  uint8 central,
  uint8 connection,
  uint8 bonding
}
```

3.1.2.5 evt_bt_connection_parameters

This event indicates the details of a single RFCOMM or HID connection. This event can be triggered when needed with bt_connection_list. For HID connections only fields address, powermode, role and encryption contain valid information.

Table 3.22. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x15	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x02	method	Message ID
4	uint8	endpoint	RFCOMM connection endpoint handle
5-8	uint32	block_size	Size of a single packet over RFCOMM
9	uint8	msc	Bit mask for MSC at the local device
10-15	bd_addr	address	Bluetooth address of the remote device in little endian format
16	uint8	direction	Direction of the connection
17	uint8	powermode	Power mode of the connection
18	uint8	role	Role in the connection
19	uint8	encryption	Encryption status of the connection
20-23	uint32	input_buffer	Amount of data in the RFCOMM receive buffer
24	uint8	port	RFCOMM local port number that was connected.

BGScript event

```
event
bt_connection_parameters(endpoint,block_size,msc,address,direction,powermode,role,encryption,input_buffer,port)
```

C Functions

```
/* Event id */
dumo_evt_bt_connection_parameters_id

/* Event structure */
struct dumo_msg_bt_connection_parameters_evt_t
{
  uint8 endpoint,
  uint32 block_size,
  uint8 msc,
  bd_addr *address,
  uint8 direction,
  uint8 powermode,
  uint8 role,
  uint8 encryption,
  uint32 input_buffer,
  uint8 port
}
```

3.1.2.6 evt_bt_connection_rssi_value

RSSI value of a connection.

Table 3.23. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x07	class	Message class: Connection management for Bluetooth BR/EDR
3	0x04	method	Message ID
4	uint8	connection	Connection handle. NOTE: this is always connection handle regardless whether RSSI was requested by RFCOMM or connection handle
5	int8	rssi	For BR/EDR: Received signal strength in dB relative to 'Golden Receive Power Range' which is from -40dBm to -60dBm. Negative values indicate we are below minimum of the range and positive values indicate that we are above the maximum of the range For LE: Absolute power level in dBm to +-6dB accuracy. If the RSSI cannot be read, the RSSI metric shall be set to 127.

BGScript event

```
event bt_connection_rssi_value(connection,rssi)
```

C Functions

```
/* Event id */
dumo_evt_bt_connection_rssi_value_id

/* Event structure */
struct dumo_msg_bt_connection_rssi_value_evt_t
{
  uint8 connection,
  int8 rssi
}
```

3.1.3 bt_connection enumerations

3.1.3.1 enum_bt_connection_direction

These values indicate the direction of the connection.

Table 3.24. Enumerations

Value	Name	Description
0	bt_connection_outgoing	Outgoing
1	bt_connection_incoming	Incoming

3.1.3.2 enum_bt_connection_encryption

These values indicate the encryption status of the connection.

Table 3.25. Enumerations

Value	Name	Description
0	bt_connection_plain	Unencrypted
1	bt_connection_encrypted	Encrypted

3.1.3.3 enum_bt_connection_powermode

These values indicate the power mode of a connection.

Table 3.26. Enumerations

Value	Name	Description
0	bt_connection_active	Active
1	bt_connection_hold	Reserved
2	bt_connection_sniff	Sniff
3	bt_connection_park	Reserved

3.1.3.4 enum_bt_connection_role

These values indicate the connection role of the local device.

Table 3.27. Enumerations

Value	Name	Description
0	bt_connection_central	Central
1	bt_connection_peripheral	Peripheral

3.2 Generic Access Profile, Bluetooth BR/EDR (bt_gap)

These commands and events are related to Generic Access Profile, Bluetooth BR/EDR.

3.2.1 bt_gap commands

3.2.1.1 cmd_bt_gap_cancel_discovery

This command can be used to cancel the ongoing Bluetooth BR/EDR device discovery (inquiry) procedure.

Table 3.28. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x01	method	Message ID

Table 3.29. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_cancel_discovery()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_cancel_discovery();

/* Response id */
dumo_rsp_bt_gap_cancel_discovery_id

/* Response structure */
struct dumo_msg_bt_gap_cancel_discovery_rsp_t
{
  uint16 result
}
```

Table 3.30. Events Generated

Event	Description
bt_gap_discovery_complete	This event indicates that discovery has been completed.

3.2.1.2 cmd_bt_gap_discover

This command can be used to discover other Bluetooth BR/EDR devices with Bluetooth BR/EDR inquiry. Command set_discovery_mode can be used to select how much information is delivered in discovery results

Table 3.31. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x00	method	Message ID
4	uint8	timeout	The maximum amount of time (in units of 1.28 seconds) before the inquiry process is halted. Range: 1 to 48. • Example: Value 5 corresponds to 5 x 1.28 seconds = 6.4 seconds.
5-8	int32	lap	Flag which selects whether to seek only devices that are in general discovery mode or in limited discovery mode.

Table 3.32. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_discover(timeout,lap)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_discover(uint8 timeout, int32 lap);

/* Response id */
dumo_rsp_bt_gap_discover_id

/* Response structure */
struct dumo_msg_bt_gap_discover_rsp_t
{
  uint16 result
}
```

Table 3.33. Events Generated

Event	Description
bt_gap_discovery_result	This event returns the discovery result for a single remote device. The name parameter is present only when using extended discovery mode. The RSSI value is valid only when using RSSI or extended discovery (inquiry) mode. The discovery mode is set by set_discovery_mode command.
bt_gap_discovery_complete	This event indicates that discovery has been completed.

3.2.1.3 cmd_bt_gap_get_mode

This command can be used to read the device's Bluetooth BR/EDR visibility and connectability settings.

Table 3.34. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x04	method	Message ID

Table 3.35. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x05	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	connectable	Informs whether the device accepts incoming connections or not. Values: • **0:** Not connectable • **1:** Connectable
7	uint8	discoverable	Informs whether the device is visible for inquiry. Values: • **0:** Not discoverable • **1:** Discoverable
8	uint8	limited	Informs whether the device is visible only in limited mode inquiry or in general mode inquiry

BGScript command

```
call bt_gap_get_mode()(result,connectable,discoverable,limited)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_get_mode();

/* Response id */
dumo_rsp_bt_gap_get_mode_id

/* Response structure */
struct dumo_msg_bt_gap_get_mode_rsp_t
{
  uint16 result,
  uint8 connectable,
  uint8 discoverable,
  uint8 limited
}
```

3.2.1.4 cmd_bt_gap_get_remote_name

This command can be used to read the name of the remote Bluetooth BR/EDR device.

Table 3.36. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x02	method	Message ID
4-9	bd_addr	address	Bluetooth address of the remote Bluetooth BR/EDR device in little endian format

Table 3.37. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_get_remote_name(address)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_get_remote_name(bd_addr *address);

/* Response id */
dumo_rsp_bt_gap_get_remote_name_id

/* Response structure */
struct dumo_msg_bt_gap_get_remote_name_rsp_t
{
  uint16 result
}
```

Table 3.38. Events Generated

Event	Description
bt_gap_remote_name	This event indicates a reply to a remote name request.

3.2.1.5 cmd_bt_gap_open

This command can be used to open a Bluetooth BR/EDR connection to a remote device. After connection is established, closing another Bluetooth BR/EDR endpoints (like RFCOMM or HID) will not close this endpoint. It is needed to be closed manually with dumo_cmd_endpoint_close. Command can be used for example when there is a need to bond the devices without opening an RFCOMM connection. After connection has been opened bonding can be done with the sm_increase_security command.

Table 3.39. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x08	method	Message ID
4-9	bd_addr	address	Bluetooth address

Table 3.40. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	connection	Unique connection handle

BGScript command

```
call bt_gap_open(address)(result,connection)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_open(bd_addr *address);

/* Response id */
dumo_rsp_bt_gap_open_id

/* Response structure */
struct dumo_msg_bt_gap_open_rsp_t
{
  uint16 result,
  uint8 connection
}
```

Table 3.41. Events Generated

Event	Description
bt_connection_opened	

3.2.1.6 cmd_bt_gap_set_auto_sniff

Set automatic sniff parameters for all connections. Please see the BLUETOOTH SPECIFICATION Version 4.2 [Vol 2] Part E chapter 7.2.2 for more information regarding the use of the related parameters.

Table 3.42. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x0b	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x09	method	Message ID
4	uint8	mode	Defines automatic sniff mode. Values: • **0:** Do not use automatic sniff • **1:** Set connection active whenever data is transmitted • **2:** Set connection to sniff when idle time is exceeded • **3:** Set both active and sniff automatically
5-6	uint16	idle	The time (in seconds) a link has to be idle before it will be set to sniff mode. Range: 1 - 250
7-8	uint16	max	Maximum sniff interval. • Range: 0x0004 - 0xfffe • Only even values are valid • Sniff interval = 0.625ms x max • Time range 2.5 ms to 40959 ms Recommended default: 0x00a0 - 0x0640 (100 ms - 1000 ms)
9-10	uint16	min	Minimum sniff interval. • Range: 0x0002 - 0xfffe • Only even values are valid • Sniff interval = 0.625ms x min • Time range 1.25 ms - 40959 ms Recommended default: 0x20
11-12	uint16	attempt	Number of baseband receive slots for sniff attempt. • Range: 0x0001-0x7fff • Time range 0.625 ms to 40959 ms Recommended default: 1
13-14	uint16	timeout	Number of baseband receive slots for sniff timeout. • Range: 0x0000-0x7fff • Time range 0.0 ms to 40959 ms Recommended default: 8

Table 3.43. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x09	method	Message ID

Byte	Type	Name	Description
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_auto_sniff(mode,idle,max,min,attempt,timeout)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_auto_sniff(uint8 mode, uint16 idle, uint16 max, uint16 min, uint16 attempt, uint16
timeout);

/* Response id */
dumo_rsp_bt_gap_set_auto_sniff_id

/* Response structure */
struct dumo_msg_bt_gap_set_auto_sniff_rsp_t
{
  uint16 result
}
```

3.2.1.7 cmd_bt_gap_set_discovery_mode

This command can be used to set the discovery mode. This determines the information given in discovery_result events.

Table 3.44. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x0a	method	Message ID
4	uint8	mode	Format on discovery results: 0: Standard short format. 1: With RSSI result. 2: Extended format. Valuea at startup: 1

Table 3.45. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x0a	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_discovery_mode(mode)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_discovery_mode(uint8 mode);

/* Response id */
dumo_rsp_bt_gap_set_discovery_mode_id

/* Response structure */
struct dumo_msg_bt_gap_set_discovery_mode_rsp_t
{
  uint16 result
}
```

3.2.1.8 cmd_bt_gap_set_host_channel_classification

This command configures Bluetooth BR/EDR channel classifications.. If successful, a bt_gap_host_channel_classification_complete event will follow when the controller has completed the configuration.

Table 3.46. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x0b	method	Message ID
4	uint8array	channel_map	Channel bitmap for 79 channels. Mark known bad channels with a zero bit, other channels with a one bit. The parameter must be given as exactly 10 bytes; the highest bit is ignored.

Table 3.47. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x0b	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_host_channel_classification(channel_map_len, channel_map_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_host_channel_classification(uint8array channel_map);

/* Response id */
dumo_rsp_bt_gap_set_host_channel_classification_id

/* Response structure */
struct dumo_msg_bt_gap_set_host_channel_classification_rsp_t
{
  uint16 result
}
```

3.2.1.9 cmd_bt_gap_set_mode

This command can be used to set Bluetooth BR/EDR visibility and connectability.

Table 3.48. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x03	method	Message ID
4	uint8	connectable	Determines whether the device accepts incoming connections or not. Values: • **0:** Not connectable • **1:** Connectable Default value: 0
5	uint8	discoverable	Determines whether the device is visible in Bluetooth BR/EDR in-quiry. Values: • **0:** Not discoverable • **1:** Discoverable Default value: 0
6	uint8	limited	Determines whether the device is visible in limited mode inquiry or in general mode inquiry. Default value: general mode

Table 3.49. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_mode(connectable,discoverable,limited)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_mode(uint8 connectable, uint8 discoverable, uint8 limited);

/* Response id */
dumo_rsp_bt_gap_set_mode_id

/* Response structure */
struct dumo_msg_bt_gap_set_mode_rsp_t
{
  uint16 result
}
```

3.2.1.10 cmd_bt_gap_set_parameters

This command can be used to set the default page timeout and scan mode.

Table 3.50. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x06	method	Message ID
4-5	uint16	pagetimeout	Page timeout defines how long the connection establishment can take before an error occurs, in multiples of 0.625 milliseconds. Range: 0x0001 - 0xffff. Default value: 0x2000 (5.12 seconds)
6-7	uint16	scan_interval	Page scan interval in multiples of 0.625ms, values from 0x12 to 0x1000, only even numbers are allowed, see BT Core spec Vol. 2 part D chapter 7.3. Default value: 0x800
8-9	uint16	scan_window	Page scan window in multiples of 0.625ms, values from 0x11 to 0x1000, must be less than or equal to page scan interval. See BT Core spec Vol. 2 part D chapter 7.3. Default value: 0x12

Table 3.51. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_parameters(pagetimeout,scan_interval,scan_window)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_parameters(uint16 pagetimeout, uint16 scan_interval, uint16 scan_window);

/* Response id */
dumo_rsp_bt_gap_set_parameters_id

/* Response structure */
struct dumo_msg_bt_gap_set_parameters_rsp_t
{
  uint16 result
}
```

3.2.1.11 cmd_bt_gap_set_policy

This command can be used to set default policies for connections. For more information on the use of policies please see BLUETOOTH SPECIFICATION Version 4.2 [Vol 2] Part E chapter 7.2.10.

Table 3.52. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x05	method	Message ID
4	uint8	allow_role_change	Defines if the the local device accepts role change requests or not. Values: • **0:** Do not allow role change • **1:** Allow role change Default value: 0
5	uint8	allow_sniff	This flag defines whether sniff mode is allowed or not. Values: • **0:** Do not allow sniff mode • **1:** Allow sniff mode Default value: 0

Table 3.53. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_policy(allow_role_change,allow_sniff)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_policy(uint8 allow_role_change, uint8 allow_sniff);

/* Response id */
dumo_rsp_bt_gap_set_policy_id

/* Response structure */
struct dumo_msg_bt_gap_set_policy_rsp_t
{
  uint16 result
}
```

3.2.1.12 cmd_bt_gap_set_power_vector

This command can be used to set power vector for radio.

Table 3.54. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x0c	method	Message ID
4	uint8	modulation	Determine for which modulation power vector is used. Values: • **1:** Power vector is used for 2-EDR modulation • **2:** Power vector is used for 3-EDR modulation
5	uint8array	power_vector	16-bytes array that fulfills following rules: 1. First byte have to be equal to 0x9C 2. Power values have to be set in descending order with equal stepping, looking from the back of the array. The last step before reaching minimal value might be smaller than stepping value. 3. When minimal value is reached, repeat it up to first byte. 4. Minimum byte value is -20dBm (0xD4), maximum is 5dBm (0x0B). Bytes represent dBm value multiplied by 2 5. Bytes 8th and 9th have to be equal **Example**: 9CD4D4D4D4D4D4D4D4E1E8EFF6FD040B

Table 3.55. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x0c	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_gap_set_power_vector(modulation,power_vector_len, power_vector_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_gap_set_power_vector(uint8 modulation, uint8array power_vector);

/* Response id */
dumo_rsp_bt_gap_set_power_vector_id

/* Response structure */
struct dumo_msg_bt_gap_set_power_vector_rsp_t
```

```
{
  uint16 result
}
```

3.2.2 bt_gap events

3.2.2.1 evt_bt_gap_discovery_complete

This event indicates that discovery has been completed.

Table 3.56. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x01	method	Message ID
4-5	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript event

```
event bt_gap_discovery_complete(status)
```

C Functions

```
/* Event id */
dumo_evt_bt_gap_discovery_complete_id

/* Event structure */
struct dumo_msg_bt_gap_discovery_complete_evt_t
{
  uint16 status
}
```

3.2.2.2 evt_bt_gap_discovery_result

This event returns the discovery result for a single remote device. The name parameter is present only when using extended discovery mode. The RSSI value is valid only when using RSSI or extended discovery (inquiry) mode. The discovery mode is set by set_discovery_mode command.

Table 3.57. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x0e	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x00	method	Message ID
4-9	bd_addr	bd_addr	Bluetooth address of the discovered Bluetooth BR/EDR device in little endian format
10	uint8	page_scan_repetition_mode	Remote devices page scan repetition mode
11-14	uint32	class_of_device	Class of Device for the device
15	int8	rssi	RSSI value of the connection. • Range: -127 to +20 • Units: dBm
16	uint8	bonding	Remote device's bonding handle. Values: • **0xff:** Device is not bonded • **Others:** Bonding handle
17	uint8array	name	Remote device's Bluetooth BR/EDR friendly name parsed from the Extended Inquiry Response (EIR) data

BGScript event

```
event     bt_gap_discovery_result(bd_addr,page_scan_repetition_mode,class_of_device,rssi,bonding,name_len,
name_data)
```

C Functions

```
/* Event id */
dumo_evt_bt_gap_discovery_result_id

/* Event structure */
struct dumo_msg_bt_gap_discovery_result_evt_t
{
  bd_addr *bd_addr,
  uint8 page_scan_repetition_mode,
  uint32 class_of_device,
  int8 rssi,
  uint8 bonding,
  uint8array name
}
```

3.2.2.3 evt_bt_gap_host_channel_classification_complete

This event indicates host channel classification request is completed.

Table 3.58. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x03	method	Message ID
4-5	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript event

```
event bt_gap_host_channel_classification_complete(status)
```

C Functions

```
/* Event id */
dumo_evt_bt_gap_host_channel_classification_complete_id

/* Event structure */
struct dumo_msg_bt_gap_host_channel_classification_complete_evt_t
{
  uint16 status
}
```

3.2.2.4 evt_bt_gap_remote_name

This event indicates a reply to a remote name request.

Table 3.59. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x09	lolen	Minimum payload length
2	0x02	class	Message class: Generic Access Profile, Bluetooth BR/EDR
3	0x02	method	Message ID
4-5	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-11	bd_addr	address	Bluetooth address of the remote Bluetooth BR/EDR device in little endian format
12	uint8array	remote_name	Name of the remote Bluetooth BR/EDR device

BGScript event

```
event bt_gap_remote_name(status,address,remote_name_len, remote_name_data)
```

C Functions

```
/* Event id */
dumo_evt_bt_gap_remote_name_id

/* Event structure */
struct dumo_msg_bt_gap_remote_name_evt_t
{
  uint16 status,
  bd_addr *address,
  uint8array remote_name
}
```

3.2.3 bt_gap enumerations

3.2.3.1 enum_bt_gap_discover_mode

These values define the GAP Discoverable mode of the module.

Table 3.60. Enumerations

Value	Name	Description
0	bt_gap_discover_generic	Discover devices which are in general discoverable mode.
1	bt_gap_discover_limited	Discover only devices which are in limited discoverable mode.

3.3 HID (bt_hid)

HID connections Please note that HID commands are available only in images compiled with HID sdk

3.3.1 bt_hid commands

3.3.1.1 cmd_bt_hid_get_report_response

This command is used to respond to evt_bt_hid_get_report requests. The parameters endpoint, parameters_used, report_type, and report_id should match those received in the request. The report_data should contain the current instantaneous state of the fields specified in the request.

Table 3.61. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x05	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the request.
5	uint8	parameters_used	
6	uint8	report_type	
7	uint8	report_id	ID of the report requested. Must match both report_type and ID, as the same ID can be used for different report types.
8	uint8array	report_data	The payload of the Report requested. Note that if the Report is larger than the max_bytes specified in the request, the report data must be truncated to max_bytes, if no report ID was requested; or max_bytes - 1 if an ID was requested.

Table 3.62. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call        bt_hid_get_report_response(endpoint,parameters_used,report_type,report_id,report_data_len,
report_data_data)(result)
```

BGLIB C API

```
/* Function */
void  dumo_cmd_bt_hid_get_report_response(uint8  endpoint,  uint8  parameters_used,  uint8  report_type,  uint8
report_id, uint8array report_data);

/* Response id */
dumo_rsp_bt_hid_get_report_response_id

/* Response structure */
struct dumo_msg_bt_hid_get_report_response_rsp_t
{
  uint16 result
}
```

3.3.1.2 cmd_bt_hid_get_set_report_reject

This command is used to reject an evt_bt_hid_get_report request for an invalid Report.

Table 3.63. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x07	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the request.
5	uint8	reason	Reason for rejecting. 0 = invalid Report ID, 1 = invalid Report Type or size mismatch.

Table 3.64. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_hid_get_set_report_reject(endpoint,reason)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_get_set_report_reject(uint8 endpoint, uint8 reason);

/* Response id */
dumo_rsp_bt_hid_get_set_report_reject_id

/* Response structure */
struct dumo_msg_bt_hid_get_set_report_reject_rsp_t
{
  uint16 result
}
```

3.3.1.3 cmd_bt_hid_open

Open HID connection to remote HID Host. Note that the HID Host must have initiated a previous connection and stored our HID SDP entry, and our SDP entry must indicate support for HID Device -initiated connections; otherwise the HID Host will reject our connection attempt.

Table 3.65. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x00	method	Message ID
4-9	bd_addr	address	Bluetooth device address of the remote device in little endian format
10	uint8	streaming_destination	For future use. Must be set to 0.

Table 3.66. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Unsigned 8-bit integer

BGScript command

```
call bt_hid_open(address,streaming_destination)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_open(bd_addr *address, uint8 streaming_destination);

/* Response id */
dumo_rsp_bt_hid_open_id

/* Response structure */
struct dumo_msg_bt_hid_open_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

Table 3.67. Events Generated

Event	Description
bt_hid_opened	This event indicates the establishment of an HID connection.
bt_hid_failed	This event indicates the establishment of an HID connection failed.
bt_hid_output_report	This event indicates an HID Output Report was received from the HID Host.

3.3.1.4 cmd_bt_hid_send_input_report

This command can be used to send HID Input Reports to the HID Host.

Table 3.68. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x03	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID connection
5	uint8	report_id	Report ID, defined in the HID Descriptor
6	uint8array	report_data	The data payload of the Input Report (prefixed with length byte)

Table 3.69. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_hid_send_input_report(endpoint,report_id,report_data_len, report_data_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_send_input_report(uint8 endpoint, uint8 report_id, uint8array report_data);

/* Response id */
dumo_rsp_bt_hid_send_input_report_id

/* Response structure */
struct dumo_msg_bt_hid_send_input_report_rsp_t
{
  uint16 result
}
```

3.3.1.5 cmd_bt_hid_set_report_response

This command is used to acknowledge an evt_bt_hid_set_report request. If the parameters are invalid, use cmd_bt_hid_get_set_report_reject to reject it.

Table 3.70. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x06	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the request.

Table 3.71. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_hid_set_report_response(endpoint)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_set_report_response(uint8 endpoint);

/* Response id */
dumo_rsp_bt_hid_set_report_response_id

/* Response structure */
struct dumo_msg_bt_hid_set_report_response_rsp_t
{
  uint16 result
}
```

3.3.1.6 cmd_bt_hid_start_server

This command can be used to start accepting HID connections.

Table 3.72. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x01	method	Message ID
4	uint8	sdp_id	ID of the SDP entry defined in project configuration file.
5	uint8	streaming_destina-tion	For future use. Must be set to 0.

Table 3.73. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_hid_start_server(sdp_id,streaming_destination)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_start_server(uint8 sdp_id, uint8 streaming_destination);

/* Response id */
dumo_rsp_bt_hid_start_server_id

/* Response structure */
struct dumo_msg_bt_hid_start_server_rsp_t
{
  uint16 result
}
```

Table 3.74. Events Generated

Event	Description
bt_hid_opened	This event indicates the establishment of an HID connection.
bt_hid_failed	This event indicates the establishment of an HID connection failed.

Event	Description
bt_hid_output_report	This event indicates an HID Output Report was received from the HID Host.

3.3.1.7 cmd_bt_hid_stop_server

This command can be used to stop an HID server.

Table 3.75. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x02	method	Message ID
4	uint8	sdp_id	ID of the SDP entry defined in the project configuration file.

Table 3.76. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_hid_stop_server(sdp_id)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_stop_server(uint8 sdp_id);

/* Response id */
dumo_rsp_bt_hid_stop_server_id

/* Response structure */
struct dumo_msg_bt_hid_stop_server_rsp_t
{
  uint16 result
}
```

3.3.1.8 cmd_bt_hid_virtual_cable_unplug

This command can be used to disassociate the device from the HID Host. Bonding information will be deleted and the connection disconnected automatically.

Table 3.77. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x04	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID connection

Table 3.78. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_hid_virtual_cable_unplug(endpoint)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_hid_virtual_cable_unplug(uint8 endpoint);

/* Response id */
dumo_rsp_bt_hid_virtual_cable_unplug_id

/* Response structure */
struct dumo_msg_bt_hid_virtual_cable_unplug_rsp_t
{
  uint16 result
}
```

3.3.2 bt_hid events

3.3.2.1 evt_bt_hid_failed

This event indicates the establishment of an HID connection failed.

Table 3.79. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x09	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x01	method	Message ID
4	uint8	endpoint	Endpoint ID assigned for the HID connection
5-10	bd_addr	address	Bluetooth device address of the remote device in little endian format.
11-12	uint16	reason	Reason for failure.

BGScript event

```
event bt_hid_failed(endpoint,address,reason)
```

C Functions

```
/* Event id */
dumo_evt_bt_hid_failed_id

/* Event structure */
struct dumo_msg_bt_hid_failed_evt_t
{
  uint8 endpoint,
  bd_addr *address,
  uint16 reason
}
```

3.3.2.2 evt_bt_hid_get_report

This event indicates the HID Host has requested the current state of a report. This is usually done to determine the initial state of the Device. A response must be sent with cmd_bt_hid_get_report_response. The parameter parameters_used defines which of the parameters were used by the Host to specify the report. The response should be sent with the same parameters_used value.

Table 3.80. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x04	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the notification.
5	uint8	parameters_used	
6	uint8	report_type	
7	uint8	report_id	ID of the report requested. Must match both report_type and ID, as the same ID can be used for different report types.
8-9	uint16	max_bytes	Maximum number of bytes to send, if the report size exceeds the current MTU; the remaining bytes are discarded and not sent in another packet. If a Report ID is sent, it takes up one byte.

BGScript event

```
event bt_hid_get_report(endpoint,parameters_used,report_type,report_id,max_bytes)
```

C Functions

```
/* Event id */
dumo_evt_bt_hid_get_report_id

/* Event structure */
struct dumo_msg_bt_hid_get_report_evt_t
{
  uint8 endpoint,
  uint8 parameters_used,
  uint8 report_type,
  uint8 report_id,
  uint16 max_bytes
}
```

3.3.2.3 evt_bt_hid_opened

This event indicates the establishment of an HID connection.

Table 3.81. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x00	method	Message ID
4	uint8	endpoint	Endpoint ID assigned for the HID connection
5-10	bd_addr	address	Bluetooth device address of the remote device in little endian format.

BGScript event

```
event bt_hid_opened(endpoint,address)
```

C Functions

```
/* Event id */
dumo_evt_bt_hid_opened_id

/* Event structure */
struct dumo_msg_bt_hid_opened_evt_t
{
  uint8 endpoint,
  bd_addr *address
}
```

3.3.2.4 evt_bt_hid_output_report

This event indicates an HID Output Report was received from the HID Host.

Table 3.82. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x02	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the report.
5	uint8	report_id	Report ID defined in the HID Descriptor.
6	uint8array	report_data	Payload of the HID Output Report (prefixed by length byte).

BGScript event

```
event bt_hid_output_report(endpoint,report_id,report_data_len, report_data_data)
```

C Functions

```
/* Event id */
dumo_evt_bt_hid_output_report_id

/* Event structure */
struct dumo_msg_bt_hid_output_report_evt_t
{
  uint8 endpoint,
  uint8 report_id,
  uint8array report_data
}
```

3.3.2.5 evt_bt_hid_set_report

This event indicates an HID report was received from the HID Host.

Table 3.83. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x04	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x05	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the report.
5	uint8	report_type	
6	uint8	report_id	Report ID defined in the HID Descriptor.
7	uint8array	report_data	Payload of the HID Report (prefixed by length byte).

BGScript event

```
event bt_hid_set_report(endpoint,report_type,report_id,report_data_len, report_data_data)
```

C Functions

```
/* Event id */
dumo_evt_bt_hid_set_report_id

/* Event structure */
struct dumo_msg_bt_hid_set_report_evt_t
{
  uint8 endpoint,
  uint8 report_type,
  uint8 report_id,
  uint8array report_data
}
```

3.3.2.6 evt_bt_hid_state_changed

This event indicates the HID Host has notified the Device about a state change. No response is required.

Table 3.84. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x13	class	Message class: HID
3	0x03	method	Message ID
4	uint8	endpoint	Endpoint handle of the HID Host that sent the notification.
5	uint8	state	

BGScript event

```
event bt_hid_state_changed(endpoint,state)
```

C Functions

```
/* Event id */
dumo_evt_bt_hid_state_changed_id

/* Event structure */
struct dumo_msg_bt_hid_state_changed_evt_t
{
  uint8 endpoint,
  uint8 state
}
```

3.3.3 bt_hid enumerations

3.3.3.1 enum_bt_hid_get_report_params

These values indicate which parameters should be ignored in the bt_hid_get_report events. The response should be sent with the same value.

Table 3.85. Enumerations

Value	Name	Description
0	bt_hid_params_no_id_no_max_size	The Host has requested the current state for the report unambiguously specified by Report Type, with no maximum data size constraints. Report ID and Max Bytes should be ignored.
1	bt_hid_params_with_id_no_max_size	The Host has requested the current state for the report identified by Report Type and Report ID, with no maximum data size constraints. Max Bytes should be ignored.
2	bt_hid_params_no_id_with_max_size	The Host has requested the current state for the report unambiguously specified by Report Type. Report ID should be ignored. Only the first N bytes of the report, as specified by Max Bytes, shall be sent.
3	bt_hid_params_with_id_with_max_size	The Host has requested the current state for the report identified by Report Type and Report ID. Only the first N-1 bytes of the report, as specified by Max Bytes, shall be sent. (Report ID will take up 1 byte.)

3.3.3.2 enum_bt_hid_report_type

Table 3.86. Enumerations

Value	Name	Description
0	bt_hid_report_type_other	Other Report
1	bt_hid_report_type_input	Input Report
2	bt_hid_report_type_output	Output Report
3	bt_hid_report_type_feature	Feature Report

3.3.3.3 enum_bt_hid_state

These values describe state changes for HID connections.

Table 3.87. Enumerations

Value	Name	Description
0	bt_hid_state_boot_mode	The Host has set the Device to use only Boot Reports. The send_input_report command should not be used in this state.
1	bt_hid_state_report_mode	The Host has set the Device to use Report Mode. The send_boot_report command should not be used in this state. This is the default state a HID connection is in.
3	bt_hid_state_suspend	The Host has entered a state where normal operation is no longer required from the Device, for example gone to sleep mode. The HID Device may also enter a power saving mode or even disconnect from the Host.
4	bt_hid_state_exit_suspend	The Host has resumed normal operation and the Device should exit any power saving mode it may have been in.
5	bt_hid_state_virtual_cable_unplug	The Host has requested to disassociate the Device with the Host, and will delete the bonding information it has associated with the Device. The connection will be automatically closed by the HID Device and its corresponding bonding deleted.

3.4 RFCOMM (bt_rfcomm)

These commands and events are related to the establishment of Bluetooth BR/EDR RFCOMM connections as specified in the Serial Port Profile SPP).

3.4.1 bt_rfcomm commands

3.4.1.1 cmd_bt_rfcomm_modem_status

This command sets modem control status bits for RFCOMM connection. This is a legacy support feature and **SHOULD NOT BE USED FOR FLOW CONTROL**. For description and meaning of bits in this field see the ETSI TS 07.10 specification.

Table 3.88. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x04	method	Message ID
4	uint8	endpoint	Endpoint ID assigned to the RFCOMM connection
5	uint8	modem	New values of the modem status bits.
6	uint8	mask	Bitmask of which bits are changed.

Table 3.89. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_rfcomm_modem_status(endpoint,modem,mask)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_modem_status(uint8 endpoint, uint8 modem, uint8 mask);

/* Response id */
dumo_rsp_bt_rfcomm_modem_status_id

/* Response structure */
struct dumo_msg_bt_rfcomm_modem_status_rsp_t
{
  uint16 result
}
```

3.4.1.2 cmd_bt_rfcomm_open

Open an RFCOMM channel to remote device. An existing connection, or a connection attempt before the page timeout expires, can be closed with the endpoint_close command. NOTE: Controller does not allow starting a BR/EDR connection while a BR/EDR discovery process in in progress. Please terminate any BR/EDR discovery with bt_gap_cancel_discovery command prior to starting the RFCOMM connection.

Table 3.90. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x08	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x00	method	Message ID
4-9	bd_addr	address	Bluetooth address of the remote device in little endian format
10	uint8	streaming_destination	Streaming destination for the connection endpoint. Endpoint 'SCRIPT' is a special case in the BGAPI mode for RFCOMM. Data events are sent to script and in addition also to UART. Please note that if size event exeeds size of 256 (inclusive of headers) it will be rejected by the script intepreter.
11	uint8array	uuid	UUID of the profile to connect to: • uuid16, 2 bytes: 16-bit UUID for searching RFCOMM port • uuid32, 4 bytes: 32-bit UUID for searching RFCOMM port • uuid128, 16 bytes: 128-bit UUID for searching RFCOMM port

Table 3.91. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Unsigned 8-bit integer

BGScript command

```
call bt_rfcomm_open(address,streaming_destination,uuid_len, uuid_data)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_open(bd_addr *address, uint8 streaming_destination, uint8array uuid);

/* Response id */
dumo_rsp_bt_rfcomm_open_id

/* Response structure */
```

```
struct dumo_msg_bt_rfcomm_open_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

Table 3.92. Events Generated

Event	Description
bt_rfcomm_opened	This event indicates the establishment of an RFCOMM connection.

3.4.1.3 cmd_bt_rfcomm_open_port

This command can be used to open an RFCOMM channel to a remote device using a fixed RFCOMM port number. This bypasses the Service Discovery Protocol procedure for retrieving the RFCOMM port from the remote device's Serial Port Profile SDP entry, thus speeding up connection establishment.

Table 3.93. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x08	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x02	method	Message ID
4-9	bd_addr	address	Bluetooth address of the remote device in little endian format
10	uint8	streaming_destina-tion	Streaming destination for the connection endpoint. Endpoint 'SCRIPT' is a special case in the BGAPI mode for RFCOMM. Da-ta events are sent to script and in addition also to UART. Please note that if size event exeeds size of 256 (inclusive of headers) it will be rejected by the script intepreter.
11	uint8	port	RFCOMM port

Table 3.94. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Unsigned 8-bit integer

BGScript command

```
call bt_rfcomm_open_port(address,streaming_destination,port)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_open_port(bd_addr *address, uint8 streaming_destination, uint8 port);

/* Response id */
dumo_rsp_bt_rfcomm_open_port_id

/* Response structure */
struct dumo_msg_bt_rfcomm_open_port_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

Table 3.95. Events Generated

Event	Description
bt_rfcomm_opened	This event indicates the establishment of an RFCOMM connection.

3.4.1.4 cmd_bt_rfcomm_set_modem_status_default

This command sets starting value modem control status bits for new outogoing RFCOMM connections.

Table 3.96. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x07	method	Message ID
4	uint8	modem	Starting values of the modem status bits.

Table 3.97. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_rfcomm_set_modem_status_default(modem)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_set_modem_status_default(uint8 modem);

/* Response id */
dumo_rsp_bt_rfcomm_set_modem_status_default_id

/* Response structure */
struct dumo_msg_bt_rfcomm_set_modem_status_default_rsp_t
{
  uint16 result
}
```

3.4.1.5 cmd_bt_rfcomm_start_server

This command can be used to start a RFCOMM server as defined in the referenced SDP-entry.

Table 3.98. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x01	method	Message ID
4	uint8	sdp_id	ID of the SDP entry defined in project configuration file
5	uint8	streaming_destina-tion	Streaming destination endpoint for the connection. This should be one of the fixed endpoints. While a dynamic connection endpoint will work for proxying data coming from an RFCOMM connection to another connection endpoint, there is no guarantee that the destination endpoint will be there when an incoming RFCOMM connection is established. Endpoint 'SCRIPT' is a special case in the BGAPI mode for RFCOMM. Data events are sent to script and in addition also to UART. Please note that if size event exeeds size of 256 (inclusive of headers) it will be rejected by the script intepreter.

Table 3.99. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_rfcomm_start_server(sdp_id,streaming_destination)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_start_server(uint8 sdp_id, uint8 streaming_destination);

/* Response id */
dumo_rsp_bt_rfcomm_start_server_id

/* Response structure */
struct dumo_msg_bt_rfcomm_start_server_rsp_t
{
  uint16 result
}
```

3.4.1.6 cmd_bt_rfcomm_start_server_port

This command can be used to start a RFCOMM server on specific port. In contrast to cmd_bt_rfcomm_start_server command, components of the port descriptor are not loaded from SDP records.

Table 3.100. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x05	method	Message ID
4	uint8	port	port to use
5	uint8	streaming_destination	Streaming destination endpoint for the connection. This should be one of the fixed endpoints. While a dynamic connection endpoint will work for proxying data coming from an RFCOMM connection to another connection endpoint, there is no guarantee that the destination endpoint will be there when an incoming RFCOMM connection is established.

Table 3.101. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_rfcomm_start_server_port(port,streaming_destination)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_start_server_port(uint8 port, uint8 streaming_destination);

/* Response id */
dumo_rsp_bt_rfcomm_start_server_port_id

/* Response structure */
struct dumo_msg_bt_rfcomm_start_server_port_rsp_t
{
  uint16 result
}
```

3.4.1.7 cmd_bt_rfcomm_stop_server

This command can be used to stop an RFCOMM server.

Table 3.102. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x03	method	Message ID
4	uint8	sdp_id	ID of the SDP entry defined in the project configuration file.

Table 3.103. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_rfcomm_stop_server(sdp_id)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_stop_server(uint8 sdp_id);

/* Response id */
dumo_rsp_bt_rfcomm_stop_server_id

/* Response structure */
struct dumo_msg_bt_rfcomm_stop_server_rsp_t
{
  uint16 result
}
```

3.4.1.8 cmd_bt_rfcomm_stop_server_port

This command can be used to stop an RFCOMM server that has been started ona port.

Table 3.104. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x06	method	Message ID
4	uint8	port	port server is listening.

Table 3.105. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_rfcomm_stop_server_port(port)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_rfcomm_stop_server_port(uint8 port);

/* Response id */
dumo_rsp_bt_rfcomm_stop_server_port_id

/* Response structure */
struct dumo_msg_bt_rfcomm_stop_server_port_rsp_t
{
  uint16 result
}
```

3.4.2 bt_rfcomm events

3.4.2.1 evt_bt_rfcomm_credit_starvation

This event indicates that outgoing data traffic has possibly been stuck. If there is no valid reason why the other end has not sent us flow control credits then the connection should be closed.

Table 3.106. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x01	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x03	method	Message ID
4	uint8	endpoint	Endpoint ID assigned to the RFCOMM connection

BGScript event

```
event bt_rfcomm_credit_starvation(endpoint)
```

C Functions

```
/* Event id */
dumo_evt_bt_rfcomm_credit_starvation_id

/* Event structure */
struct dumo_msg_bt_rfcomm_credit_starvation_evt_t
{
  uint8 endpoint
}
```

3.4.2.2 evt_bt_rfcomm_incoming_rejected

This event indicates that incoming rfcomm connection was rejected due being low in memory.

Table 3.107. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x02	method	Message ID
4-9	bd_addr	address	Bluetooth address of the remote device in little endian format

BGScript event

```
event bt_rfcomm_incoming_rejected(address)
```

C Functions

```
/* Event id */
dumo_evt_bt_rfcomm_incoming_rejected_id

/* Event structure */
struct dumo_msg_bt_rfcomm_incoming_rejected_evt_t
{
  bd_addr *address
}
```

3.4.2.3 evt_bt_rfcomm_modem_status

This event indicates change in modem control signals.

Table 3.108. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x01	method	Message ID
4	uint8	endpoint	Endpoint ID assigned to the RFCOMM connection
5	uint8	modem	Value of the modem status. For description and meaning of bits in this field see ETSI TS 07.10.

BGScript event

```
event bt_rfcomm_modem_status(endpoint,modem)
```

C Functions

```
/* Event id */
dumo_evt_bt_rfcomm_modem_status_id

/* Event structure */
struct dumo_msg_bt_rfcomm_modem_status_evt_t
{
  uint8 endpoint,
  uint8 modem
}
```

3.4.2.4 evt_bt_rfcomm_opened

This event indicates the establishment of an RFCOMM connection.

Table 3.109. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x04	class	Message class: RFCOMM
3	0x00	method	Message ID
4	uint8	endpoint	Endpoint ID assigned to the RFCOMM connection
5-10	bd_addr	address	Bluetooth address of the remote Bluetooth BR/EDR device in little endian format.

BGScript event

```
event bt_rfcomm_opened(endpoint,address)
```

C Functions

```
/* Event id */
dumo_evt_bt_rfcomm_opened_id

/* Event structure */
struct dumo_msg_bt_rfcomm_opened_evt_t
{
  uint8 endpoint,
  bd_addr *address
}
```

3.5 Service Discovery Profile (bt_sdp)

The commands and events in this are related to the Service Discovery Profile (SDP).

3.5.1 bt_sdp commands

3.5.1.1 cmd_bt_sdp_add_entry

This function load custom defined SDP record into the SDP server. Note that this funtion does not verify the correctness of the record at all.

Table 3.110. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x02	method	Message ID
4-7	uint32	sdp_id	ID of the SDP entry to be loaded. Range from 1000 to 2000
8	uint8array	record	SDP record

Table 3.111. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_sdp_add_entry(sdp_id,record_len, record_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_sdp_add_entry(uint32 sdp_id, uint8array record);

/* Response id */
dumo_rsp_bt_sdp_add_entry_id

/* Response structure */
struct dumo_msg_bt_sdp_add_entry_rsp_t
{
  uint16 result
}
```

3.5.1.2 cmd_bt_sdp_delete_entry

This function removes custom defined SDP record from the SDP server.

Table 3.112. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x03	method	Message ID
4-7	uint32	sdp_id	ID of the SDP entry to be loaded. Range from 1000 to 2000

Table 3.113. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_sdp_delete_entry(sdp_id)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_sdp_delete_entry(uint32 sdp_id);

/* Response id */
dumo_rsp_bt_sdp_delete_entry_id

/* Response structure */
struct dumo_msg_bt_sdp_delete_entry_rsp_t
{
  uint16 result
}
```

3.5.1.3 cmd_bt_sdp_load_entry

This command can be used to load an SDP entry from the internal filesystem to the SDP server. NOTE: command only loads SDP record. It does not do anything else. Like start RFCOMM server

Table 3.114. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x01	method	Message ID
4-7	uint32	sdp_id	ID of the SDP entry defined in the project configuration file. See the Bluetooth Dual Mode Serial Port Profile Application Notes for details

Table 3.115. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_sdp_load_entry(sdp_id)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_sdp_load_entry(uint32 sdp_id);

/* Response id */
dumo_rsp_bt_sdp_load_entry_id

/* Response structure */
struct dumo_msg_bt_sdp_load_entry_rsp_t
{
  uint16 result
}
```

3.5.1.4 cmd_bt_sdp_search_rfcomm_port

This command can be used to search for Serial Port Profile (SPP) services in a Bluetooth BR/EDR device. The reply is an event specifying the RFCOMM port found.

Table 3.116. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x00	method	Message ID
4-9	bd_addr	address	Bluetooth device address of the remote device in little endian format
10	uint8array	uuid	UUID is one of the following: • uuid16, 2 bytes: 16-bit UUID for searching RFCOMM port • uuid32, 4 bytes: 32-bit UUID for searching RFCOMM port • uuid128, 16 bytes: 128-bit UUID for RFCOMM port

Table 3.117. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call bt_sdp_search_rfcomm_port(address,uuid_len, uuid_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_bt_sdp_search_rfcomm_port(bd_addr *address, uint8array uuid);

/* Response id */
dumo_rsp_bt_sdp_search_rfcomm_port_id

/* Response structure */
struct dumo_msg_bt_sdp_search_rfcomm_port_rsp_t
{
  uint16 result
}
```

Table 3.118. Events Generated

Event	Description
bt_sdp_search_rfcomm_port	This event indicates the SDP search result.

3.5.2 bt_sdp events

3.5.2.1 evt_bt_sdp_search_rfcomm_port

This event indicates the SDP search result.

Table 3.119. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x08	lolen	Minimum payload length
2	0x06	class	Message class: Service Discovery Profile
3	0x00	method	Message ID
4-7	uint32	request_handle	Reserved; should be set to zero
8-9	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
10	uint8	port	RFCOMM port number
11	uint8array	service_name	RFCOMM service name

BGScript event

```
event bt_sdp_search_rfcomm_port(request_handle,status,port,service_name_len, service_name_data)
```

C Functions

```
/* Event id */
dumo_evt_bt_sdp_search_rfcomm_port_id

/* Event structure */
struct dumo_msg_bt_sdp_search_rfcomm_port_evt_t
{
  uint32 request_handle,
  uint16 status,
  uint8 port,
  uint8array service_name
}
```

3.6 Device Firmware Upgrade (dfu)

These commands and events are related to controlling firmware update over the configured host interface and are available only when the module has been booted into DFU mode. **The DFU process:**

1. Boot device to DFU mode with DFU reset command
2. Wait for DFU boot event
3. Send command Flash Set Address to start the firmware update
4. Upload the firmware with Flash Upload commands until all the data has been uploaded
5. Send Flash Upload Finish when all the data has been uploaded
6. Finalize the DFU firmware update with Reset command.

Bootloader checks the CRC checksum from the uploaded image and the module will remain in DFU mode if it does not match. DFU mode is using UART baudrate from the hardware configuration of the firmware. Default baudrate 115200 is used if firmware is missing or firmware content does not match with CRC checksum.

3.6.1 dfu commands

3.6.1.1 cmd_dfu_flash_set_address

After re-booting the local device into DFU mode, this command can be used to define the starting address on the flash to where the new firmware will be written in.

Table 3.120. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x01	method	Message ID
4-7	uint32	address	The offset in the flash where the new firmware is uploaded to. To upload new firmware without the bootloader, value 0x00001800 should be used. To upload firmware and bootloader or bootloader only, value 0x00000000 should be used.

Table 3.121. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call dfu_flash_set_address(address)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_dfu_flash_set_address(uint32 address);

/* Response id */
dumo_rsp_dfu_flash_set_address_id

/* Response structure */
struct dumo_msg_dfu_flash_set_address_rsp_t
{
  uint16 result
}
```

3.6.1.2 cmd_dfu_flash_upload

This command can be used to upload the whole firmware image file in to the Bluetooth module. The recommended payload size of the command is 128 bytes, so multiple commands need to be issued one after the other until the whole .bin firmware image file is uploaded to the module. The next address of the flash sector in memory to write to is automatically updated by the bootloader after each individual command.

Table 3.122. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x02	method	Message ID
4	uint8array	data	An array of data which will be written onto the flash.

Table 3.123. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call dfu_flash_upload(data_len, data_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_dfu_flash_upload(uint8array data);

/* Response id */
dumo_rsp_dfu_flash_upload_id

/* Response structure */
struct dumo_msg_dfu_flash_upload_rsp_t
{
  uint16 result
}
```

3.6.1.3 cmd_dfu_flash_upload_finish

This command can be used to tell to the device that the DFU file has been fully uploaded. To return the device back to normal mode the command DFU Reset must be issued next.

Table 3.124. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x03	method	Message ID

Table 3.125. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call dfu_flash_upload_finish()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_dfu_flash_upload_finish();

/* Response id */
dumo_rsp_dfu_flash_upload_finish_id

/* Response structure */
struct dumo_msg_dfu_flash_upload_finish_rsp_t
{
  uint16 result
}
```

3.6.1.4 cmd_dfu_reset

This command can be used to reset the system. This command does not have a response, but it triggers one of the boot events (normal reset or boot to DFU mode) after re-boot.

Table 3.126. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x00	method	Message ID
4	uint8	dfu	Boot mode: • **0:** Normal reset • **1:** Boot to DFU mode

BGScript command

```
call dfu_reset(dfu)
```

BGLIB C API

```
/* Function */
void dumo_cmd_dfu_reset(uint8 dfu);

/* Command does not have a response */
```

Table 3.127. Events Generated

Event	Description
system_boot	Sent after the device has booted into normal mode
dfu_boot	Sent after the device has booted into DFU mode

3.6.2 dfu events

3.6.2.1 evt_dfu_boot

This event indicates that the module booted into DFU mode, and is now ready to receive commands related to device firmware upgade (DFU).

Table 3.128. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x04	lolen	Minimum payload length
2	0x00	class	Message class: Device Firmware Upgrade
3	0x00	method	Message ID
4-7	uint32	version	The version of the bootloader

BGScript event

```
event dfu_boot(version)
```

C Functions

```
/* Event id */
dumo_evt_dfu_boot_id

/* Event structure */
struct dumo_msg_dfu_boot_evt_t
{
  uint32 version
}
```

3.7 Endpoint (endpoint)

These commands and events are related to the control of endpoints. They allow the creation and deletion of endpoints as well as configuration of data routing. Predefined endpoints ID's are:

- **0:** UART
- **1:** SCRIPT
- **31:** DROP

Note the difference between these endpoint ID's and the endpoint types is that endpoint types describe different categories. Each endpoint has an endpoint type which describes what kind of endpoint it is. There may be multiple endpoints which have the same type. Each endpoint has exactly one ID, and each ID points to exactly one endpoint.

3.7.1 endpoint commands

3.7.1.1 cmd_endpoint_close

This command can be used to close an RFCOMM endpoint , LE cable replacement endpoint, or a BLE connection. This command must always be used to close an endpoint with WAIT_CLOSE status when the remote side has closed the RFCOMM or LE cable replacement connection. This is to free the memory allocated by the endpoint for future reuse in the case when the remote side closes the connection. Note : this command may not be issued inside endpoint_data event handler in BgScript.

Table 3.129. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x02	method	Message ID
4	uint8	endpoint	The index of the RFCOMM/LE cable replacement endpoint to close or the connection handle ID of the BLE connection to be closed. The connection handle ID is reported for example in the event le_connection_opened.

Table 3.130. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	The endpoint that was closed

BGScript command

```
call endpoint_close(endpoint)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_endpoint_close(uint8 endpoint);

/* Response id */
dumo_rsp_endpoint_close_id

/* Response structure */
struct dumo_msg_endpoint_close_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

Table 3.131. Events Generated

Event	Description
endpoint_status	Sent when endpoint status changes

3.7.1.2 cmd_endpoint_read_counters

This command can be used to read the data performance counters (data sent counter and data received counter) of an endpoint.

Table 3.132. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x05	method	Message ID
4	uint8	endpoint	The endpoint's handle

Table 3.133. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x0b	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	
7-10	uint32	tx	Amount of data sent to this endpoint
11-14	uint32	rx	Amount of data received from this endpoint

BGScript command

```
call endpoint_read_counters(endpoint)(result,endpoint,tx,rx)
```

BGLIB C API

```
/* Function */
void dumo_cmd_endpoint_read_counters(uint8 endpoint);

/* Response id */
dumo_rsp_endpoint_read_counters_id

/* Response structure */
struct dumo_msg_endpoint_read_counters_rsp_t
{
  uint16 result,
  uint8 endpoint,
  uint32 tx,
  uint32 rx
}
```

3.7.1.3 cmd_endpoint_send

This command can be used to send data to the defined endpoint. When this command is issued data to be sent is placed to send queue for sending.

Table 3.134. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x00	method	Message ID
4	uint8	endpoint	The index of the endpoint to which the data will be sent.
5	uint8array	data	The RAW data which will be written or sent

Table 3.135. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **0x018e:** Internal buffers are full and the data was discarded and not sent.The host should resend the data again later. The host can optionally wait for an endpoint_status event and check that endpoint_FLAG_FULL is not set. • **Non-zero:** an other error occurred For other values refer to the Error codes
6	uint8	endpoint	The endpoint to which the data was written

BGScript command

```
call endpoint_send(endpoint,data_len, data_data)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_endpoint_send(uint8 endpoint, uint8array data);

/* Response id */
dumo_rsp_endpoint_send_id

/* Response structure */
struct dumo_msg_endpoint_send_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

3.7.1.4 cmd_endpoint_set_active

This command can be used to set the endpoint active or inactive. When the endpoint is inactive, any incoming data will be paused, and no data may be sent out. Not all endpoint types can set changed inactive. Currently only rfcomm endpoints can be set inactive.

Table 3.136. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x06	method	Message ID
4	uint8	endpoint	The endpoint's handle
5	uint8	active	Active state (0 or 1).

Table 3.137. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call endpoint_set_active(endpoint,active)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_endpoint_set_active(uint8 endpoint, uint8 active);

/* Response id */
dumo_rsp_endpoint_set_active_id

/* Response structure */
struct dumo_msg_endpoint_set_active_rsp_t
{
  uint16 result
}
```

Table 3.138. Events Generated

Event	Description
endpoint_status	This event indicates an endpoint's status.

3.7.1.5 cmd_endpoint_set_streaming_destination

This command can be used to set the destination into which data from an endpoint will be routed to.

Table 3.139. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x01	method	Message ID
4	uint8	endpoint	The endpoint which to control
5	uint8	destination_endpoint	The destination for the data

Table 3.140. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call endpoint_set_streaming_destination(endpoint,destination_endpoint)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_endpoint_set_streaming_destination(uint8 endpoint, uint8 destination_endpoint);

/* Response id */
dumo_rsp_endpoint_set_streaming_destination_id

/* Response structure */
struct dumo_msg_endpoint_set_streaming_destination_rsp_t
{
  uint16 result
}
```

Table 3.141. Events Generated

Event	Description
endpoint_status	Sent when endpoint status changes

3.7.2 endpoint events

3.7.2.1 evt_endpoint_closed

This event indicates that an RFCOMM endpoint has been closed by the safety timer. After endpoint_closing event user should close the endpoint to release the resources taken by the enpoint. If user fails to do so in about 5 seconds then module SW will release resources and dispatch this event.

Table 3.142. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x01	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x04	method	Message ID
4	uint8	endpoint	Endpoint handle. Values: • **0xff:** connection failed without associated endpoint • **Others:** Handle for closed endpoint

BGScript event

```
event endpoint_closed(endpoint)
```

C Functions

```
/* Event id */
dumo_evt_endpoint_closed_id

/* Event structure */
struct dumo_msg_endpoint_closed_evt_t
{
  uint8 endpoint
}
```

3.7.2.2 evt_endpoint_closing

This event indicates that an endpoint is closing or that the remote end has terminated the connection. This event should be acknowledged by calling the endpoint_close command or otherwise the firmware will not re-use the endpoint index.

Table 3.143. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x03	method	Message ID
4-5	uint16	reason	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Endpoint handle. Values: • **0xff:** connection failed without associated endpoint • **Others:** Handle for closed endpoint

BGScript event

```
event endpoint_closing(reason,endpoint)
```

C Functions

```
/* Event id */
dumo_evt_endpoint_closing_id

/* Event structure */
struct dumo_msg_endpoint_closing_evt_t
{
  uint16 reason,
  uint8 endpoint
}
```

3.7.2.3 evt_endpoint_data

This event indicates incoming data from an endpoint. Note : endpoint_close command must not be used in BgScript handler for this event.

Table 3.144. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x01	method	Message ID
4	uint8	endpoint	The endpoint which received this data, i.e. to which it was sent.
5	uint8array	data	The raw data

BGScript event

```
event endpoint_data(endpoint,data_len, data_data)
```

C Functions

```
/* Event id */
dumo_evt_endpoint_data_id

/* Event structure */
struct dumo_msg_endpoint_data_evt_t
{
  uint8 endpoint,
  uint8array data
}
```

3.7.2.4 evt_endpoint_status

This event indicates an endpoint's status.

Table 3.145. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x02	method	Message ID
4	uint8	endpoint	The index of the endpoint whose status this event describes
5-8	uint32	type	Unsigned 32-bit integer
9	int8	destination_endpoint	The index of the endpoint to which the incoming data goes.
10	uint8	flags	Flags which indicate the mode of endpoint

BGScript event

```
event endpoint_status(endpoint,type,destination_endpoint,flags)
```

C Functions

```
/* Event id */
dumo_evt_endpoint_status_id

/* Event structure */
struct dumo_msg_endpoint_status_evt_t
{
  uint8 endpoint,
  uint32 type,
  int8 destination_endpoint,
  uint8 flags
}
```

3.7.2.5 evt_endpoint_syntax_error

This event indicates that a protocol error was detected in BGAPI command parser. This event is triggered if a BGAPI command from the host contains syntax error(s), or if a command is only partially sent, in which case the BGAPI parser has a 1 second command timeout by default. In practice, the latter case happens if a byte belonging to a command is sent not before a timeout of 1 second since the previous byte. The default timeout can be changed from 1ms to 4s via the "timeout" parameter of the attribute <uart> in the hardware.xml firmware project file. Any partial or wrongly formatted command will be discarded.

Table 3.146. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x0b	class	Message class: Endpoint
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Endpoint of the connection

BGScript event

```
event endpoint_syntax_error(result,endpoint)
```

C Functions

```
/* Event id */
dumo_evt_endpoint_syntax_error_id

/* Event structure */
struct dumo_msg_endpoint_syntax_error_evt_t
{
  uint16 result,
  uint8 endpoint
}
```

3.7.3 endpoint enumerations

3.7.3.1 enum_endpoint_types

These values define the endpoint types. Please note that there may be multiple endpoints with type

Table 3.147. Enumerations

Value	Name	Description
0	endpoint_free	Endpoint is not in use
1	endpoint_uart	UART
2	endpoint_script	Scripting
4	endpoint_reserved	Reserved for future use
16	endpoint_drop	Drop all data sent to this endpoint
32	endpoint_rfcomm	RFCOMM channel
64	endpoint_spi	SPI
128	endpoint_connection	Connection
512	endpoint_iap	iAP
1024	endpoint_l2cap	L2CAP
2048	endpoint_hid	HID
4096	endpoint_leserial	Bluetooth LE serial channel

3.7.4 endpoint defines

3.7.4.1 define_endpoint_endpoint_flags

Table 3.148. Defines

Value	Name	Description
1	ENDPOINT_FLAG_UPDATED	Endpoint status has been changed since last indication
2	ENDPOINT_FLAG_ACTIVE	Endpoint is active and can send and receive data
4	ENDPOINT_FLAG_STREAMING	Endpoint is in streaming mode. Data is sent and received from endpoint without framing
8	ENDPOINT_FLAG_BGAPI	Endpoint is configured for BGAPI. Data received is parsed as BGAPI commands. Also all BGAPI events and responses are sent to this endpoint
16	ENDPOINT_FLAG_WAIT_CLOSE	Endpoint is closed from the device side. Host needs to acknowledge by sending endpoint_close command to device with this endpoint as parameter
32	ENDPOINT_FLAG_CLOSING	Endpoint is closed from the host side and is waiting for the device to acknowledge closing of the endpoint
64	ENDPOINT_FLAG_FULL	Endpoint buffers are full and no data from host can be sent to it. When more data can be sent to the endpoint, a new endpoint_status event will be generated with the updated flags.

3.8 Persistent Store (flash)

Thse commands and events can be used to manage the user data in the flash memory of the Bluetooth module. User data stored in PS keys within the flash memory is persistent across reset and power cycling of the module.

3.8.1 flash commands

3.8.1.1 cmd_flash_ps_dump

This command can be used to retrieve all PS keys and their current values. For each existing PS key a flash_pskey event will be generated which includes the corresponding PS key value.

Table 3.149. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x00	method	Message ID

Table 3.150. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call flash_ps_dump()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_flash_ps_dump();

/* Response id */
dumo_rsp_flash_ps_dump_id

/* Response structure */
struct dumo_msg_flash_ps_dump_rsp_t
{
  uint16 result
}
```

Table 3.151. Events Generated

Event	Description
flash_ps_key	PS Key contents

3.8.1.2 cmd_flash_ps_erase

This command can be used to erase a single PS key and its value from the Persistent Store.

Table 3.152. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x04	method	Message ID
4-5	uint16	key	PS key to erase

Table 3.153. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call flash_ps_erase(key)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_flash_ps_erase(uint16 key);

/* Response id */
dumo_rsp_flash_ps_erase_id

/* Response structure */
struct dumo_msg_flash_ps_erase_rsp_t
{
  uint16 result
}
```

3.8.1.3 cmd_flash_ps_erase_all

This command can be used to erase all PS keys and their corresponding value.

Table 3.154. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x01	method	Message ID

Table 3.155. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call flash_ps_erase_all()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_flash_ps_erase_all();

/* Response id */
dumo_rsp_flash_ps_erase_all_id

/* Response structure */
struct dumo_msg_flash_ps_erase_all_rsp_t
{
  uint16 result
}
```

3.8.1.4 cmd_flash_ps_load

This command can be used for retrieving the value of the specified PS key.

Table 3.156. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x03	method	Message ID
4-5	uint16	key	PS key of the value to be retrieved

Table 3.157. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	value	The returned value of the specified PS key.

BGScript command

```
call flash_ps_load(key)(result,value_len, value_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_flash_ps_load(uint16 key);

/* Response id */
dumo_rsp_flash_ps_load_id

/* Response structure */
struct dumo_msg_flash_ps_load_rsp_t
{
  uint16 result,
  uint8array value
}
```

3.8.1.5 cmd_flash_ps_save

This command can be used to store a value into the specified PS key. The allowed PS key range is from 0x4000 to 0x407F. Maximum length of value is 250 bytes. Maximum storage space is 4 KB and this is shared with system internal keys. Available storage space depends on how much storage space the application will use. In addition 20 bytes of metadata is stored for each PS item.

Table 3.158. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x02	method	Message ID
4-5	uint16	key	PS key
6	uint8array	value	Value to store into the specified PS key.

Table 3.159. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call flash_ps_save(key,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_flash_ps_save(uint16 key, uint8array value);

/* Response id */
dumo_rsp_flash_ps_save_id

/* Response structure */
struct dumo_msg_flash_ps_save_rsp_t
{
  uint16 result
}
```

3.8.2 flash events

3.8.2.1 evt_flash_ps_key

This event indicates that the flash_ps_dump command was given. It returns a single PS key and its value. There can be multiple events if multiple PS keys exist.

Table 3.160. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x0d	class	Message class: Persistent Store
3	0x00	method	Message ID
4-5	uint16	key	PS key
6	uint8array	value	Current value of the PS key specified in this event.

BGScript event

```
event flash_ps_key(key,value_len, value_data)
```

C Functions

```
/* Event id */
dumo_evt_flash_ps_key_id

/* Event structure */
struct dumo_msg_flash_ps_key_evt_t
{
  uint16 key,
  uint8array value
}
```

3.9 Generic Attribute Profile (gatt)

The commands and events in this class can be used to browse and manage attributes in a remote GATT server.

3.9.1 gatt commands

3.9.1.1 cmd_gatt_discover_characteristics

This command can be used to discover all characteristics of the defined GATT service from a remote GATT database. This command generates a unique gatt_characteristic event for every discovered characteristic. Received gatt_procedure_completed event indicates that this GATT procedure has succesfully completed or failed with error.

Table 3.161. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x03	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	service	GATT service handle. This value is normally received from the gatt_service event.

Table 3.162. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_discover_characteristics(connection,service)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_discover_characteristics(uint8 connection, uint32 service);

/* Response id */
dumo_rsp_gatt_discover_characteristics_id

/* Response structure */
struct dumo_msg_gatt_discover_characteristics_rsp_t
{
  uint16 result
}
```

Table 3.163. Events Generated

Event	Description
gatt_characteristic	Discovered characteristic from remote GATT database.

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.2 cmd_gatt_discover_characteristics_by_uuid

This command can be used to discover all the characteristics of the specified GATT service in a remote GATT database having the specified UUID. This command generates a unique gatt_characteristic event for every discovered characteristic having the specified UUID. Received gatt_procedure_completed event indicates that this GATT procedure has successfully completed or failed with error.

Table 3.164. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x04	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	service	GATT service handle. This value is normally received from the gatt_service event.
9	uint8array	uuid	Characteristic UUID, first byte is the length of UUID and rest is UUID in little-endian format

Table 3.165. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_discover_characteristics_by_uuid(connection,service,uuid_len, uuid_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_discover_characteristics_by_uuid(uint8 connection, uint32 service, uint8array uuid);

/* Response id */
dumo_rsp_gatt_discover_characteristics_by_uuid_id

/* Response structure */
struct dumo_msg_gatt_discover_characteristics_by_uuid_rsp_t
{
  uint16 result
}
```

Table 3.166. Events Generated

Event	Description
gatt_characteristic	Discovered characteristic from remote GATT database.
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.3 cmd_gatt_discover_descriptors

This command can be used to discover all the descriptors of the specified remote GATT characteristics in a remote GATT database. This command generates a unique gatt_descriptor event for every discovered descriptor. Received gatt_procedure_completed event indicates that this GATT procedure has succesfully completed or failed with error.

Table 3.167. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x06	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event

Table 3.168. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_discover_descriptors(connection,characteristic)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_discover_descriptors(uint8 connection, uint16 characteristic);

/* Response id */
dumo_rsp_gatt_discover_descriptors_id

/* Response structure */
struct dumo_msg_gatt_discover_descriptors_rsp_t
{
  uint16 result
}
```

Table 3.169. Events Generated

Event	Description
gatt_descriptor	Discovered descriptor from remote GATT database.

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.4 cmd_gatt_discover_primary_services

This command can be used to discover all the primary services of a remote GATT database. This command generates a unique gatt_service event for every discovered primary service. Received gatt_procedure_completed event indicates that this GATT procedure has successfully completed or failed with error.

Table 3.170. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x01	method	Message ID
4	uint8	connection	Connection handle

Table 3.171. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_discover_primary_services(connection)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_discover_primary_services(uint8 connection);

/* Response id */
dumo_rsp_gatt_discover_primary_services_id

/* Response structure */
struct dumo_msg_gatt_discover_primary_services_rsp_t
{
  uint16 result
}
```

Table 3.172. Events Generated

Event	Description
gatt_service	Discovered service from remote GATT database
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.5 cmd_gatt_discover_primary_services_by_uuid

This command can be used to discover primary services with the specified UUID in a remote GATT database. This command generates unique gatt_service event for every discovered primary service. Received gatt_procedure_completed event indicates that this GATT procedure has succesfully completed or failed with error.

Table 3.173. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x02	method	Message ID
4	uint8	connection	Connection handle
5	uint8array	uuid	Characteristic UUID, first byte is the length of UUID and rest is UUID in little-endian format

Table 3.174. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_discover_primary_services_by_uuid(connection,uuid_len, uuid_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_discover_primary_services_by_uuid(uint8 connection, uint8array uuid);

/* Response id */
dumo_rsp_gatt_discover_primary_services_by_uuid_id

/* Response structure */
struct dumo_msg_gatt_discover_primary_services_by_uuid_rsp_t
{
  uint16 result
}
```

Table 3.175. Events Generated

Event	Description
gatt_service	Discovered service from remote GATT database.

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.6 cmd_gatt_execute_characteristic_value_write

This command can be used to commit or cancel previously queued writes to a long characteristic of a remote GATT server. Writes are sent to queue with prepare_characteristic_value_write command. Content, offset and length of queued values are validated by this procedure. A received gatt_procedure_completed event indicates that all data has been written successfully or that an error response has been received.

Table 3.176. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0c	method	Message ID
4	uint8	connection	Connection handle
5	uint8	flags	Unsigned 8-bit integer

Table 3.177. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0c	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_execute_characteristic_value_write(connection,flags)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_execute_characteristic_value_write(uint8 connection, uint8 flags);

/* Response id */
dumo_rsp_gatt_execute_characteristic_value_write_id

/* Response structure */
struct dumo_msg_gatt_execute_characteristic_value_write_rsp_t
{
  uint16 result
}
```

Table 3.178. Events Generated

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.7 cmd_gatt_find_included_services

This command can be used to find out if a service of a remote GATT database includes one or more other services. This command generates a unique gatt_service_completed event for each included service. This command generates a unique gatt_service event for every discovered service. Received gatt_procedure_completed event indicates that this GATT procedure has successfully completed or failed with error.

Table 3.179. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x10	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	service	GATT service handle. This value is normally received from the gatt_service event.

Table 3.180. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x10	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_find_included_services(connection,service)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_find_included_services(uint8 connection, uint32 service);

/* Response id */
dumo_rsp_gatt_find_included_services_id

/* Response structure */
struct dumo_msg_gatt_find_included_services_rsp_t
{
  uint16 result
}
```

Table 3.181. Events Generated

Event	Description
gatt_service	Discovered service from remote GATT database.
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.8 cmd_gatt_find_information_request

This command is used to obtain the mapping of attribute handles with their associated types (UUIDs) in a given handle range.

Table 3.182. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x12	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	start_handle	First requested handle number
7-8	uint16	end_handle	Last requested handle number

Table 3.183. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x12	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_find_information_request(connection,start_handle,end_handle)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_find_information_request(uint8 connection, uint16 start_handle, uint16 end_handle);

/* Response id */
dumo_rsp_gatt_find_information_request_id

/* Response structure */
struct dumo_msg_gatt_find_information_request_rsp_t
{
  uint16 result
}
```

Table 3.184. Events Generated

Event	Description
gatt_find_information_found	One or more attributes have been found.
gatt_procedure_completed	Find Information Request Transaction has successfully completed or failed with an error.

3.9.1.9 cmd_gatt_prepare_characteristic_value_write

This command can be used to add a characteristic value to the write queue of a remote GATT server. This command can be used in cases where very long attributes need to be written, or a set of values needs to be written atomically. In all cases where the amount of data to transfer fits into the BGAPI payload the command gatt_write_characteristic_value is recommended for writing long values since it transparently performs the prepare_write and execute_write commands. A received evt_gatt_characteristic_value event can be used to verify that the data has been transmitted. Writes are executed or cancelled with the execute_characteristic_value_write command. Whether the writes succeeded or not are indicated in the response of the execute_characteristic_value_write command.

Table 3.185. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0b	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7-8	uint16	offset	Offset of the characteristic value
9	uint8array	value	Value to write into the specified characteristic of the remote GATT database

Table 3.186. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0b	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_prepare_characteristic_value_write(connection,characteristic,offset,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_prepare_characteristic_value_write(uint8 connection, uint16 characteristic, uint16 offset,
uint8array value);

/* Response id */
dumo_rsp_gatt_prepare_characteristic_value_write_id

/* Response structure */
struct dumo_msg_gatt_prepare_characteristic_value_write_rsp_t
{
  uint16 result
}
```

Table 3.187. Events Generated

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.10 cmd_gatt_read_characteristic_value

This command can be used to read the value of a characteristic from a remote GATT database. A single gatt_characteristic_value event is generated if the length of the characteristic value returned by the remote GATT server is less than or equal to the size of the GATT MTU. If the length of the value exceeds the size of the GATT MTU more than one gatt_characteristic_value event is generated because the firmware will automatically use the "read long" GATT procedure. A received gatt_procedure_completed event indicates that all data has been read successfully or that an error response has been received.

Table 3.188. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x07	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event

Table 3.189. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_read_characteristic_value(connection,characteristic)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_read_characteristic_value(uint8 connection, uint16 characteristic);

/* Response id */
dumo_rsp_gatt_read_characteristic_value_id

/* Response structure */
struct dumo_msg_gatt_read_characteristic_value_rsp_t
{
  uint16 result
}
```

Table 3.190. Events Generated

Event	Description
gatt_characteristic_value	This event contains the data belonging to a characteristic sent by the GATT Server.
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.11 cmd_gatt_read_characteristic_value_by_uuid

This command can be used to read the characteristic value of a service from a remote GATT database by giving the UUID of the characteristic and the handle of the service containing this characteristic. A single gatt_characteristic_value event is generated if the length of the characteristic value returned by the remote GATT server is less than or equal to the size of the GATT MTU. If the length of the value exceeds the size of the GATT MTU more than one gatt_characteristic_value event is generated because the firmware will automatically use the "read long" GATT procedure. A received gatt_procedure_completed event indicates that all data has been read successfully or that an error response has been received.

Table 3.191. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x08	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	service	GATT service handle. This value is normally received from the gatt_service event.
9	uint8array	uuid	Characteristic UUID

Table 3.192. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_read_characteristic_value_by_uuid(connection,service,uuid_len, uuid_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_read_characteristic_value_by_uuid(uint8 connection, uint32 service, uint8array uuid);

/* Response id */
dumo_rsp_gatt_read_characteristic_value_by_uuid_id

/* Response structure */
struct dumo_msg_gatt_read_characteristic_value_by_uuid_rsp_t
{
  uint16 result
}
```

Table 3.193. Events Generated

Event	Description
gatt_characteristic_value	This event contains the data belonging to a characteristic sent by the GATT Server.
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.12 cmd_gatt_read_descriptor_value

This command can be used to read the descriptor value of a characteristic in a remote GATT database. A single gatt_descriptor_value event is generated if the length of the descriptor value returned by the remote GATT server is less than or equal to the size of the GATT MTU. If the length of the value exceeds the size of the GATT MTU more than one gatt_descriptor_value event is generated because the firmware will automatically use the "read long" GATT procedure. A received gatt_procedure_completed event indicates that all data has been read successfully or that an error response has been received.

Table 3.194. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0e	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	descriptor	The handle of the GATT characteristic descriptor

Table 3.195. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0e	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_read_descriptor_value(connection,descriptor)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_read_descriptor_value(uint8 connection, uint16 descriptor);

/* Response id */
dumo_rsp_gatt_read_descriptor_value_id

/* Response structure */
struct dumo_msg_gatt_read_descriptor_value_rsp_t
{
  uint16 result
}
```

Table 3.196. Events Generated

Event	Description
gatt_descriptor_value	Descriptor value received from the remote GATT server.
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.13 cmd_gatt_read_multiple_characteristic_values

This command can be used to read the values of multiple characteristics from a remote GATT database at once. gatt_characteristic_value events are generated as the values are returned by the remote GATT server. A received gatt_procedure_completed event indicates that either all data has been read successfully or that an error response has been received.

Table 3.197. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x11	method	Message ID
4	uint8	connection	Connection handle
5	uint8array	characteristic_list	Little endian encoded uint16 list of characteristics to be read.

Table 3.198. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x11	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call   gatt_read_multiple_characteristic_values(connection,characteristic_list_len,   characteristic_list_data)
(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_read_multiple_characteristic_values(uint8 connection, uint8array characteristic_list);

/* Response id */
dumo_rsp_gatt_read_multiple_characteristic_values_id

/* Response structure */
struct dumo_msg_gatt_read_multiple_characteristic_values_rsp_t
{
  uint16 result
}
```

Table 3.199. Events Generated

Event	Description
gatt_characteristic_value	This event contains the data belonging to a characteristic sent by the GATT Server.

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.14 cmd_gatt_send_characteristic_confirmation

This command must be used to send a characteristic confirmation to a remote GATT server after receiving an indication. The gatt_characteristic_value_event carries the att_opcode containing handle_value_indication (0x1e) which reveals that an indication has been received and this must be confirmed with this command. Confirmation needs to be sent within 30 seconds, otherwise the GATT transactions between the client and the server are discontinued.

Table 3.200. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0d	method	Message ID
4	uint8	connection	Connection handle

Table 3.201. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0d	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_send_characteristic_confirmation(connection)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_send_characteristic_confirmation(uint8 connection);

/* Response id */
dumo_rsp_gatt_send_characteristic_confirmation_id

/* Response structure */
struct dumo_msg_gatt_send_characteristic_confirmation_rsp_t
{
  uint16 result
}
```

3.9.1.15 cmd_gatt_set_characteristic_notification

This command can be used to enable or disable the notifications and indications being sent from a remote GATT server. This procedure discovers a characteristic client configuration descriptor and writes the related configuration flags to a remote GATT database. A received gatt_procedure_completed event indicates that this GATT procedure has successfully completed or that is has failed with an error. The alternative way to subscribe attribute's notification or subscribe attribute's indication is to discover Client Characteristic Configuration Descriptor (with cmd_gatt_find_information_request), and then to write expected value (with cmd_gatt_write_descriptor_value) to its handler.

Table 3.202. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x05	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	flags	Characteristic client configuration flags

Table 3.203. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_set_characteristic_notification(connection,characteristic,flags)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_set_characteristic_notification(uint8 connection, uint16 characteristic, uint8 flags);

/* Response id */
dumo_rsp_gatt_set_characteristic_notification_id

/* Response structure */
struct dumo_msg_gatt_set_characteristic_notification_rsp_t
{
  uint16 result
}
```

Table 3.204. Events Generated

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.
gatt_characteristic_value	If an indication or notification has been enabled for a characteristic, this event is triggered whenever an indication or notification is sent by the remote GATT server. The triggering conditions on the GATT server side are defined by an upper level, for example by a profile; **so it is possible that no values are ever received, or that it may take time, depending on how the server is configured.**

3.9.1.16 cmd_gatt_set_max_mtu

This command can be used to set the maximum number of GATT Message Transfer Units (MTU). If max_mtu is non-default, MTU is exchanged automatically after Bluetooth LE connection has been established.

Table 3.205. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x00	method	Message ID
4-5	uint16	max_mtu	Maximum number of Message Transfer Units (MTU) allowed • Range: 23 to 158 Default: 23

Table 3.206. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_set_max_mtu(max_mtu)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_set_max_mtu(uint16 max_mtu);

/* Response id */
dumo_rsp_gatt_set_max_mtu_id

/* Response structure */
struct dumo_msg_gatt_set_max_mtu_rsp_t
{
  uint16 result
}
```

3.9.1.17 cmd_gatt_write_characteristic_value

This command can be used to write the value of a characteristic in a remote GATT database. If the length of the given value is greater than the exchanged GATT MTU (Message Transfer Unit), "write long" GATT procedure is used automatically. Received gatt_procedure_completed event indicates that all data has been written successfully or that an error response has been received.

Table 3.207. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x09	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8array	value	Characteristic value

Table 3.208. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x09	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_write_characteristic_value(connection,characteristic,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_write_characteristic_value(uint8 connection, uint16 characteristic, uint8array value);

/* Response id */
dumo_rsp_gatt_write_characteristic_value_id

/* Response structure */
struct dumo_msg_gatt_write_characteristic_value_rsp_t
{
  uint16 result
}
```

Table 3.209. Events Generated

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.1.18 cmd_gatt_write_characteristic_value_without_response

This command can be used to write the value of a characteristic in a remote GATT database. This command does not generate any event. All failures on the server are ignored silently. For example, if an error is generated in the remote GATT server and the given value is not written into database no error message will be reported to the local GATT client. Note that this command cannot be used to write long values.

Table 3.210. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0a	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8array	value	Characteristic value

Table 3.211. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0a	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_write_characteristic_value_without_response(connection,characteristic,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void  dumo_cmd_gatt_write_characteristic_value_without_response(uint8  connection,  uint16  characteristic,
uint8array value);

/* Response id */
dumo_rsp_gatt_write_characteristic_value_without_response_id

/* Response structure */
struct dumo_msg_gatt_write_characteristic_value_without_response_rsp_t
{
  uint16 result
}
```

3.9.1.19 cmd_gatt_write_descriptor_value

This command can be used to write the value of a characteristic descriptor in a remote GATT database. If the length of the given value is greater than the exchanged GATT MTU size, "write long" GATT procedure is used automatically. Received gatt_procedure_completed event indicates that all data has been written succesfully or that an error response has been received.

Table 3.212. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0f	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	descriptor	The handle of the GATT characteristic descriptor
7	uint8array	value	Descriptor value

Table 3.213. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x0f	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_write_descriptor_value(connection,descriptor,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_write_descriptor_value(uint8 connection, uint16 descriptor, uint8array value);

/* Response id */
dumo_rsp_gatt_write_descriptor_value_id

/* Response structure */
struct dumo_msg_gatt_write_descriptor_value_rsp_t
{
  uint16 result
}
```

Table 3.214. Events Generated

Event	Description
gatt_procedure_completed	Procedure has been successfully completed or failed with error.

3.9.2 gatt events

3.9.2.1 evt_gatt_characteristic

This event indicates that a GATT characteristic in the remote GATT database was discovered. This event is generated after issuing either the gatt_discover_characteristics or gatt_discover_characteristics_by_uuid command.

Table 3.215. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x05	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x02	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle
7	uint8	properties	Characteristic properties as a bitmask: • **0x01:** broadcast permitted • **0x02:** read permitted • **0x04:** write without response permitted • **0x08:** write permitted • **0x10:** notifications permitted • **0x20:** indications permitted • **0x40:** signed writes permitted • **0x80:** characteristic has extended properties Consult the GATT specification for more details.
8	uint8array	uuid	Characteristic UUID, first byte is the length of UUID and rest is UUID in little-endian format

BGScript event

```
event gatt_characteristic(connection,characteristic,properties,uuid_len, uuid_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_characteristic_id

/* Event structure */
struct dumo_msg_gatt_characteristic_evt_t
{
  uint8 connection,
  uint16 characteristic,
  uint8 properties,
  uint8array uuid
}
```

3.9.2.2 evt_gatt_characteristic_value

This event indicates that the value of a characteristic in the remote GATT server was received. This event is triggered as a result of several commands: gatt_read_characteristic_value, gatt_read_characteristic_value_by_uuid, gatt_read_multiple_characteristic_values, gatt_prepare_characteristic_value_write; and when the remote GATT server sends indications or notifications after enabling notifications with gatt_set_characteristic_notification. The parameter att_opcode reveals which type of GATT transaction triggered this event. In particular, if the att_opcode type is handle_value_indication (0x1d), the application needs to confirm the indication with gatt_send_characteristic_confirmation.

Table 3.216. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x04	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	att_opcode	Attribute opcode which informs the GATT transaction used
8-9	uint16	offset	Value offset
10	uint8array	value	Characteristic value

BGScript event

```
event gatt_characteristic_value(connection,characteristic,att_opcode,offset,value_len, value_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_characteristic_value_id

/* Event structure */
struct dumo_msg_gatt_characteristic_value_evt_t
{
  uint8 connection,
  uint16 characteristic,
  uint8 att_opcode,
  uint16 offset,
  uint8array value
}
```

3.9.2.3 evt_gatt_descriptor

This event indicates that a GATT characteristic descriptor in the remote GATT database was discovered. This event is generated after issuing the gatt_discover_descriptors command.

Table 3.217. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x04	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x03	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	descriptor	The handle of the GATT characteristic descriptor
7	uint8array	uuid	Characteristic UUID, first byte is the length of UUID and rest is UUID in little-endian format

BGScript event

```
event gatt_descriptor(connection,descriptor,uuid_len, uuid_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_descriptor_id

/* Event structure */
struct dumo_msg_gatt_descriptor_evt_t
{
  uint8 connection,
  uint16 descriptor,
  uint8array uuid
}
```

3.9.2.4 evt_gatt_descriptor_value

This event indicates that the value of a descriptor in the remote GATT server was received. This event is generated by the gatt_read_descriptor_value command.

Table 3.218. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x05	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	descriptor	The handle of the GATT characteristic descriptor
7-8	uint16	offset	Value offset
9	uint8array	value	Descriptor value

BGScript event

```
event gatt_descriptor_value(connection,descriptor,offset,value_len, value_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_descriptor_value_id

/* Event structure */
struct dumo_msg_gatt_descriptor_value_evt_t
{
  uint8 connection,
  uint16 descriptor,
  uint16 offset,
  uint8array value
}
```

3.9.2.5 evt_gatt_find_information_found

These events are generated when Find Information Response has received (after dumo_cmd_gatt_find_information_request command execution). For ranges which contain more than one attribute, one event is generated for every found attribute. At the end of the event(s) sequence (after last Find Information Found event) a dumo_evt_gatt_procedure_completed event (with or without error code) is generated.

Table 3.219. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x04	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x07	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	handle	Attribute handle
7	uint8array	uuid	Attribute type (UUID)

BGScript event

```
event gatt_find_information_found(connection,handle,uuid_len, uuid_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_find_information_found_id

/* Event structure */
struct dumo_msg_gatt_find_information_found_evt_t
{
  uint8 connection,
  uint16 handle,
  uint8array uuid
}
```

3.9.2.6 evt_gatt_procedure_completed

This event indicates that the current GATT procedure has been completed successfully or that is has failed with an error. All GATT commands excluding gatt_write_characteristic_value_without_response and gatt_send_characteristic_confirmation will trigger this event, so the application must wait for this event before issuing another GATT command (excluding the two aforementioned exceptions).

Table 3.220. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x06	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript event

```
event gatt_procedure_completed(connection,result)
```

C Functions

```
/* Event id */
dumo_evt_gatt_procedure_completed_id

/* Event structure */
struct dumo_msg_gatt_procedure_completed_evt_t
{
  uint8 connection,
  uint16 result
}
```

3.9.2.7 evt_gatt_service

This event indicates that a GATT service in the remote GATT database was discovered. This event is generated after issuing either the gatt_discover_primary_services or gatt_discover_primary_services_by_uuid command.

Table 3.221. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x09	class	Message class: Generic Attribute Profile
3	0x01	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	service	GATT service handle
9	uint8array	uuid	Characteristic UUID, first byte is the length of UUID and rest is UUID in little-endian format

BGScript event

```
event gatt_service(connection,service,uuid_len, uuid_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_service_id

/* Event structure */
struct dumo_msg_gatt_service_evt_t
{
  uint8 connection,
  uint32 service,
  uint8array uuid
}
```

3.9.3 gatt enumerations

3.9.3.1 enum_gatt_att_opcode

These values indicate which attribute request or response has caused the event.

Table 3.222. Enumerations

Value	Name	Description
8	gatt_read_by_type_request	Read by type request
9	gatt_read_by_type_response	Read by type response
10	gatt_read_request	Read request
11	gatt_read_response	Read response
12	gatt_read_blob_request	Read blob request
13	gatt_read_blob_response	Read blob response
14	gatt_read_multiple_request	Read multiple request
15	gatt_read_multiple_response	Read multiple response
18	gatt_write_request	Write request
19	gatt_write_response	Write response
82	gatt_write_command	Write command
22	gatt_prepare_write_request	Prepare write request
23	gatt_prepare_write_response	Prepare write response
24	gatt_execute_write_request	Execute write request
25	gatt_execute_write_response	Execute write response
27	gatt_handle_value_notification	Notification
29	gatt_handle_value_indication	Indication

3.9.3.2 enum_gatt_client_config_flag

These values define whether the client is to receive notifications or indications from a remote GATT server.

Table 3.223. Enumerations

Value	Name	Description
0	gatt_disable	Disable notifications and indications
1	gatt_notification	Notification
2	gatt_indication	Indication

3.9.3.3 enum_gatt_execute_write_flag

These values define whether the GATT server is to cancel all queued writes or commit all queued writes to a remote database.

Table 3.224. Enumerations

Value	Name	Description
0	gatt_cancel	Cancel all queued writes
1	gatt_commit	Commit all queued writes

3.10 Generic Attribute Profile Server (gatt_server)

These commands and events are used by the local GATT server to manage the local GATT database.

3.10.1 gatt_server commands

3.10.1.1 cmd_gatt_server_read_attribute_type

This command can be used to read the type of an attribute from a local GATT database. The type is a UUID, usually 16 or 128 bits long.

Table 3.225. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x01	method	Message ID
4-5	uint16	attribute	Attribute handle

Table 3.226. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	type	Variable length byte array. First byte is the length of the array.

BGScript command

```
call gatt_server_read_attribute_type(attribute)(result,type_len, type_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_server_read_attribute_type(uint16 attribute);

/* Response id */
dumo_rsp_gatt_server_read_attribute_type_id

/* Response structure */
struct dumo_msg_gatt_server_read_attribute_type_rsp_t
{
  uint16 result,
  uint8array type
}
```

3.10.1.2 cmd_gatt_server_read_attribute_value

This command can be used to read the value of an attribute from a local GATT database.

Table 3.227. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x00	method	Message ID
4-5	uint16	attribute	Attribute handle
6-7	uint16	offset	Value offset

Table 3.228. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	value	Variable length byte array. First byte is the length of the array.

BGScript command

```
call gatt_server_read_attribute_value(attribute,offset)(result,value_len, value_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_server_read_attribute_value(uint16 attribute, uint16 offset);

/* Response id */
dumo_rsp_gatt_server_read_attribute_value_id

/* Response structure */
struct dumo_msg_gatt_server_read_attribute_value_rsp_t
{
  uint16 result,
  uint8array value
}
```

3.10.1.3 cmd_gatt_server_send_characteristic_notification

This command can be used to send notifications or indications to a remote GATT client. Notification or indication is sent only if the client has enabled them by setting the corresponding flag to the Client Characteristic Configuration descriptor. A new indication cannot be sent before a confirmation from the GATT client is first received. The confirmation is indicated by gatt_server_characteristic_status event.

Table 3.229. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x05	method	Message ID
4	uint8	connection	Handle of the connection over which the notification or indication is sent. Values: • **0xff:** Sends notification or indication to all connected devices. • **Other:** Connection handle
5-6	uint16	characteristic	Characteristic handle
7	uint8array	value	Value to be notified or indicated

Table 3.230. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_server_send_characteristic_notification(connection,characteristic,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_server_send_characteristic_notification(uint8 connection, uint16 characteristic, uint8array
value);

/* Response id */
dumo_rsp_gatt_server_send_characteristic_notification_id

/* Response structure */
struct dumo_msg_gatt_server_send_characteristic_notification_rsp_t
{
  uint16 result
}
```

3.10.1.4 cmd_gatt_server_send_user_read_response

This command must be used to send a response to a user_read_request event. The response needs to be sent within 30 second, otherwise no more GATT transactions are allowed by the remote side. If attr_errorcode is set to 0 the characteristic value is sent to the remote GATT client in the normal way. Other attr_errorcode values will cause the local GATT server to send an attribute protocol error response instead of the actual data.

Table 3.231. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x03	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	att_errorcode	Attribute protocol error code. Values: • **0:** No error • Non-zero: see error codes
8	uint8array	value	Characteristic value to send to the GATT client. Ignored if att_errorcode is not 0.

Table 3.232. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_server_send_user_read_response(connection,characteristic,att_errorcode,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void   dumo_cmd_gatt_server_send_user_read_response(uint8   connection,   uint16   characteristic,   uint8
att_errorcode, uint8array value);

/* Response id */
dumo_rsp_gatt_server_send_user_read_response_id

/* Response structure */
struct dumo_msg_gatt_server_send_user_read_response_rsp_t
{
  uint16 result
}
```

3.10.1.5 cmd_gatt_server_send_user_write_response

This command must be used to send a response to a gatt_server_user_write_request event. The response needs to be sent within 30 seconds, otherwise no more GATT transactions are allowed by the remote side. If attr_errorcode is set to 0 the ATT protocol's write response is sent to indicate to the remote GATT client that the write operation was processed successfully. Other values will cause the local GATT server to send an ATT protocol error response.

Table 3.233. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x04	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	att_errorcode	Attribute protocol error code. Values: • **0:** No error • Non-zero: see error codes

Table 3.234. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_server_send_user_write_response(connection,characteristic,att_errorcode)(result)
```

BGLIB C API

```
/* Function */
void   dumo_cmd_gatt_server_send_user_write_response(uint8   connection,   uint16   characteristic,   uint8
att_errorcode);

/* Response id */
dumo_rsp_gatt_server_send_user_write_response_id

/* Response structure */
struct dumo_msg_gatt_server_send_user_write_response_rsp_t
{
  uint16 result
}
```

3.10.1.6 cmd_gatt_server_set_service_status

This command can be used to enable or disable service visibility when other device perform Service Discovery procedure. Refer to 'constants' file produced by build process to find handles for services. Only services with 'id' attribute in gatt description file are stored in 'constants' file.

Table 3.235. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x06	method	Message ID
4-5	uint16	service	Service handle
6	uint8	enable	Service enable flag. Values: • **0:** Disable • **1:** Enable

Table 3.236. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_server_set_service_status(service,enable)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_server_set_service_status(uint16 service, uint8 enable);

/* Response id */
dumo_rsp_gatt_server_set_service_status_id

/* Response structure */
struct dumo_msg_gatt_server_set_service_status_rsp_t
{
  uint16 result
}
```

3.10.1.7 cmd_gatt_server_write_attribute_value

This command can be used to write the value of an attribute in the local GATT database. Writing the value of a characteristic of the local GATT database will not trigger notifications or indications to the remote GATT client in case such characteristic has property of indicate or notify and the client has enabled notification or indication. Notifications and indications are sent to the remote GATT client using gatt_server_send_characteristic_notification command.

Table 3.237. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x02	method	Message ID
4-5	uint16	attribute	Attribute handle
6-7	uint16	offset	Value offset
8	uint8array	value	Value

Table 3.238. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call gatt_server_write_attribute_value(attribute,offset,value_len, value_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_gatt_server_write_attribute_value(uint16 attribute, uint16 offset, uint8array value);

/* Response id */
dumo_rsp_gatt_server_write_attribute_value_id

/* Response structure */
struct dumo_msg_gatt_server_write_attribute_value_rsp_t
{
  uint16 result
}
```

3.10.2 gatt_server events

3.10.2.1 evt_gatt_server_attribute_value

This event indicates that the value of an attribute in the local GATT database has been changed by a remote GATT client. Parameter att_opcode describes which GATT procedure was used to change the value.

Table 3.239. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x00	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	attribute	Attribute Handle
7	uint8	att_opcode	Attribute opcode which informs the procedure from which attribute the value was received
8-9	uint16	offset	Value offset
10	uint8array	value	Value

BGScript event

```
event gatt_server_attribute_value(connection,attribute,att_opcode,offset,value_len, value_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_server_attribute_value_id

/* Event structure */
struct dumo_msg_gatt_server_attribute_value_evt_t
{
  uint8 connection,
  uint16 attribute,
  uint8 att_opcode,
  uint16 offset,
  uint8array value
}
```

3.10.2.2 evt_gatt_server_characteristic_status

This event indicates either that a local Client Characteristic Configuration descriptor has been changed by the remote GATT client, or that a confirmation from the remote GATT client was received upon a successful reception of the indication. Confirmation by the remote GATT client should be received within 30 seconds after an indication has been sent with the gatt_server_send_characteristic_notification command, otherwise further GATT transactions over this connection are disabled by the stack.

Table 3.240. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x03	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	status_flags	Describes whether Client Characteristic Configuration was changed or if confirmation was received.
8-9	uint16	client_config_flags	This field carries the new value of the Client Characteristic Configuration. If the status_flags is 0x2 (confirmation received), the value of this field can be ignored.

BGScript event

```
event gatt_server_characteristic_status(connection,characteristic,status_flags,client_config_flags)
```

C Functions

```
/* Event id */
dumo_evt_gatt_server_characteristic_status_id

/* Event structure */
struct dumo_msg_gatt_server_characteristic_status_evt_t
{
  uint8 connection,
  uint16 characteristic,
  uint8 status_flags,
  uint16 client_config_flags
}
```

3.10.2.3 evt_gatt_server_user_read_request

This event indicates that a remote GATT client is attempting to read a value of an attribute from the local GATT database, where the attribute was defined in the GATT XML firmware configuration file to have type="user". Parameter att_opcode informs which GATT procedure was used to read the value. The application needs to respond to this request by using the gatt_server_send_user_read_response command within 30 seconds, otherwise this GATT connection is dropped by remote side.

Table 3.241. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x01	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	att_opcode	Attribute opcode which informs the procedure from which attribute the value was received
8-9	uint16	offset	Value offset

BGScript event

```
event gatt_server_user_read_request(connection,characteristic,att_opcode,offset)
```

C Functions

```
/* Event id */
dumo_evt_gatt_server_user_read_request_id

/* Event structure */
struct dumo_msg_gatt_server_user_read_request_evt_t
{
  uint8 connection,
  uint16 characteristic,
  uint8 att_opcode,
  uint16 offset
}
```

3.10.2.4 evt_gatt_server_user_write_request

This event indicates that a remote GATT client is attempting to write a value of an attribute in to the local GATT database, where the attribute was defined in the GATT XML firmware configuration file to have type="user". Parameter att_opcode informs which attribute procedure was used to write the value. The application needs to respond to this request by using the gatt_server_send_user_write_response command within 30 seconds, otherwise this GATT connection is dropped by the remote side.

Table 3.242. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x07	lolen	Minimum payload length
2	0x0a	class	Message class: Generic Attribute Profile Server
3	0x02	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	characteristic	GATT characteristic handle. This value is normally received from the gatt_characteristic event
7	uint8	att_opcode	Attribute opcode which informs the procedure from which attribute the value was received
8-9	uint16	offset	Value offset
10	uint8array	value	Value

BGScript event

```
event gatt_server_user_write_request(connection,characteristic,att_opcode,offset,value_len, value_data)
```

C Functions

```
/* Event id */
dumo_evt_gatt_server_user_write_request_id

/* Event structure */
struct dumo_msg_gatt_server_user_write_request_evt_t
{
  uint8 connection,
  uint16 characteristic,
  uint8 att_opcode,
  uint16 offset,
  uint8array value
}
```

3.10.3 gatt_server enumerations

3.10.3.1 enum_gatt_server_characteristic_status_flag

These values describe whether characteristic client configuration was changed or whether a characteristic confirmation was received.

Table 3.243. Enumerations

Value	Name	Description
1	gatt_server_client_config	Characteristic client configuration has been changed.
2	gatt_server_confirmation	Characteristic confirmation has been received.

3.11 Hardware (hardware)

The commands and events in this class can be used to access and configure the system hardware and peripherals.

3.11.1 hardware commands

3.11.1.1 cmd_hardware_configure_gpio

This command can be used to configure the mode of an I/O port. After a boot, the module uses the default settings defined in hardware.xml, and this command can used to override the default settings. Note that GPIO configurations set with this command do not persist over a reset. The hardware_gpio_output mode configuration sets the output pins in the push-pull mode.

Table 3.244. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x01	method	Message ID
4	uint8	port	Port index, where A=0, C=1, F=2.
5-6	uint16	gpio	Index of the GPIO pin on the port which this command affects.
7	uint8	mode	Pin mode
8	uint8	pullup	Input pin configuration.

Table 3.245. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_configure_gpio(port,gpio,mode,pullup)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_configure_gpio(uint8 port, uint16 gpio, uint8 mode, uint8 pullup);

/* Response id */
dumo_rsp_hardware_configure_gpio_id

/* Response structure */
struct dumo_msg_hardware_configure_gpio_rsp_t
{
  uint16 result
}
```

3.11.1.2 cmd_hardware_read_adc

This command can be used to read the specified channel of the A/D converter in the module. Note that the ADC channels must be configured in the hardware.xml file, as described in the module Configuration Guide. Note that only channels 0 through 2 are connected. ADC value of 4095 corresponds to the input being at Vdd, value of which can be obtained with read vdd command

Table 3.246. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x04	method	Message ID
4	uint8	input	ADC input channel. Value range: 0-2.

Table 3.247. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x05	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	input	ADC input channel. Value range: 0-2.
7-8	uint16	value	ADC value

BGScript command

```
call hardware_read_adc(input)(result,input,value)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_read_adc(uint8 input);

/* Response id */
dumo_rsp_hardware_read_adc_id

/* Response structure */
struct dumo_msg_hardware_read_adc_rsp_t
{
  uint16 result,
  uint8 input,
  uint16 value
}
```

3.11.1.3 cmd_hardware_read_gpio

This command can be used to read the pins of the specified I/O-port of the module.

Table 3.248. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x03	method	Message ID
4	uint8	port	Port index to read from, A=0, C=1, F=2.
5-6	uint16	mask	Bitmask of which pins on the port should be read

Table 3.249. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x04	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-7	uint16	data	Port data

BGScript command

```
call hardware_read_gpio(port,mask)(result,data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_read_gpio(uint8 port, uint16 mask);

/* Response id */
dumo_rsp_hardware_read_gpio_id

/* Response structure */
struct dumo_msg_hardware_read_gpio_rsp_t
{
  uint16 result,
  uint16 data
}
```

3.11.1.4 cmd_hardware_read_i2c

This command can be used to read from the specified I2C interface. The I2C interfaces must be configured in accordance with UG496: BT122 Project Configuration User's Guide.

Table 3.250. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x05	method	Message ID
4	uint8	channel	I2C channel to use. Value: 1
5-6	uint16	slave_address	Slave address to use
7	uint8	length	Amount of data to read

Table 3.251. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	data	Data that was read if command was successful

BGScript command

```
call hardware_read_i2c(channel,slave_address,length)(result,data_len, data_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_read_i2c(uint8 channel, uint16 slave_address, uint8 length);

/* Response id */
dumo_rsp_hardware_read_i2c_id

/* Response structure */
struct dumo_msg_hardware_read_i2c_rsp_t
{
  uint16 result,
  uint8array data
}
```

3.11.1.5 cmd_hardware_read_junction_temperature

This command can be used to read the junction temperature of the module's MCU. Command is active only if the ADC is active. For more information, see the Hardware Configuration Guide.

Table 3.252. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0a	method	Message ID

Table 3.253. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x04	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0a	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-7	uint16	value	Junction temperature in Celsius

BGScript command

```
call hardware_read_junction_temperature()(result,value)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_read_junction_temperature();

/* Response id */
dumo_rsp_hardware_read_junction_temperature_id

/* Response structure */
struct dumo_msg_hardware_read_junction_temperature_rsp_t
{
  uint16 result,
  uint16 value
}
```

3.11.1.6 cmd_hardware_read_vdd

This command can be used to read the voltage level of the Vdd pin. This command is active only if the ADC is active. For more information see the Hardware Configuration Guide.

Table 3.254. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x09	method	Message ID

Table 3.255. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x04	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x09	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-7	uint16	value	Voltage of Vdd in millivolts

BGScript command

```
call hardware_read_vdd()(result,value)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_read_vdd();

/* Response id */
dumo_rsp_hardware_read_vdd_id

/* Response structure */
struct dumo_msg_hardware_read_vdd_rsp_t
{
  uint16 result,
  uint16 value
}
```

3.11.1.7 cmd_hardware_read_write_spi

This command can be used to read from and write to the specified SPI interface. The SPI interfaces must be configured in the hardware.xml file, as described in the module Configuration Guide. SPI slave is working in the blocking mode, waiting for CS signal and clock from master.

Table 3.256. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0b	method	Message ID
4	uint8	read_length	Amount of data to read and write. Note: SPI read and write are synchronous and you will receive at least as many bytes as you have written. If you reading more than writing then the writing will be zero padded to match the length of the data to read.
5	uint8array	data	Data to write

Table 3.257. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0b	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	data	Data that was read if command was successful.

BGScript command

```
call hardware_read_write_spi(read_length,data_len, data_data)(result,data_len, data_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_read_write_spi(uint8 read_length, uint8array data);

/* Response id */
dumo_rsp_hardware_read_write_spi_id

/* Response structure */
struct dumo_msg_hardware_read_write_spi_rsp_t
{
  uint16 result,
  uint8array data
}
```

3.11.1.8 cmd_hardware_set_soft_timer

This command can be used to start a software timer. Multiple concurrent timers can be running simultaneously. There are 256 unique timer ID's available, but in practice the amount of concurrent timers is limited by the amount of free memory.

Table 3.258. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x00	method	Message ID
4-7	uint32	time	Interval between how often to send events, in milliseconds. If time is 0, removes the scheduled timer. The maximum value is 4294967295, which corresponds to about 49.7 days.
8	uint8	timer_id	Handle that is returned with event
9	uint8	single_shot	Timer mode. Values: • **0:** false (timer is repeating) • **1:** true (timer runs only once)

Table 3.259. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_set_soft_timer(time,timer_id,single_shot)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_set_soft_timer(uint32 time, uint8 timer_id, uint8 single_shot);

/* Response id */
dumo_rsp_hardware_set_soft_timer_id

/* Response structure */
struct dumo_msg_hardware_set_soft_timer_rsp_t
{
  uint16 result
}
```

Table 3.260. Events Generated

Event	Description
hardware_soft_timer	Sent after specified interval

3.11.1.9 cmd_hardware_set_spi_configuration

This command can be used to reconfigure the SPI interface.

Table 3.261. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0d	method	Message ID
4	uint8	polarity	Clock polarity. Values: • **0:** Clock is Low when inactive (CPOL = 0) • **1:** Clock is High when inactive (CPOL = 1)
5	uint8	phase	Clock phase. Values: • **0:** Data is Valid on Clock Leading Edge (CPHA = 0) • **1:** Data is Valid on Clock Trailing Edge (CPHA = 1)
6	uint8	endianness	Endianness. Values: • **0:** Most Significant Bit First (MSB) • **1:** Least Significant Bit First (LSB)
7-10	uint32	baud	Baud rate. Range: 9600 to 8000000

Table 3.262. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0d	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_set_spi_configuration(polarity,phase,endianness,baud)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_set_spi_configuration(uint8 polarity, uint8 phase, uint8 endianness, uint32 baud);

/* Response id */
dumo_rsp_hardware_set_spi_configuration_id

/* Response structure */
struct dumo_msg_hardware_set_spi_configuration_rsp_t
{
  uint16 result
}
```

3.11.1.10 cmd_hardware_set_uart_bgapi_mode

This command can be used to switch the UART interface between BGAPI and DATA mode. In BGAPI mode all data frames defined in BGAPI protocol specification are processed (and also generated) by the firmware. In DATA mode all UART's data are routed "from" and "to" selected endpoint as RAW data.

Table 3.263. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0c	method	Message ID
4	uint8	bgapi_mode	Values: • **1:** Set UART in BGAPI mode • **0:** Set UART in DATA mode

Table 3.264. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0c	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_set_uart_bgapi_mode(bgapi_mode)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_set_uart_bgapi_mode(uint8 bgapi_mode);

/* Response id */
dumo_rsp_hardware_set_uart_bgapi_mode_id

/* Response structure */
struct dumo_msg_hardware_set_uart_bgapi_mode_rsp_t
{
  uint16 result
}
```

3.11.1.11 cmd_hardware_set_uart_configuration

This command can be used to reconfigure the UART interface. The new configuration will become effective after a 100 ms delay from issuing the command. The response to the command will be sent before the 100 ms delay has elapsed using the original UART parameters. Any new configuration parameter is lost after reset and the firmware default parameters will be used again.

Table 3.265. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x09	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x08	method	Message ID
4	uint8	endpoint	Endpoint. Must be 0.
5-8	uint32	rate	UART baud rate. Range: 9600 to 3000000
9	uint8	data_bits	Data bits. Must be 8.
10	uint8	stop_bits	Stop bits. Values: • **1:** 1 stop bit • **2:** 2 stop bits
11	uint8	parity	Parity bit. Values: see link
12	uint8	flow_ctrl	UART flow control. Values: • **0:** None • **1:** RTS/CTS

Table 3.266. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_set_uart_configuration(endpoint,rate,data_bits,stop_bits,parity,flow_ctrl)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_set_uart_configuration(uint8 endpoint, uint32 rate, uint8 data_bits, uint8 stop_bits, 
uint8 parity, uint8 flow_ctrl);

/* Response id */
dumo_rsp_hardware_set_uart_configuration_id

/* Response structure */
```

```
struct dumo_msg_hardware_set_uart_configuration_rsp_t
{
  uint16 result
}
```

3.11.1.12 cmd_hardware_stop_i2c

This command can be used to stop I2C transmission. **Warning: Deprecated command!** The stop sequence is sent after each I2C transfer called by the dumo_cmd_hardware_write_i2c, dumo_cmd_hardware_read_i2c, dumo_cmd_hardware_write_read_i2c command.

Table 3.267. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x07	method	Message ID
4	uint8	channel	I2C channel to use.

Table 3.268. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_stop_i2c(channel)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_stop_i2c(uint8 channel);

/* Response id */
dumo_rsp_hardware_stop_i2c_id

/* Response structure */
struct dumo_msg_hardware_stop_i2c_rsp_t
{
  uint16 result
}
```

3.11.1.13 cmd_hardware_write_gpio

This command can be used to set the logic states of pins of the specified I/O-port using a bitmask. Correct usage of this command requires output pins configuration with the cmd_hardware_configure_gpio (or port configuration in hardware configuration file) at first.

Table 3.269. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x02	method	Message ID
4	uint8	port	Port index, where A=0, C=1, F=2.
5-6	uint16	mask	Bitmask which determines the pins this command is used to set
7-8	uint16	data	Bitmask of which pins to set high and which pins to set low (1 is high, 0 is low)

Table 3.270. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_write_gpio(port,mask,data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_write_gpio(uint8 port, uint16 mask, uint16 data);

/* Response id */
dumo_rsp_hardware_write_gpio_id

/* Response structure */
struct dumo_msg_hardware_write_gpio_rsp_t
{
  uint16 result
}
```

3.11.1.14 cmd_hardware_write_i2c

This command can be used to write data into I2C interface. The I2C interfaces must be configured in accordance with UG496: BT122 Project Configuration User's Guide.

Table 3.271. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x06	method	Message ID
4	uint8	channel	I2C channel to use. Value: 1
5-6	uint16	slave_address	Slave address to use
7	uint8array	data	Data to write

Table 3.272. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call hardware_write_i2c(channel,slave_address,data_len, data_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_write_i2c(uint8 channel, uint16 slave_address, uint8array data);

/* Response id */
dumo_rsp_hardware_write_i2c_id

/* Response structure */
struct dumo_msg_hardware_write_i2c_rsp_t
{
  uint16 result
}
```

3.11.1.15 cmd_hardware_write_read_i2c

This command can be used to write data into the I2C interface and then read from the specified I2C interface after the repeated start sequence (in a single transfer). The I2C interfaces must be configured in accordance with UG496: BT122 Project Configuration User's Guide.

Table 3.273. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0e	method	Message ID
4	uint8	channel	I2C channel to use. Value: 1.
5-6	uint16	slave_address	Slave address to use.
7	uint8	read_length	Amount of data to read.
8	uint8array	data	Data to write.

Table 3.274. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x0e	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	data	Data that was read if command was successful.

BGScript command

```
call hardware_write_read_i2c(channel,slave_address,read_length,data_len, data_data)(result,data_len, data_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_hardware_write_read_i2c(uint8 channel, uint16 slave_address, uint8 read_length, uint8array data);

/* Response id */
dumo_rsp_hardware_write_read_i2c_id

/* Response structure */
struct dumo_msg_hardware_write_read_i2c_rsp_t
{
  uint16 result,
  uint8array data
}
```

3.11.2 hardware events

3.11.2.1 evt_hardware_bluetooth_controller_error

A failure related to the external Bluetooth Controller has been detected.

Table 3.275. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x02	method	Message ID
4-5	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	error_data_dump	Optional additional detailed data related to the error and its conditions.

BGScript event

```
event hardware_bluetooth_controller_error(status,error_data_dump_len, error_data_dump_data)
```

C Functions

```
/* Event id */
dumo_evt_hardware_bluetooth_controller_error_id

/* Event structure */
struct dumo_msg_hardware_bluetooth_controller_error_evt_t
{
  uint16 status,
  uint8array error_data_dump
}
```

3.11.2.2 evt_hardware_interrupt

This event indicates that an external interrupt has occurred and provides a timestamp and a mask which indicates all triggered interrupt channels.

Table 3.276. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x01	method	Message ID
4-5	uint16	interrupts	Mask of interrupt channels
6-9	uint32	timestamp	Timestamp

BGScript event

```
event hardware_interrupt(interrupts,timestamp)
```

C Functions

```
/* Event id */
dumo_evt_hardware_interrupt_id

/* Event structure */
struct dumo_msg_hardware_interrupt_evt_t
{
  uint16 interrupts,
  uint32 timestamp
}
```

3.11.2.3 evt_hardware_soft_timer

This event indicates that the soft timer has lapsed.

Table 3.277. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x01	lolen	Minimum payload length
2	0x0c	class	Message class: Hardware
3	0x00	method	Message ID
4	uint8	timer_id	Timer handle

BGScript event

```
event hardware_soft_timer(timer_id)
```

C Functions

```
/* Event id */
dumo_evt_hardware_soft_timer_id

/* Event structure */
struct dumo_msg_hardware_soft_timer_evt_t
{
  uint8 timer_id
}
```

3.11.3 hardware enumerations

3.11.3.1 enum_hardware_gpio_configuration

These values define whether the pin is used in pull-up, pull-down or in no pull-up and no pull-down mode. Pull-up and pull-down resistors are only available for input pins.

Table 3.278. Enumerations

Value	Name	Description
0	hardware_gpio_float	No pull-up, no pull-down
1	hardware_gpio_pullup	Pull-up
2	hardware_gpio_pulldown	Pull-down

3.11.3.2 enum_hardware_gpio_mode

These values define whether the pin is used as an input, an output or as an analog signal pin.

Table 3.279. Enumerations

Value	Name	Description
0	hardware_gpio_input	Input
1	hardware_gpio_output	Output (the push-pull digital output driver)
3	hardware_gpio_analog	Analog

3.11.3.3 enum_hardware_uartparity

These values define the parity bit configuration of the related UART connection.

Table 3.280. Enumerations

Value	Name	Description
0	hardware_none	None
1	hardware_odd	Odd parity
2	hardware_even	Even parity

3.12 Identity Profile (identity)

The commands and events in this class are related to Bluetooth BR/EDR Identity Profile operations.

3.12.1 identity commands

3.12.1.1 cmd_identity_local_identity

This command can be used to read Identity Profile information from the local device.

Table 3.281. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x01	method	Message ID

Table 3.282. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x0b	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-7	uint16	source	The authority who has issued the Vendor ID. Values: • **1:** Bluetooth SIG • **0x0002:** USB IF
8-9	uint16	vendor	Vendor ID
10-11	uint16	product	Product ID
12-13	uint16	version	Version ID
14	uint8array	description	Service Description

BGScript command

```
call identity_local_identity()(result,source,vendor,product,version,description_len, description_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_identity_local_identity();

/* Response id */
dumo_rsp_identity_local_identity_id

/* Response structure */
struct dumo_msg_identity_local_identity_rsp_t
{
  uint16 result,
  uint16 source,
  uint16 vendor,
  uint16 product,
  uint16 version,
  uint8array description
}
```

3.12.1.2 cmd_identity_modify_local_identity

This command can be used to modify some fields in the local identity profile.

Table 3.283. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x02	method	Message ID
4-5	uint16	vendor	Vendor ID.
6-7	uint16	product	Product ID
8-9	uint16	version	Version ID

Table 3.284. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call identity_modify_local_identity(vendor,product,version)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_identity_modify_local_identity(uint16 vendor, uint16 product, uint16 version);

/* Response id */
dumo_rsp_identity_modify_local_identity_id

/* Response structure */
struct dumo_msg_identity_modify_local_identity_rsp_t
{
  uint16 result
}
```

3.12.1.3 cmd_identity_remote_identity

This command can be used to read Identity Profile information from a remote Bluetooth BR/EDR device.

Table 3.285. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x06	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x00	method	Message ID
4-9	bd_addr	address	Bluetooth BR/EDR address in little endian format

Table 3.286. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call identity_remote_identity(address)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_identity_remote_identity(bd_addr *address);

/* Response id */
dumo_rsp_identity_remote_identity_id

/* Response structure */
struct dumo_msg_identity_remote_identity_rsp_t
{
  uint16 result
}
```

Table 3.287. Events Generated

Event	Description
identity_remote_identity	This event indicates the reception of Identity Profile information from a remote Bluetooth BR/EDR device.

3.12.2 identity events

3.12.2.1 evt_identity_remote_identity

This event indicates the reception of Identity Profile information from a remote Bluetooth BR/EDR device.

Table 3.288. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x11	lolen	Minimum payload length
2	0x05	class	Message class: Identity Profile
3	0x00	method	Message ID
4-5	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-11	bd_addr	address	Bluetooth address of remote device in little endian format
12-13	uint16	source	The authority who has issued the Vendor ID. Values: • **1:** Bluetooth SIG • **0x0002:** USB IF
14-15	uint16	vendor	Vendor ID. A comprehensive list of Bluetooth SIG -assigned ID's is at https://www.bluetooth.org/en-us/specification/assigned-num-bers/company-identifiers
16-17	uint16	product	Product ID
18-19	uint16	version	Version ID
20	uint8array	description	Service Description

BGScript event

```
event identity_remote_identity(status,address,source,vendor,product,version,description_len, description_data)
```

C Functions

```
/* Event id */
dumo_evt_identity_remote_identity_id

/* Event structure */
struct dumo_msg_identity_remote_identity_evt_t
{
  uint16 status,
  bd_addr *address,
  uint16 source,
  uint16 vendor,
  uint16 product,
  uint16 version,
  uint8array description
}
```

3.13 Connection management for Bluetooth Low Energy (le_connection)

The commands and events in this class are related to managing connection establishment, parameter setting, and disconnection procedures.

3.13.1 le_connection commands

3.13.1.1 cmd_le_connection_list

This command can be used to list all LE connections and check their parameters.

Table 3.289. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Ener-gy
3	0x01	method	Message ID

Table 3.290. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Ener-gy
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_connection_list()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_connection_list();

/* Response id */
dumo_rsp_le_connection_list_id

/* Response structure */
struct dumo_msg_le_connection_list_rsp_t
{
  uint16 result
}
```

Table 3.291. Events Generated

Event	Description
le_connection_parameters	This event is triggered whenever the connection parameters are changed and at any time a connection is established. The event is also generated by LE connection listing.
le_connection_list_complete	This event indicates that all connections have been listed.

3.13.1.2 cmd_le_connection_set_parameters

This command can be used to request a change in the connection parameters of a Bluetooth LE connection.

Table 3.292. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x09	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Energy
3	0x00	method	Message ID
4	uint8	connection	Connection Handle
5-6	uint16	min_interval	Minimum value for the connection event interval. This must be set be less than or equal to max_interval. • Time = Value x 1.25 ms • Range: 0x0006 to 0x0c80 • Time Range: 7.5 ms to 4 s
7-8	uint16	max_interval	Maximum value for the connection event interval. This must be set greater than or equal to min_interval. • Time = Value x 1.25 ms • Range: 0x0006 to 0x0c80 • Time Range: 7.5 ms to 4 s
9-10	uint16	latency	Peripheral latency. This parameter defines how many connection intervals the Peripheral can skip if it has no data to send • Range: 0x0000 to 0x01f4 Use 0x0000 for default value
11-12	uint16	timeout	Supervision timeout. The supervision timeout defines for how long the connection is maintained despite the devices being unable to communicate at the currently configured connection intervals. • Range: 0x000a to 0x0c80 • Time = Value x 10 ms • Time Range: 100 ms to 32 s • The minimum value must be at least maximum interval in ms * (latency + 1) * 2 It is recommended that the supervision timeout is set at a value which allows communication attempts over at least a few connection intervals.

Table 3.293. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Energy
3	0x00	method	Message ID

Byte	Type	Name	Description
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_connection_set_parameters(connection,min_interval,max_interval,latency,timeout)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_connection_set_parameters(uint8 connection, uint16 min_interval, uint16 max_interval, uint16
latency, uint16 timeout);

/* Response id */
dumo_rsp_le_connection_set_parameters_id

/* Response structure */
struct dumo_msg_le_connection_set_parameters_rsp_t
{
  uint16 result
}
```

3.13.2 le_connection events

3.13.2.1 evt_le_connection_closed

This event indicates that a connection was closed.

Table 3.294. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Ener-gy
3	0x01	method	Message ID
4-5	uint16	reason	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	connection	Handle of the closed connection

BGScript event

```
event le_connection_closed(reason,connection)
```

C Functions

```
/* Event id */
dumo_evt_le_connection_closed_id

/* Event structure */
struct dumo_msg_le_connection_closed_evt_t
{
  uint16 reason,
  uint8 connection
}
```

3.13.2.2 evt_le_connection_list_complete

This event indicates that all connections have been listed.

Table 3.295. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x00	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Energy
3	0x03	method	Message ID

BGScript event

```
event le_connection_list_complete()
```

C Functions

```
/* Event id */
dumo_evt_le_connection_list_complete_id

/* Event structure */
struct dumo_msg_le_connection_list_complete_evt_t
{
}
```

3.13.2.3 evt_le_connection_opened

This event indicates that a new connection was opened, whether the devices are already bonded, and what is the role of the Bluetooth module (Peripheral or Central). After entering the Connection State, the connection is considered to be created. The connection is not considered to be established at this point. A connection is only considered to be established once a data channel packet has been received from the peer device. An open connection can be closed with the command dumo_cmd_endpoint_close by giving the connection handle ID obtained from this event.

Table 3.296. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x0a	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Energy
3	0x00	method	Message ID
4-9	bd_addr	address	Remote device address
10	uint8	address_type	Remote device address type
11	uint8	central	Module role in connection. Values: • **0:** Peripheral • **1:** Central
12	uint8	connection	Handle for new connection
13	uint8	bonding	Bonding handle. Values: • **0xff:** No bonding • **Other:** Bonding handle

BGScript event

```
event le_connection_opened(address,address_type,central,connection,bonding)
```

C Functions

```
/* Event id */
dumo_evt_le_connection_opened_id

/* Event structure */
struct dumo_msg_le_connection_opened_evt_t
{
  bd_addr *address,
  uint8 address_type,
  uint8 central,
  uint8 connection,
  uint8 bonding
}
```

3.13.2.4 evt_le_connection_parameters

This event is triggered whenever the connection parameters are changed and at any time a connection is established. The event is also generated by LE connection listing.

Table 3.297. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x0e	lolen	Minimum payload length
2	0x08	class	Message class: Connection management for Bluetooth Low Ener-gy
3	0x02	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	interval	Connection interval
7-8	uint16	latency	Peripheral latency
9-10	uint16	timeout	Supervision timeout
11	uint8	security_mode	Connection security mode
12-17	bd_addr	address	Remote device address

BGScript event

```
event le_connection_parameters(connection,interval,latency,timeout,security_mode,address)
```

C Functions

```
/* Event id */
dumo_evt_le_connection_parameters_id

/* Event structure */
struct dumo_msg_le_connection_parameters_evt_t
{
  uint8 connection,
  uint16 interval,
  uint16 latency,
  uint16 timeout,
  uint8 security_mode,
  bd_addr *address
}
```

3.13.3 le_connection enumerations

3.13.3.1 enum_le_connection_security

These values indicate the Bluetooth LE Security Mode.

Table 3.298. Enumerations

Value	Name	Description
0	le_connection_mode1_level1	No security
1	le_connection_mode1_level2	Unauthenticated pairing with encryption
2	le_connection_mode1_level3	Authenticated pairing with encryption

3.14 Generic Access Profile, Bluetooth Low Energy (le_gap)

The commands and events in this class are related to Generic Access Profile (GAP) in Bluetooth Low Energy (LE).

3.14.1 le_gap commands

3.14.1.1 cmd_le_gap_discover

This command can be used to start the GAP discovery procedure to scan for advertising devices, that is to perform a device discovery. Scanning parameters can be configured with the le_gap_set_scan_parameters command before issuing this command. To cancel an ongoing discovery process use the le_gap_end_procedure command.

Table 3.299. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x02	method	Message ID
4	uint8	mode	Bluetooth LE Discovery Mode. For values see link

Table 3.300. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_discover(mode)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_discover(uint8 mode);

/* Response id */
dumo_rsp_le_gap_discover_id

/* Response structure */
struct dumo_msg_le_gap_discover_rsp_t
{
  uint16 result
}
```

Table 3.301. Events Generated

Event	Description
le_gap_scan_response	Every time an advertisement packet is received, this event is triggered. The packets are not filtered in any way, so multiple events will be received for every advertising device in range.

3.14.1.2 cmd_le_gap_enable_accept_list_filtering

Enable or disable accept list filtering. The setting will be effective the next time that scanning is enabled. To add devices to the filter accept list, either bond with the device or add it manually with dumo_cmd_sm_add_to_filter_accept_list.

Table 3.302. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0d	method	Message ID
4	uint8	enable	1 enable, 0 disable accept list filtering.

Table 3.303. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0d	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_enable_accept_list_filtering(enable)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_enable_accept_list_filtering(uint8 enable);

/* Response id */
dumo_rsp_le_gap_enable_accept_list_filtering_id

/* Response structure */
struct dumo_msg_le_gap_enable_accept_list_filtering_rsp_t
{
  uint16 result
}
```

3.14.1.3 cmd_le_gap_end_procedure

This command can be used to end a current GAP procedure.

Table 3.304. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x03	method	Message ID

Table 3.305. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_end_procedure()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_end_procedure();

/* Response id */
dumo_rsp_le_gap_end_procedure_id

/* Response structure */
struct dumo_msg_le_gap_end_procedure_rsp_t
{
  uint16 result
}
```

3.14.1.4 cmd_le_gap_open

This command can be used to open a Bluetooth LE connection. Scanning parameters can be configured with the le_gap_set_scan_parameters command before issuing this command. To cancel on an ongoing connection process use the endpoint_close command.

Table 3.306. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x00	method	Message ID
4-9	bd_addr	address	Address of the device to connect to
10	uint8	address_type	Address type of the device to connect to

Table 3.307. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	connection	Handle that will be assigned to the connection once the connection is established. This handle is valid only if the result code of this response is 0 (zero).

BGScript command

```
call le_gap_open(address,address_type)(result,connection)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_open(bd_addr *address, uint8 address_type);

/* Response id */
dumo_rsp_le_gap_open_id

/* Response structure */
struct dumo_msg_le_gap_open_rsp_t
{
  uint16 result,
  uint8 connection
}
```

Table 3.308. Events Generated

Event	Description
le_connection_opened	This event is triggered after the connection has been opened, and indicates whether the devices are already bonded and what is the role of the Bluetooth module (Peripheral or Central).

3.14.1.5 cmd_le_gap_scan_filter_clear

This command can be used to remove all scan filters.

Table 3.309. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0b	method	Message ID

Table 3.310. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0b	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_scan_filter_clear()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_scan_filter_clear();

/* Response id */
dumo_rsp_le_gap_scan_filter_clear_id

/* Response structure */
struct dumo_msg_le_gap_scan_filter_clear_rsp_t
{
  uint16 result
}
```

3.14.1.6 cmd_le_gap_set_adv_data

This command can be used to set the data in advertisement packets or in the scan response packets. This data is used when advertising in user data mode. It is recommended to set both the advertisement data and scan response data at the same time.

Table 3.311. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x07	method	Message ID
4	uint8	scan_rsp	This value selects if the data is intended for advertisement packets or scan response packets. Values: • **0:** Advertisement packets • **1:** Scan response packets
5	uint8array	adv_data	Data to be set. Maximum length is 31 bytes which is the maximum user data that will fit in the payload of an advertising channel PDU, according to the specification.

Table 3.312. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_adv_data(scan_rsp,adv_data_len, adv_data_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_adv_data(uint8 scan_rsp, uint8array adv_data);

/* Response id */
dumo_rsp_le_gap_set_adv_data_id

/* Response structure */
struct dumo_msg_le_gap_set_adv_data_rsp_t
{
  uint16 result
}
```

3.14.1.7 cmd_le_gap_set_adv_parameters

This command can be used to set Bluetooth LE advertisement parameters.

Table 3.313. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x04	method	Message ID
4-5	uint16	interval_min	Minimum advertising intervalValue multiplied in units of 0.625 msFor connectable advertisingRange: 0x0020 to 0x4000Time range: 20 ms to 10.24 sFor non connectable advertisingRange: 0x00a0 to 0x4000Time range: 100 ms to 10.24 s default: 0xa0
6-7	uint16	interval_max	Maximum advertising interval. Value in units of 0.625 ms • Range: 0x0020 to 0x4000 • Time range: 20 ms to 10.24 s • Note: interval_max must be at least equal to or bigger than interval_min • default: 0x140
8	uint8	channel_map	Advertisement channel map which determines which of the three channels will be used for advertising. This value is given as a bitmask. Values: • **1:** Advertise on CH37 • **2:** Advertise on CH38 • **3:** Advertise on CH37 and CH38 • **4:** Advertise on CH39 • **5:** Advertise on CH37 and CH39 • **6:** Advertise on CH38 and CH39 • **7:** Advertise on all channels • Recommended/default value: 7

Table 3.314. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_adv_parameters(interval_min,interval_max,channel_map)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_adv_parameters(uint16 interval_min, uint16 interval_max, uint8 channel_map);

/* Response id */
dumo_rsp_le_gap_set_adv_parameters_id

/* Response structure */
struct dumo_msg_le_gap_set_adv_parameters_rsp_t
{
  uint16 result
}
```

3.14.1.8 cmd_le_gap_set_conn_parameters

This command can be used to set the default Bluetooth LE connection parameters. The configured values are valid for all subsequent connections that will be established. For changing the parameters of an already established connection use the command le_connection_set_parameters.

Table 3.315. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x08	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x05	method	Message ID
4-5	uint16	min_interval	Minimum value for the connection event interval. This must be set be less than or equal to max_interval. • Time = Value x 1.25 ms • Range: 0x0006 to 0x0c80 • Time Range: 7.5 ms to 4 s • default: 100
6-7	uint16	max_interval	Maximum value for the connection event interval. This must be set greater than or equal to min_interval. • Time = Value x 1.25 ms • Range: 0x0006 to 0x0c80 • Time Range: 7.5 ms to 4 s • default: 200
8-9	uint16	latency	Peripheral latency. This parameter defines how many connection intervals the Peripheral can skip if it has no data to send • Range: 0x0000 to 0x01f4 Use 0x0000 for default value
10-11	uint16	timeout	Supervision timeout. The supervision timeout defines for how long the connection is maintained despite the devices being unable to communicate at the currently configured connection intervals. • Range: 0x000a to 0x0c80 • Time = Value x 10 ms • Time Range: 100 ms to 32 s • The minimum value must be at least maximum interval * (latency + 1) • default: 100 It is recommended that the supervision timeout is set at a value which allows communication attempts over at least a few connection intervals.

Table 3.316. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x05	method	Message ID

Byte	Type	Name	Description
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_conn_parameters(min_interval,max_interval,latency,timeout)(result)
```

BGLIB C API

```
/* Function */
void  dumo_cmd_le_gap_set_conn_parameters(uint16  min_interval,  uint16  max_interval,  uint16  latency,  uint16
timeout);

/* Response id */
dumo_rsp_le_gap_set_conn_parameters_id

/* Response structure */
struct dumo_msg_le_gap_set_conn_parameters_rsp_t
{
  uint16 result
}
```

3.14.1.9 cmd_le_gap_set_host_channel_classification

This command configures Bluetooth LE channel classifications. If successful, a bt_gap_host_channel_classification_complete event will follow when the controller has completed the configuration.

Table 3.317. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x09	method	Message ID
4	uint8array	channel_map	Channel bitmap for 37 channels. Mark known bad channels with a zero bit, other channels with a one bit. The parameter must be given as exactly 5 bytes; the 3 high bits are ignored.

Table 3.318. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x09	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_host_channel_classification(channel_map_len, channel_map_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_host_channel_classification(uint8array channel_map);

/* Response id */
dumo_rsp_le_gap_set_host_channel_classification_id

/* Response structure */
struct dumo_msg_le_gap_set_host_channel_classification_rsp_t
{
  uint16 result
}
```

3.14.1.10 cmd_le_gap_set_max_power

This command can be used to set the maximum TX power for Bluetooth LE.

Table 3.319. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x08	method	Message ID
4	int8	max_power	Maximum radio TX power. Values: • **0:** 7dBm • **1:** 2dBm • **2:** -3dBm • **3:** -8 dBm • **4:** -13 dBm • **5:** -18 dBm • Default value: 0

Table 3.320. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_max_power(max_power)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_max_power(int8 max_power);

/* Response id */
dumo_rsp_le_gap_set_max_power_id

/* Response structure */
struct dumo_msg_le_gap_set_max_power_rsp_t
{
  uint16 result
}
```

3.14.1.11 cmd_le_gap_set_mode

This command can be used to configure the current Bluetooth LE GAP Connectable and Discoverable modes. It can be used to enable advertisements and/or allow incoming connections. To exit from this mode (to stop advertising and/or disallow incoming connections), issue this command with the Not Discoverable / Not Connectable parameter values. After connection establishment with remote Central module, advertising on the Peripheral module is stopped and switched to non - connectable mode. Availability of the discoverable and connectable modes depend on device role (Advertiser, Scanner, Central, Peripheral). For more information see Bluetooth 4.0 specification.

Table 3.321. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x01	method	Message ID
4	uint8	discover	Discoverable mode
5	uint8	connect	Connectable mode

Table 3.322. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_mode(discover,connect)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_mode(uint8 discover, uint8 connect);

/* Response id */
dumo_rsp_le_gap_set_mode_id

/* Response structure */
struct dumo_msg_le_gap_set_mode_rsp_t
{
  uint16 result
}
```

3.14.1.12 cmd_le_gap_set_random_static_address

This command can be used to set random static address for LE

Table 3.323. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0c	method	Message ID
4-9	bd_addr	static_address	Bluetooth address
10	uint8	enable	Unsigned 8-bit integer

Table 3.324. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0c	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_random_static_address(static_address,enable)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_random_static_address(bd_addr *static_address, uint8 enable);

/* Response id */
dumo_rsp_le_gap_set_random_static_address_id

/* Response structure */
struct dumo_msg_le_gap_set_random_static_address_rsp_t
{
  uint16 result
}
```

3.14.1.13 cmd_le_gap_set_scan_parameters

This command can be used to set Bluetooth LE scan parameters.

Table 3.325. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x06	method	Message ID
4-5	uint16	scan_interval	Scanner interval. This is defined as the time interval from when the module started its last LE scan until it begins the subsequent LE scan, that is how often to scan • Time = Value x 0.625 ms • Range: 0x0004 to 0x4000 • Time Range: 2.5 ms to 10.24 s • Default: 0x0010 (10 ms)
6-7	uint16	scan_window	Scan window. The duration of the LE scan. scan_window shall be less than or equal to scan_interval • Time = Value x 0.625 ms • Range: 0x0004 to 0x4000 • Time Range: 2.5 ms to 10.24 s • Default: 0x0010 (10 ms)
8	uint8	active	Scan type indicated by a flag. Values: • **0:** Passive scanning • **1:** Active scanning • Default value: 0 • In passive scanning mode the module only listens to advertising packets and will not transmit any packet • In active scanning mode the module will send out a scan request packet upon receiving advertising packet from a remote device and then it will listen to the scan response packet from remote device

Table 3.326. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_scan_parameters(scan_interval,scan_window,active)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_scan_parameters(uint16 scan_interval, uint16 scan_window, uint8 active);

/* Response id */
dumo_rsp_le_gap_set_scan_parameters_id

/* Response structure */
struct dumo_msg_le_gap_set_scan_parameters_rsp_t
{
  uint16 result
}
```

3.14.1.14 cmd_le_gap_set_scan_result_filter

This command can be used to filter scan responses and advertisements by device name.

Table 3.327. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0a	method	Message ID
4	uint8array	name	Beginning of the device name in the payload of the scan responses and advertisements must match this string for the le_gap_scan_response to be generated. Each call to this function will add new filter in addition to previously set. To Clear the filterring issue le_gap_scan_filter_clear command By default and at boot filtering is disabled.

Table 3.328. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x0a	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call le_gap_set_scan_result_filter(name_len, name_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_gap_set_scan_result_filter(uint8array name);

/* Response id */
dumo_rsp_le_gap_set_scan_result_filter_id

/* Response structure */
struct dumo_msg_le_gap_set_scan_result_filter_rsp_t
{
  uint16 result
}
```

3.14.2 le_gap events

3.14.2.1 evt_le_gap_host_channel_classification_complete

This event indicates LE host channel classification request is completed.

Table 3.329. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x01	method	Message ID
4-5	uint16	status	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript event

```
event le_gap_host_channel_classification_complete(status)
```

C Functions

```
/* Event id */
dumo_evt_le_gap_host_channel_classification_complete_id

/* Event structure */
struct dumo_msg_le_gap_host_channel_classification_complete_evt_t
{
  uint16 status
}
```

3.14.2.2 evt_le_gap_scan_response

This event reports any advertisement or scan response packet that is received by the module's radio while in scanning mode.

Table 3.330. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x0b	lolen	Minimum payload length
2	0x03	class	Message class: Generic Access Profile, Bluetooth Low Energy
3	0x00	method	Message ID
4	int8	rssi	Received signal strength indicator (RSSI) • Range: -127 to +20 • Units: dBm
5	uint8	packet_type	Advertisement packet type • 0x00: Connectable undirected advertising • 0x02: Scannable undirected advertising • 0x03: Non connectable undirected advertising • 0x04: Scan Response Note: Scan response (0x04) is only received if the device is in active scan mode.
6-11	bd_addr	address	Bluetooth address of the remote device
12	uint8	address_type	Advertiser address type. Values: • **0:** Public address • **1:** Random address
13	uint8	bonding	Bonding handle if the remote advertising device has previously bonded with the local device. Values: • **0xff:** No bonding • **Other:** Bonding handle
14	uint8array	data	Advertisement or scan response data

BGScript event

```
event le_gap_scan_response(rssi,packet_type,address,address_type,bonding,data_len, data_data)
```

C Functions

```
/* Event id */
dumo_evt_le_gap_scan_response_id

/* Event structure */
struct dumo_msg_le_gap_scan_response_evt_t
{
  int8 rssi,
  uint8 packet_type,
  bd_addr *address,
  uint8 address_type,
  uint8 bonding,
  uint8array data
}
```

3.14.3 le_gap enumerations

3.14.3.1 enum_le_gap_address_type

These values define the Bluetooth Address types used by the stack.

Table 3.331. Enumerations

Value	Name	Description
0	le_gap_address_type_public	LE public address
1	le_gap_address_type_random	LE random address
2	le_gap_address_type_public_identity	LE public identity address resolved by stack
3	le_gap_address_type_random_identity	LE random identity address resolved by stack
16	le_gap_address_type_bredr	BR/EDR Bluetooth address

3.14.3.2 enum_le_gap_connectable_mode

These values define the available Connectable Modes.

Table 3.332. Enumerations

Value	Name	Description
0	le_gap_non_connectable	Not connectable
1	le_gap_directed_connectable	Directed Connectable (RESERVED, DO NOT USE)
2	le_gap_undirected_connectable	Undirected connectable
3	le_gap_scannable_non_connectable	Not connectable but responds to scan_req-packets

3.14.3.3 enum_le_gap_discover_mode

These values indicate which Bluetooth LE discovery mode to use when scanning for advertising Peripherals.

Table 3.333. Enumerations

Value	Name	Description
0	le_gap_discover_limited	Discover only limited discoverable devices
1	le_gap_discover_generic	Discover limited and generic discoverable devices
2	le_gap_discover_observation	Discover all devices

3.14.3.4 enum_le_gap_discoverable_mode

These values define the available Discoverable Modes, which dictate how the module is visible to other devices.

Table 3.334. Enumerations

Value	Name	Description
0	le_gap_non_discoverable	Not discoverable
1	le_gap_limited_discoverable	Discoverable using both limited and general discoverable mode
2	le_gap_general_discoverable	Discoverable using general discoverable mode
3	le_gap_broadcast	Device is not discoverable in either limited or generic discoverable procedure, but may be discovered by using the Observation procedure
4	le_gap_user_data	Send advertisement and/or scan response data defined by the user using le_gap_set_adv_data command. The limited/general discoverable flags are defined by the user.

3.15 LE Cable Replacement (le_serial)

These commands and events are related to the establishment of Bluetooth LE cable replacement connections. LE cable replacement can be used to send and receive streaming data over LE connections. Please note that LE Cable Replacement commands are available only in images compiled with LE Cable Replacement sdk

3.15.1 le_serial commands

3.15.1.1 cmd_le_serial_listen

Listen for an incoming LE cable replacement connection. Creates an endpoint which will be set as active when an incoming connection completes. Note that once the cable replacement connection is closed by the remote side, the endpoint is not usable anymore; it must be cleaned up using endpoint_close command and listen must be called again to handle the next incoming connection. Also note that a listening endpoint may be closed only when not yet connected or already disconnected by the remote. Only the side initiating the connection may close the endpoint while it is connected.

Table 3.335. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x14	class	Message class: LE Cable Replacement
3	0x01	method	Message ID
4-5	uint16	characteristic	Handle of the local characteristic used to transmit data
6	uint8	streaming_destination	Streaming destination endpoint for the connection. This should be one of the fixed endpoints. If this argument is set to the invalid endpoint handle (255), endpoint streaming will not be set up. Instead, bgscript can use endpoint_send command and endpoint_data event for sending and receiving data.

Table 3.336. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x14	class	Message class: LE Cable Replacement
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Endpoint ID assigned to the LE serial connection. Valid only if the result code is zero. Endpoint will become active when connection is ready.

BGScript command

```
call le_serial_listen(characteristic,streaming_destination)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_serial_listen(uint16 characteristic, uint8 streaming_destination);

/* Response id */
dumo_rsp_le_serial_listen_id

/* Response structure */
struct dumo_msg_le_serial_listen_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

Table 3.337. Events Generated

Event	Description
le_serial_opened	This event indicates the establishment of an LE cable replacement connection.

3.15.1.2 cmd_le_serial_open

Open an LE cable replacement connection endpoint to a remote device. The endpoint can be closed with the endpoint_close command when done. If no ACL connection to the remote device exists, one is formed before the cable replacement connection handshake. Otherwise the existing ACL connection will be used. Note that if the remote device requires encryption or authentication for communication, ACL connection security must be set up before opening the LE cable replacement connection; see sm_increase_security command

Table 3.338. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x09	lolen	Minimum payload length
2	0x14	class	Message class: LE Cable Replacement
3	0x00	method	Message ID
4-9	bd_addr	address	Bluetooth address of the remote device in little endian format.
10	uint8	address_type	Address type of the device to connect to
11	uint8	streaming_destination	Streaming destination for the connection endpoint. If this argument is set to the invalid endpoint handle (255), endpoint streaming will not be set up. Instead, bgscript can use endpoint_send command and endpoint_data event for sending and receiving data.
12	uint8array	service	UUID of the service to connect to.

Table 3.339. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x14	class	Message class: LE Cable Replacement
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	endpoint	Endpoint ID assigned to the LE serial connection. Valid only if the result code is zero. Endpoint will become active when connection is ready.

BGScript command

```
call le_serial_open(address,address_type,streaming_destination,service_len, service_data)(result,endpoint)
```

BGLIB C API

```
/* Function */
void dumo_cmd_le_serial_open(bd_addr *address, uint8 address_type, uint8 streaming_destination, uint8array
service);

/* Response id */
dumo_rsp_le_serial_open_id
```

```
/* Response structure */
struct dumo_msg_le_serial_open_rsp_t
{
  uint16 result,
  uint8 endpoint
}
```

Table 3.340. Events Generated

Event	Description
le_serial_opened	This event indicates the establishment of an LE cable replacement connection.

3.15.2 le_serial events

3.15.2.1 evt_le_serial_opened

This event indicates the establishment of an LE cable replacement connection.

Table 3.341. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x01	lolen	Minimum payload length
2	0x14	class	Message class: LE Cable Replacement
3	0x00	method	Message ID
4	uint8	endpoint	Endpoint ID assigned to the connection

BGScript event

```
event le_serial_opened(endpoint)
```

C Functions

```
/* Event id */
dumo_evt_le_serial_opened_id

/* Event structure */
struct dumo_msg_le_serial_opened_evt_t
{
  uint8 endpoint
}
```

3.16 Security Manager (sm)

The commands and events in this class are used to manage Bluetooth security and include commands for starting and stopping encryption and commands for managing bonding operations.

3.16.1 sm commands

3.16.1.1 cmd_sm_add_to_filter_accept_list

Add device to filter accept list, which can be enabled with dumo_cmd_le_gap_enable_accept_list_filtering.

Table 3.342. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x13	method	Message ID
4-9	bd_addr	address	Address of the device added to filter accept list
10	uint8	address_type	Address type of the device added to filter accept list. Values: See link.

Table 3.343. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x13	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_add_to_filter_accept_list(address,address_type)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_add_to_filter_accept_list(bd_addr *address, uint8 address_type);

/* Response id */
dumo_rsp_sm_add_to_filter_accept_list_id

/* Response structure */
struct dumo_msg_sm_add_to_filter_accept_list_rsp_t
{
  uint16 result
}
```

3.16.1.2 cmd_sm_configure

This command can be used to configure authentication methods and I/O capabilities of the system.

Table 3.344. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x01	method	Message ID
4	uint8	flags	Security requirement bitmask. Bit 0: • **0:** Allow bonding without MITM protection • **1:** Bonding requires MITM protection Bit 1: • **0:** Allow encryption without bonding • **1:** Encryption requires bonding. Note that this setting will also enable bonding. Bit 2: • **0:** Allow bonding with legacy pairing • **1:** Secure connections only Bit 3: • **0:** Bonding request does not need to be confirmed • **1:** Bonding requests need to be confirmed. Received bonding requests are notified by dumo_cmd_sm_confirm_bonding Bit 4: • **0:** Allow all connections • **1:** Allow connections only from bonded devices Bit 5 to 7: Reserved Default value: 0x00
5	uint8	io_capabilities	I/O Capabilities. See link

Table 3.345. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x01	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_configure(flags,io_capabilities)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_configure(uint8 flags, uint8 io_capabilities);

/* Response id */
dumo_rsp_sm_configure_id

/* Response structure */
struct dumo_msg_sm_configure_rsp_t
{
  uint16 result
}
```

3.16.1.3 cmd_sm_confirm_bonding

This command can be used to confirm bonding when dumo_evt_sm_bonding_request event is received.

Table 3.346. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0c	method	Message ID
4	uint8	connection	Connection handle
5	uint8	confirm	Bonding confirmation. Values: • **0:** Reject • **1:** Accept

Table 3.347. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0c	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_confirm_bonding(connection,confirm)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_confirm_bonding(uint8 connection, uint8 confirm);

/* Response id */
dumo_rsp_sm_confirm_bonding_id

/* Response structure */
struct dumo_msg_sm_confirm_bonding_rsp_t
{
  uint16 result
}
```

3.16.1.4 cmd_sm_delete_bonding

This command can be used to delete specified bonding information or accept list filtering from Persistent Store.

Table 3.348. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x06	method	Message ID
4	uint8	bonding	Bonding handle

Table 3.349. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_delete_bonding(bonding)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_delete_bonding(uint8 bonding);

/* Response id */
dumo_rsp_sm_delete_bonding_id

/* Response structure */
struct dumo_msg_sm_delete_bonding_rsp_t
{
  uint16 result
}
```

3.16.1.5 cmd_sm_delete_bondings

This command can be used to delete all bonding information and accept list filtering from Persistent Store.

Table 3.350. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x07	method	Message ID

Table 3.351. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_delete_bondings()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_delete_bondings();

/* Response id */
dumo_rsp_sm_delete_bondings_id

/* Response structure */
struct dumo_msg_sm_delete_bondings_rsp_t
{
  uint16 result
}
```

3.16.1.6 cmd_sm_enter_passkey

This command can be used to enter a passkey after receiving a passkey request event.

Table 3.352. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x08	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	passkey	Passkey. Valid range: 0-999999

Table 3.353. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_enter_passkey(connection,passkey)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_enter_passkey(uint8 connection, uint32 passkey);

/* Response id */
dumo_rsp_sm_enter_passkey_id

/* Response structure */
struct dumo_msg_sm_enter_passkey_rsp_t
{
  uint16 result
}
```

3.16.1.7 cmd_sm_enter_pin_code

This command can be used to enter a PIN code after receiving a PIN code request event.

Table 3.354. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x07	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0d	method	Message ID
4-9	bd_addr	address	Bluetooth address of remote device
10	uint8array	pin_code	PIN code as a string. Length: 1-16 characters

Table 3.355. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0d	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_enter_pin_code(address,pin_code_len, pin_code_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_enter_pin_code(bd_addr *address, uint8array pin_code);

/* Response id */
dumo_rsp_sm_enter_pin_code_id

/* Response structure */
struct dumo_msg_sm_enter_pin_code_rsp_t
{
  uint16 result
}
```

3.16.1.8 cmd_sm_increase_security

This command can be used to enhance the security of a Bluetooth BR/EDR or Bluetooth LE connection to current security requirements. By default, connections opened by the module are not encrypted, unless the remote device requests it (most devices do). For Bluetooth LE connections, this command initiates encryption, as there are only two levels of security: unencrypted and encrypted. If the devices are bonded, the existing bonding will be used. If the devices are not bonded, a new key will be created; if bonding is enabled the key will be stored for future use, if not the key will be discarded after the connection is closed. For Bluetooth BR/EDR connections, in some cases it's possible to first increase the security to encryption with a Just Works key, then increase it again by creating a MITM protected key.

Table 3.356. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x04	method	Message ID
4	uint8	connection	Connection handle

Table 3.357. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x04	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_increase_security(connection)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_increase_security(uint8 connection);

/* Response id */
dumo_rsp_sm_increase_security_id

/* Response structure */
struct dumo_msg_sm_increase_security_rsp_t
{
  uint16 result
}
```

3.16.1.9 cmd_sm_list_all_bondings

This command can be used to list all bondings stored in the bonding database. The entry in the bonding database can be either bonding or accept list filtering device. Bondings are reported by using the sm_list_bonding_entry event for each bonding and the report is ended with sm_list_all_bondings_complete event. Recommended to be used only for debugging purposes, because reading from the Persistent Store is relatively slow.

Table 3.358. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0b	method	Message ID

Table 3.359. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0b	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_list_all_bondings()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_list_all_bondings();

/* Response id */
dumo_rsp_sm_list_all_bondings_id

/* Response structure */
struct dumo_msg_sm_list_all_bondings_rsp_t
{
  uint16 result
}
```

Table 3.360. Events Generated

Event	Description
sm_list_bonding_entry	This event is triggered by the command sm_list_all_bondings if bondings exist in the local database.
sm_list_all_bondings_complete	This event is triggered by the sm_list_all_bondings and follows sm_list_bonding_entry events.

3.16.1.10 cmd_sm_passkey_confirm

This command can be used for accepting or rejecting reported confirm value.

Table 3.361. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x09	method	Message ID
4	uint8	connection	Connection handle
5	uint8	confirm	Accept confirm value. Values: • **0:** Reject • **1:** Accept confirm value

Table 3.362. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x09	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_passkey_confirm(connection,confirm)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_passkey_confirm(uint8 connection, uint8 confirm);

/* Response id */
dumo_rsp_sm_passkey_confirm_id

/* Response structure */
struct dumo_msg_sm_passkey_confirm_rsp_t
{
  uint16 result
}
```

3.16.1.11 cmd_sm_read_bonding

This command can be used to read the encryption key for a specific bonding. Used in debugging for reading encryption keys which can be used e.g. for protocol sniffing.

Table 3.363. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x05	method	Message ID
4	uint8	bonding	Bonding index of bonding data

Table 3.364. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x0a	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x05	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6-11	bd_addr	address	Bluetooth address of the remote device this bonding entry refers to
12	uint8	address_type	Address type of the this bonding entry
13	uint8array	bonding_key	Encryption key stored for this bonding entry. Maximum 16 bytes

BGScript command

```
call sm_read_bonding(bonding)(result,address,address_type,bonding_key_len, bonding_key_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_read_bonding(uint8 bonding);

/* Response id */
dumo_rsp_sm_read_bonding_id

/* Response structure */
struct dumo_msg_sm_read_bonding_rsp_t
{
  uint16 result,
  bd_addr *address,
  uint8 address_type,
  uint8array bonding_key
}
```

3.16.1.12 cmd_sm_read_bonding_configuration

This command can be used to read the maximum number of allowed bonding entries and to reveal the currently set bonding policy.

Table 3.365. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x03	method	Message ID

Table 3.366. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x04	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x03	method	Message ID
4	uint8	max_bonding_count	Maximum allowed bonding count. Range: 1 to 12 Default: 12
5	uint8	policy_flags	Bonding policy. Values: • **0:** If database is full, new bonding attempts will fail • **1:** New bonding will overwrite the oldest existing bonding
6-7	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_read_bonding_configuration()(max_bonding_count,policy_flags,result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_read_bonding_configuration();

/* Response id */
dumo_rsp_sm_read_bonding_configuration_id

/* Response structure */
struct dumo_msg_sm_read_bonding_configuration_rsp_t
{
  uint8 max_bonding_count,
  uint8 policy_flags,
  uint16 result
}
```

3.16.1.13 cmd_sm_set_bondable_mode

This command can be used to set whether the device accepts new bondings or not.

Table 3.367. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x00	method	Message ID
4	uint8	bondable	Bondable mode. Values: • **0:** New bondings not accepted • **1:** Bondings allowed

Table 3.368. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_set_bondable_mode(bondable)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_set_bondable_mode(uint8 bondable);

/* Response id */
dumo_rsp_sm_set_bondable_mode_id

/* Response structure */
struct dumo_msg_sm_set_bondable_mode_rsp_t
{
  uint16 result
}
```

3.16.1.14 cmd_sm_set_minimum_key_size

This command can be used to set the minimum allowed encryption key size value used for bonding. The default value is 7 bytes. If negotiated value of the key size is less than expected minimum after connection establishment, the credential bonding process is considered invalid and dumo_evt_sm_bonding_failed event with dumo_err_sm_encryption_key_size (0x0306) code is generated.

Table 3.369. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x10	method	Message ID
4	uint8	minimum_key_size	Minimum allowed encryption key size value for bonding. Range: 7 - 16 bytes.

Table 3.370. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x10	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8	minimum_key_size	Current setting of minimal allowed encryption key size value (in bytes).

BGScript command

```
call sm_set_minimum_key_size(minimum_key_size)(result,minimum_key_size)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_set_minimum_key_size(uint8 minimum_key_size);

/* Response id */
dumo_rsp_sm_set_minimum_key_size_id

/* Response structure */
struct dumo_msg_sm_set_minimum_key_size_rsp_t
{
  uint16 result,
  uint8 minimum_key_size
}
```

3.16.1.15 cmd_sm_set_oob_data

This command can be used to set the OOB data (out-of-band encryption data) for a device. The OOB data may be, for example, a PIN code exchanged over an alternate path like NFC. The device will not allow any other kind of bonding if OOB data is set. This bonding method is available only for LE bonding.

Table 3.371. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0a	method	Message ID
4	uint8array	oob_data	LE OOB data. To set OOB data, send a 16-byte array. To clear OOB data, send a zero-length array.

Table 3.372. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x0a	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_set_oob_data(oob_data_len, oob_data_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_set_oob_data(uint8array oob_data);

/* Response id */
dumo_rsp_sm_set_oob_data_id

/* Response structure */
struct dumo_msg_sm_set_oob_data_rsp_t
{
  uint16 result
}
```

3.16.1.16 cmd_sm_set_sc_remote_oob_data

Set OOB data and confirm values (out-of-band encryption) received from the remote device for secure connections pairing. OOB data must be enabled with dumo_cmd_sm_use_sc_oob before setting the remote device OOB data.

Table 3.373. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x11	method	Message ID
4	uint8array	oob_data	Remote device OOB data and confirm values. To set OOB data, send a 32-byte array. First 16-bytes is OOB data and last 16-bytes the confirm value. Values are in little endian format. To clear OOB data, send a zero-length array.

Table 3.374. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x11	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_set_sc_remote_oob_data(oob_data_len, oob_data_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_set_sc_remote_oob_data(uint8array oob_data);

/* Response id */
dumo_rsp_sm_set_sc_remote_oob_data_id

/* Response structure */
struct dumo_msg_sm_set_sc_remote_oob_data_rsp_t
{
  uint16 result
}
```

3.16.1.17 cmd_sm_store_bonding_configuration

This command can be used to set maximum allowed bonding count and bonding policy.

Table 3.375. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x02	method	Message ID
4	uint8	max_bonding_count	Maximum allowed bonding count. Range: 1 to 12 Default: 12
5	uint8	policy_flags	Bonding policy. Values: • **0:** If database is full, new bonding attempts will fail • **1:** New bonding will overwrite the oldest existing bonding Default: 0

Table 3.376. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call sm_store_bonding_configuration(max_bonding_count,policy_flags)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_store_bonding_configuration(uint8 max_bonding_count, uint8 policy_flags);

/* Response id */
dumo_rsp_sm_store_bonding_configuration_id

/* Response structure */
struct dumo_msg_sm_store_bonding_configuration_rsp_t
{
  uint16 result
}
```

3.16.1.18 cmd_sm_use_sc_oob

Enable the use of OOB data (out-of-band encryption data) for a device for secure connections pairing. Enabling will generate new OOB data and confirm values, which can be sent to the remote device. After enabling the secure connections OOB data, the remote devices OOB data can be set with dumo_cmd_sm_set_sc_remote_oob_data. Calling this function will erase any set remote device OOB data and confirm values. The device will not allow any other bonding if OOB data is set. The secure connections OOB data cannot be enabled simultaneously with legacy pairing OOB data.

Table 3.377. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x12	method	Message ID
4	uint8	enable	Enable OOB with secure connections pairing. Values: • **0:** disable • **1:** enable

Table 3.378. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x12	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	oob_data	OOB data. 32-byte array. The first 16-bytes contain randomly-generated OOB data and the last 16-bytes confirm value. Values are in little endian format.

BGScript command

```
call sm_use_sc_oob(enable)(result,oob_data_len, oob_data_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_sm_use_sc_oob(uint8 enable);

/* Response id */
dumo_rsp_sm_use_sc_oob_id

/* Response structure */
struct dumo_msg_sm_use_sc_oob_rsp_t
{
  uint16 result,
  uint8array oob_data
}
```

3.16.2 sm events

3.16.2.1 evt_sm_bonded

This event is triggered after the pairing or bonding procedure has been successfully completed.

Table 3.379. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x03	method	Message ID
4	uint8	connection	Connection handle
5	uint8	bonding	Bonding handle. Values: • **0xff:** Pairing completed without bonding - the pairing key will be discarded after disconnection. • **Other:** Procedure completed, pairing key stored with given bonding handle

BGScript event

```
event sm_bonded(connection,bonding)
```

C Functions

```
/* Event id */
dumo_evt_sm_bonded_id

/* Event structure */
struct dumo_msg_sm_bonded_evt_t
{
  uint8 connection,
  uint8 bonding
}
```

3.16.2.2 evt_sm_bonding_failed

This event is triggered if the pairing or bonding procedure has failed.

Table 3.380. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x03	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x04	method	Message ID
4	uint8	connection	Connection handle
5-6	uint16	reason	Describes error that occurred

BGScript event

```
event sm_bonding_failed(connection,reason)
```

C Functions

```
/* Event id */
dumo_evt_sm_bonding_failed_id

/* Event structure */
struct dumo_msg_sm_bonding_failed_evt_t
{
  uint8 connection,
  uint16 reason
}
```

3.16.2.3 evt_sm_bonding_request

Indicates a user request to display that the new bonding request is received and for the user to confirm the request. Use the command dumo_cmd_sm_confirm_bonding to accept or reject the bonding request.

Table 3.381. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x07	method	Message ID
4	uint8	connection	Connection handle
5	uint8	bonding_handle	Bonding handle for the request. Range: 0 to 31, or invalid bonding handle(0xff). • NOTE! When the bonding handle is anything other than invalid bonding handle(0xff), a bonding already exists for this connection. Overwriting the existing bonding is a potential security risk.

BGScript event

```
event sm_bonding_request(connection,bonding_handle)
```

C Functions

```
/* Event id */
dumo_evt_sm_bonding_request_id

/* Event structure */
struct dumo_msg_sm_bonding_request_evt_t
{
  uint8 connection,
  uint8 bonding_handle
}
```

3.16.2.4 evt_sm_confirm_passkey

This event indicates a request to display the passkey to the user and for the user to confirm the displayed passkey. Use the command sm_passkey_confirm to accept or reject the displayed passkey.

Table 3.382. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x05	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x02	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	passkey	Passkey. Range: 0 to 999999. • NOTE! When displaying the passkey to the user, prefix the number with zeros in order to obtain a 6 digit number • Example: Passkey value is 42 • Number to display to user is 000042

BGScript event

```
event sm_confirm_passkey(connection,passkey)
```

C Functions

```
/* Event id */
dumo_evt_sm_confirm_passkey_id

/* Event structure */
struct dumo_msg_sm_confirm_passkey_evt_t
{
  uint8 connection,
  uint32 passkey
}
```

3.16.2.5 evt_sm_list_all_bondings_complete

This event is triggered by the sm_list_all_bondings and follows sm_list_bonding_entry events.

Table 3.383. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x00	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x06	method	Message ID

BGScript event

```
event sm_list_all_bondings_complete()
```

C Functions

```
/* Event id */
dumo_evt_sm_list_all_bondings_complete_id

/* Event structure */
struct dumo_msg_sm_list_all_bondings_complete_evt_t
{
}
```

3.16.2.6 evt_sm_list_bonding_entry

This event is triggered by the command sm_list_all_bondings if bondings exist in the local database.

Table 3.384. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x08	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x05	method	Message ID
4	uint8	bonding	Bonding index of bonding data
5-10	bd_addr	address	Bluetooth address of the remote device
11	uint8	address_type	Address type

BGScript event

```
event sm_list_bonding_entry(bonding,address,address_type)
```

C Functions

```
/* Event id */
dumo_evt_sm_list_bonding_entry_id

/* Event structure */
struct dumo_msg_sm_list_bonding_entry_evt_t
{
  uint8 bonding,
  bd_addr *address,
  uint8 address_type
}
```

3.16.2.7 evt_sm_passkey_display

This event indicates a request to display the passkey to the user.

Table 3.385. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x05	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x00	method	Message ID
4	uint8	connection	Connection handle
5-8	uint32	passkey	Passkey. Range: 0 to 999999. • NOTE! When displaying the passkey to the user, prefix the number with zeros in order to obtain a 6 digit number • Example: Passkey value is 42 • Number to display to user is 000042

BGScript event

```
event sm_passkey_display(connection,passkey)
```

C Functions

```
/* Event id */
dumo_evt_sm_passkey_display_id

/* Event structure */
struct dumo_msg_sm_passkey_display_evt_t
{
  uint8 connection,
  uint32 passkey
}
```

3.16.2.8 evt_sm_passkey_request

This event indicates a request for the user to enter the passkey displayed on the remote device. Use the command sm_enter_passkey to input the passkey value.

Table 3.386. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x01	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x01	method	Message ID
4	uint8	connection	Connection handle

BGScript event

```
event sm_passkey_request(connection)
```

C Functions

```
/* Event id */
dumo_evt_sm_passkey_request_id

/* Event structure */
struct dumo_msg_sm_passkey_request_evt_t
{
  uint8 connection
}
```

3.16.2.9 evt_sm_pin_code_request

This event indicates a request for the user to enter the PIN. Use the command sm_enter_pin_code to input the PIN code value. The PIN code is used to create legacy pairing with old (v2.0 and before) Bluetooth devices.

Table 3.387. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x0f	class	Message class: Security Manager
3	0x08	method	Message ID
4-9	bd_addr	address	Bluetooth address of remote device

BGScript event

```
event sm_pin_code_request(address)
```

C Functions

```
/* Event id */
dumo_evt_sm_pin_code_request_id

/* Event structure */
struct dumo_msg_sm_pin_code_request_evt_t
{
  bd_addr *address
}
```

3.16.3 sm enumerations

3.16.3.1 enum_sm_io_capability

These values define the security management related I/O capabilities supported by the module

Table 3.388. Enumerations

Value	Name	Description
0	sm_io_capability_displayonly	Display Only
1	sm_io_capability_displayyesno	Display with Yes/No-buttons
2	sm_io_capability_keyboardonly	Keyboard Only
3	sm_io_capability_noinputnooutput	No Input and No Output
4	sm_io_capability_keyboarddisplay	Display with Keyboard

3.17 System (system)

The commands and events in this class can be used to access and query the local device.

3.17.1 system commands

3.17.1.1 cmd_system_get_app_version

This command can be used to get a user application version number.

Table 3.389. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x0c	method	Message ID

Table 3.390. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x04	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x0c	method	Message ID
4-5	uint16	app_version	User application version number.
6-7	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_get_app_version()(app_version,result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_get_app_version();

/* Response id */
dumo_rsp_system_get_app_version_id

/* Response structure */
struct dumo_msg_system_get_app_version_rsp_t
{
  uint16 app_version,
  uint16 result
}
```

3.17.1.2 cmd_system_get_bt_address

This command can be used to read the Bluetooth address of the module.

Table 3.391. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x03	method	Message ID

Table 3.392. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x06	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x03	method	Message ID
4-9	bd_addr	address	Bluetooth BR/EDR address and LE public address in little endian format.

BGScript command

```
call system_get_bt_address()(address)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_get_bt_address();

/* Response id */
dumo_rsp_system_get_bt_address_id

/* Response structure */
struct dumo_msg_system_get_bt_address_rsp_t
{
  bd_addr *address
}
```

3.17.1.3 cmd_system_get_class_of_device

This command can be used to read the device's Bluetooth BR/EDR Class of Device (COD) information.

Table 3.393. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x05	method	Message ID

Table 3.394. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x06	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x05	method	Message ID
4-7	uint32	cod	Class of Device. A comprehensive list of values can be found at https://www.bluetooth.org/en-us/specification/assigned-numbers/baseband • Example: • **0x001f00:** Uncategorized device
8-9	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_get_class_of_device()(cod,result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_get_class_of_device();

/* Response id */
dumo_rsp_system_get_class_of_device_id

/* Response structure */
struct dumo_msg_system_get_class_of_device_rsp_t
{
  uint32 cod,
  uint16 result
}
```

3.17.1.4 cmd_system_get_info

This command can be used to get the firmware build number and other identification codes.

Table 3.395. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x0b	method	Message ID

Table 3.396. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x0e	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x0b	method	Message ID
4-5	uint16	major	Major release version.
6-7	uint16	minor	Minor release version.
8-9	uint16	patch	Patch release number.
10-11	uint16	build	Build number.
12-13	uint16	bootloader	Bootloader version.
14-15	uint16	ll_version	Link layer version.
16-17	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_get_info()(major,minor,patch,build,bootloader,ll_version,result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_get_info();

/* Response id */
dumo_rsp_system_get_info_id

/* Response structure */
struct dumo_msg_system_get_info_rsp_t
{
  uint16 major,
  uint16 minor,
  uint16 patch,
  uint16 build,
  uint16 bootloader,
  uint16 ll_version,
  uint16 result
}
```

3.17.1.5 cmd_system_get_local_name

This command can be used to read the Bluetooth BR/EDR friendly name of the local device. Note that for Bluetooth LE the device name is stored in the GAP Service of the GATT database.

Table 3.397. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x09	method	Message ID

Table 3.398. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x03	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x09	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes
6	uint8array	name	Local device's Bluetooth BR/EDR friendly name

BGScript command

```
call system_get_local_name()(result,name_len, name_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_get_local_name();

/* Response id */
dumo_rsp_system_get_local_name_id

/* Response structure */
struct dumo_msg_system_get_local_name_rsp_t
{
  uint16 result,
  uint8array name
}
```

3.17.1.6 cmd_system_hello

This command does not trigger any event but the response to the command is used to verify that communication between the host and the module is working.

Table 3.399. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x00	method	Message ID

Table 3.400. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x00	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_hello()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_hello();

/* Response id */
dumo_rsp_system_hello_id

/* Response structure */
struct dumo_msg_system_hello_rsp_t
{
  uint16 result
}
```

3.17.1.7 cmd_system_reset

This command can be used to reset the system. It does not have a response, but it triggers one of the boot events (normal reset or boot to DFU mode) depending on the selected boot mode.

Table 3.401. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x01	method	Message ID
4	uint8	dfu	Boot mode: • **0:** Normal reset • **1:** Boot to DFU mode

BGScript command

```
call system_reset(dfu)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_reset(uint8 dfu);

/* Command does not have a response */
```

Table 3.402. Events Generated

Event	Description
system_boot	Sent after the device has booted into normal mode
dfu_boot	Sent after the device has booted into DFU mode

3.17.1.8 cmd_system_reset_factory_settings

This command can be used to reset the module and clear all settings including bonding information. It also resets the friendly name to its default value. The Apple iAP configuration and the persistent store are cleared. Note that the module's Bluetooth BR/EDR / LE public address is preserved.

Table 3.403. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x07	method	Message ID

Table 3.404. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x07	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_reset_factory_settings()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_reset_factory_settings();

/* Response id */
dumo_rsp_system_reset_factory_settings_id

/* Response structure */
struct dumo_msg_system_reset_factory_settings_rsp_t
{
  uint16 result
}
```

3.17.1.9 cmd_system_set_class_of_device

This command is used to set the Bluetooth BR/EDR Class of Device (COD) setting.

Table 3.405. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x06	method	Message ID
4-7	uint32	cod	Class of Device. A comprehensive list of values can be found at https://www.bluetooth.org/en-us/specification/assigned-numbers/baseband • Example: • **0x001f00:** Uncategorized device

Table 3.406. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x06	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_set_class_of_device(cod)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_set_class_of_device(uint32 cod);

/* Response id */
dumo_rsp_system_set_class_of_device_id

/* Response structure */
struct dumo_msg_system_set_class_of_device_rsp_t
{
  uint16 result
}
```

3.17.1.10 cmd_system_set_local_name

This command can be used to set the local device's Bluetooth BR/EDR friendly name. For Bluetooth LE the device name is stored in the GAP Service local name parameter of the GATT database. If the device name attribute is not set as a constant in the project's GATT configuration XML file, it can be changed with gatt_server_write_attribute_value. It is also possible to advertise with a different device name by using le_gap_set_adv_data, but in that case if a remote device connects and asks for the device name over GATT, the value will be different from the advertised value.

Table 3.407. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x08	method	Message ID
4	uint8array	name	Local device's Bluetooth BR/EDR friendly name. Maximum name length is 30 bytes

Table 3.408. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_set_local_name(name_len, name_data)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_set_local_name(uint8array name);

/* Response id */
dumo_rsp_system_set_local_name_id

/* Response structure */
struct dumo_msg_system_set_local_name_rsp_t
{
  uint16 result
}
```

3.17.1.11 cmd_system_set_max_power_mode

This command can be used to set the most efficient power saving state allowed for the system.

Table 3.409. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x02	method	Message ID
4	uint8	power_mode	Power saving mode. Values: • **1:** CPU allowed to enter idle mode • **2:** CPU allowed to enter idle and sleep modes Default: 2. See the module data sheet for details concerning power modes. Power saving modes 1 and 2 differ only if sleep has been enabled in the HW configuration. This setting is not persistent

Table 3.410. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x02	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call system_set_max_power_mode(power_mode)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_system_set_max_power_mode(uint8 power_mode);

/* Response id */
dumo_rsp_system_set_max_power_mode_id

/* Response structure */
struct dumo_msg_system_set_max_power_mode_rsp_t
{
  uint16 result
}
```

3.17.2 system events

3.17.2.1 evt_system_boot

This event indicates the device has started and is ready to receive commands that are not related to Bluetooth. When the Bluetooth stack is ready, the event system_initialized is generated. This event carries the firmware build number and other SW and HW identification codes.

Table 3.411. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x0c	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x00	method	Message ID
4-5	uint16	major	Major release version
6-7	uint16	minor	Minor release version
8-9	uint16	patch	Patch release number
10-11	uint16	build	Build number
12-13	uint16	bootloader	Bootloader version
14-15	uint16	hw	Hardware type

BGScript event

```
event system_boot(major,minor,patch,build,bootloader,hw)
```

C Functions

```
/* Event id */
dumo_evt_system_boot_id

/* Event structure */
struct dumo_msg_system_boot_evt_t
{
  uint16 major,
  uint16 minor,
  uint16 patch,
  uint16 build,
  uint16 bootloader,
  uint16 hw
}
```

3.17.2.2 evt_system_initialized

This event indicates that all systems including the Bluetooth stack and radio are ready for use.

Table 3.412. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x06	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x01	method	Message ID
4-9	bd_addr	address	Bluetooth BR/EDR address and LE public address in little endian format.

BGScript event

```
event system_initialized(address)
```

C Functions

```
/* Event id */
dumo_evt_system_initialized_id

/* Event structure */
struct dumo_msg_system_initialized_evt_t
{
  bd_addr *address
}
```

3.17.2.3 evt_system_recovery

This event indicates the device has encountered an error condition and has reset.

Table 3.413. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x09	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x02	method	Message ID
4-7	uint32	id1	
8-11	uint32	id2	
12	uint8array	data	

BGScript event

```
event system_recovery(id1,id2,data_len, data_data)
```

C Functions

```
/* Event id */
dumo_evt_system_recovery_id

/* Event structure */
struct dumo_msg_system_recovery_evt_t
{
  uint32 id1,
  uint32 id2,
  uint8array data
}
```

3.17.2.4 evt_system_script_stopped

This event is generated when a event handler has been running more than 1 000 000 script intepreter steps (about 2 seconds).

Table 3.414. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x02	lolen	Minimum payload length
2	0x01	class	Message class: System
3	0x03	method	Message ID
4	uint8	event_class	Id to to Class of handled event
5	uint8	event_id	event id of handled event

BGScript event

```
event system_script_stopped(event_class,event_id)
```

C Functions

```
/* Event id */
dumo_evt_system_script_stopped_id

/* Event structure */
struct dumo_msg_system_script_stopped_evt_t
{
  uint8 event_class,
  uint8 event_id
}
```

3.18 Testing commands (test)

The commands and events in this class can be used in production and RF development testing and as an aid in debugging.

3.18.1 test commands

3.18.1.1 cmd_test_device_under_test_mode

This command can used to set BT122 in "BT RF SIG mode" which is meant for connecting with a Bluetooth tester where the BT122 is controlled over the LMP (Link Management Protocol). Command makes the BT122 module visible, connectable, acceptable all connections and put them in test mode. Then the Bluetooth tester can take control of the BT122 module through the RF link. For more details see Bluetooth Core Specification 4.2 (Volume 2 Part E, chapter 7.6.3).

Table 3.415. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x08	method	Message ID

Table 3.416. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x08	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call test_device_under_test_mode()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_device_under_test_mode();

/* Response id */
dumo_rsp_test_device_under_test_mode_id

/* Response structure */
struct dumo_msg_test_device_under_test_mode_rsp_t
{
  uint16 result
}
```

3.18.1.2 cmd_test_dtm_end

This command can be used to end the Bluetooth LE Direct Test Mode (DTM) mode.

Table 3.417. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x00	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x02	method	Message ID

Table 3.418. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x02	method	Message ID
4-5	uint16	result	Command result

BGScript command

```
call test_dtm_end()(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_dtm_end();

/* Response id */
dumo_rsp_test_dtm_end_id

/* Response structure */
struct dumo_msg_test_dtm_end_rsp_t
{
  uint16 result
}
```

Table 3.419. Events Generated

Event	Description
test_dtm_completed	LE Direct Test Mode TX (or RX) has completed.

3.18.1.3 cmd_test_dtm_rx

This command can be used to start the Bluetooth LE Direct Test Mode (DTM) RX test. After RX test termination with dumo_cmd_test_dtm_end, event dumo_evt_test_dtm_completed (with number of packets received) will be generated.

Table 3.420. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x01	method	Message ID
4	uint8	channel	Bluetooth channel to use in testing. Value range: 0-39

Table 3.421. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x01	method	Message ID
4-5	uint16	result	Command result

BGScript command

```
call test_dtm_rx(channel)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_dtm_rx(uint8 channel);

/* Response id */
dumo_rsp_test_dtm_rx_id

/* Response structure */
struct dumo_msg_test_dtm_rx_rsp_t
{
  uint16 result
}
```

3.18.1.4 cmd_test_dtm_tx

This command can be used to start the Bluetooth LE Direct Test Mode TX test. The module will send continuous BLE packets at the highest output power for BLE. It is possible to change the RF TX power in DTM transmissions using dumo_cmd_le_gap_set_max_power command before starting the test mode.

Table 3.422. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x05	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x00	method	Message ID
4	uint8	packet_type	Packet type to use in testing. Value range: 0-7
5	uint8	length	Packet length to use in testing. Value range: 0-37
6	uint8	channel	Bluetooth channel to use in testing. Value range: 0-39
7-8	uint16	number_of_packets	Number of packets to transmit. Value range: 0-65536. If 0 chosen as a value the continuous packet transmission selected.

Table 3.423. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x00	method	Message ID
4-5	uint16	result	Command result

BGScript command

```
call test_dtm_tx(packet_type,length,channel,number_of_packets)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_dtm_tx(uint8 packet_type, uint8 length, uint8 channel, uint16 number_of_packets);

/* Response id */
dumo_rsp_test_dtm_tx_id

/* Response structure */
struct dumo_msg_test_dtm_tx_rsp_t
{
  uint16 result
}
```

3.18.1.5 cmd_test_packet_test

This command can be used to start the packet testing mode for Bluetooth BR/EDR.

Table 3.424. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x08	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x0a	method	Message ID
4	uint8	mode	Values: • **0:** Frequency hopping enabled • **3:** Single frequency
5	uint8	tx_freq	Bluetooth TX channel/frequency to use in single frequency mode. Value range is 0-78, where • F = 2402 + 2k, when k from 0 to 39 • F = 2403 +2(k-40), when k from 40 to 78
6	uint8	rx_freq	Bluetooth RX channel/frequency to use in single frequency mode. Value range is 0-78, where • F = 2402 + 2k, when k from 0 to 39 • F = 2403 +2(k-40), when k from 40 to 78 • Disable RX (packet TX only), when k = 255
7	uint8	acl_type	Values: • **0:** DM1 • **1:** DH1 • **2:** DM3 • **3:** DH3 • **4:** DM5 • **5:** DH5 • **6:** 2-DH1 • **7:** 2-DH3 • **8:** 2-DH5 • **9:** 3-DH1 • **10:** 3-DH3 • **11:** 3-DH5
8-9	uint16	acl_len	Values: • **0-17:** for DM1 type • **0-27:** for DH1 type • **0-121:** for DM3 type • **0-183:** for DH3 type • **0-224:** for DM5 type • **0-339:** for DH5 type • **0-54:** for 2-DH1 type • **0-367:** for 2-DH3 type • **0-679:** for 2-DH5 type • **0-83:** for 3-DH1 type • **0-552:** for 3-DH3 type • **0-1021:** for 3-DH5 type
10	uint8	power	TX power. Value range: 8-15, 8 is lowest, 15 is highest.

Byte	Type	Name	Description
11	uint8	disable_whitening	0 to enable whitening, 1 to disable whitening

Table 3.425. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x0a	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call test_packet_test(mode,tx_freq,rx_freq,acl_type,acl_len,power,disable_whitening)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_packet_test(uint8 mode, uint8 tx_freq, uint8 rx_freq, uint8 acl_type, uint16 acl_len, uint8
power, uint8 disable_whitening);

/* Response id */
dumo_rsp_test_packet_test_id

/* Response structure */
struct dumo_msg_test_packet_test_rsp_t
{
  uint16 result
}
```

3.18.1.6 cmd_test_rx_test

This command can be used to start the RX test mode with continuous reception. It can be useful for current consumption measurements or marking the level of unwanted emissions.

Table 3.426. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x09	method	Message ID
4	uint8	channel	Bluetooth RX channel/frequency to use. Value range is 0-78, where • F = 2402 + 2k, when k from 0 to 39 • F = 2403 +2(k-40) when k from 40 to 78

Table 3.427. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x09	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call test_rx_test(channel)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_rx_test(uint8 channel);

/* Response id */
dumo_rsp_test_rx_test_id

/* Response structure */
struct dumo_msg_test_rx_test_rsp_t
{
  uint16 result
}
```

3.18.1.7 cmd_test_ssp_debug

This command can be used to enable or disable using a pre-defined Diffie-Hellman key pair for generating Bluetooth BR/EDR Secure Simple Pairing link keys. When the debug mode is enabled, a Bluetooth sniffer can decrypt the communication between two Bluetooth devices using Secure Simple Pairing. It is sufficient that one party uses the debug mode - it is not necessary for both parties to use it.

Table 3.428. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x06	method	Message ID
4	uint8	enable	Debug enable flag. Values: • **0:** Disable • **1:** Enable

Table 3.429. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x00	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x06	method	Message ID

BGScript command

```
call test_ssp_debug(enable)()
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_ssp_debug(uint8 enable);

/* Response id */
dumo_rsp_test_ssp_debug_id

/* Response structure */
struct dumo_msg_test_ssp_debug_rsp_t
{
}
```

3.18.1.8 cmd_test_tx_test

This command can be used to start a continuous transmission TX test. For Continuous Wave modulation, the data is all zeros, for all other modulations the data is PN15 pseudo - random noise. No Bluetooth - formatted packets are sent in this mode.

Table 3.430. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x03	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x03	method	Message ID
4	uint8	modulation	Modulation type. Values: • **0:** Continuous Wave • **1:** 1 Mbit GFSK • **2:** 2 Mbit Pi/4-DQPSK • **3:** 3 Mbit 8-PSK • **4:** 1 Mbit GFSK (Bluetooth LE)
5	uint8	channel	Bluetooth channel/frequency to use in testing. For modulation types 0-3, the value range is 0-78, where • F = 2402 + 2k, when k from 0 to 39 • F = 2403 +2(k-40) when k from 40 to 78 For modulation type 4, the range is 0-39.
6	uint8	power	TX power level. Range: 1, 8-15, where: • **0:** Reserved • **1:** Bluetooth LE TX power (used when modulation is 4) • **2-7:** Reserved • **8-15:** Bluetooth BR/EDR TX power, 8 is lowest, 15 is highest

Table 3.431. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x02	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x03	method	Message ID
4-5	uint16	result	Result code • **0:** success • **Non-zero:** an error occurred For other values refer to the Error codes

BGScript command

```
call test_tx_test(modulation,channel,power)(result)
```

BGLIB C API

```
/* Function */
void dumo_cmd_test_tx_test(uint8 modulation, uint8 channel, uint8 power);
```

```
/* Response id */
dumo_rsp_test_tx_test_id

/* Response structure */
struct dumo_msg_test_tx_test_rsp_t
{
  uint16 result
}
```

3.18.2 test events

3.18.2.1 evt_test_dtm_completed

This event indicates that a Bluetooth LE Direct Test Mode (DTM) command has completed.

Table 3.432. Event

Byte	Type	Name	Description
0	0xa0	hilen	Message type: Event
1	0x04	lolen	Minimum payload length
2	0x0e	class	Message class: Testing commands
3	0x00	method	Message ID
4-5	uint16	result	Command result
6-7	uint16	number_of_packets	Number of packets received, only valid for test_dtm_end command

BGScript event

```
event test_dtm_completed(result,number_of_packets)
```

C Functions

```
/* Event id */
dumo_evt_test_dtm_completed_id

/* Event structure */
struct dumo_msg_test_dtm_completed_evt_t
{
  uint16 result,
  uint16 number_of_packets
}
```

3.18.3 test enumerations

3.18.3.1 enum_test_packet_type

The following table lists supported test packet types.

Table 3.433. Enumerations

Value	Name	Description
0	test_pkt_prbs9	PRBS9 packet payload.
1	test_pkt_11110000	11110000 packet payload.
2	test_pkt_10101010	10101010 packet payload.
3	test_pkt_prbs15	PRBS15 packet payload.
4	test_pkt_11111111	11111111 packet payload.
5	test_pkt_00000000	00000000 packet payload.
6	test_pkt_00001111	00001111 packet payload.
7	test_pkt_01010101	01010101 packet payload.

3.19 Utilities for BGScript (util)

The commands and events in this class can be used to simplify BGScript based application development and are typically not used in any other applications.

3.19.1 util commands

3.19.1.1 cmd_util_atoi

Converts decimal value in ASCII string to 32-bit signed integer.

Table 3.434. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x01	lolen	Minimum payload length
2	0x11	class	Message class: Utilities for BGScript
3	0x00	method	Message ID
4	uint8array	string	String to convert

Table 3.435. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x04	lolen	Minimum payload length
2	0x11	class	Message class: Utilities for BGScript
3	0x00	method	Message ID
4-7	int32	value	Conversion result presenting the decimal value input as a string as a 32-bit signed integer value

BGScript command

```
call util_atoi(string_len, string_data)(value)
```

BGLIB C API

```
/* Function */
void dumo_cmd_util_atoi(uint8array string);

/* Response id */
dumo_rsp_util_atoi_id

/* Response structure */
struct dumo_msg_util_atoi_rsp_t
{
  int32 value
}
```

3.19.1.2 cmd_util_itoa

This command can be used to convert a 32-bit signed integer value into a decimal value represented as a string.

Table 3.436. Command

Byte	Type	Name	Description
0	0x20	hilen	Message type: Command
1	0x04	lolen	Minimum payload length
2	0x11	class	Message class: Utilities for BGScript
3	0x01	method	Message ID
4-7	int32	value	32-bit number to convert

Table 3.437. Response

Byte	Type	Name	Description
0	0x20	hilen	Message type: Response
1	0x01	lolen	Minimum payload length
2	0x11	class	Message class: Utilities for BGScript
3	0x01	method	Message ID
4	uint8array	string	Conversion result presenting the 32-bit signed integer value input as a decimal value presented by a string

BGScript command

```
call util_itoa(value)(string_len, string_data)
```

BGLIB C API

```
/* Function */
void dumo_cmd_util_itoa(int32 value);

/* Response id */
dumo_rsp_util_itoa_id

/* Response structure */
struct dumo_msg_util_itoa_rsp_t
{
  uint8array string
}
```

3.20 Error codes

This chapter describes all BGAPI error codes.

- **Errors related to hardware**

Code	Name	Description
0x0501	ps_store_full	Flash reserved for PS store is full
0x0502	ps_key_not_found	PS key not found
0x0503	i2c_ack_missing	Acknowledge for i2c was not received.

Code	Name	Description
0x0504	i2c_timeout	I2C read or write timed out.
0x0505	not_configured	Hardware is not configured for that function.
0x0506	ble_not_supported	Hardware does not support Bluetooth Low Energy.
0x0507	bluetooth_controller_response_timeout	External Bluetooth Controller is unresponsive. To recover restart (or power cycle) the BT122 module.

- **Errors related to BGAPI protocol**

Code	Name	Description
0x0101	invalid_conn_handle	Invalid GATT connection handle.
0x0102	waiting_response	Waiting response from GATT server to previous procedure.
0x0103	gatt_connection_timeout	GATT connection is closed due procedure timeout.
0x0180	invalid_param	Command contained invalid parameter
0x0181	wrong_state	Device is in wrong state to receive command
0x0182	out_of_memory	Device has run out of memory
0x0183	not_implemented	Feature is not implemented
0x0184	invalid_command	Command was not recognized
0x0185	timeout	Command or Procedure failed due to timeout
0x0186	not_connected	Connection handle passed is to command is not a valid handle
0x0187	flow	Command would cause either underflow or overflow error
0x0188	user_attribute	User attribute was accessed through API which is not supported
0x0189	invalid_license_key	No valid license key found
0x018a	command_too_long	Command maximum length exceeded
0x018b	out_of_bonds	Bonding procedure can't be started because device has no space left for bond.
0x018c	unspecified	Unspecified error
0x018d	hardware	Hardware failure
0x018e	buffers_full	Command not accepted, because internal buffers are full
0x018f	disconnected	Command or Procedure failed due to disconnection
0x0190	too_many_requests	Too many Simultaneous Requests
0x0191	not_supported	Feature is not supported in this firmware build
0x0192	server_already_in_use	A server for the specified type of connection (SPP, HID, or L2CAP with specific PSM) was already started. Only one SPP server per SDP entry is supported; only one HID server altogether is supported; only one L2CAP sever per PSM is supported.
0x0193	no_such_endpoint	The specified endpoint does not exist.

Code	Name	Description
0x0194	invalid_endpoint	The endpoint exists, but it does not support the BGAPI command executed.
0x0195	invalid_endpoint_state	The endpoint could not execute the command in its current state.
0x0196	power_vector_pattern_mismatch	Power vector coordinates in indexes from 0 to 8 have wrong values.
0x0197	max_power_exceeded	Maximum power value is too high.
0x0198	wrong_power_step	Power steps between levels need to be constant and correct.

- **SDP errors**

Code	Name	Description
0x0601	record_not_found	Service Record not found
0x0602	record_already_exist	Service Record with this handle already exist.

- **Errors from Security Manager Protocol**

Code	Name	Description
0x0301	passkey_entry_failed	The user input of passkey failed, for example, the user cancelled the operation
0x0302	oob_not_available	Out of Band data is not available for authentication
0x0303	authentication_requirements	The pairing procedure cannot be performed as authentication requirements cannot be met due to IO capabilities of one or both devices
0x0304	confirm_value_failed	The confirm value does not match the calculated compare value
0x0305	pairing_not_supported	Pairing is not supported by the device
0x0306	encryption_key_size	The resultant encryption key size is insufficient for the security requirements of this device
0x0307	command_not_supported	The SMP command received is not supported on this device
0x0308	unspecified_reason	Pairing failed due to an unspecified reason
0x0309	repeated_attempts	Pairing or authentication procedure is disallowed because too little time has elapsed since last pairing request or security request
0x030a	invalid_parameters	The Invalid Parameters error code indicates: the command length is invalid or a parameter is outside of the specified range.
0x030b	no_bonding	The bonding does not exist.

- **Bluetooth errors**

Code	Name	Description
0x0202	unknown_connection_identifier	A command was sent from the Host that should identify a connection, but that connection does not exist.

Code	Name	Description
0x0204	page_timeout	The Page Timeout error code indicates that a page timed out because of the Page Timeout configuration parameter.
0x0205	authentication_failure	Pairing or authentication failed due to incorrect results in the pairing or authentication procedure. This could be due to an incorrect PIN or Link Key
0x0206	pin_or_key_missing	Pairing failed because of missing PIN, or authentication failed because of missing Key
0x0207	memory_capacity_exceeded	Controller is out of memory.
0x0208	connection_timeout	Link supervision timeout has expired.
0x0209	connection_limit_exceeded	Controller is at limit of connections it can support.
0x020a	synchronous_connectiontion_limit_exceeded	The Synchronous Connection Limit to a Device Exceeded error code indicates that the Controller has reached the limit to the number of synchronous connections that can be achieved to a device.
0x020b	acl_connection_already_exists	The ACL Connection Already Exists error code indicates that an attempt to create a new ACL Connection to a device when there is already a connection to this device.
0x020c	command_disallowed	Command requested cannot be executed because the Controller is in a state where it cannot process this command at this time.
0x020d	connection_rejected_due_to_limited_resources	The Connection Rejected Due To Limited Resources error code indicates that an incoming connection was rejected due to limited resources.
0x020e	connection_rejected_due_to_security_reasons	The Connection Rejected Due To Security Reasons error code indicates that a connection was rejected due to security requirements not being fulfilled, like authentication or pairing.
0x020f	connection_rejected_due_to_unacceptable_bd_addr	The Connection was rejected because this device does not accept the BD_ADDR. This may be because the device will only accept connections from specific BD_ADDRs.
0x0210	connection_accept_timeout_exceeded	The Connection Accept Timeout has been exceeded for this connection attempt.
0x0211	unsupported_feature_or_parameter_value	A feature or parameter value in the HCI command is not supported.
0x0212	invalid_command_parameters	Command contained invalid parameters.
0x0213	remote_user_terminated	User on the remote device terminated the connection.
0x0214	remote_device_terminated_connection_due_to_low_resources	The remote device terminated the connection because of low resources
0x0215	remote_powering_off	Remote Device Terminated Connection due to Power Off
0x0216	connection_terminated_by_local_host	Local device terminated the connection.
0x0217	repeated_attempts	The Controller is disallowing an authentication or pairing procedure because too little time has elapsed since the last authentication or pairing attempt failed.
0x0218	pairing_not_allowed	The device does not allow pairing. This can be for example, when a device only allows pairing during a certain time window after some user input allows pairing

Code	Name	Description
0x0219	unknown_lmp_pdu	The Controller has received an unknown LMP OpCode.
0x021a	unsupported_remote_feature	The remote device does not support the feature associ-ated with the issued command or LMP PDU.
0x021b	sco_offset_rejected	The offset requested in the LMP_SCO_link_req PDU has been rejected.
0x021c	sco_interval_rejected	The interval requested in the LMP_SCO_link_req PDU has been rejected.
0x021d	sco_air_mode_rejected	The air mode requested in the LMP_SCO_link_req PDU has been rejected.
0x021e	invalid_lmp_parameters	Some LMP PDU / LL Control PDU parameters were in-valid.
0x021f	unspecified_error	No other error code specified is appropriate to use.
0x0220	unsupported_lmp_parameter_value	An LMP PDU or an LL Control PDU contains at least one parameter value that is not supported by the Con-troller at this time.
0x0221	role_change_not_allowed	Controller will not allow a role change at this time.
0x0222	ll_response_timeout	Connection terminated due to link-layer procedure time-out.
0x0223	lmp_error_transaction_collision	LMP transaction has collided with the same transaction that is already in progress.
0x0224	lmp_pdu_not_allowed	Controller sent an LMP PDU with an OpCode that was not allowed.
0x0225	encryption_mode_not_acceptable	The requested encryption mode is not acceptable at this time.
0x0226	link_key_cannot_be_changed	Link key cannot be changed because a fixed unit key is being used.
0x0227	requested_qos_not_supported	The requested Quality of Service is not supported.
0x0228	instant_passed	LMP PDU or LL PDU that includes an instant cannot be performed because the instant when this would have oc-curred has passed.
0x0229	pairing_with_unit_key_not_supported	It was not possible to pair as a unit key was requested and it is not supported.
0x022a	different_transaction_collision	LMP transaction was started that collides with an ongo-ing transaction.
0x022c	qos_unacceptable_parameter	The specified quality of service parameters could not be accepted at this time, but other parameters may be ac-ceptable.
0x022d	qos_rejected	The specified quality of service parameters cannot be accepted and QoS negotiation should be terminated.
0x022e	channel_assesment_not_supported	The Controller cannot perform channel assessment be-cause it is not supported.
0x022f	insufficient_security	The HCI command or LMP PDU sent is only possible on an encrypted link.
0x0230	parameter_out_of_mandatory_range	A parameter value requested is outside the mandatory range of parameters for the given HCI command or LMP PDU.

Code	Name	Description
0x0232	role_switch_pending	Role Switch is pending. This can be used when an HCI command or LMP PDU cannot be accepted because of a pending role switch. This can also be used to notify a peer device about a pending role switch.
0x0234	reserved_slot_violation	The current Synchronous negotiation was terminated with the negotiation state set to Reserved Slot Violation.
0x0235	role_switch_failed	role switch was attempted but it failed and the original piconet structure is restored. The switch may have failed because the TDD switch or piconet switch failed.
0x0236	extended_inquiry_response_too_large	The extended inquiry response, with the requested requirements for FEC, is too large to fit in any of the packet types supported by the Controller.
0x0237	simple_pairing_not_supported_by_host	The IO capabilities request or response was rejected because the sending Host does not support Secure Simple Pairing even though the receiving Link Manager does.
0x0238	host_busy_pairing	The Host is busy with another pairing operation and unable to support the requested pairing. The receiving device should retry pairing again later.
0x0239	connection_rejected_due_to_no_suitable_channel_found	The Controller could not calculate an appropriate value for the Channel selection operation.
0x023a	controller_busy	Operation was rejected because the controller is busy and unable to process the request.
0x023b	unacceptable_connection_interval	Remote evice terminated the connection because of an unacceptable connection interval.
0x023c	directed_advertising_timeout	Directed advertising completed without a connection being created.
0x023d	connection_terminated_due_to_mic_failure	Connection was terminated because the Message Integrity Check (MIC) failed on a received packet.
0x023e	connection_failed_to_be_established	LL initiated a connection but the connection has failed to be established. Controller did not receive any packets from remote end.
0x023f	mac_connection_failed	The MAC of the 802.11 AMP was requested to connect to a peer, but the connection failed.
0x0240	coarse_clock_adjustment_rejected_but_will_try_to_adjust_using_clock_dragging	The Central, at this time, is unable to make a coarse adjustment to the piconet clock, using the supplied parameters. Instead the Central will attempt to move the clock using clock dragging.
0x0241	refused_psm_not_supported	The remote end did not have a service that would accept L2CAP connection requests to the specified PSM.
0x0242	refused_security_block	The L2CAP connection attempt was blocked by the remote end due to security reasons.
0x0243	refused_no_resources	The remote end rejected the L2CAP connection due to lack of resources.
0x0244	acl_disconnected	The ACL carrying the L2CAP link was disconnected.
0x0245	psm_already_in_use	An L2CAP connection with the specified PSM is already open on the same ACL. For each ACL, only one connection can use the same PSM.

- **Application errors**

Code	Name	Description
0x0a01	file_open_failed	File open failed.
0x0a02	xml_parse_failed	XML parsing failed.
0x0a03	device_connection_failed	Device connection failed.
0x0a04	device_comunication_failed	Device communication failed.

- **Errors from Attribute Protocol**

Code	Name	Description
0x0401	invalid_handle	The attribute handle given was not valid on this server
0x0402	read_not_permitted	The attribute cannot be read
0x0403	write_not_permitted	The attribute cannot be written
0x0404	invalid_pdu	The attribute PDU was invalid
0x0405	insufficient_authentication	The attribute requires authentication before it can be read or written.
0x0406	request_not_supported	Attribute Server does not support the request received from the client.
0x0407	invalid_offset	Offset specified was past the end of the attribute
0x0408	insufficient_authorization	The attribute requires authorization before it can be read or written.
0x0409	prepare_queue_full	Too many prepare writes have been queueud
0x040a	att_not_found	No attribute found within the given attribute handle range.
0x040b	att_not_long	The attribute cannot be read or written using the Read Blob Request
0x040c	insufficient_enc_key_size	The Encryption Key Size used for encrypting this link is insufficient.
0x040d	invalid_att_length	The attribute value length is invalid for the operation
0x040e	unlikely_error	The attribute request that was requested has encountered an error that was unlikely, and therefore could not be completed as requested.
0x040f	insufficient_encryption	The attribute requires encryption before it can be read or written.
0x0410	unsupported_group_type	The attribute type is not a supported grouping attribute as defined by a higher layer specification.
0x0411	insufficient_resources	Insufficient Resources to complete the request
0x0480	application	Application error code defined by a higher layer specification.

- **Filesystem errors**

Code	Name	Description
0x0901	file_not_found	File not found

4. Document Revision History

Table 4.1. Document Revision History

Revision Number	Effective Date	Change Description
1.0	18 June 2021	Initial version
1.1	4 October 2021	Updated for software version 1.1.0.
1.2	27 July 2022	Updated for software version 1.2.0.
1.3	1 February 2023	Updated for software version 1.3.0.
1.4	15 November 2023	Updated for software version 1.4.0.

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