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	Bluetooth Profile Quick-Start Guide	Par :	rop
		Version :	B
		Statut:	Valide

Intended use:

This document aims to describe how to set up a quick communication link with Sylvac Bluetooth low energy technology¹ enabled products.

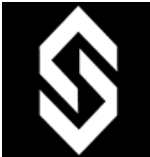
To the attention of:

Developers who want to integrate Sylvac Bluetooth® instruments to custom apps or software solution.

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Developer tool

Code samples to set up a connection and exchange data between Sylvac instruments and Bluegiga master

Warm-up with Bluegiga API

If you are not familiar with the technical aspects of a Bluetooth® connection, Sylvac highly recommends setting up a connection using blegui2.exe, a BLED112 Bluegiga dongle (981.7100) and a Sylvac Bluetooth® enabled instrument (see catalog for sale ref.)

The best way to test the communication and see messages exchanged between an instrument and the dongle is the Bluegiga/Silabs application “blegui2.exe”.

- Find it within folder “...\BLED112\ble-x.x.x-xxx\bin\blegui2.exe”
- Complete instructions “UG208 - BLEGUI User Guide.pdf”

For further information about Bluegiga API


- See “Bluetooth_Smart_Software_API_Reference_vXX.pdf”

Prerequisites

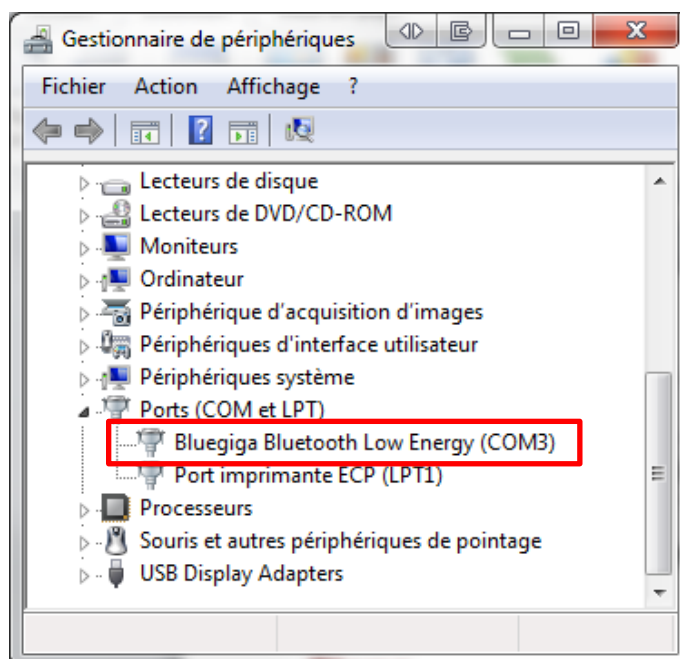
- Install BLED112 drivers (browse within folder “...\BLED112\ble-x.x.x-xxx\windrv\”
- Use blegui2.exe as described above or download and install package from Silabs website

Steps

Profile « SIMPLE »	Profile « PAIR »
Open the dongle's COM port	Open the dongle's COM port
-	Set the dongle in bondable mode
Start scan in generic/observation mode	Start scan in generic/observation mode
Connect the instrument	Connect the instrument
-	Enable encryption
Discover services	Discover services
Activate services	Activate services
Send/Receive data	Send/Receive data

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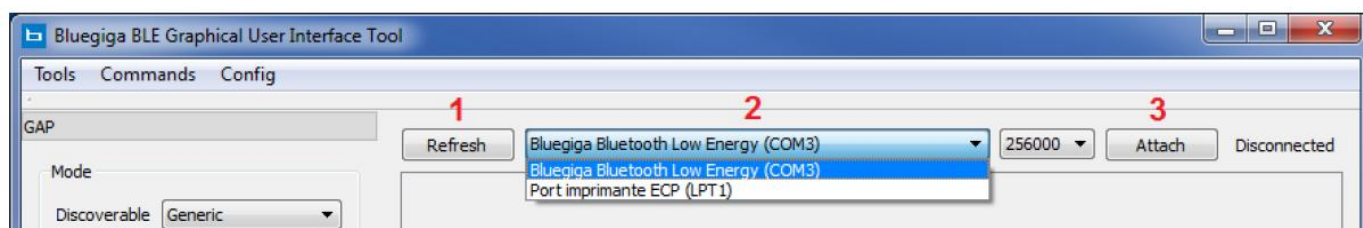
Open COM

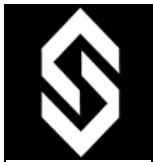


Customer software:

8 data, parity none, 1 stop, 110-256000Bds, control Hardware

Blegui2:





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Set bondable mode

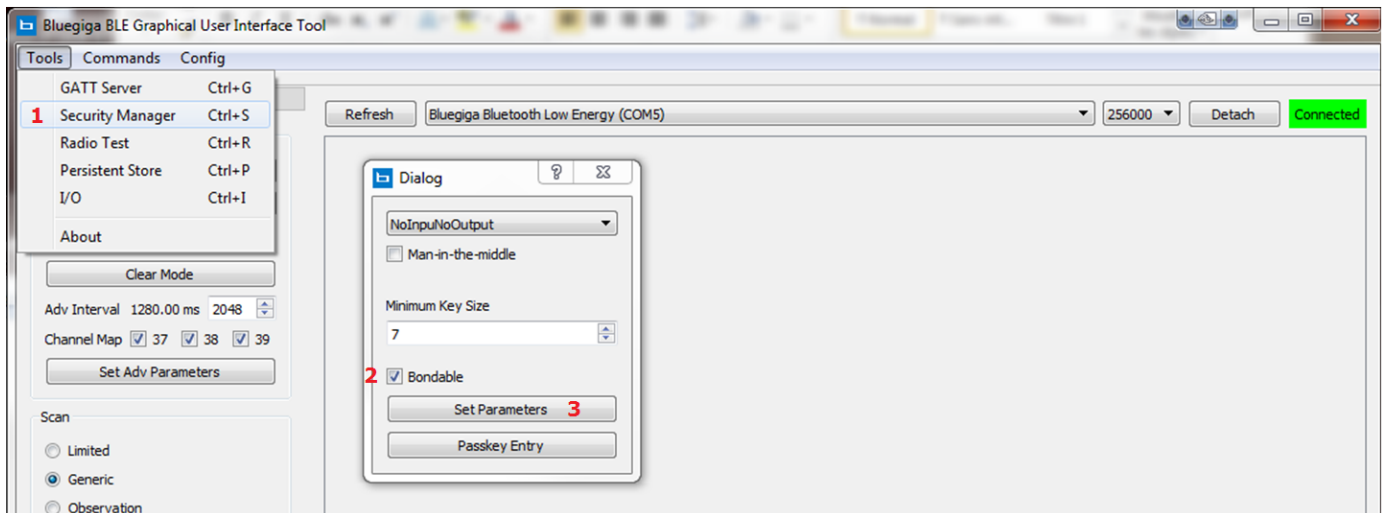
In case of “PAIR” profile selected on instrument.

Customer software:


```
ble_cmd_sm_set_bondable_mode(1);
```

See chap 5.7.1.5 on BGAPI²

Blegui2:



² Chapters are identified on 3 levels (X.X.X) within the API reference guide and the forth level is added in this paper reference to identify the command within selection

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Start scan

Scan has to be restarted after each connection. See GAP Discover mode “Observation” for all advertising packet types.

Customer software:

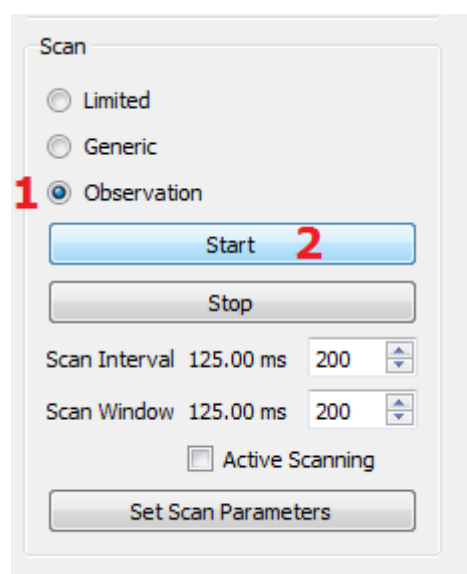
`ble_cmd_gap_discover(2);`


See chap 5.4.1.3 on BGAPI

`ble_cmd_gap_end_procedure();`

See chap 5.4.1.4 on BGAPI

Blegui2:



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Connect an instrument

Master initiates connection. Sylvac instruments are optimized for the following timing parameters

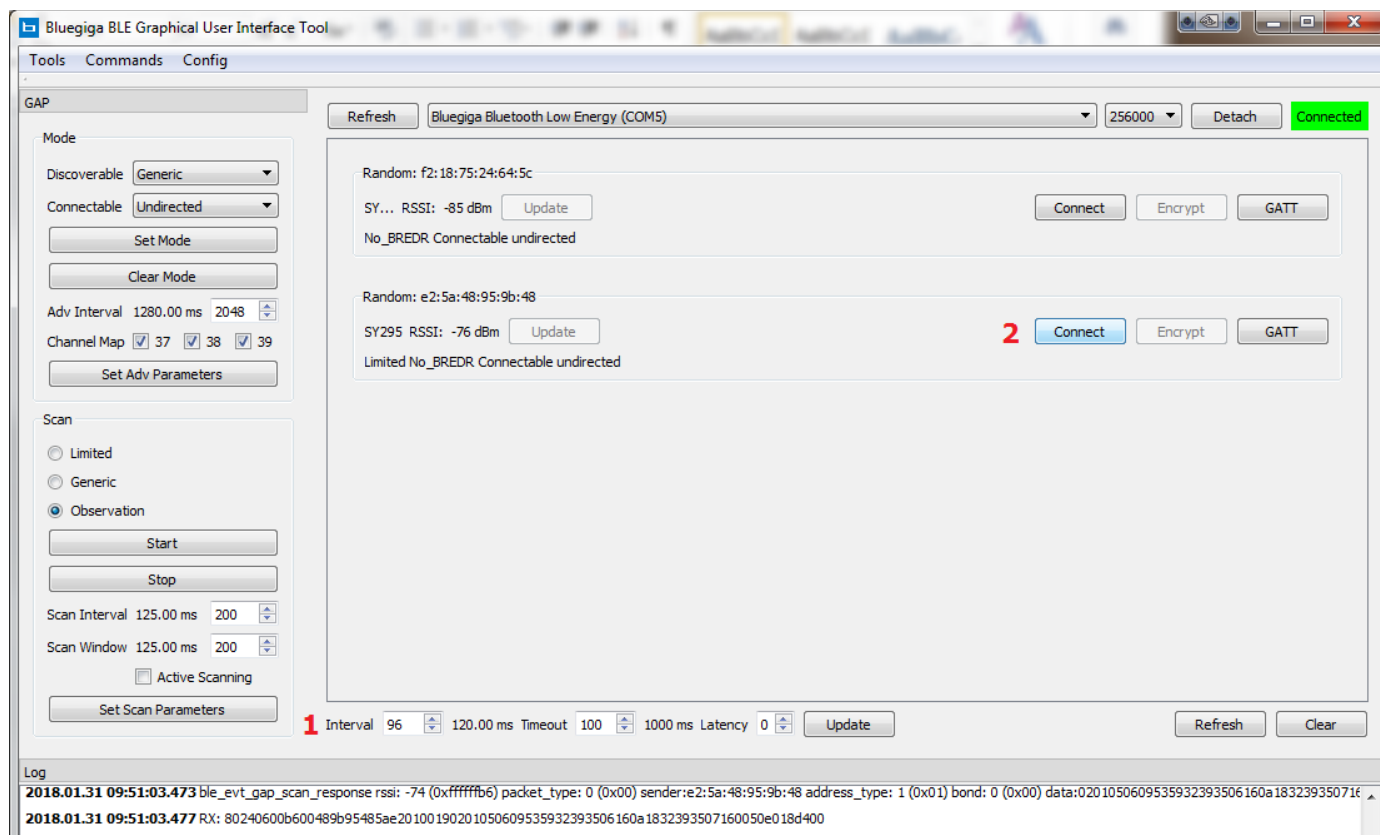
- Min connection interval 120ms ($120/1.25 = 96$ or 0x60)
- Max connection interval 140ms ($140/1.25 = 112$ or 0x70)
- Timeout 1000ms ($1000/10 = 100$ or 0x64)
- Slave latency 0


Customer software:

```
ble_cmd_gap_connect_direct(bd_addr, 1, 0x0060, 0x0070, 0x0064, 0x0000);
```

See chap 5.4.1.1 on BGAPI

Blegui2:



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Encrypt connection

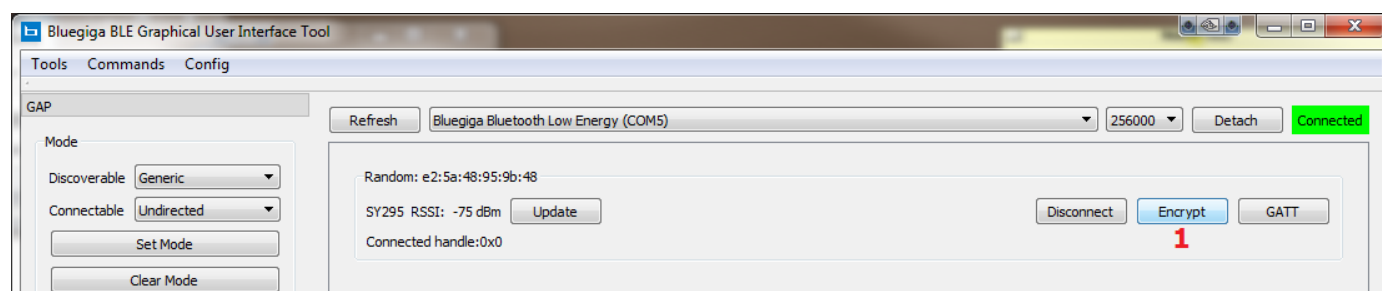
In case of “PAIR” profile selected on instrument.


Customer software:

ble_cmd_sm_encrypt_start handle(0x00,0x01)

See chap 5.7.1.2 on BGAPI

Blegui2:



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Service discovering

Use the complete discovering procedure

- Primary services discovery on UUID 0x2800 (find Services, e.g: Metrology)
- Characteristics discovery on UUID 0x2800 (find properties and permissions)
- Descriptors discovery on full handle position (find client characteristic configuration)

Check with Blegui2 to find out which parameter to use before programming with Bluegiga API

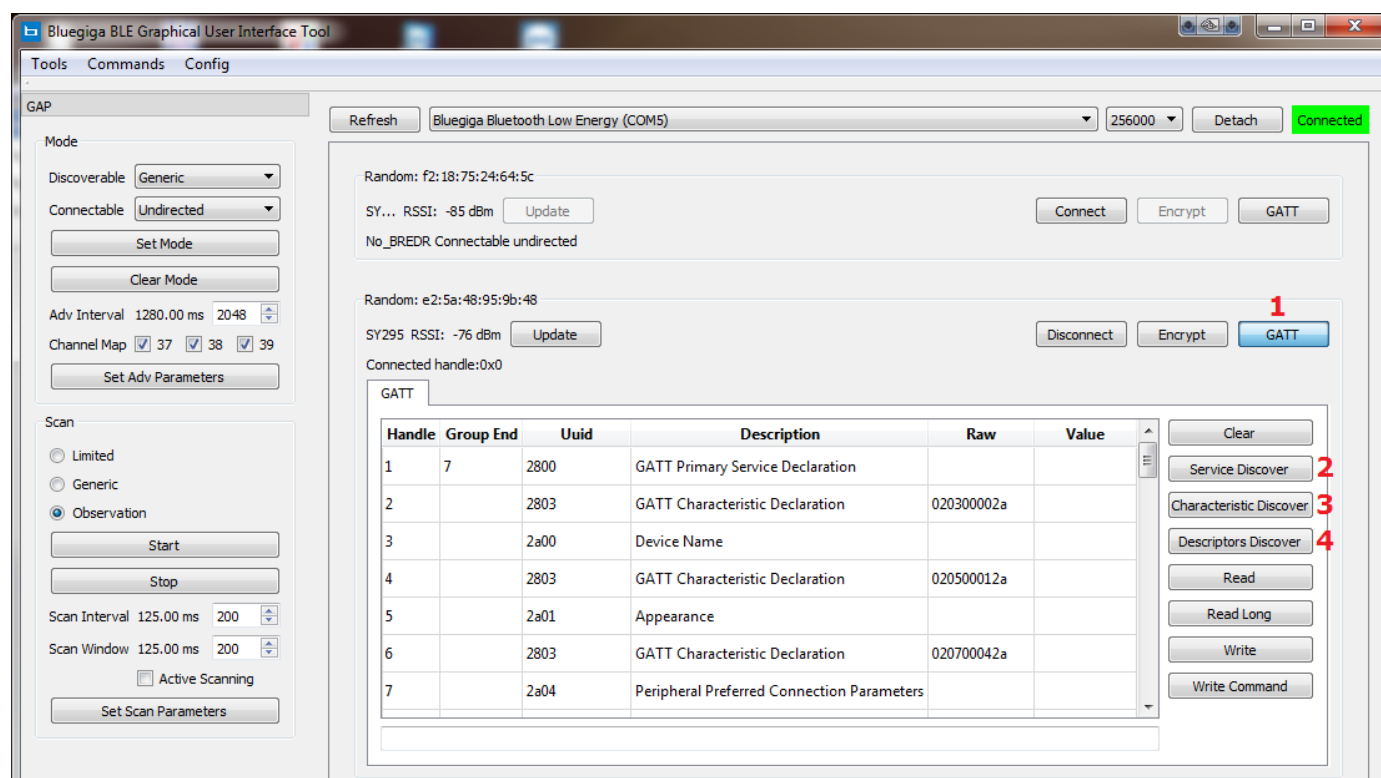
Customer software:

ble_cmd_attclient_read_by_group_type (connection, start, end, uuid_len, uuid_data)
See chap 5.1.1.7 on BGAPI

ble_cmd_attclient_read_by_type (connection, start, end, uuid_len, uuid_data)
See chap 5.1.1.9 on BGAPI

ble_cmd_attclient_find_information (connection, start, end)
See chap 5.1.1.4 on BGAPI

Blegui2:



**SYLVAC SA****Bluetooth Profile Quick-Start Guide**No. : **MEM-PM 292-1806-04**Date : **14/12/202018**Par : **rop**Version : **B**Statut: **Valide****Activate services**

To be able to communicate, indication and notification channels need to be enabled on the dedicated characteristics of the Metrology Service. This is done by writing the appropriate values to the associated “Client Characteristic Configuration” handles (notify: 0x01, indicate: 0x02). For paired devices, there is no need to reactivate services for further connections.

Example for Metrology Service (short UUID 5000) on connection handle 0x00:

Attr. handle	UUID	Description	Remark
0x0b	c1b25010caa...	Metrology service / characteristic “DataSend”	Data sent from instrument on button action will be accessible on this characteristic
0x0c	2902	Client Characteristic Configuration	Activate indication here (0x02)
0x0d	2803	GATT Characteristic Declaration	Available information on the characteristic: properties, attribute handle and UUID
0x0e	c1b25012caa...	Metrology service / characteristic “RemoteReq”	Send request to the instrument on this characteristic
0x0f	2803	GATT Characteristic Declaration	Available information on the characteristic: properties, attribute handle and UUID
0x10	c1b25013caa...	Metrology service / characteristic “RemoteResp”	Response to a request will be transmitted on this characteristic
0x11	2902	Client Characteristic Configuration	Activate notification here (0x01)
0x12	2803	GATT Characteristic Declaration	Available information on the characteristic: properties, attribute handle and UUID

DataSend
characteristic groupRemoteReq
characteristic groupRemoteResp
characteristic group

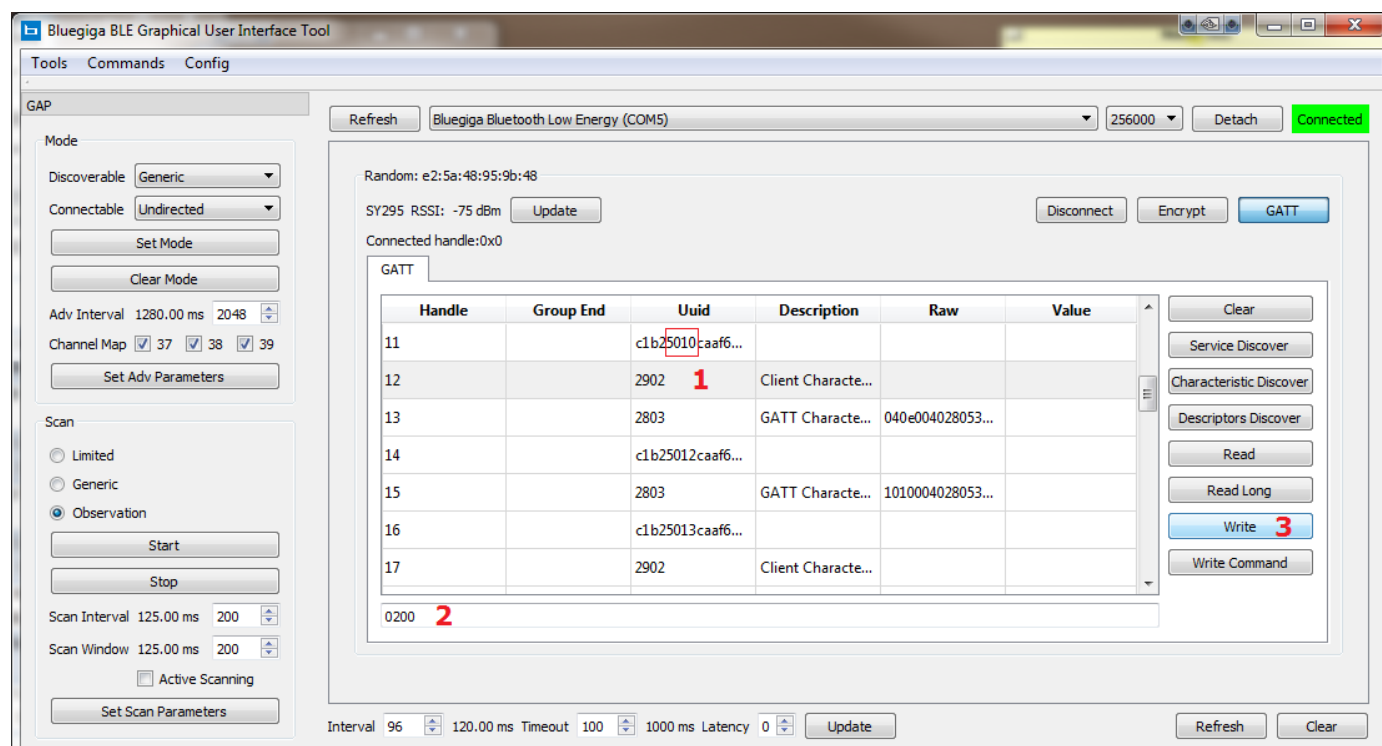
Send data request

Activate indication to allow the instrument to send data.

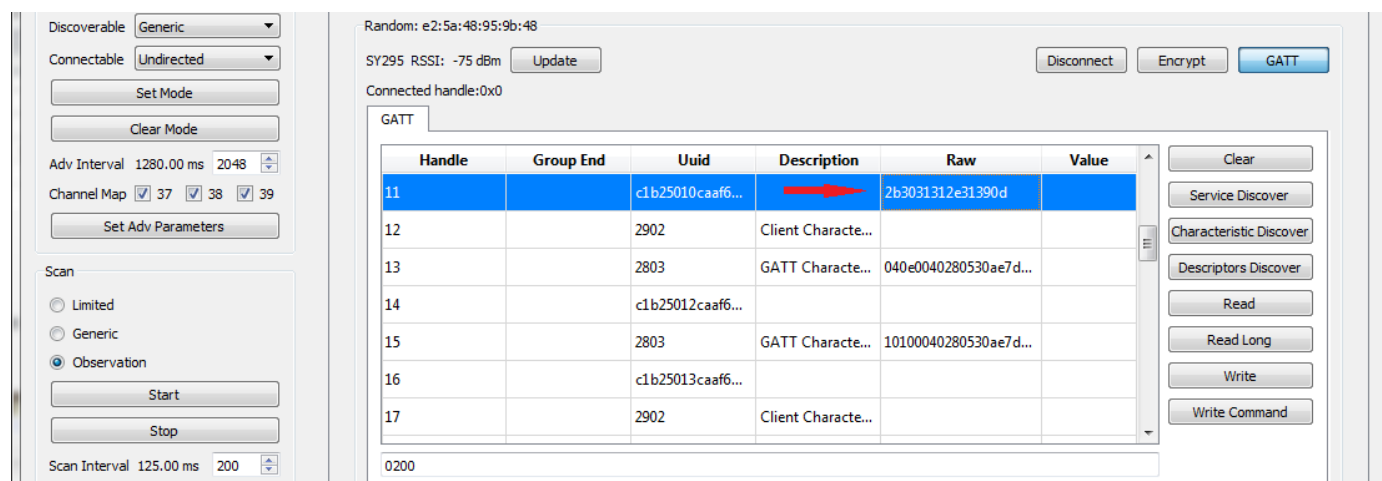
Customer software:

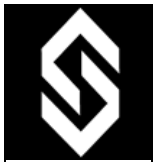
`ble_cmd_attclient_attribute_write(0, 0x0C, 2, 0x0200);` See chap 5.1.1.1 on BGAPI

Blegui2:



Then send a data from the instrument and read it on DataSend characteristic (ASCII char).





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Receive remote response

Activate notification to be able to get a response to a request.

Then write a request on "RemoteReq" characteristic and see the response on "RemoteResp" characteristic.

Customer software:

`ble_cmd_attclient_attribute_write(0, 0x11, 2, 0x0100);` See chap 5.1.1.1 on BGAPI

`ble_cmd_attclient_write_command(0, 0x10, 2, "\x3F\x0D");` See chap 5.1.1.12 on BGAPI

Blegui2:


The screenshot shows the Bluegiga BLE Graphical User Interface Tool. The main window displays a connected device (Bluegiga Bluetooth Low Energy (COM5)) with a random address of e2:5a:48:95:9b:48. The GATT table is visible, showing various characteristics and their values. The table has columns: Handle, Group End, Uuid, Description, Raw, and Value. The table contains 17 rows of data. The 'Write' button is highlighted with a red '3'.

Handle	Group End	Uuid	Description	Raw	Value
11		c1b25010caaf6...		2b3031312e31390d	
12		2902	Client Characte...		
13		2803	GATT Characte...	040e0040280530ae7d...	
14		c1b25012caaf6...			
15		2803	GATT Characte...	10100040280530ae7d...	
16		c1b25013caaf6...			
17		2902	Client Characte...		

Write a request...

The screenshot shows the Bluegiga BLE Graphical User Interface Tool. The main window displays a connected device (Bluegiga Bluetooth Low Energy (COM5)) with a random address of e2:5a:48:95:9b:48. The GATT table is visible, showing various characteristics and their values. The table has columns: Handle, Group End, Uuid, Description, Raw, and Value. The table contains 17 rows of data. The 'Write' button is highlighted with a red '3'. A red arrow points to the row with Handle 16, Uuid c1b25013caaf6..., and Description Client Characte....

Handle	Group End	Uuid	Description	Raw	Value
11		c1b25010caaf6...		2b3030382e34390d	
12		2902	Client Characte...		
13		2803	GATT Characte...	040e0040280530ae7d...	
14		c1b25012caaf6...			
15		2803	GATT Characte...	10100040280530ae7d...	
16		c1b25013caaf6...	Client Characte...	2b3030382e34390d	
17		2902	Client Characte...		

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Clean the dongle

The dongle BLED112 can handle 8 bonds (if provided by Sylvac, else factory default is 3).

To ensure a proper use, it must be cleaned at least after 8 new paired connections.

Procedure

Send the following commands to clean memory, delete bonds and reset the dongle

- ble_cmd_flash_ps_erase_all
- ble_cmd_sm_delete_bonding ff

And then, menu Commands -> Reset (or Alt+R)

