

# LPRF BlueNRG-12 Level-2 training

## How to use GUI

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- Demonstration applications—BLE demonstration&test applications—DTM--Release\_UART\_16MHz
- 使用者根据自己实际情况将DTM的固件烧录进芯片

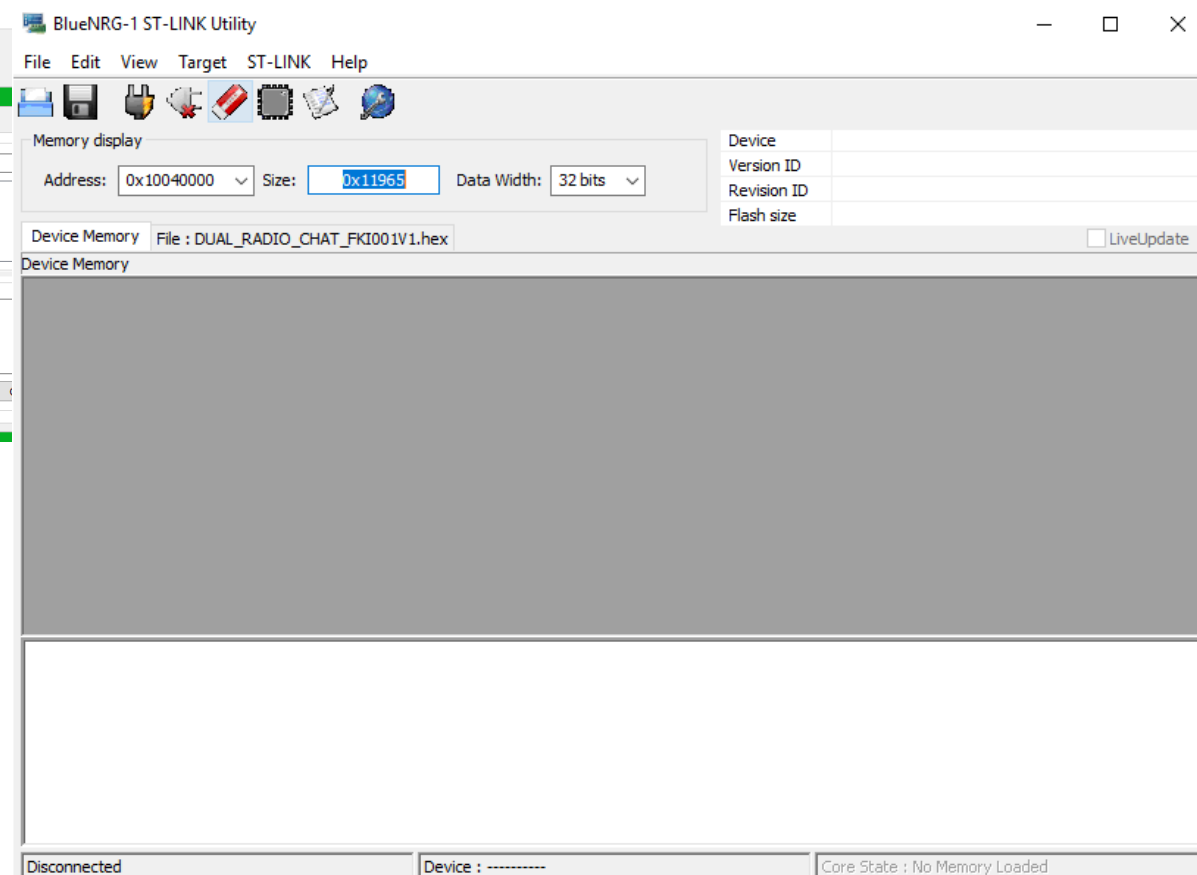
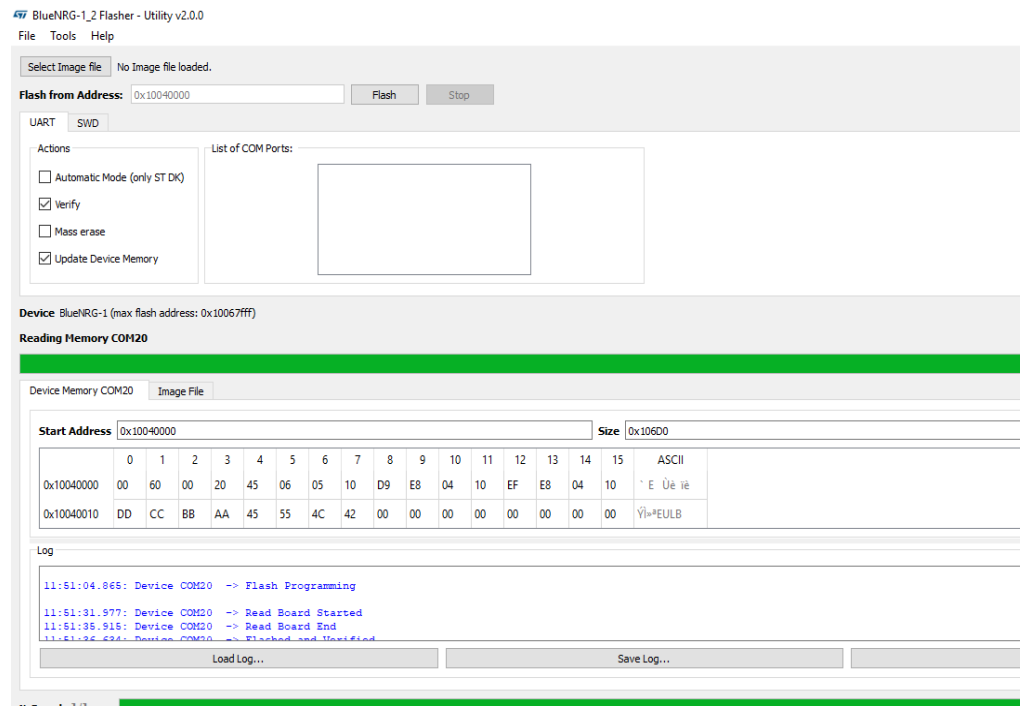
# 进入DTM

3

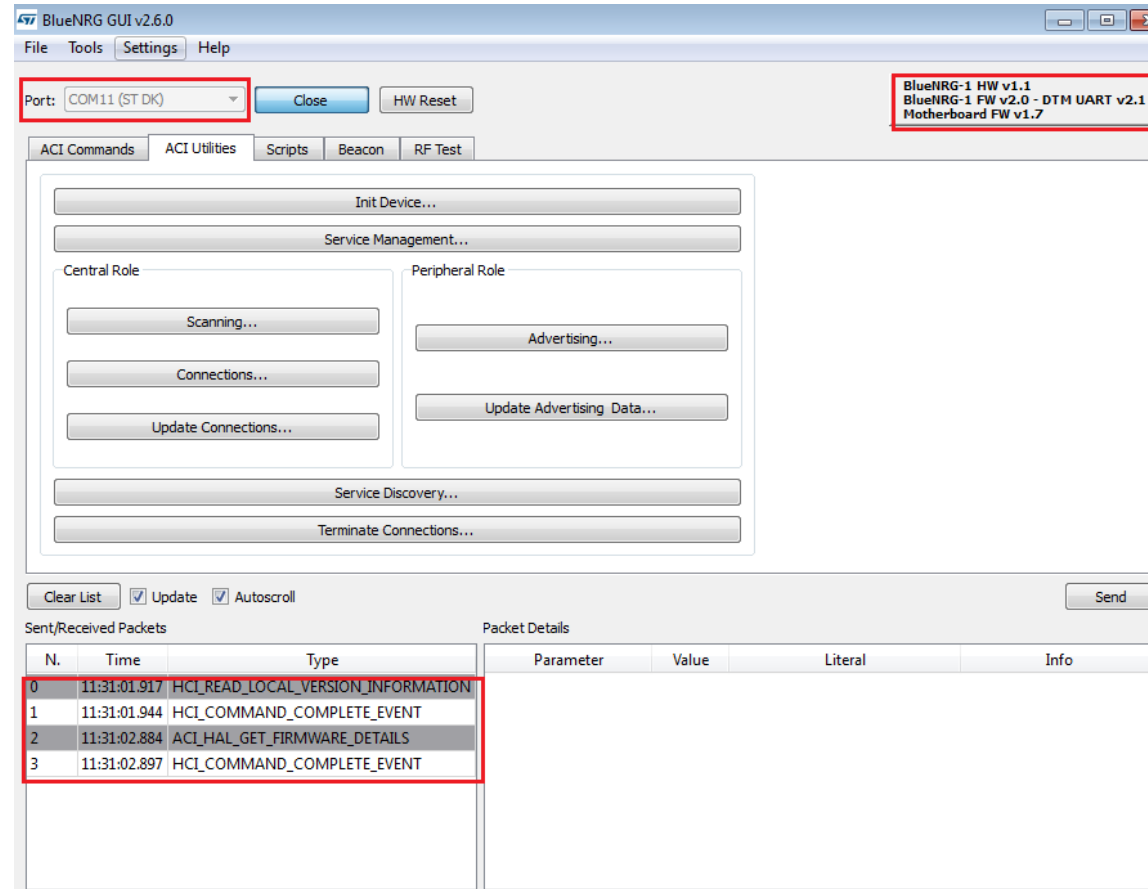


# 进入DTM

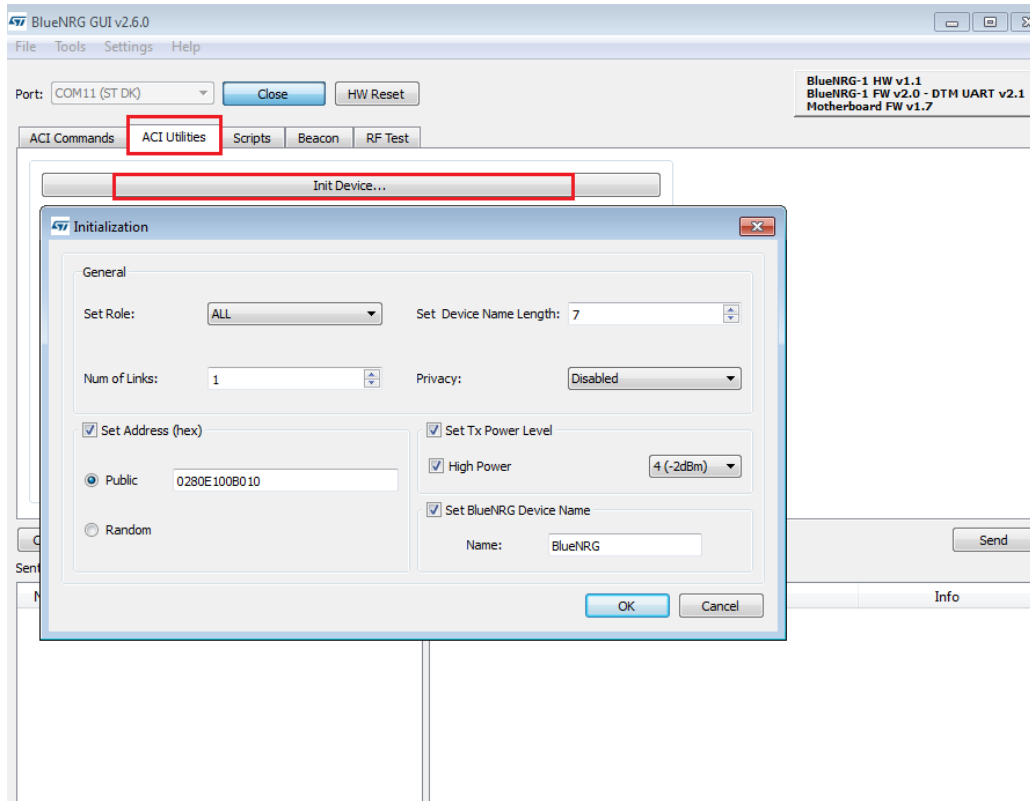
4



- 打开串口并成功读取到版本号



## • 使用ACI Utilities 初始化设备



N.	Time	Type
0	12:05:32.915	Job start
1	12:05:32.885	HCI_RESET
2	12:05:32.915	HCI_COMMAND_COMPLETE_EVENT
3	12:05:32.918	ACI_BLUE_INITIALIZED_EVENT
4	12:05:33.118	ACI_HAL_WRITE_CONFIG_DATA
5	12:05:33.125	HCI_COMMAND_COMPLETE_EVENT
6	12:05:33.128	ACI_HAL_SET_TX_POWER_LEVEL
7	12:05:33.131	HCI_COMMAND_COMPLETE_EVENT
8	12:05:33.134	ACI_GATT_INIT
9	12:05:33.135	HCI_COMMAND_COMPLETE_EVENT
10	12:05:33.141	ACI_GAP_INIT
11	12:05:33.148	HCI_COMMAND_COMPLETE_EVENT
12	12:05:33.151	ACI_GATT_UPDATE_CHAR_VALUE
13	12:05:33.155	HCI_COMMAND_COMPLETE_EVENT
14	12:05:33.168	Job finished

```

/* Configure Public address */
ret = aci_hal_write_config_data(CONFIG_DATA_PUBADDR_OFFSET, CONFIG_DATA_PUBADDR_LEN, baddr);
if (ret != BLE_STATUS_SUCCESS) {
    printf("Setting BD_ADDR failed: 0x%02x\r\n", ret);
    return ret;
}

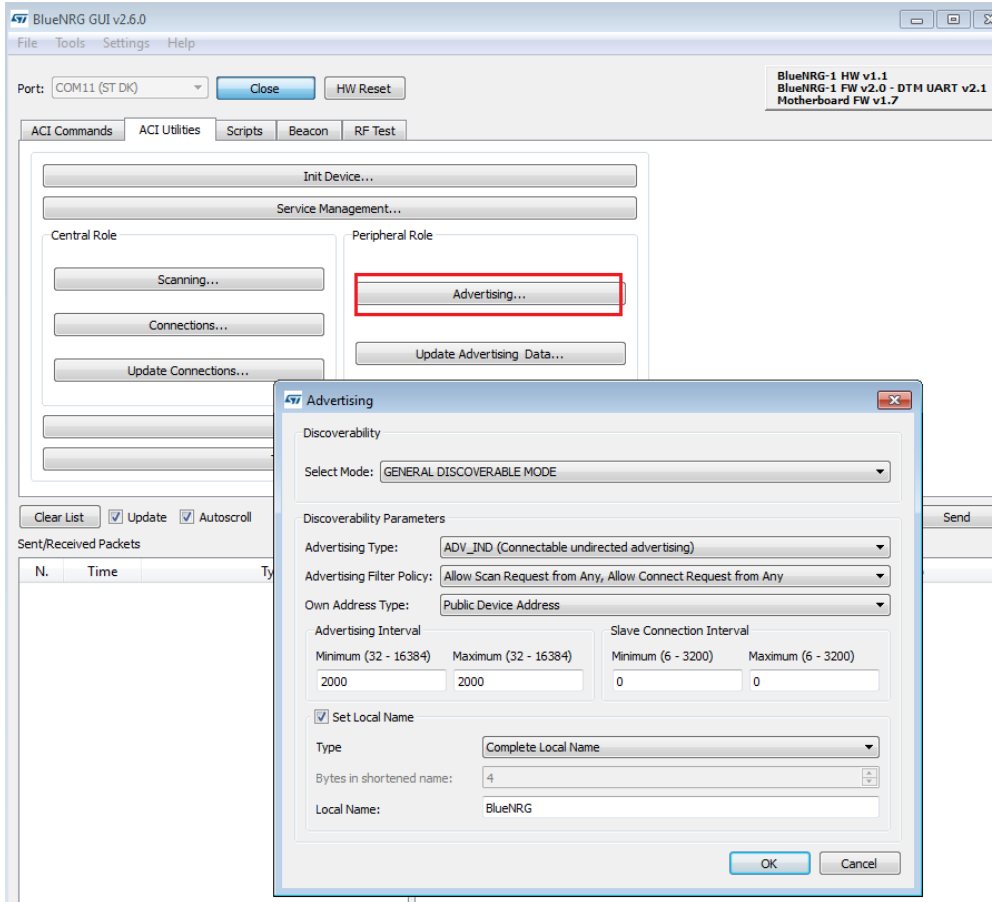
/* Set the TX power to -2 dBm */
aci_hal_set_tx_power_level(1, 4);

/* GATT Init */
ret = aci_gatt_init();
if (ret != BLE_STATUS_SUCCESS) {
    printf("Error in aci_gatt_init(): 0x%02x\r\n", ret);
    return ret;
} else {
    printf("aci_gatt_init() --> SUCCESS\r\n");
}

/* GAP Init */
ret = aci_gap_init(role, 0x00, 0x00, sservice_handle,
    sdev_name_char_handle, sappearance_char_handle);
printf("service_handle=%d dev_name_char_handle=%d appearance_char_handle=%d\r\n",
    service_handle, dev_name_char_handle, appearance_char_handle);
if (ret != BLE_STATUS_SUCCESS) {
    printf("Error in aci_gap_init() 0x%02x\r\n", ret);
    return ret;
} else {
    printf("aci_gap_init() --> SUCCESS\r\n");
}

/* Set the device name */
ret = aci_gatt_update_char_value(service_handle, dev_name_char_handle,
    0, sizeof(name), name);
if (ret != BLE_STATUS_SUCCESS) {
    printf("Error in Gatt Update characteristic value 0x%02x\r\n", ret);
    return ret;
} else {
    printf("aci_gatt_update_char_value() --> SUCCESS\r\n");
}
    
```

## • 使用 ACI Utilities 进行广播



N.	Time	Type
0	12:12:59.375	Job start
1	12:12:59.369	HCI_LE_SET_SCAN_RESPONSE_DATA
2	12:12:59.380	HCI_COMMAND_COMPLETE_EVENT
3	12:12:59.380	ACI_GAP_SET_DISCOVERABLE
4	12:12:59.384	HCI_COMMAND_COMPLETE_EVENT
5	12:12:59.388	Job finished

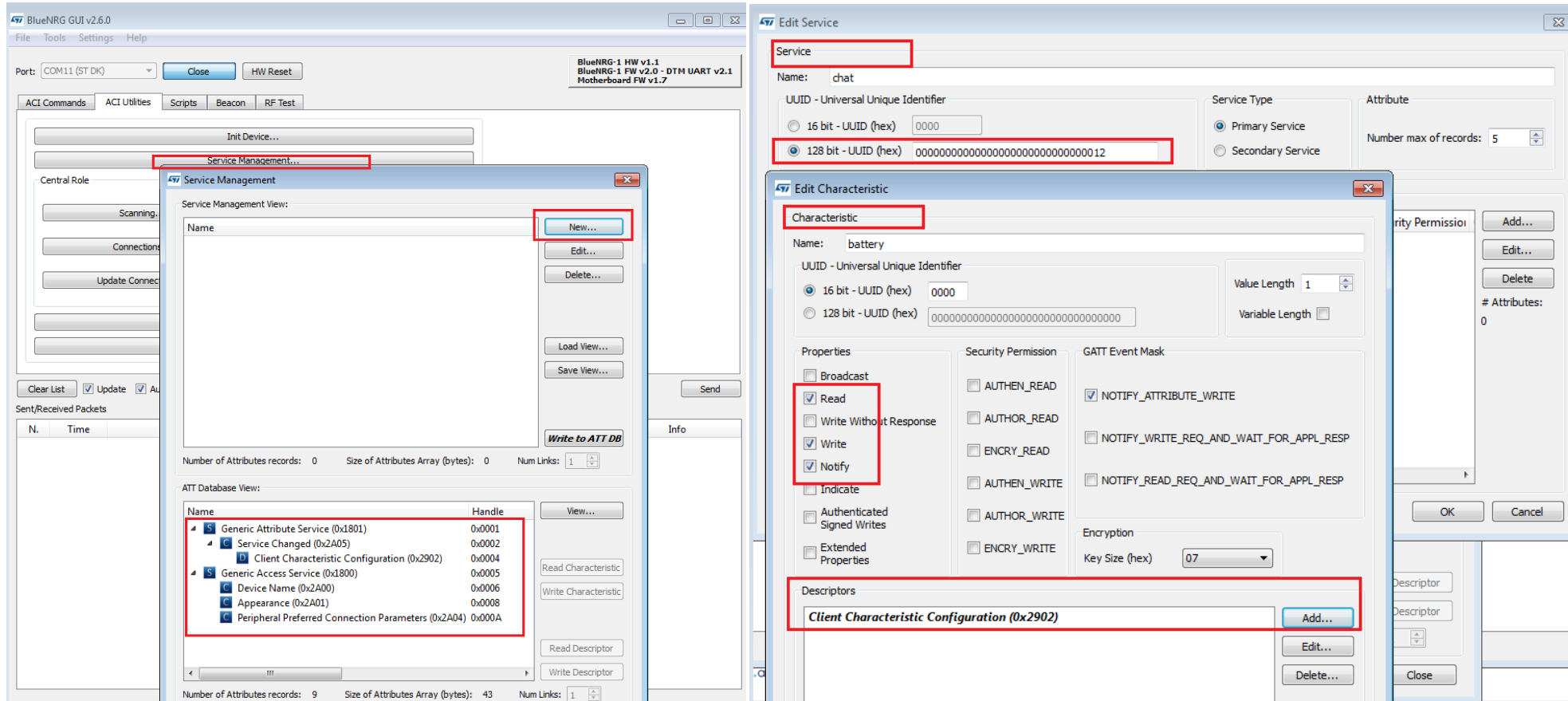
N.	Time	Type
0	12:15:41.108	HCI_LE_META_EVENT
1	12:15:41.237	ACI_ATT_EXCHANGE_MTU_RESP_EVENT
2	12:15:41.538	ACI_GATT_ATTRIBUTE_MODIFIED_EVENT
3	12:15:54.108	HCI_DISCONNECTION_COMPLETE_EVENT

Peripherals Nearby

-49 No services

BlueNRG
  
UUID: 6327F51E-D920-9D28-7705-CD991E04CAA8
  
Connected
  
ADVERTISEMENT DATA [Hide](#)
  
Yes
  
Device Is Connectable
  
BlueNRG
  
Local Name
  
-2
  
Tx Power Level

- 使用ACI Utilities 进入服务管理，添加一个service， 一个characteristic





- 使用ACI Utilities 进入服务管理，添加一个service，一个characteristic

The screenshot displays the 'Service Management' window in the BlueNRG-GUI. The 'Service Management View' on the left shows a tree structure with 'chat' selected, containing 'battery' and 'Client Characteristic Configuration'. The 'ATT Database View' on the right shows a table of attributes, with 'Service User Defined' and 'Characteristic User Defined' highlighted. The 'Write to ATT DB' button is visible at the bottom right of the 'Service Management View'.

**Service Management View:**

Name	Handle
chat (0x00000000000000000000000000000012)	
battery (0x0000)	
Client Characteristic Configuration (0x2902)	

**ATT Database View:**

Name	Handle	Property	Value	Value Length
Generic Attribute Service (0x1801)	0x0001			
Service Changed (0x2A05)	0x0002	Indicate	0xFFFF0000	0x0004
Client Characteristic Configuration (0x2902)	0x0004			
Generic Access Service (0x1800)	0x0005			
Device Name (0x2A00)	0x0006	Read, Write w/o resp, Write, Authenticated Signed Writes	0x47524E65756C42	0x0007
Appearance (0x2A01)	0x0008	Read, Write w/o resp, Write, Authenticated Signed Writes	0x0000	0x0002
Peripheral Preferred Connection Parameters (0x2A04)	0x000A	Read	0xFFFF0000FFFFFFFF	0x0008
Service User Defined (0x00000000000000000000000000000012)	0x000C			
Characteristic User Defined (0x0000)	0x000D	Read, Write, Notify	0x00	0x0001
Client Characteristic Configuration (0x2902)	0x000F			

Number of Attributes records: 12      Size of Attributes Array (bytes): 51      Num Links: 1

**Write to ATT DB**

**Service Management View (Bottom):**

Name	Handle
Generic Attribute Service (0x1801)	0x0001
Service Changed (0x2A05)	0x0002
Client Characteristic Configuration (0x2902)	0x0004
Generic Access Service (0x1800)	0x0005
Device Name (0x2A00)	0x0006
Appearance (0x2A01)	0x0008
Peripheral Preferred Connection Parameters (0x2A04)	0x000A

Number of Attributes records: 9      Size of Attributes Array (bytes): 43      Num Links: 1

**ATT Database View (Bottom):**

N.	Time	Type
0	13:55:26.740	Job start
1	13:55:26.720	ACI_GATT_ADD_SERVICE
2	13:55:26.733	HCI_COMMAND_COMPLETE_EVENT
3	13:55:26.733	ACI_GATT_ADD_CHAR
4	13:55:26.739	HCI_COMMAND_COMPLETE_EVENT
5	13:55:26.740	ACI_GATT_READ_HANDLE_VALUE
6	13:55:26.746	HCI_COMMAND_COMPLETE_EVENT
7	13:55:26.750	Job finished

Parameter	Value	Literal	Info
Opcode	0xFD04	ACI_GATT_ADD_CHAR	
Parameter Total Length	0x0C		
Service_Handle	0x000C		Handle of the Serv...
Char_UUID_Type	0x01	16-bit UUID	UUID type. Values: ...
Char_UUID_16	0x0000		16-bit UUID
Char_Value_Length	0x0001		Maximum length ...
Char_Properties	0x1A	CHAR_PROP_READ (Read) CH...	Characteristic Pro...
Security_Permissions	0x00	None	Security permisso...
GATT_Evt_Mask	0x01	GATT_NOTIFY_ATTRIBUTE_WR...	GATT event mask....
Enc_Key_Size	0x07		Minimum encrypt...
Is_Variable	0x00	Fixed length	Specify if the char...

- 使用ACI Utilities 写一个value并使用手机app读取

BlueNRG

UUID: 6327F51E-D920-9D28-7705-CD991E04CAA8

Connected

ADVERTISEMENT DATA [Show](#)

UUID:  
00000000-0000...-0000000000012

0x0000

Properties: read write notify

BlueNRG

0x0000

UUID: 0000

Connected

READ/NOTIFIED VALUES

[Read again](#) [Stop listening](#)

[i](#) Cloud Connect ☐

0xEB  
14:01:25.819

0xEB  
14:01:15.887

0xEB  
14:01:07.968

0x00  
14:00:17.137

WRITTEN VALUES

[Write new value](#)

0xEB [i](#)  
14:01:25.716

14	14:00:08.907	HCI_LE_META_EVENT
15	14:00:09.045	ACI_ATT_EXCHANGE_MTU_RESP_EVENT
16	14:00:09.407	ACI_GATT_ATTRIBUTE_MODIFIED_EVENT
17	14:01:07.816	ACI_GATT_ATTRIBUTE_MODIFIED_EVENT
18	14:01:23.747	ACI_GATT_ATTRIBUTE_MODIFIED_EVENT
19	14:01:25.667	ACI_GATT_ATTRIBUTE_MODIFIED_EVENT

- 使用ACI Utilities 写一个value并且使用手机app去读取 同时观察到 service management里面的char value也改变了

The screenshot displays the BlueNRG-GUI interface. At the top, a tree view shows the GATT structure: Service User Defined (0x00000000000000000000000000000012) 0x000C, Characteristic User Defined (0x0000) 0x000D (Read, Write, Notify), and Client Characteristic Configuration (0x2902) 0x000F. The value 0xEB is highlighted in a red box next to the Characteristic User Defined entry. Below this, a summary bar indicates 'Number of Attributes records: 12' and 'Size of Attributes Array (bytes): 51'. The bottom section shows a log of events with three entries: '14:07:56.167 ACI\_GATT\_READ\_HANDLE\_VALUE' (highlighted in a red box), '14:07:56.181 HCI\_COMMAND\_COMPLETE\_EVENT', and '14:07:56.196 Job finished' (highlighted in yellow).

Time	Event
14:07:56.167	ACI_GATT_READ_HANDLE_VALUE
14:07:56.181	HCI_COMMAND_COMPLETE_EVENT
14:07:56.196	Job finished

- 使用ACI Utilities 写一个值并且使用GUI读取 手机app读取到这个值并且也被改变

[illegible]

BlueNRG



0x0000

UUID: 0000

Connected

READ/NOTIFIED VALUES

Read again Stop listening

 Cloud Connect 

0xEC  
14:10:10.020

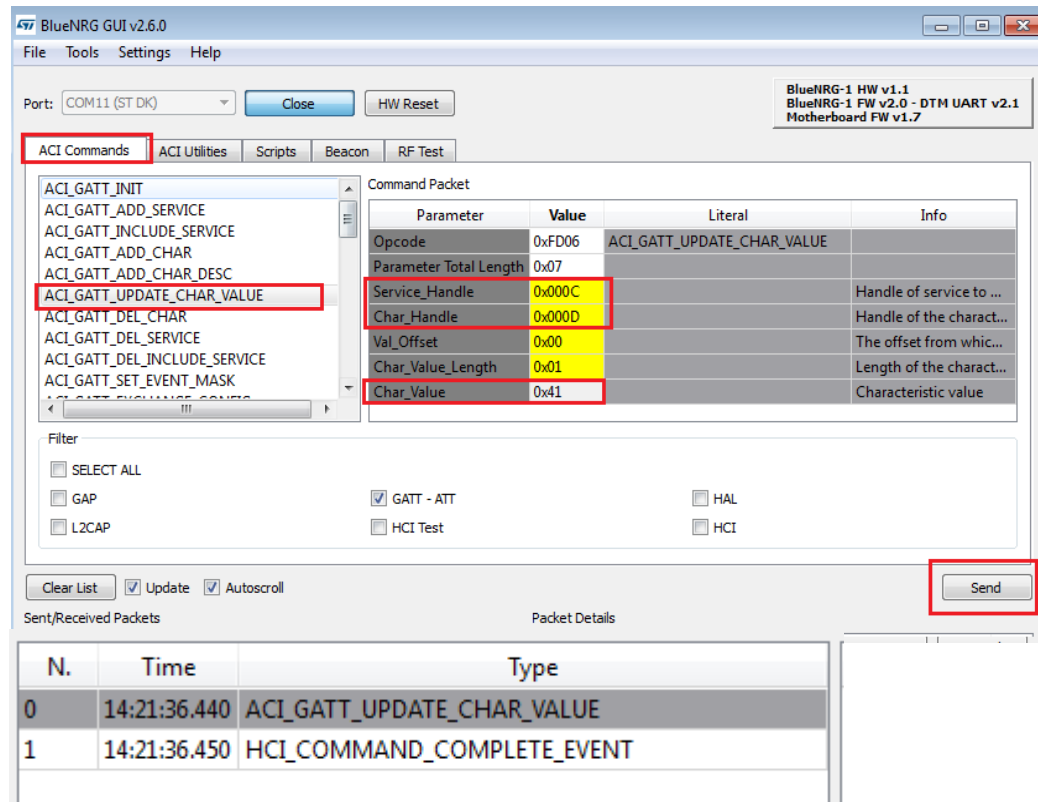
0xEC  
14:09:57.464

0xEB  
14:09:37.730

0xEB  
14:01:25.819

0xEB  
14:01:15.887

- 使用ACI command 更新一个value



- 使用ACI command 手机app读取到这个值被改变 同时观察到service management里面的char value也改变了also.

Peripheral Preferred Connection Parameters (0x2A04)	0x000A	Read	0xFFFFFFFFFFFFFFFF 0x0000
Service User Defined (0x00000000000000000000000000000012)	0x000C		
Characteristic User Defined (0x0000)	0x000D	Read, Write, Notify	0x41 0x0001
Client Characteristic Configuration (0x2902)	0x000F		

Number of Attributes records: 12      Size of Attributes Array (bytes): 51      Num Links: 1

BlueNRG

0x0000

UUID: 0000

Connected

READ/NOTIFIED VALUES

Read again      Stop listening

Cloud Connect ☐

0x41  
14:01:36.708

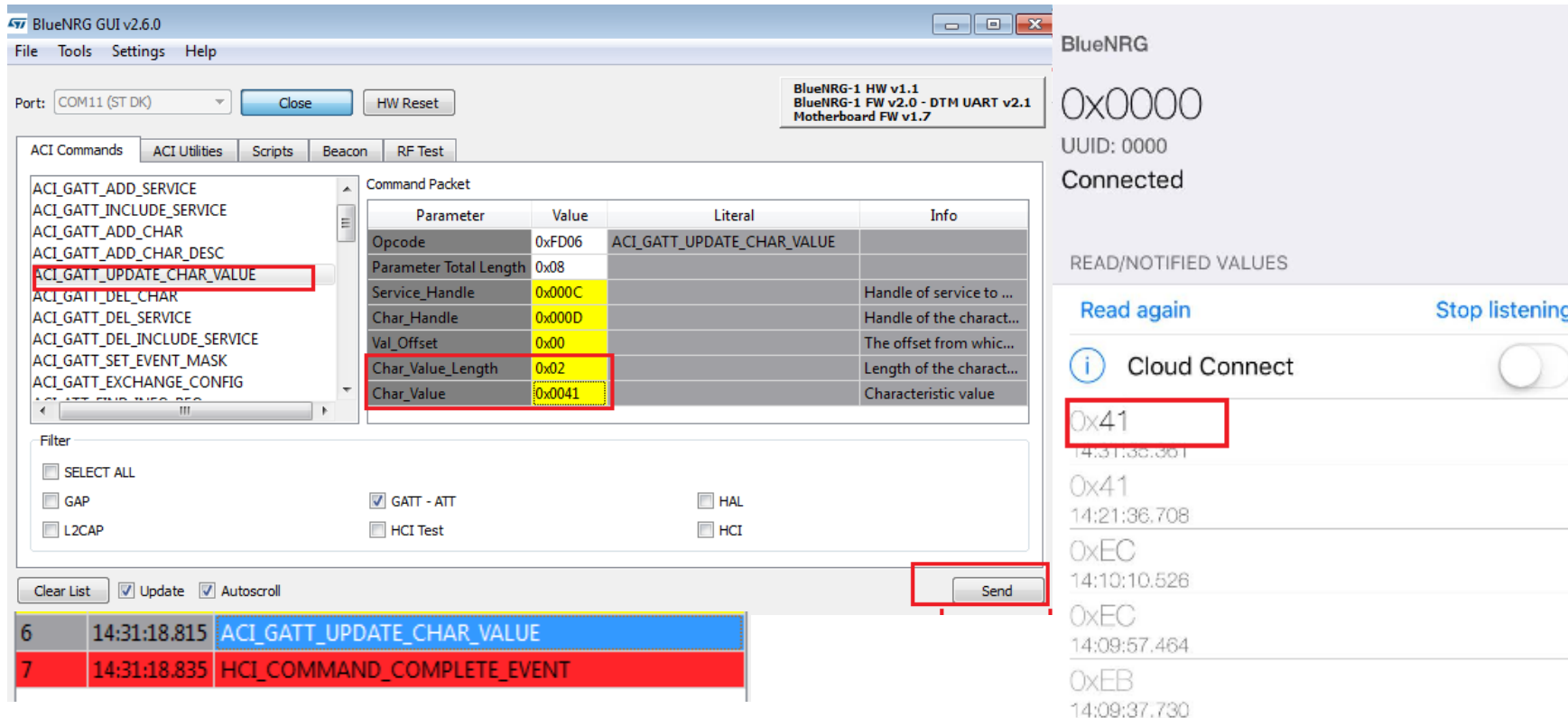
0xEC  
14:10:10.526

0xEC  
14:09:57.464

0xEB  
14:09:37.730

0xEB  
14:01:25.819

- 使用ACI command 使用aci command更新值为0x0041失败 值仍然是0x41



The screenshot shows the BlueNRG GUI v2.6.0 interface. The 'ACI Commands' tab is selected, and the 'Command Packet' table is displayed. The table has four columns: Parameter, Value, Literal, and Info. The 'Char\_Value' row is highlighted in red, showing a value of 0x0041. The 'Send' button is also highlighted in red.

Parameter	Value	Literal	Info
Opcode	0xFD06	ACI_GATT_UPDATE_CHAR_VALUE	
Parameter Total Length	0x08		
Service_Handle	0x000C		Handle of service to ...
Char_Handle	0x000D		Handle of the charact...
Val_Offset	0x00		The offset from whic...
Char_Value_Length	0x02		Length of the charact...
Char_Value	0x0041		Characteristic value

BlueNRG  
0x0000  
UUID: 0000  
Connected

READ/NOTIFIED VALUES

Read again Stop listening

Cloud Connect

0x41  
14:31:36.361  
0x41  
14:21:36.708  
0xEC  
14:10:10.526  
0xEC  
14:09:57.464  
0xEB  
14:09:37.730

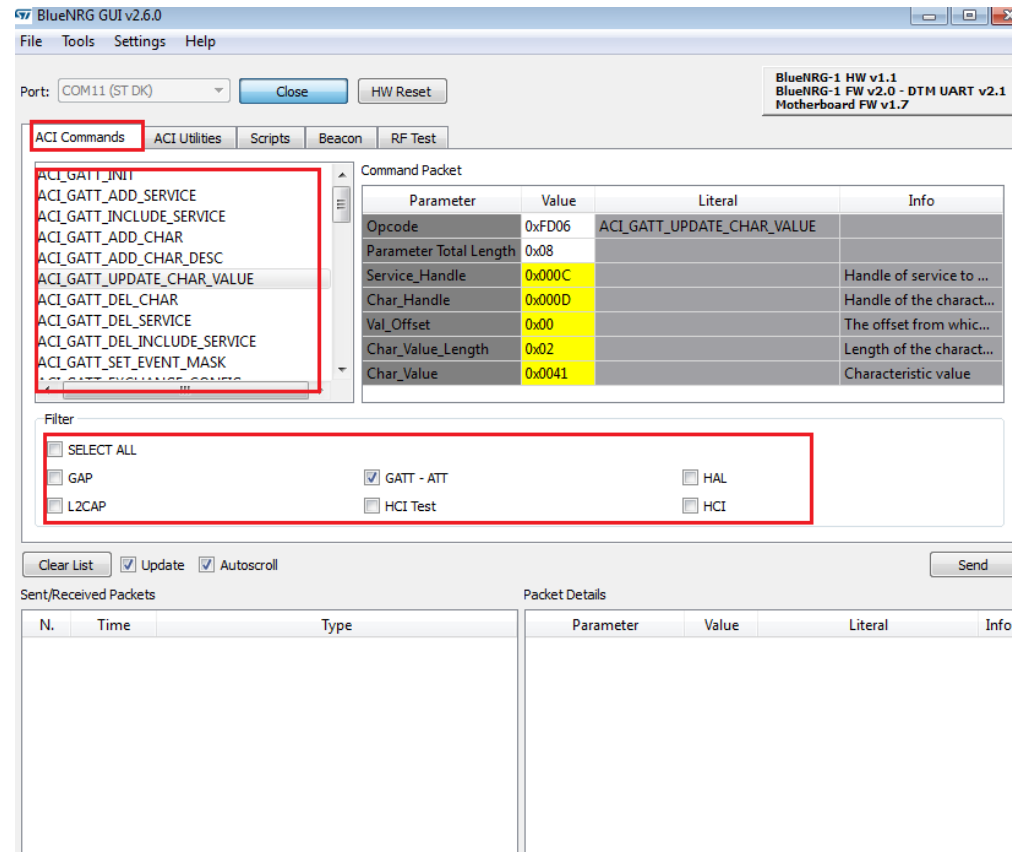
- 使用ACI command 原因：值长度为1byte

ATT Database View:

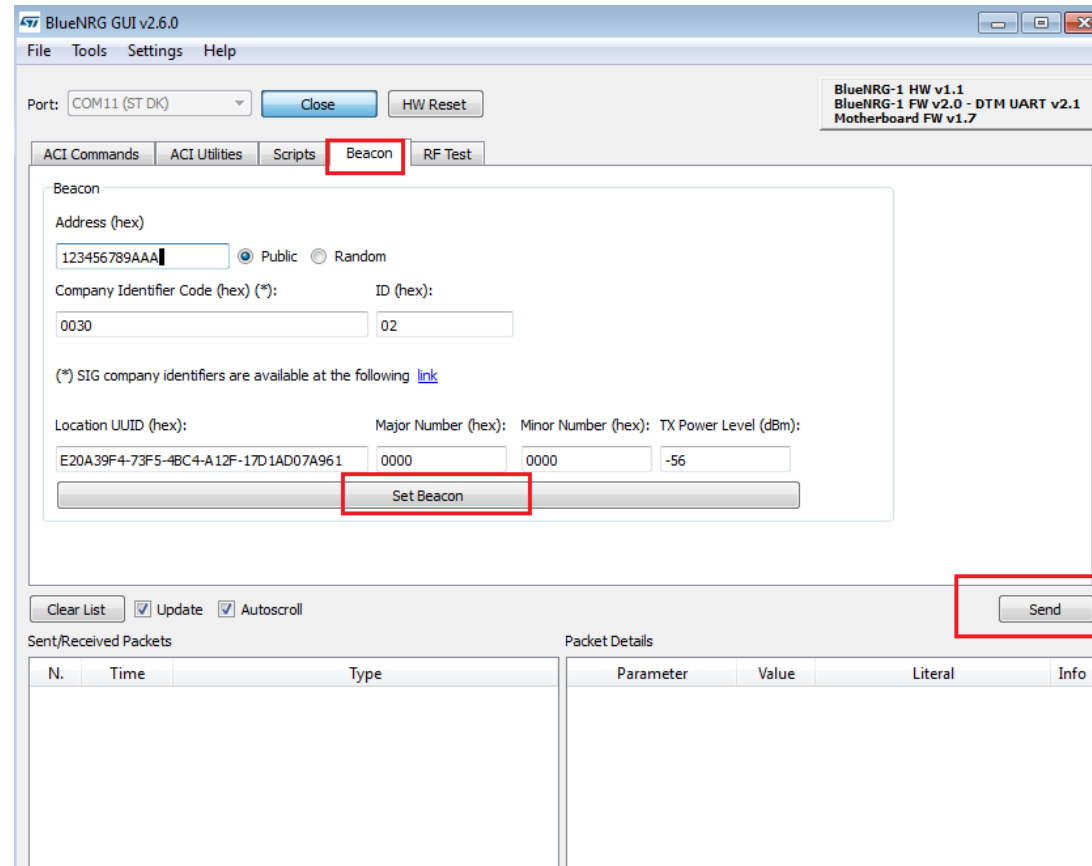
Name	Handle	Property	Value	Value Length
Generic Attribute Service (0x1801)	0x0001			
Service Changed (0x2A05)	0x0002	Indicate	0xFFFF0000	0x0004
Client Characteristic Configuration (0x2902)	0x0004			
Generic Access Service (0x1800)	0x0005			
Device Name (0x2A00)	0x0006	Read, Write w/o resp, Write, Authenticated Signed Writes	0x47524E65756C42	0x0007
Appearance (0x2A01)	0x0008	Read, Write w/o resp, Write, Authenticated Signed Writes	0x0000	0x0002
Peripheral Preferred Connection Parameters (0x2A04)	0x000A	Read	0xFFFF0000FFFFFFFF	0x0008
Service User Defined (0x00000000000000000000000000000012)	0x000C			
Characteristic User Defined (0x0000)	0x000D	Read, Write, Notify	0x41	0x0001
Client Characteristic Configuration (0x2902)	0x000F			



- 使用 ACI command 使用ACI命令进行测试



- Beacon 直接广播设置的数据



BlueNRG GUI v2.6.0

File Tools Settings Help

Port: COM11 (ST DK) Close HW Reset

BlueNRG-1 HW v1.1  
BlueNRG-1 FW v2.0 - DTM UART v2.1  
Motherboard FW v1.7

ACI Commands ACI Utilities Scripts **Beacon** RF Test

Beacon

Address (hex)  
123456789AAA ☒ Public ☐ Random

Company Identifier Code (hex) (\*): 0030 ID (hex): 02

(\*) SIG company identifiers are available at the following [link](#)

Location UUID (hex): E20A39F4-73F5-4BC4-A12F-17D1AD07A961 Major Number (hex): 0000 Minor Number (hex): 0000 TX Power Level (dBm): -56

**Set Beacon**

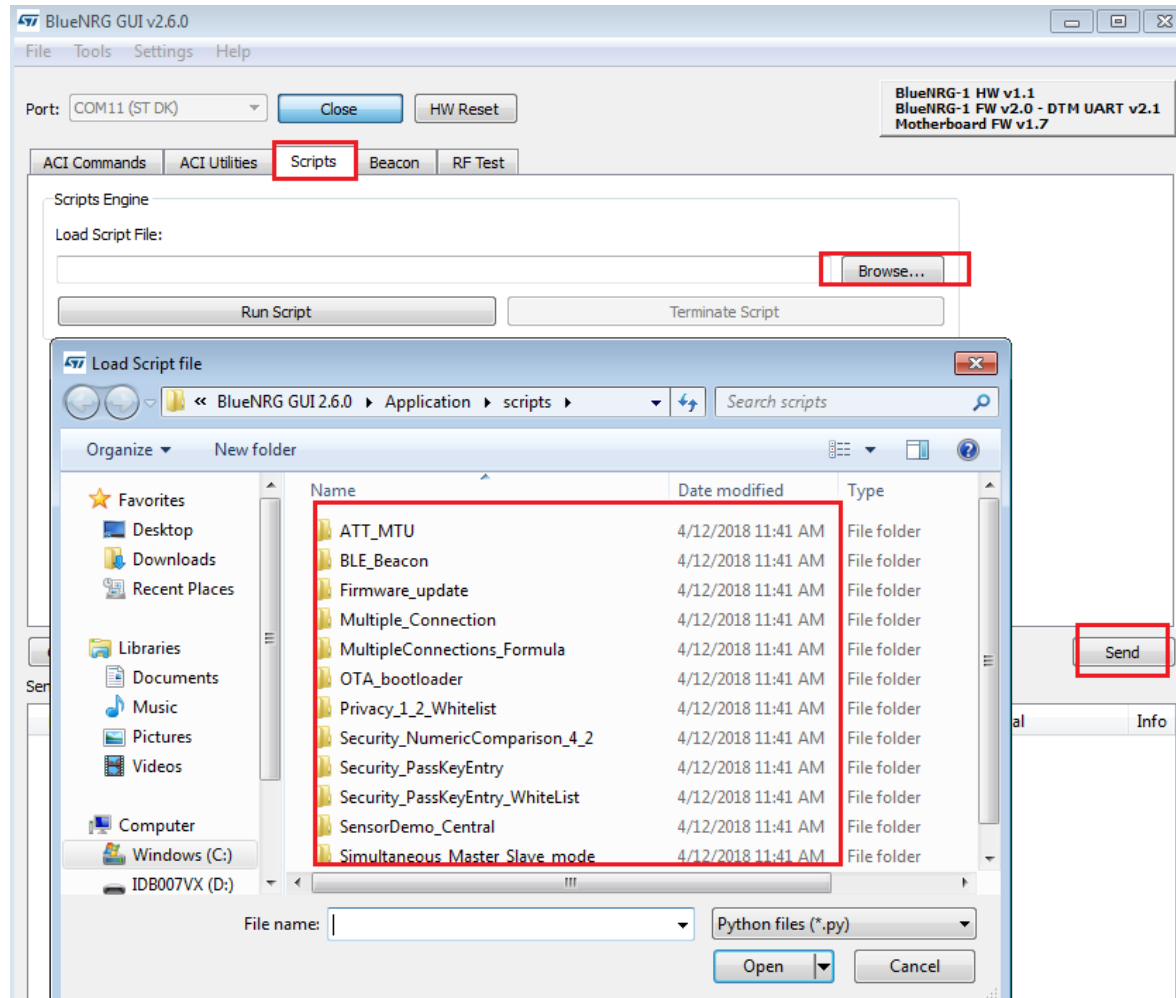
Clear List ☒ Update ☒ Autoscroll **Send**

Sent/Received Packets

N.	Time	Type	Parameter	Value	Literal	Info
----	------	------	-----------	-------	---------	------

Packet Details

- Scripts 选择相应的script去运行



- RF test 用户可以在这里设置发射和接收，进行常规的射频测试

BlueNRG GUI v2.6.0

File Tools Settings Help

Port: COM11 (ST DK) Close HW Reset

BlueNRG-1 HW v1.1  
BlueNRG-1 FW v2.0 - DTM UART v2.1  
Motherboard FW v1.7

ACI Commands ACI Utilities Scripts Beacon **RF Test**

Test

**TRANSMITTER**

☒ High Power 4 (-2dBm)

TX Frequency: 2402 MHz (Channel 0)

Length of Data: 0x25

Packet Payload: 0x00 - Pseudo-Random bit sequence 9

# Packet Transmitted

Start Transmitter 0

Start Tone

**RECEIVER**

RX Frequency: 2402 MHz (Channel 0)

# Packet Received

Start Receiver 0

PER

Packet Transmitted: 0

Packet Received: 0

Packet Error Rate (PER): - %

Clear List ☒ Update ☒ Autoscroll Send

Sent/Received Packets

N.	Time	Type
----	------	------

Packet Details

Parameter	Value	Literal	Info
-----------	-------	---------	------

多谢!

