QTool User Manual

Version 1.0

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1. Overview

QTool is a visual PC based application that allows a user to form a connection between two BLE devices. It helps the developers to evaluate Quintic's BLE devices. QTool works by communicating with the BLE devices through a serial port, acting as a network processor by using Quintic ACI commands.

1.1 Getting Started

Before you start QTool, please do the following preparations:

1. Insert the Quintic's BLE USB dongle in the computer's USB port.

2. If the BLE chip's version is B0, then download the "np_controller_v18.bin" file (in the directory: QBlue installation path \BinFiles) to Quintic's BLE USB dongle by using QnISPStudio tool. If the BLE chip's version is B1, please download the "np_controller_v20.bin" file. More information of QnISPStudio tool, please refer to "ISP Studio Manual v0.6.pdf".

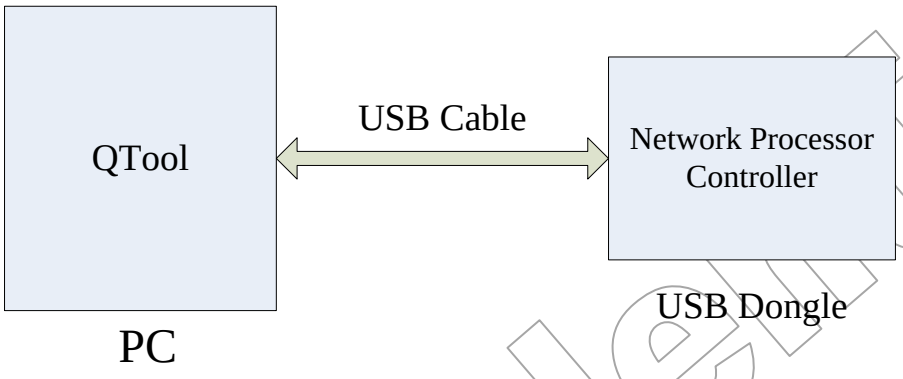


Figure 1 Connection

2. Main Window Description

The main window consists of following components as shown in Figure 2.

1. Menu bar
2. Toolbar
3. Central window, including Device window, trace window and setting window.
4. Status bar

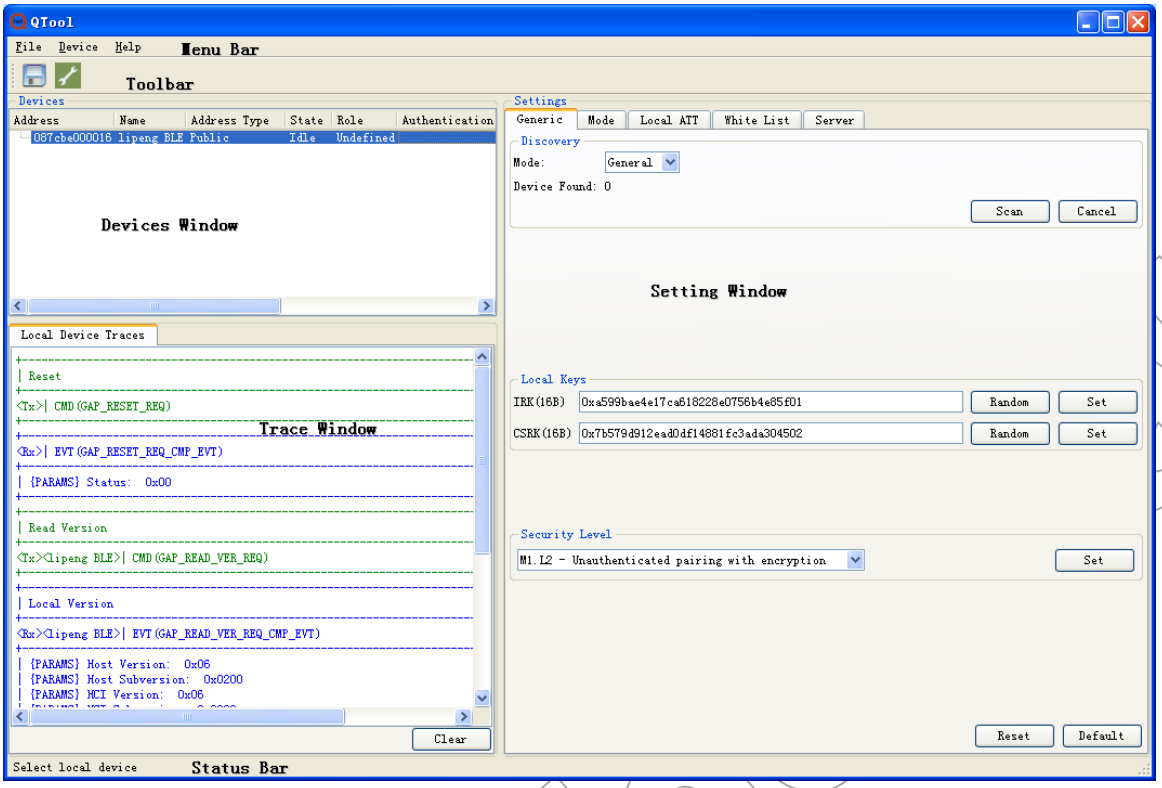


Figure 2 Main Window

2.1 Menu Bar

In the “File” menu, selecting “Save As”, you can save the current Trace information as shown in Figure 3.

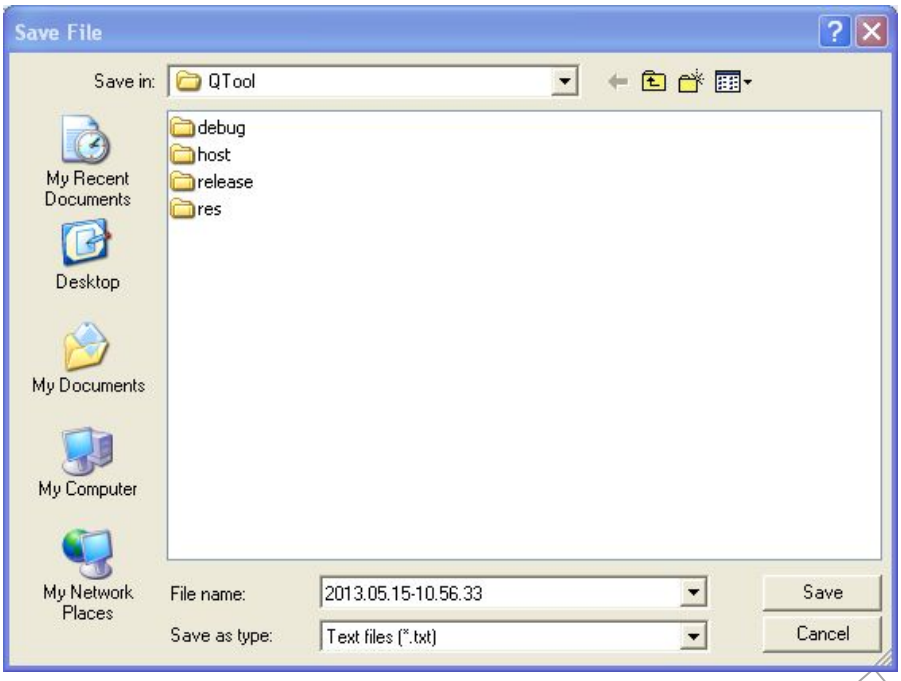


Figure 3 Save As Dialog

In the “Device” menu, selecting “Setting”, it pops up a dialog as shown in Figure 4.

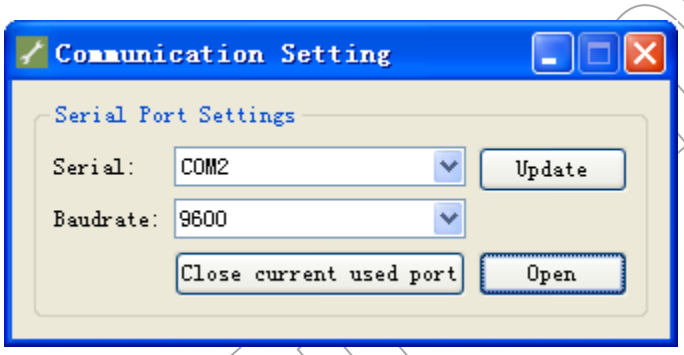


Figure 4 Serial Setting Dialog

[Name]: BLE local device name, shown in Device Window as well.
[Serial]: The current available serial ports.
[Baud rate]: Serial’s baud rate, default value is 9600.
[Update]: refresh the available serials.
[Close]: Close the current opened serial.

2.2 Toolbar

The first icon in the tool bar is used to save the trace information, as same as the “Save As” menu.
The second icon is used for setting serial ports, as same as the “Setting” in the “Device” menu.

2.3 Central Window

On the central window you could see three sub windows: Devices Window, Trace Window and Setting Window.

The devices window is used to show the all the devices (both local devices and remote devices). When you click on a device item, you will see its Setting Window.

The trace window shows the information parsed from the original data devices sending and receiving.

The setting window is used to show and change the setting information of devices, as well as the work modes and parameters.

2.4 Status bar

The status bar shows the current operation's status or results.

3. Devices Window

The devices window is shown in Figure 5 below.

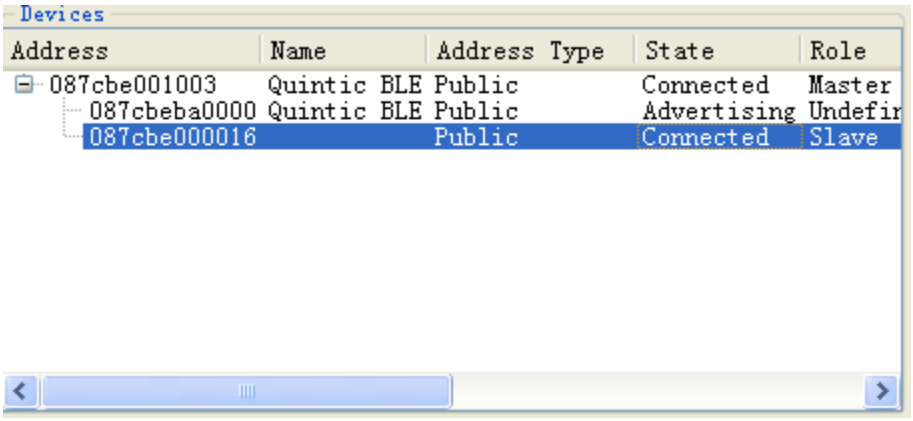


Figure 5 Devices Window

The first item shows the information about the local device. And the other items (max 8) are the remote devices.

[Address]: Bluetooth address

[Name]: Local device: setting name, remote device: adv name (friendly name)

[Address Type]: Public or Random

[State]： Idle, Scanning, Connecting, Connected, Bonding, Bonded, Advertising.

[Role]: Master or Slave

[Authentication]: Enable or Disable

[Encrypt]: Enable or Disable

4. Setting Window

There are two kinds of setting window: the local device setting window and the remote device setting Window.

4.1 Local Device Setting Window

There are five kinds of local device setting tab: the “Generic” tab, the “Mode” tab, the “Local ATT” tab, the “White List” tab, and the “Server” tab.

4.1.1 Generic Tab

The “Generic” tab as the figure 6 shows:

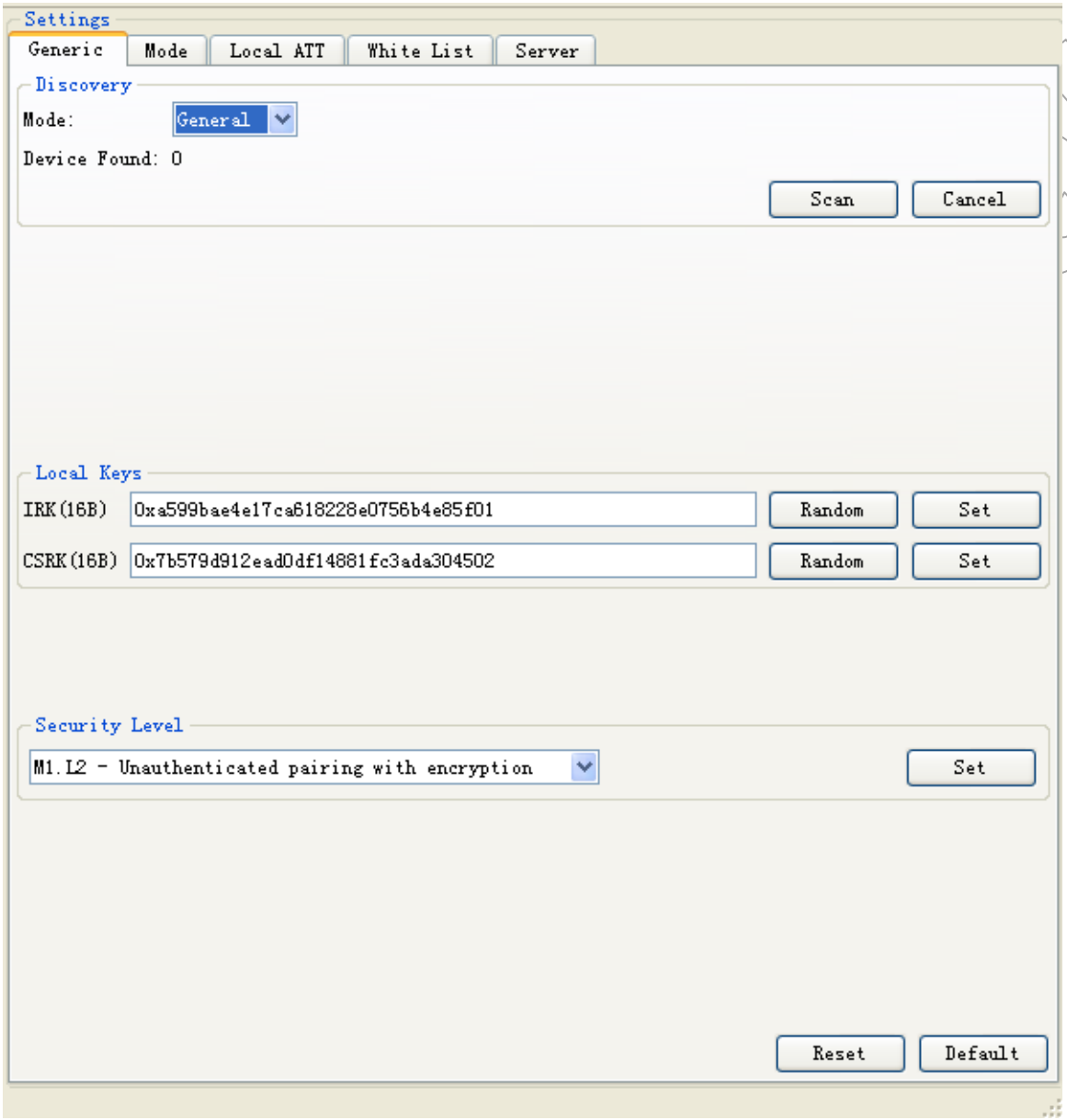


Figure 6 Local Devices Setting Window

Three groups (Discovery, Local Keys and Security Level) and two buttons (the “Reset” button and the “Default” button) are in the “Generic” tab.

[Reset]: This button used for GAP reset.

[Default]: Click this button to reset the configurations in this tab to default values.

4.1.1.1 Discovery Group

[Mode]: Scan mode

[Scan]: Click this button to search devices.

[Cancel]: Click this button to stop the current inquiry.

4.1.1.2 Local Keys Group

[IRK]: Identity Resolving Key (IRK) is a 128-bit key used to generate and resolve random addresses.

[CSRK]: Connection Signature Resolving Key (CSRK) is a 128-bit key used to sign data and verify signatures on the receiving device.

[Random]: Create a random number.

[Set]: Set the IRK or CSRK.

4.1.1.3 Security Group

[Set]: Click this button to set the Security Level.

4.1.2 Mode Tab

The “Mode” tab, as the figure 7 shows:

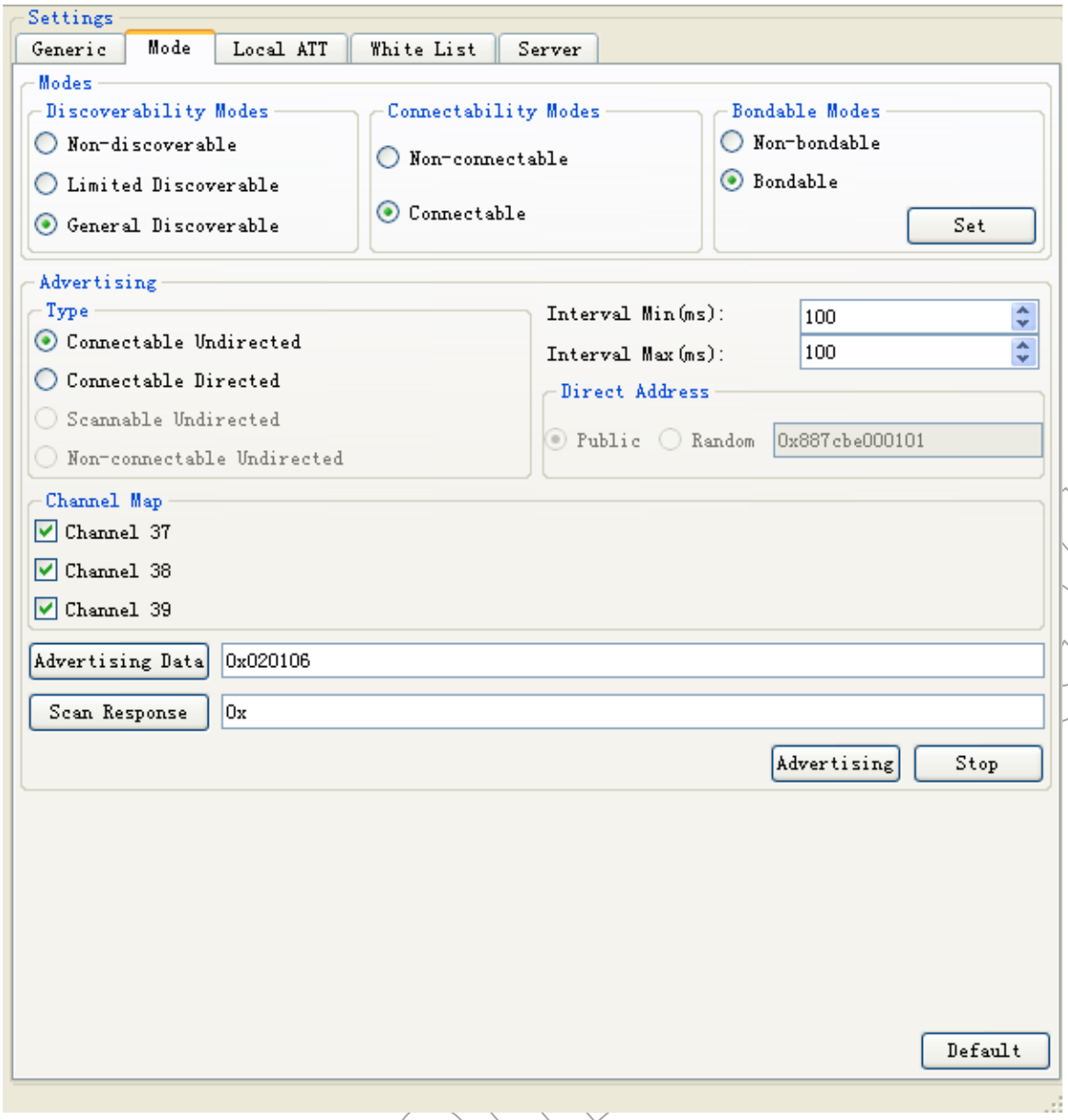


Figure 7 Mode Tab

Two Groups (the Modes Group and the Advertising Group) and a “Default” button are in this tab.

[Default]: Click this button if you want to reset the configurations in this tab to default values.

4.1.2.1 Modes Group

[Non-discoverable]: Non-discoverable Mode. The Bluetooth device shall never be discovered.

[Limited Discoverable]: Limited Discoverable Mode: Discoverable only for a limited period of time.

[General Discoverable]: General Discoverable Mode: Discoverable continuously.

[Non-connectable]: A device in the non-connectable mode shall not allow a connection to be established. Two advertising type: Scannable Undirected and Non-connectable Directed

[Connectable]: A device in the directed connectable mode shall accept a connection request. Two advertising type: Connectable Undirected and Connectable Directed

[Non-bondable]: A device in the non-bondable mode does not allow a bond to be created with a peer device.

[Bondable]: A device in the bondable mode allows a bond to be created with a peer device in the bondable mode.

[Set]: Set Bondable mode.

4.1.2.2 Advertising Group

[Connectable Undirected]：Connectable undirected advertising

[Connectable Directed]: Connectable directed advertising

[Scannable Undirected]: Scannable undirected advertising

[Non-connectable Undirected]: Non connectable undirected advertising

[Interval Min(ms)]: Minimum advertising interval for non-directed advertising.

[Interval Max(ms)]: Maximum advertising interval for non-directed advertising.

[Public]: Public Device Address (default).

[Random]: Random Device Address

[Channel 37]: Enable channel 37 use.

[Channel 38]: Enable channel 38 use.

[Channel 39]: Enable channel 39 use.

[Adv. Data]: Set advertising data.

[Scan Resp.]: Set scan response data.

[Advertising]: Start advertising.

[Stop]: Stop advertising.

4.1.3 Local ATT Tab

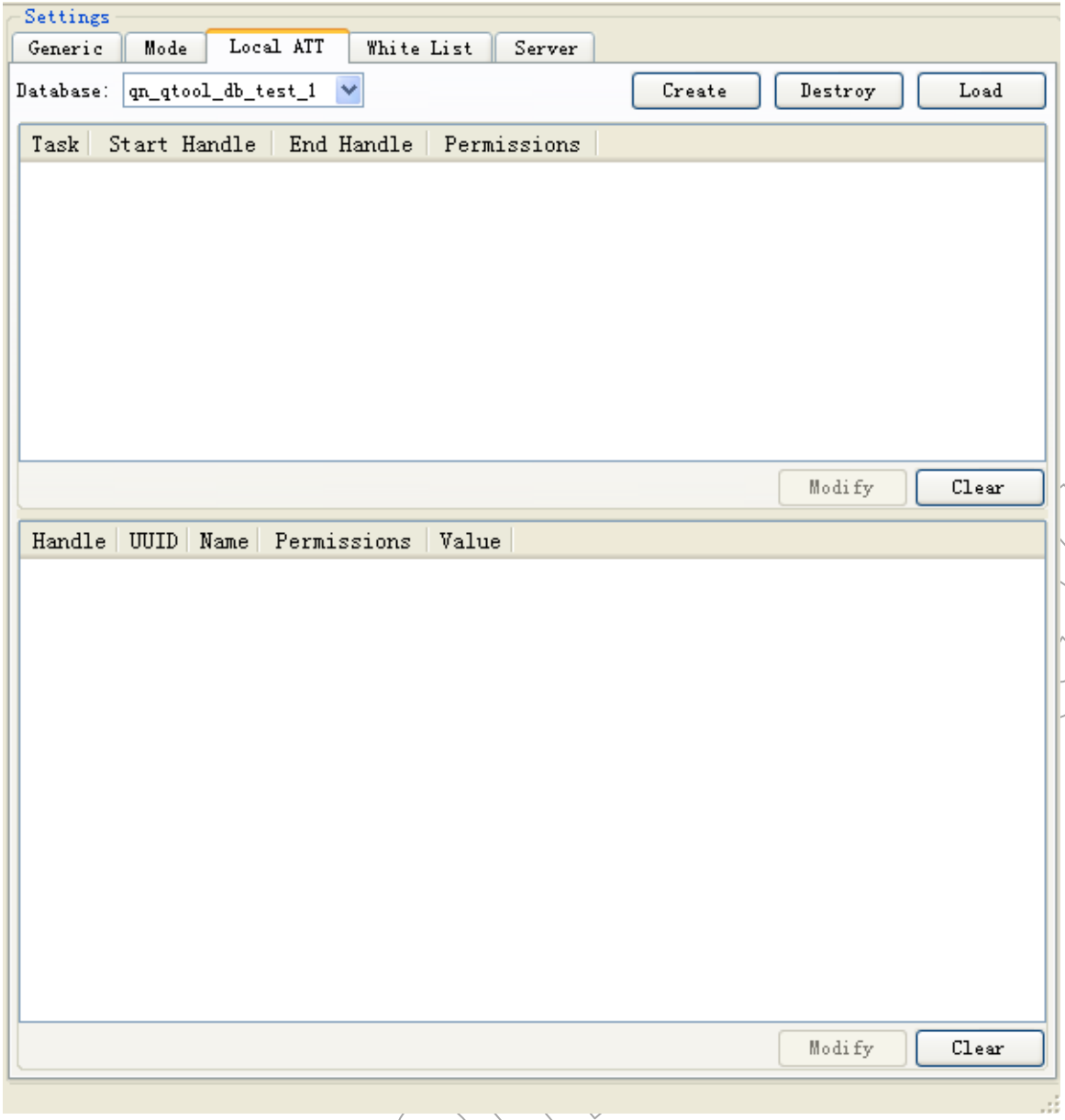


Figure 8 Local ATT Tab

[Database]: Choose a service database.
[Create]: Create the current selected database.
[Destroy]: Destroy the current selected service database.
[Load]: Load the current selected service database.
The service table widget:
[Task]: Task id: TASK_GAP/ TASK_GATT
[Start Handle]: Start handler
[End Handle]: End handler
[Permissions]: Disable access / Enable access.
The attribute table widget:

[Handle]: Attribute handler.

[UUID]: Attribute UUID.

[Name]: Attribute name.

[Permission]: Attribute access types: Read Access, Write Access, Indication Access, Notification Access

[Value]: Attribute value.

4.1.4 White List Tab

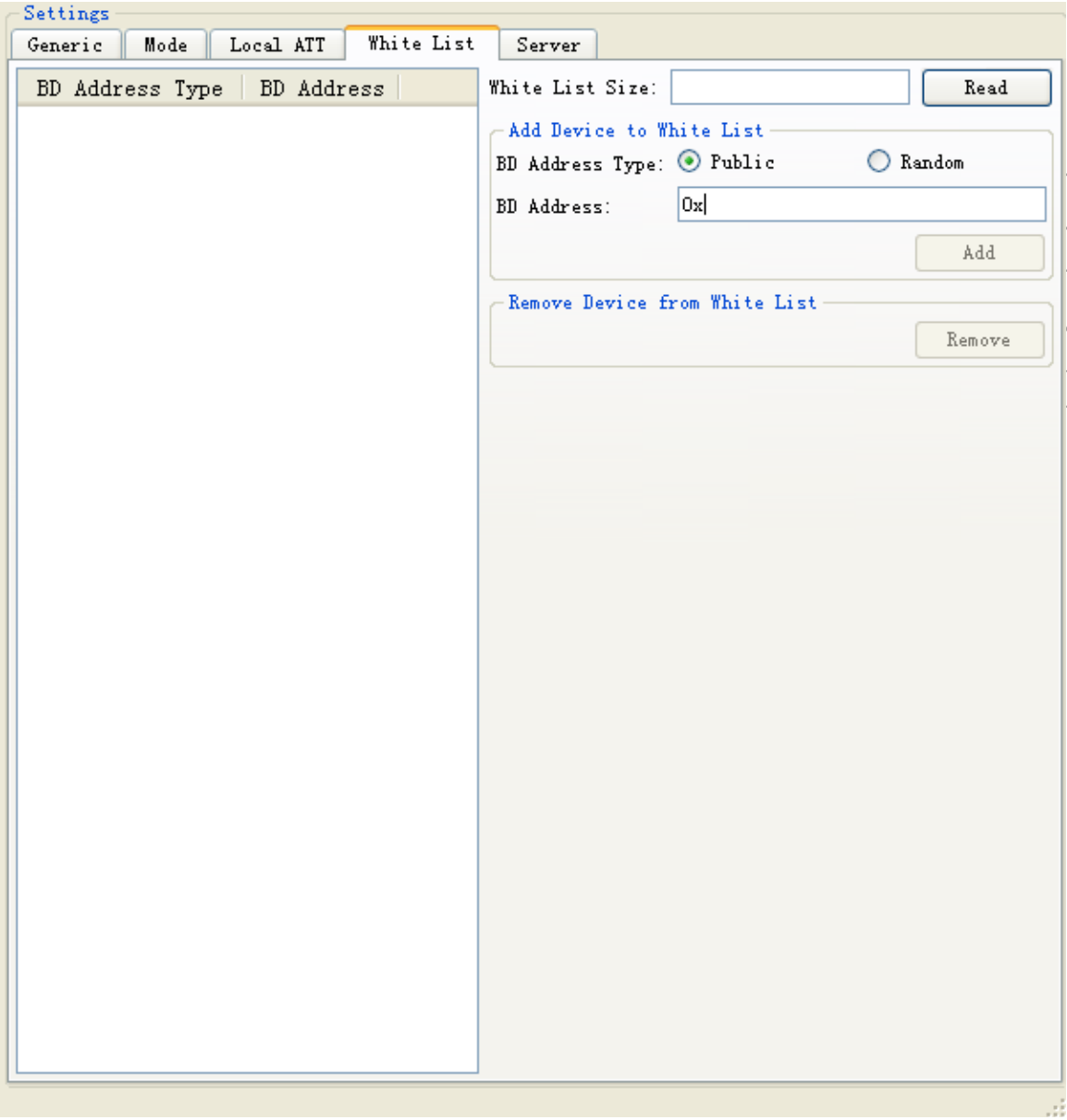


Figure 9 White List Tab

[White List Size]: White list size.

[Read]: Read white list size.

[BD Address Type]: Bluetooth device address type. Public Device Address (default)/ Random Device Address

[Add]: Add a Bluetooth device to white list.

[Remove]: Remove the current selected Bluetooth device from white list item.

4.1.5 Server Tab

On the “Server” tab, there are all the GATT Servers that could be created. By operate on each sub tab, the GATT Servers could be tested.

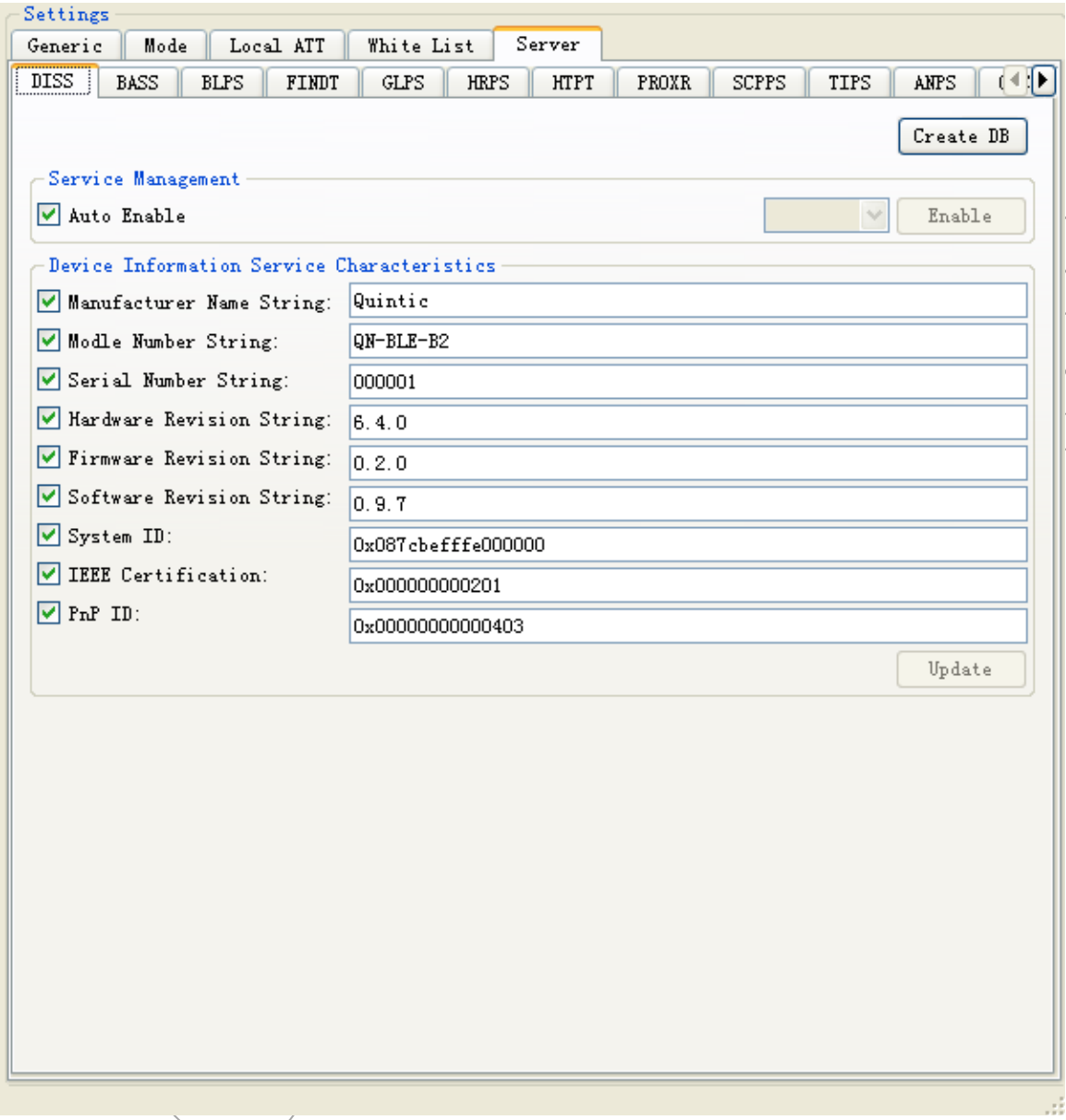


Figure 10 Server Tab

4.2 Remote Device Setting Tabs

There are four kinds of remote device setting tab: the “Connection to Peer” tab, the “Peer ATT” tab, the “Security” tab, and the “Client” tab.

4.2.1 Connection to Peer Tab

The “Connection to peer” tab as the figure 11 shows:

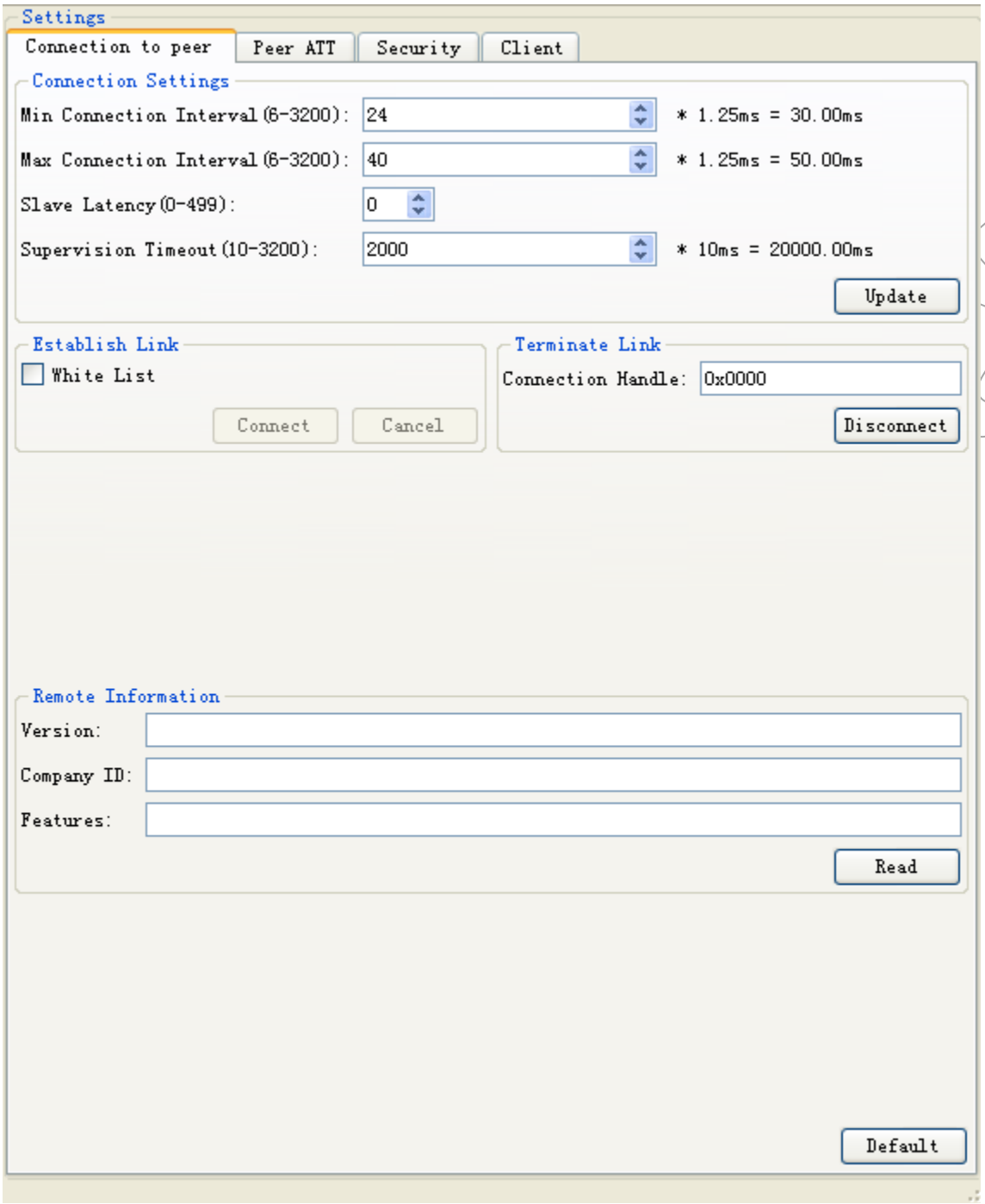


Figure 11 Connection to Peer Tab

Four Groups (the Connection Setting Group, the Establish Link Group, the Terminate Link Group, the Remote Information Group) and a ”Default” button are in this tab.

[Default]: Click this button if you want to reset the configurations in this tab to default values.

4.2.1.1 Connection Settings Group

[Min Connection Interval]: minimum connection interval, value range: 7.5ms~4000 ms

[Max Connection Interval]: maximum connection interval, value range: 7.5ms ~4000ms

[Slave Latency]: slave latency (connSlaveLatency).value range: 0~499

[Supervision Timeout]: Supervision Timeout. Value range: 100ms~3200ms

[Update]: Update a set of new connection parameters

4.2.1.2 Establish Link Group

[Connect]: Click this button to connect device.

[Cancel]: Click this button to stop the current connects operation.

[White List]: Connect the devices in the white list only.

4.2.1.3 Terminate Link Group

[Disconnect]: Click this button if you want to disconnect the connection between this remote devices and the local devices.

4.2.1.4 Remote Information Group

[Read]: Click this button to get the remote device’s version and company id.

4.2.2 Peer ATT Tab

The “Peer ATT” tab as Figure 12 shows:

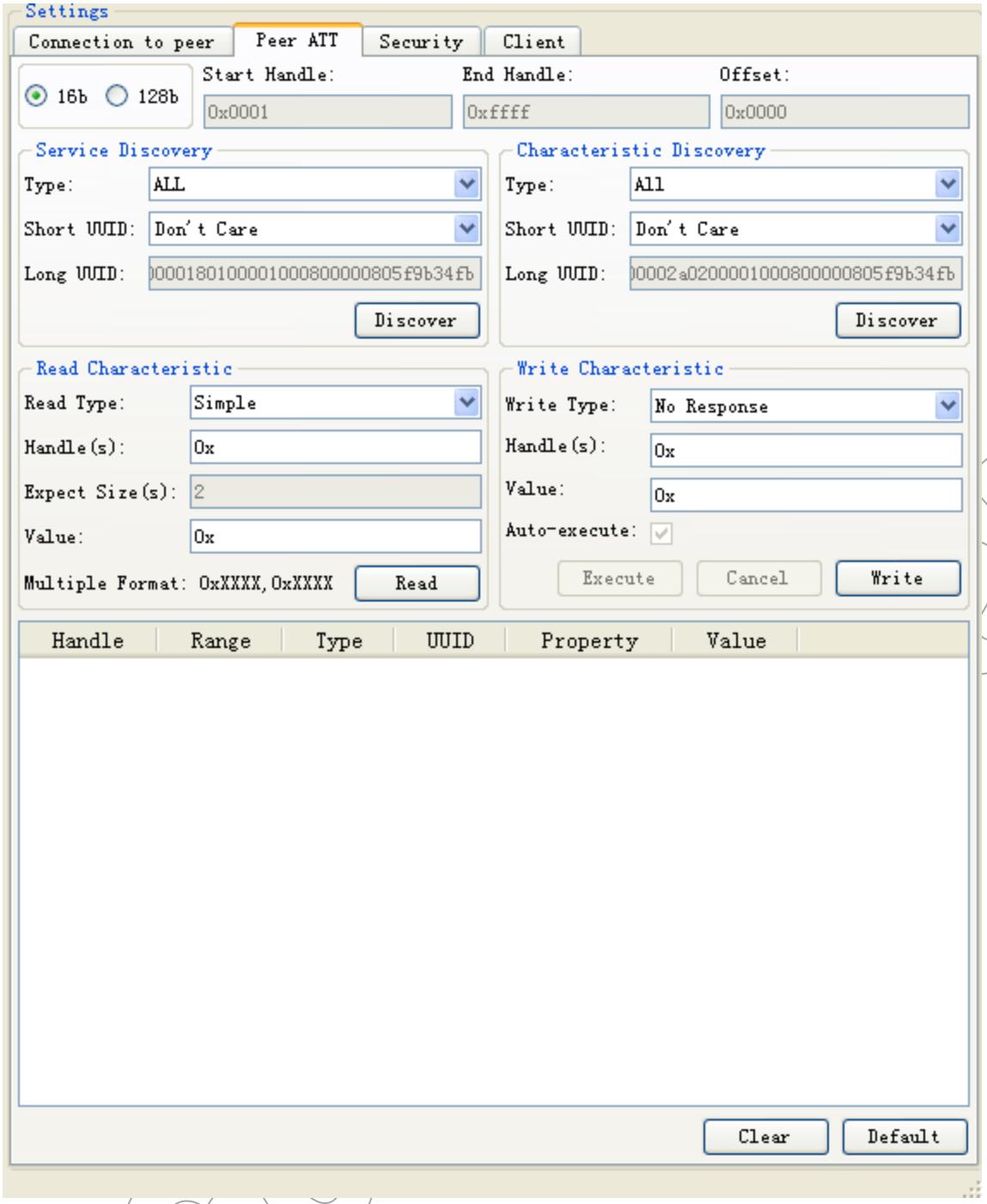


Figure 12 Peer ATT Tab

4.2.2.1 Service Discovery Group

[Type]: There three kinds of service discovery type: ALL, UUID, Include

ALL: Discovery all services.

By UUID: Discovery services by UUID. There are two kinds of UUID: 16bit UUID, 128bit UUID.

[Short UUID]: Also called "16bit UUID". Selected by the "Short UUID" combo box or you could write the short UUID value directly in the "Short UUID" combo box.

[Long UUID]: Also called “128 bit UUID”. Write the value in the “Long UUID” line edit.

Include: Discover services within the Handle range from start Handle value to the end Handle value.

You could set the start Handle value in the “Start Handle” line edit, and the end Handle value in the “end Handle” line edit.

4.2.2.2 Characteristics Discovery Group

[Type]: Three Characteristics discovery types: ALL, By UUID, Descriptor.

ALL: Discover all Characteristics.

By UUID: Discovery Characteristics by UUID.

Descriptor: Discover Characteristics within the Handle range from start Handle value to the end Handle value.

You could set the start Handle value in the Start Handle line edit, and the end Handle value in the end Handle line edit.

4.2.2.3 Read Characteristics Group

[Read Type]:

“Simple”: Read Characteristic Value.

“By UUID”: Read Using Characteristic UUID.

“Long”: Read Long Characteristic Value.

“Multiple Long”: Read Multiple Characteristic Values.

“Descriptor”: Read Characteristic Descriptors.

“Long Descriptor”: Read Long Characteristic Descriptor.

4.2.2.4 Write Characteristics Group

[Write type]

“No response”: Write without response

“Signed”: Signed Write Characteristic value

“Simple”: Write Characteristic value

“Long”: Write Long Characteristic value

“Reliable”: Characteristic Value Reliable Write

“Descriptor”: Write Characteristic Descriptors

“Long Descriptor”: Write Long Characteristic Descriptors

4.2.3 Security Tab

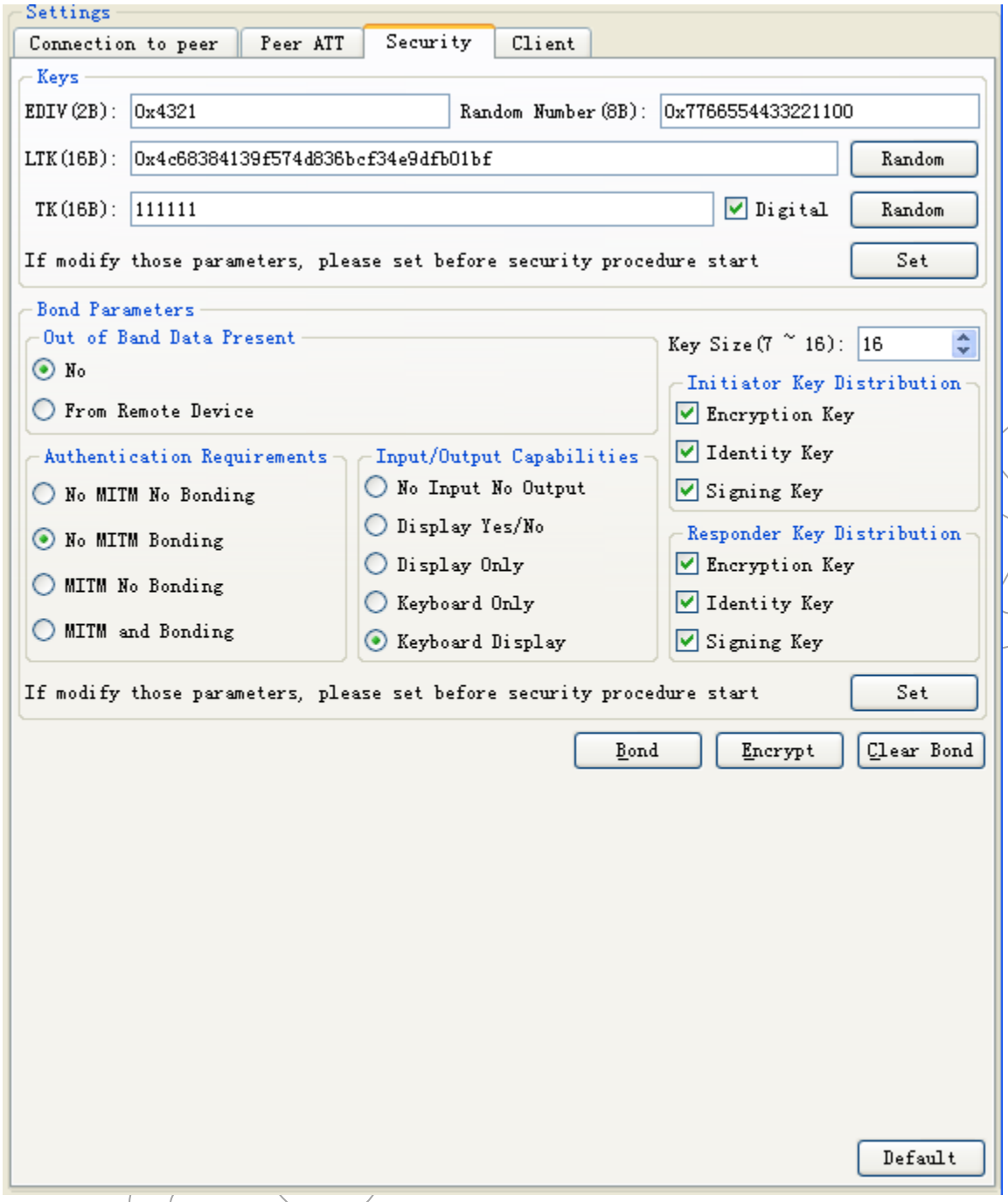


Figure 13 Security Tab

[Bond]：Bond the local device with the remote BLE device.

[Encrypt]: Directly encrypt a link with a peer using known bonding information from a previous connection when pairing or bonding occurred.

[Clear Bond]: Clear local bond information.

4.2.3.1 Keys Group

[EDIV]: Encrypted Diversifier (EDIV) is a 16-bit stored value used to identify the LTK.

[Random Number]: Random Number (Rand) is a 64-bit stored valued used to identify the LTK.

[LTK]: Long Term Key (LTK) is a 128-bit key used to generate the contributory session key for an encrypted connection.

[TK]: Temporary Key

4.2.3.2 Bond Parameters Group

Five sub groups are in the “Bond Parameters” group: the “Out of Band Data Present” group, the “Input / Output Capabilities” group, the “Authentication Requirements” group, the “Initiator Key Distribution” group, the “Responder Key Distribution” group.

4.2.4 Client Tab

On the “Client” tab, there are all the GATT Clients that could be created. By operate on each sub tab, the GATT clients could be tested.

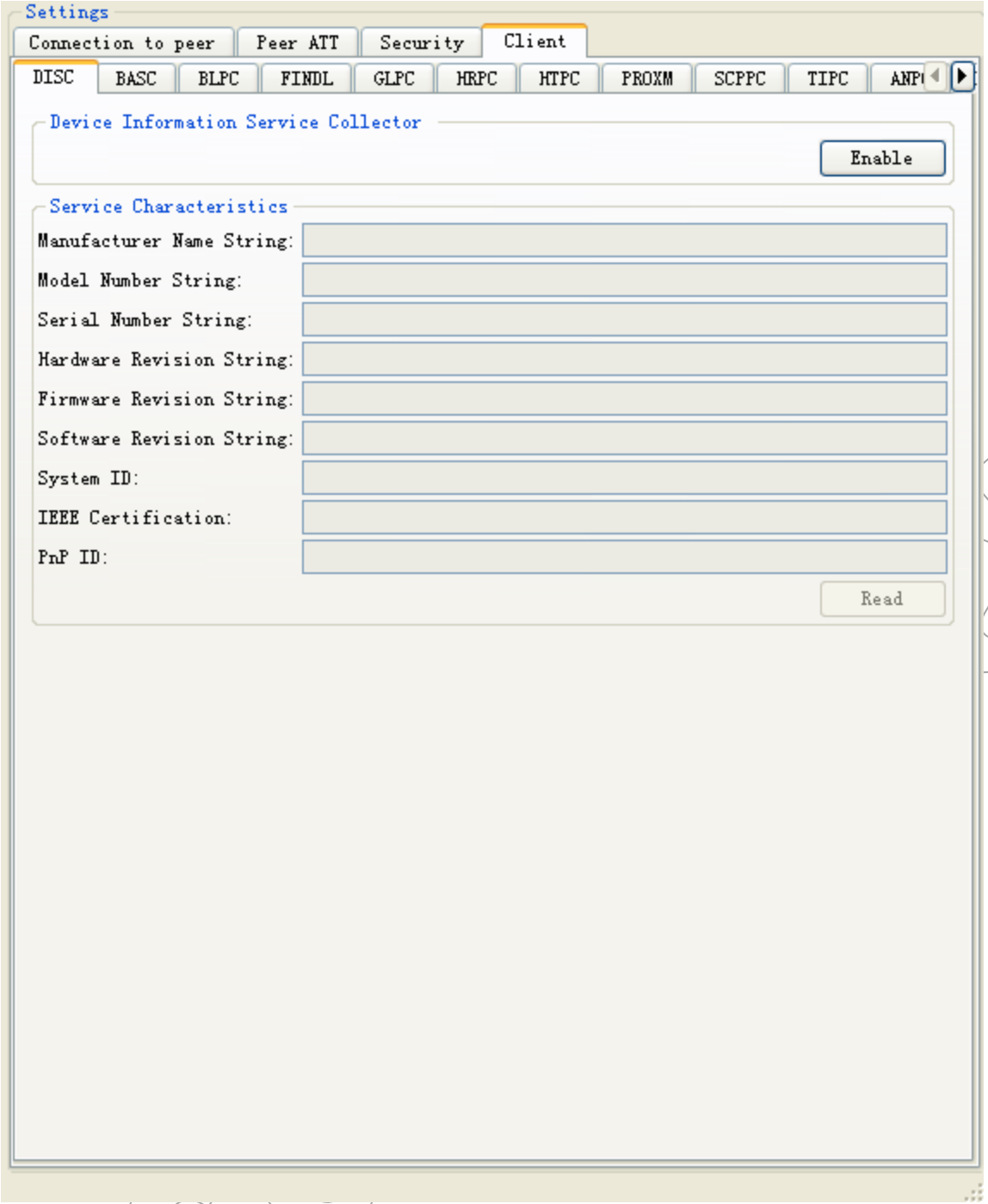


Figure 14 Client Tab

5. Trace Window

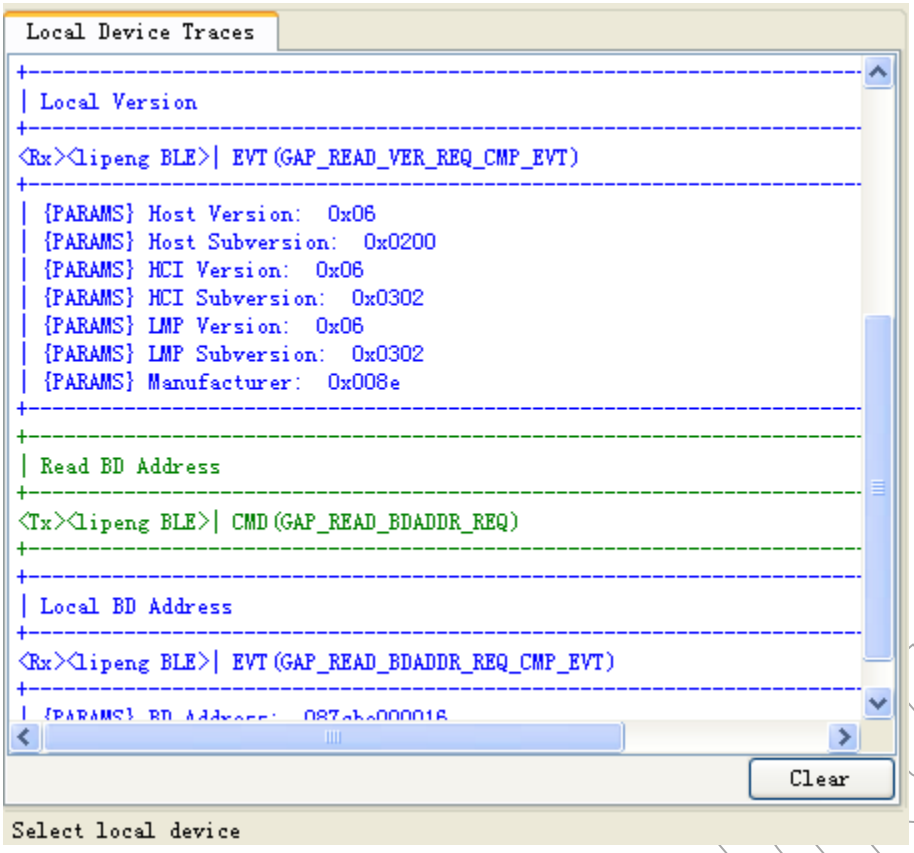


Figure 15 Trace Window

The Trace Window shows the information that the local device sends and receives. The state information of the current operation is shown below the "Local Device Traces" text edit.

6. Operation Examples

6.1 Scan

First, select a local BLE device item in the Devices Window.

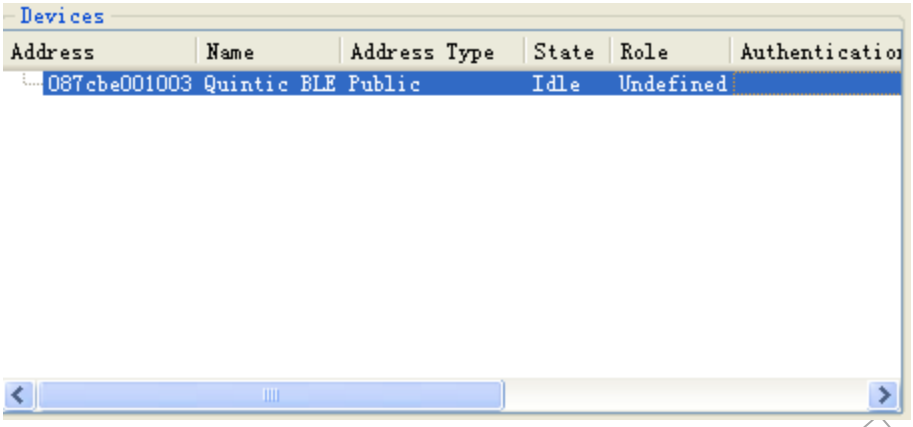


Figure 16 Select a Device

Second, click the "Scan" button in the Discovery Group of this device's Setting Window.

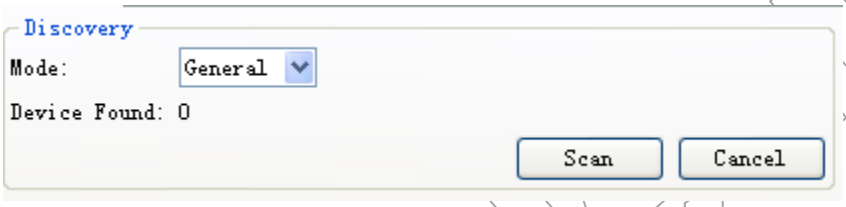


Figure 17 Scan

After about 10 seconds or you clicked the "Cancel" button while scanning, the status bar shows "Scan complete". You will see all Discovered BLE Devices shows in the Devices Window.

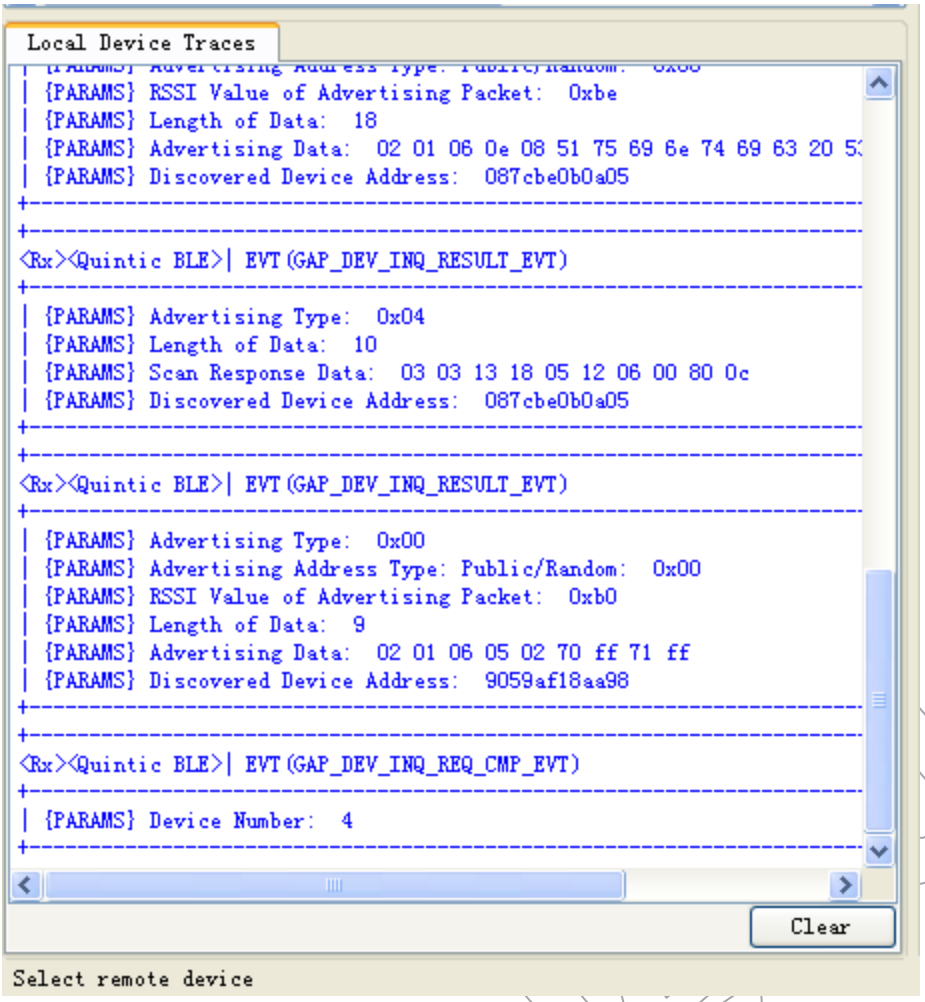


Figure 18 Trace Information

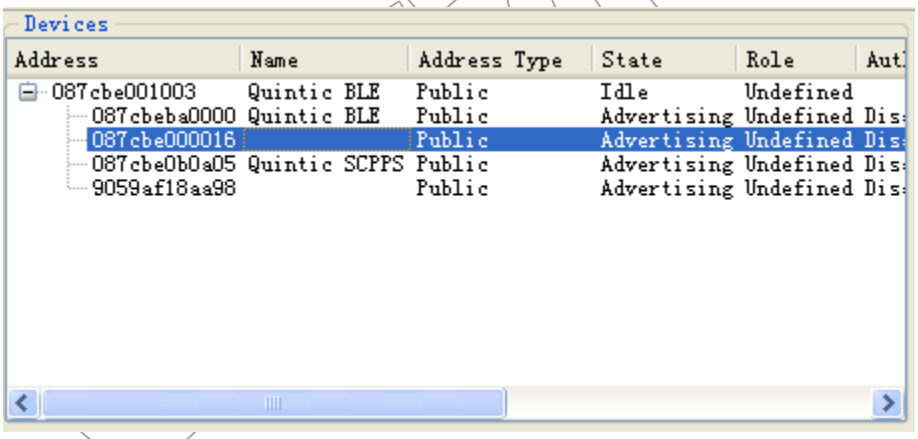


Figure 19 Scan Result

6.2 Connection

6.2.1 Establish a link

After finished scanning, we could connect the local devices with a remote device.

First, select a remote BLE device item in the Devices Window.

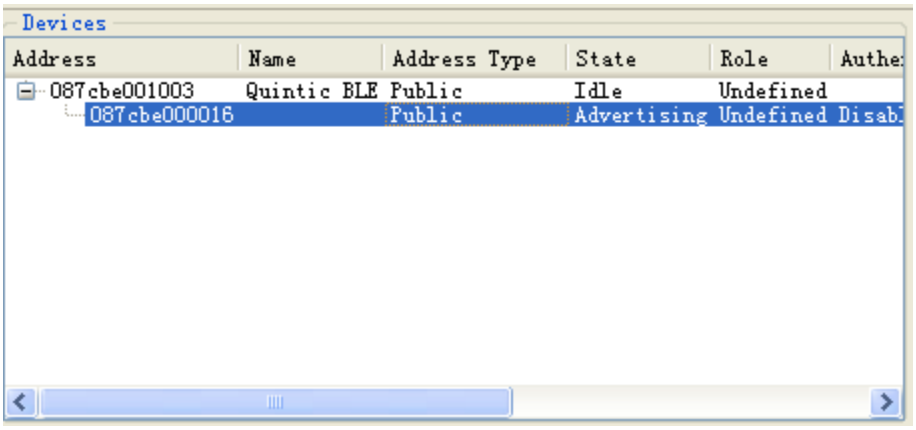


Figure 20 Establish Connection

Second Click the “Connect” button in the Establish Link Group of this device’s Connect to pair tab.

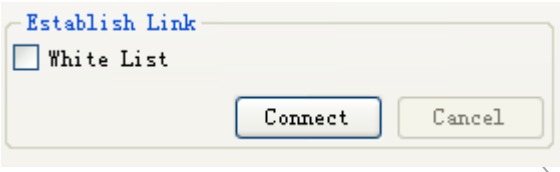


Figure 21 Connect

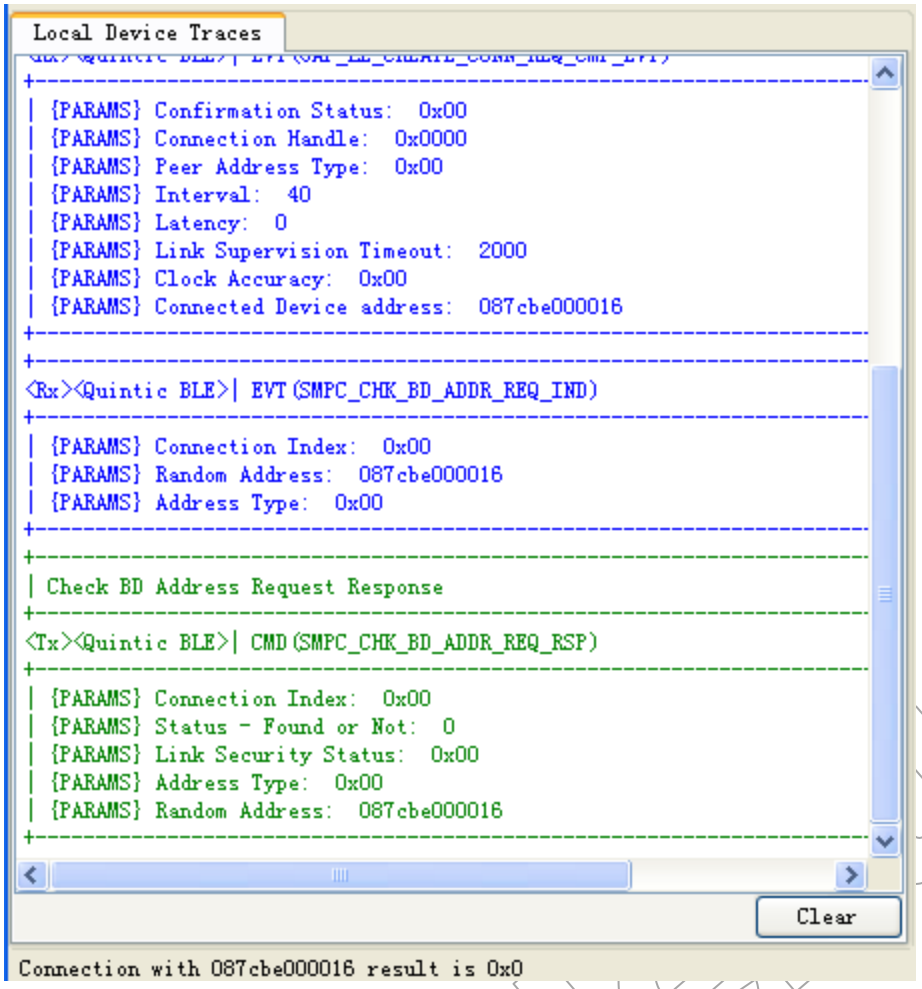


Figure 22 Connect Trace Information

6.2.2 Terminate a link

First, select a connected remote device in the “Devices” window.

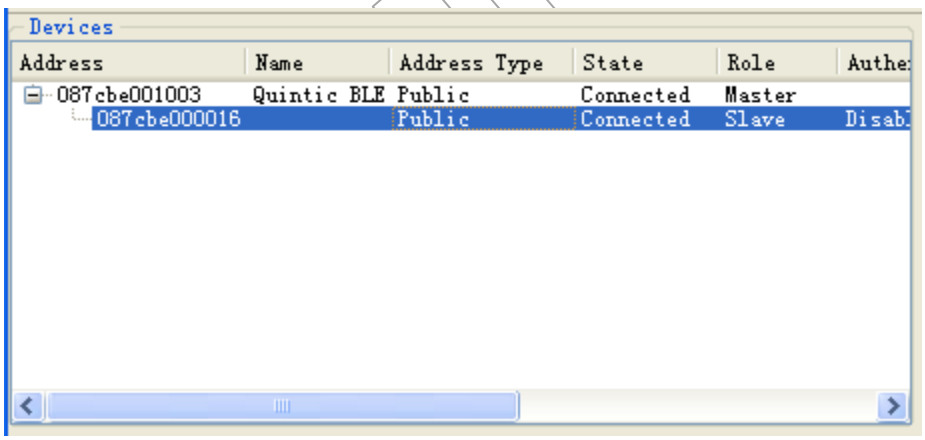


Figure 23 Select Device

Second, click the “Disconnect” button in the “Terminate Link” group of this device.

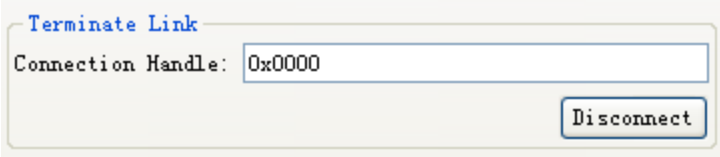


Figure 24 Disconnect

The remote device's state becomes "Disconnected", meaning this operation succeeds.

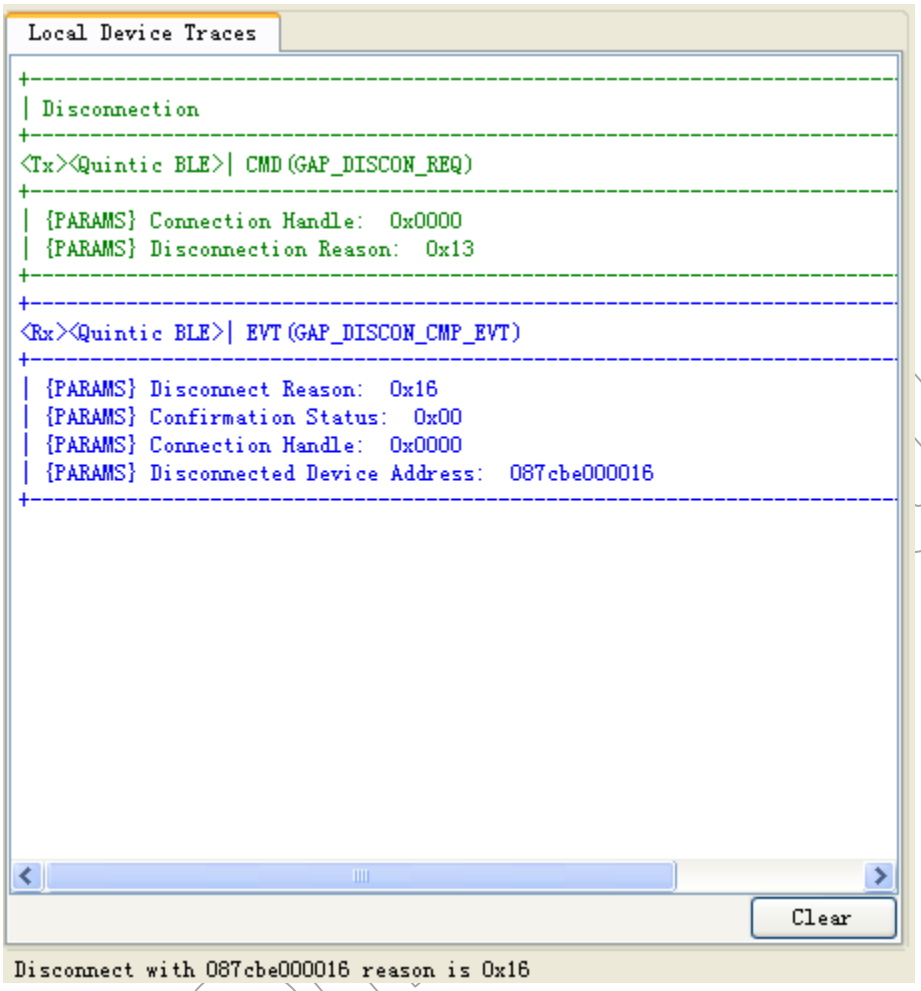


Figure 25 Terminate Connection Trace Information

6.3 Discovery Services

Example 1:

First, click on the "Type" combo box, and choose the "ALL" option.

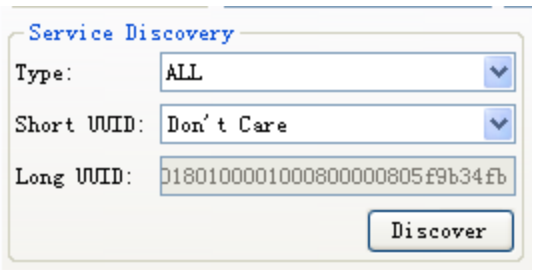


Figure 26 Service Discovery

Second, click on the "Discover" button, this application will search out all the services that will be listed in the table widget on the bottom of the tab.

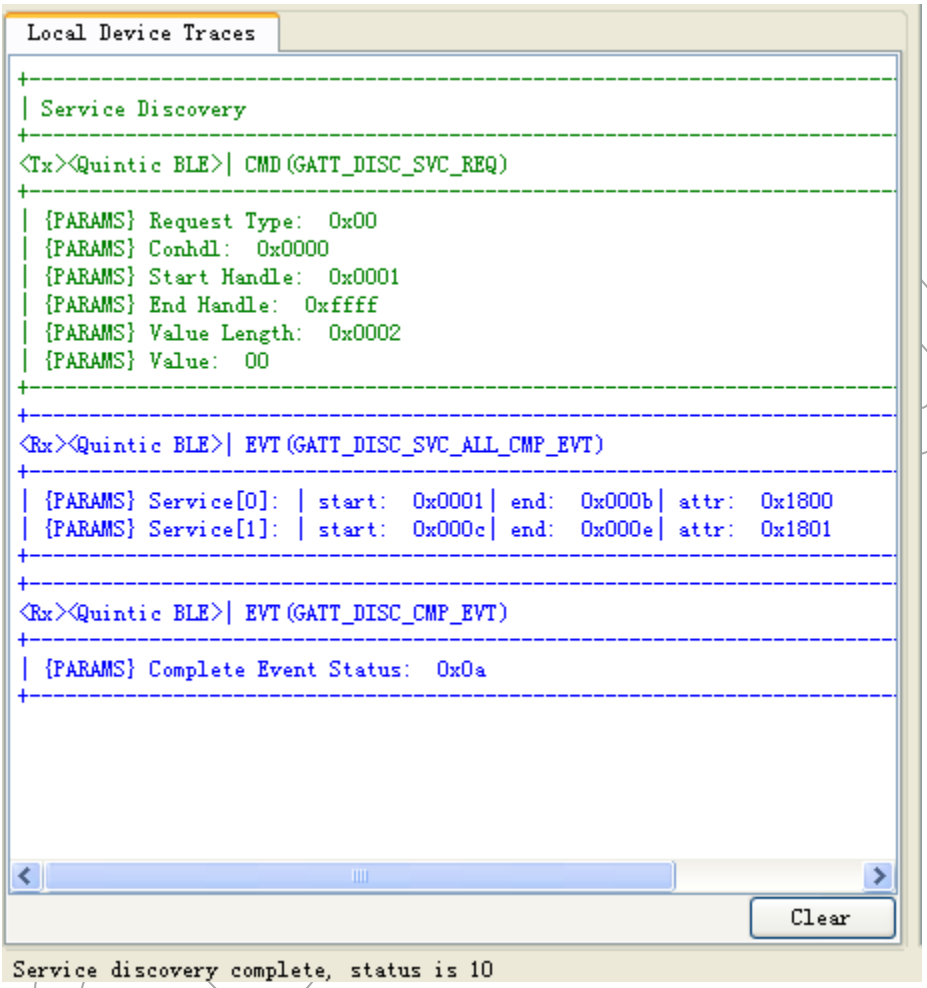


Figure 27 Trace Information

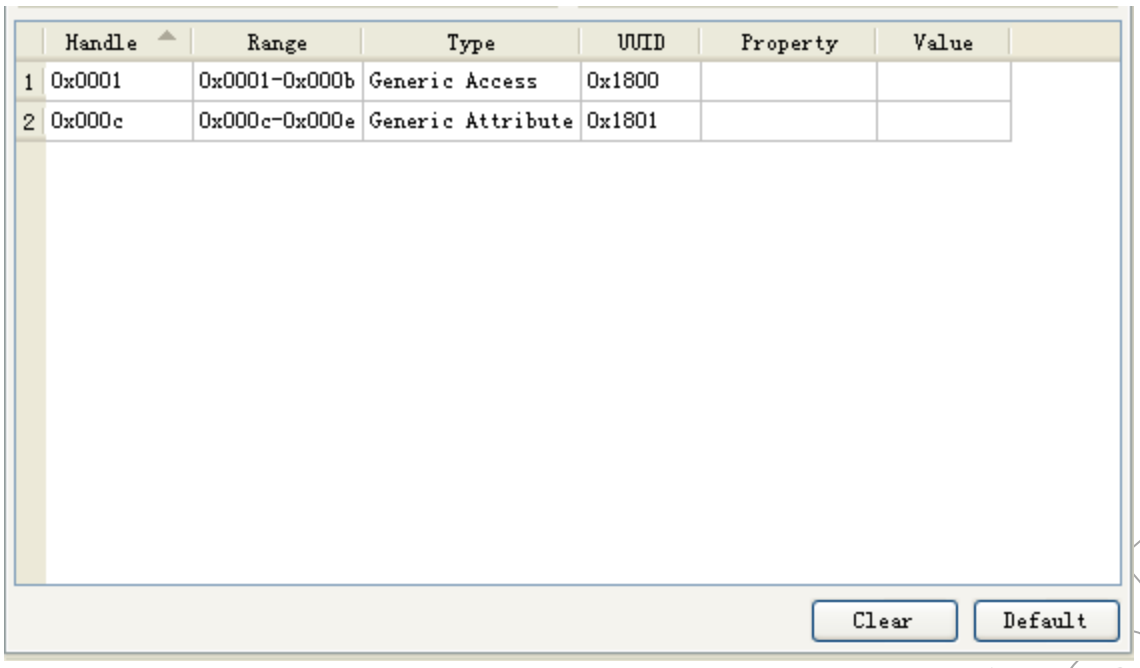


Figure 28 Discovery Result

6.4 Discovery Characteristics

First, click on the “Type” combo box, and choose the “All” option.

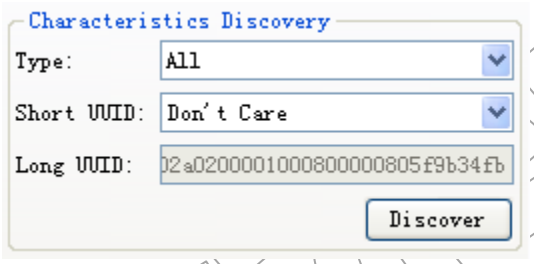


Figure 29 Characteristics Discovery

Second, click on the “Discover” button, this application will search out all the characteristics that will be listed in the table widget on the bottom of the peer tab.

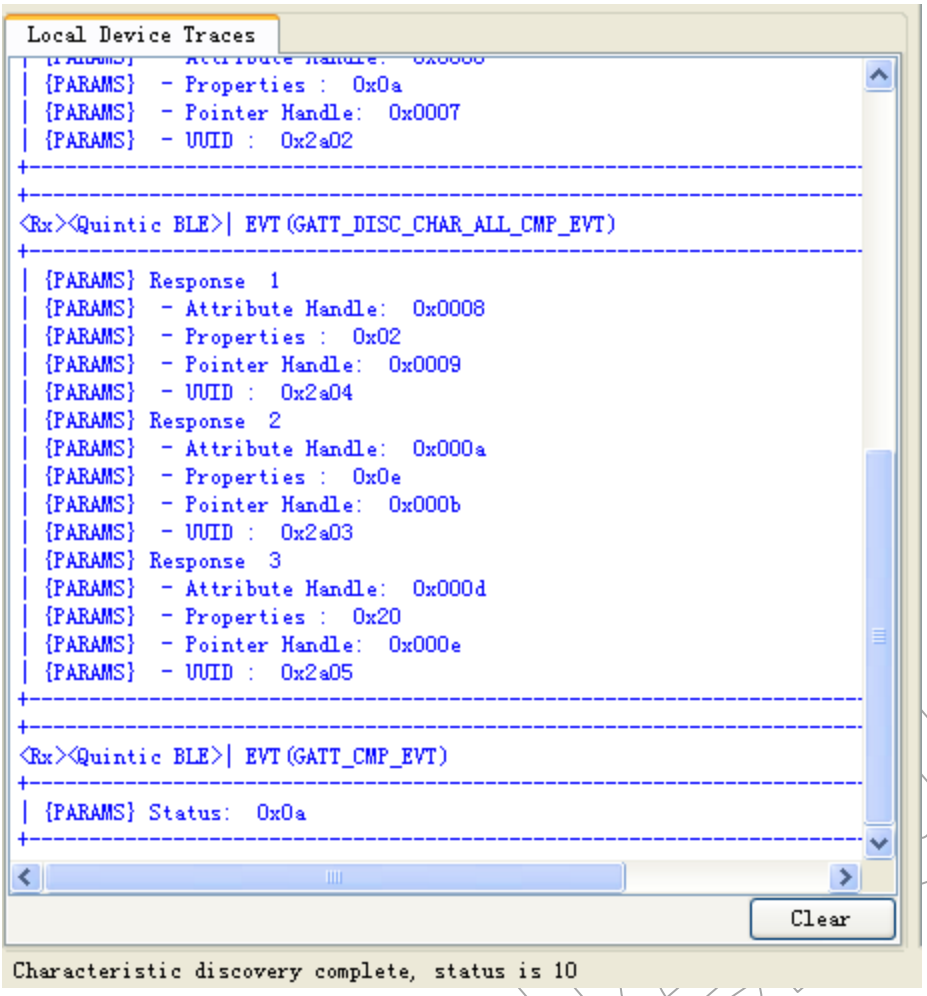
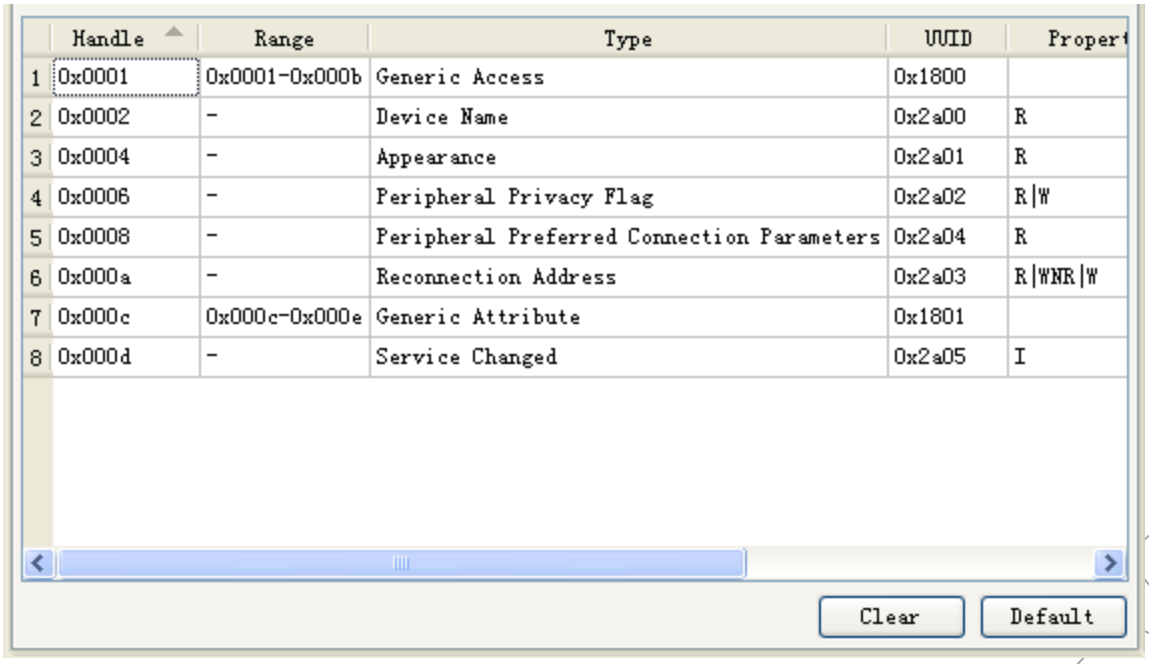


Figure 30 Characteristics Discovery Trace Information



	Handle	Range	Type	UUID	Propert
1	0x0001	0x0001-0x000b	Generic Access	0x1800	
2	0x0002	-	Device Name	0x2a00	R
3	0x0004	-	Appearance	0x2a01	R
4	0x0006	-	Peripheral Privacy Flag	0x2a02	R|W
5	0x0008	-	Peripheral Preferred Connection Parameters	0x2a04	R
6	0x000a	-	Reconnection Address	0x2a03	R|WNR|W
7	0x000c	0x000c-0x000e	Generic Attribute	0x1801	
8	0x000d	-	Service Changed	0x2a05	I

Clear Default

Figure 31 Discovery Characteristics Result

6.5 Read Characteristics

First, click on the “Read Type” combo box, and choose the “Simple” option or “long” option. Second, write the handle number (for example 0x0011) in the “Handle(s)” line Edit. Third, the value size you expected should be written in the “Expect Size(s)” line edit.

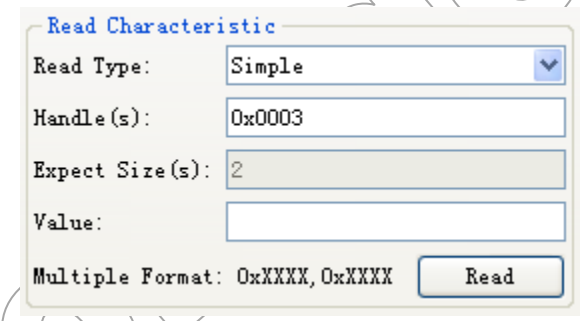


Figure 32 Read Characteristics

When you clicked on the “Read” button, then this application will read the characteristic by the handle number and shows it in the “Value” line edit.

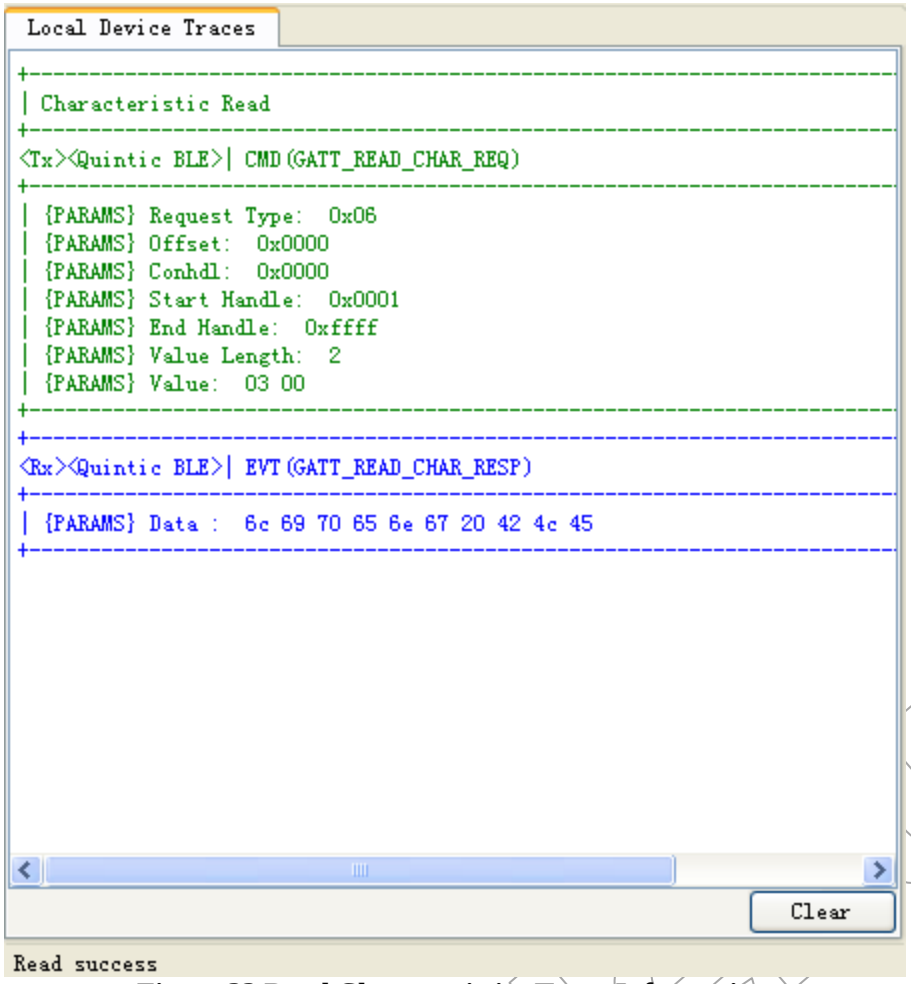


Figure 33 Read Characteristics Trace Information

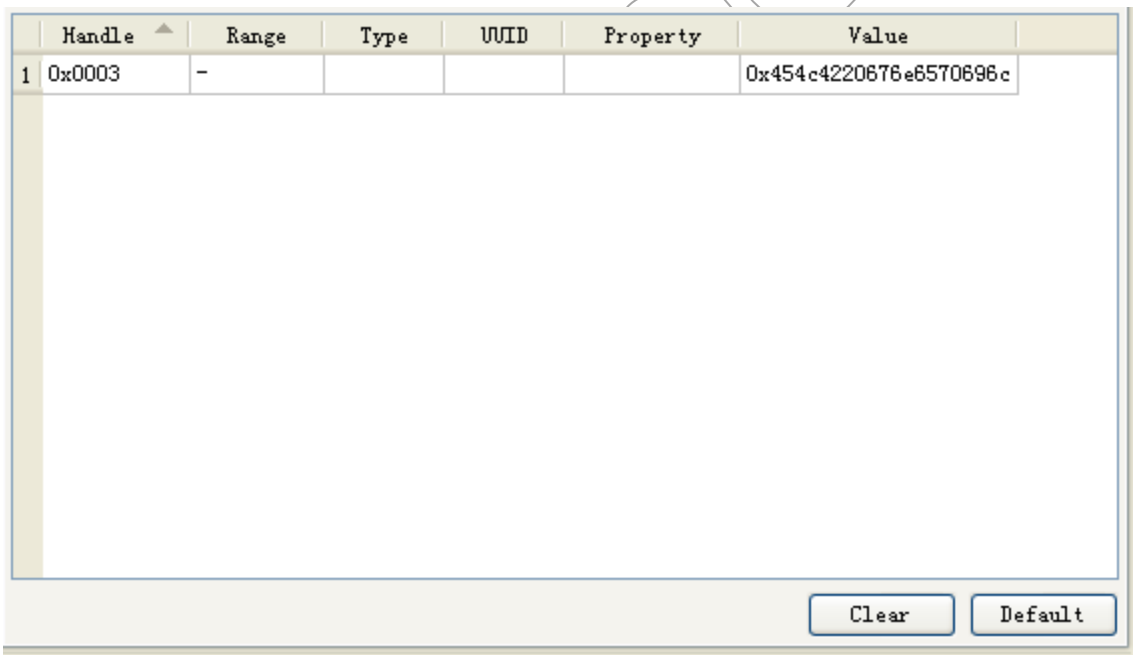


Figure 34 Read Characteristics Result

6.6 Write Characteristics

First, Click on the “Write Type” combo box, and choose the “Simple” option or the “Long” option： Then write a handle number (for example 0x12) in the “Handle(s)” line edit. Write the value you want to set in the “Value” line edit.

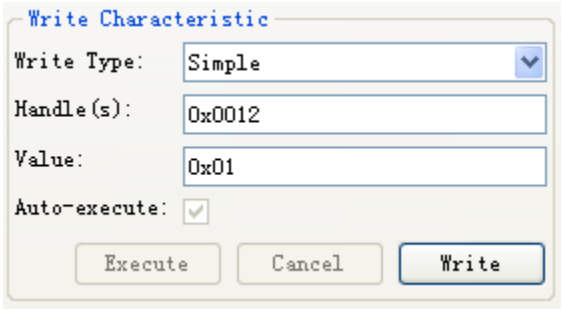


Figure 35 Write Characteristics Examples

At last, click on the “Write” button. This application will write the value to the character of this remote device.

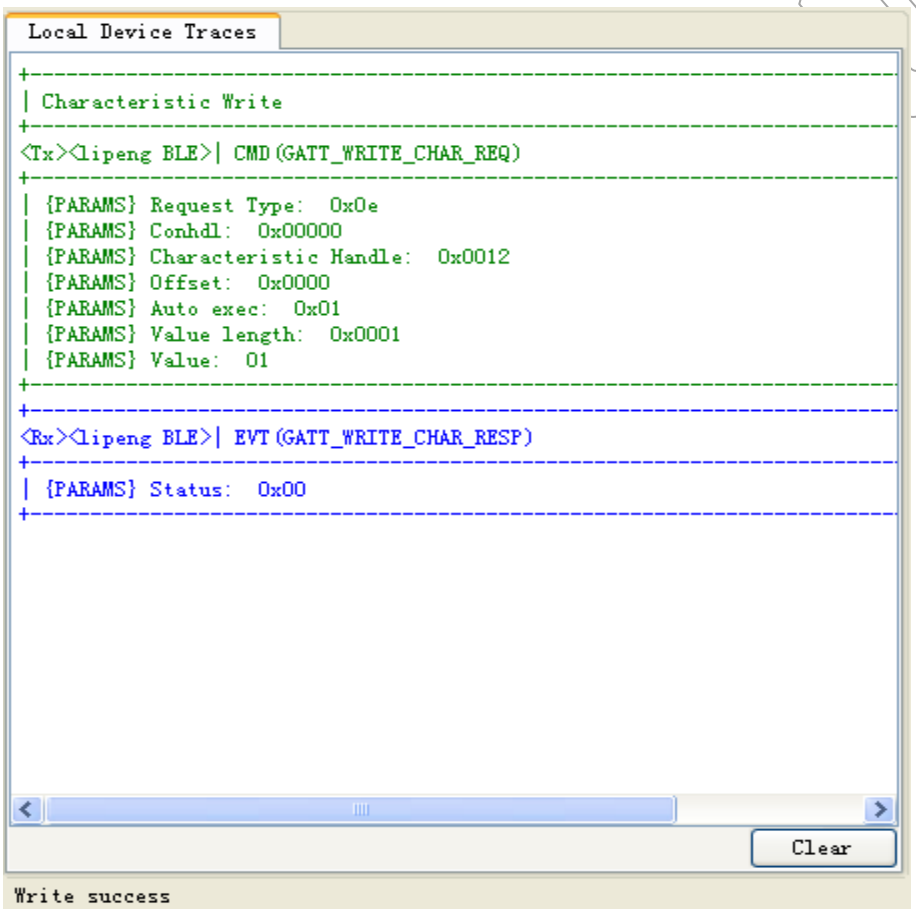


Figure 36 Trace Information

6.7 Bond a Device

To bond this remote device with the local device after “Connection”, usually you should do the three following steps.

Step 1: Set the bond information in the “Bond Information” Group in the Security tab of this device.

Step 2: Click the “Set” button.

Step 3: Click the “Bond” button. If you did not do step 1 and step 2, it will use the default values.

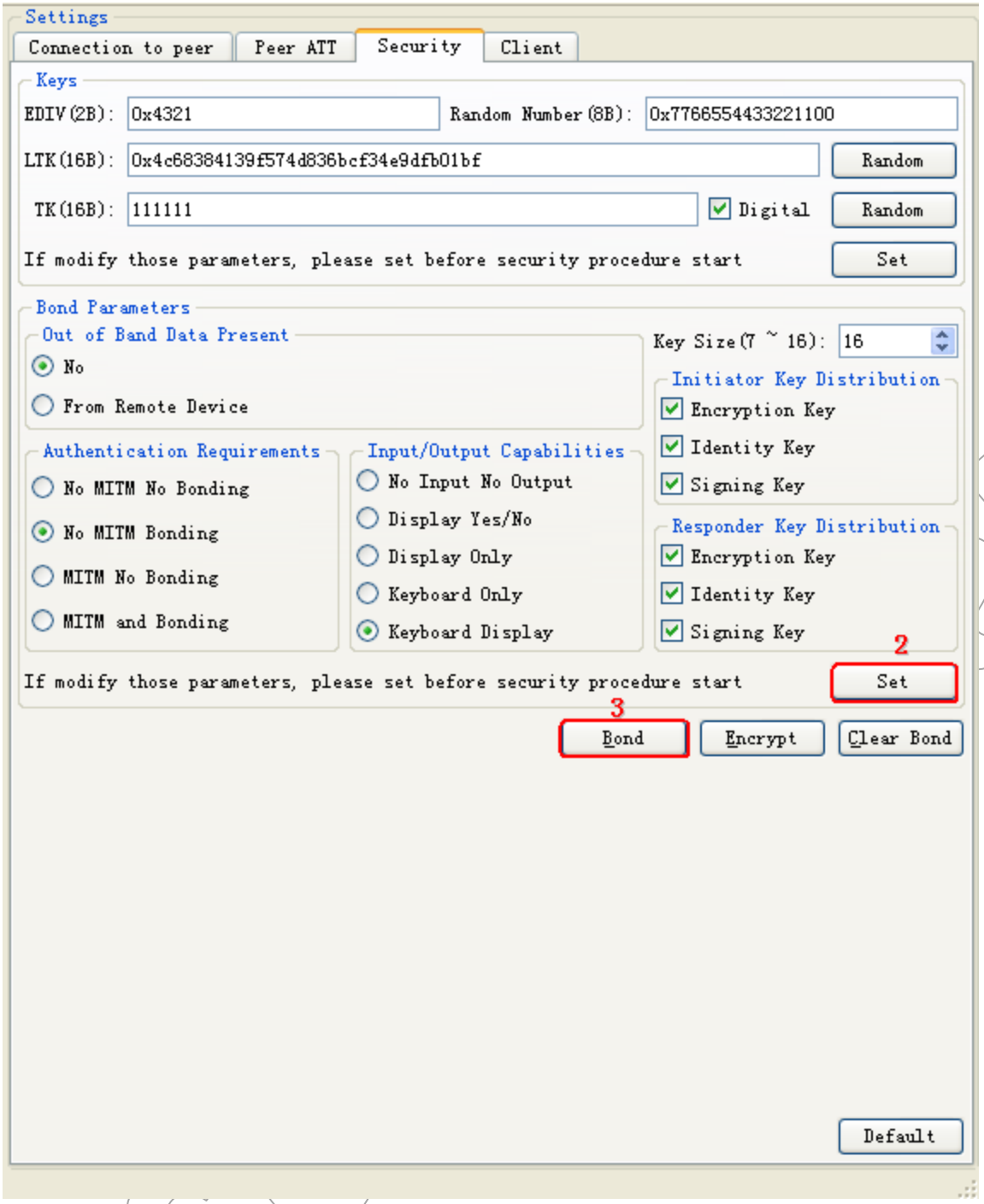


Figure 37 Pair a device

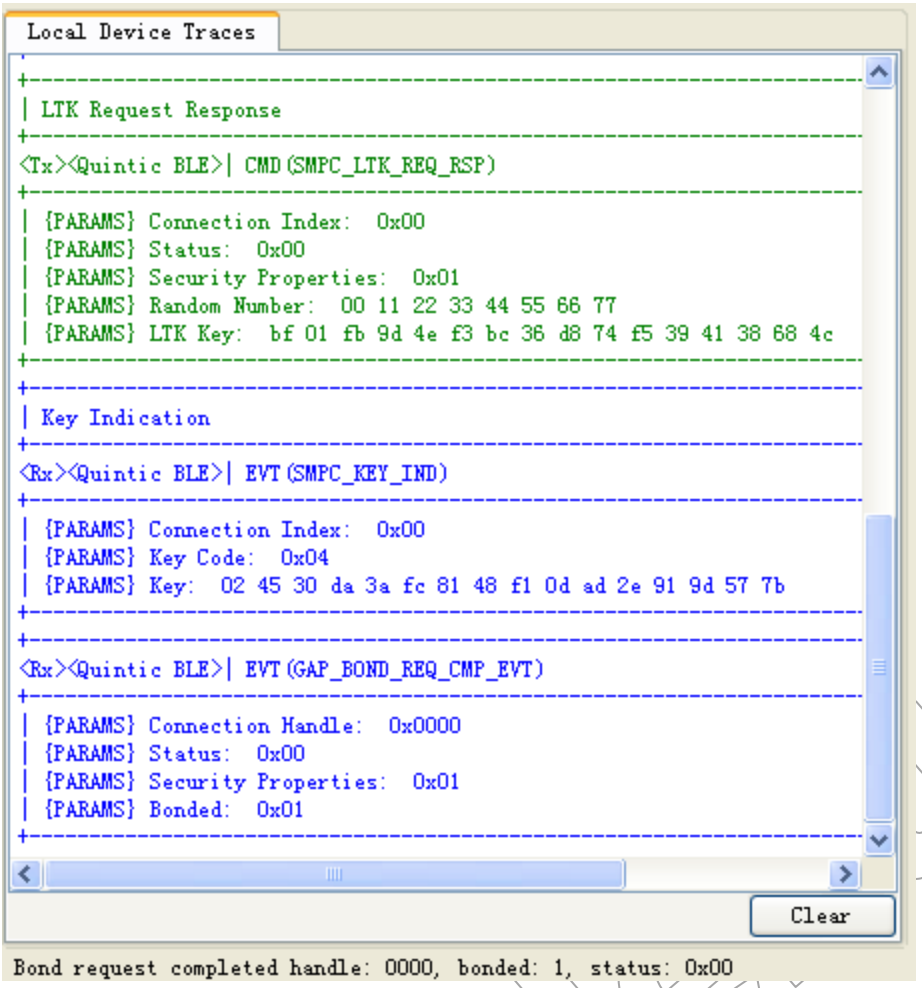


Figure 38 Pair Device Trace Information

6.8 Advertising

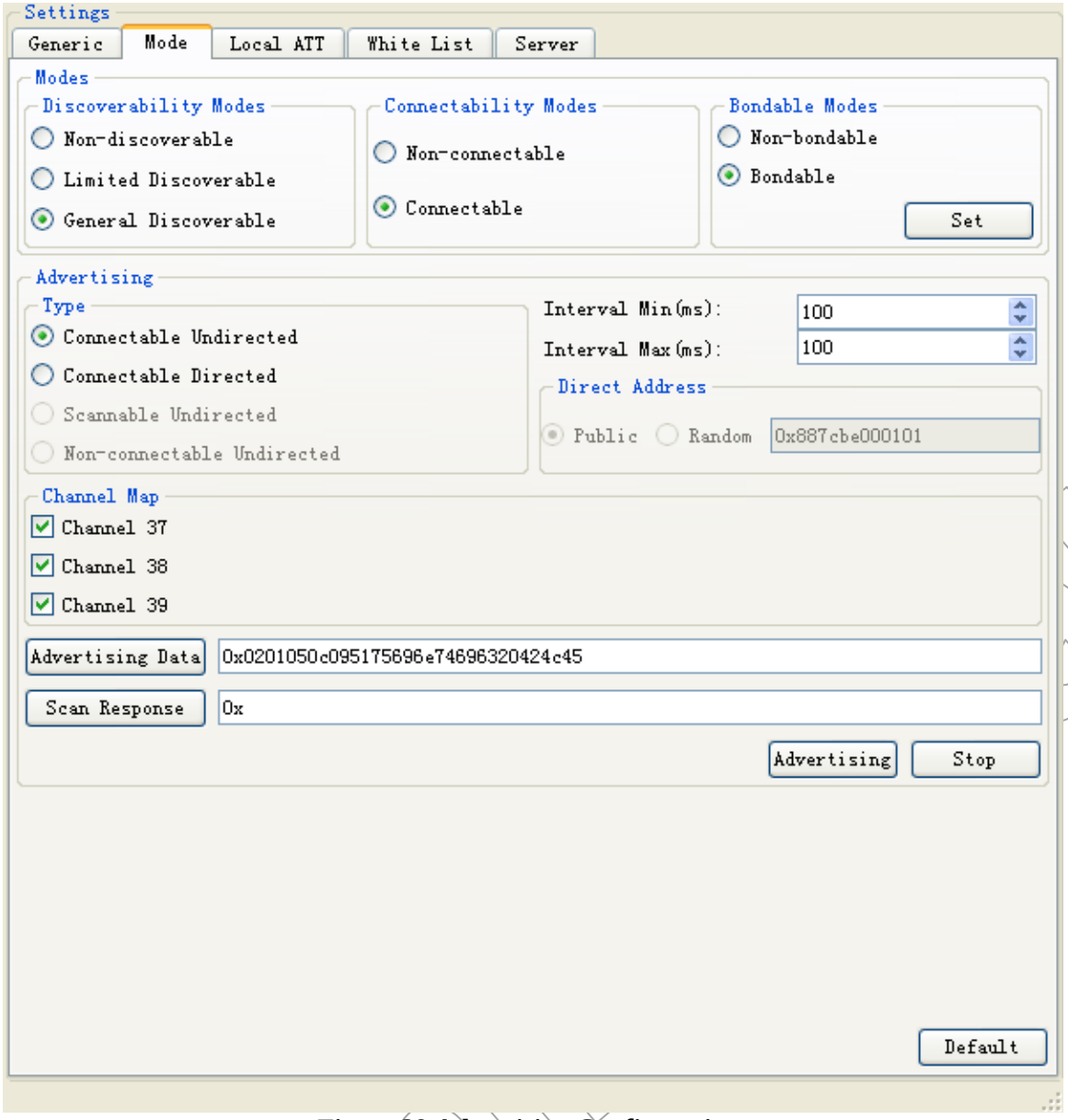


Figure 39 Advertising Configuration

To advertising, please do the follow steps:

Step 1: Select the discoverable modes. For example, select the “General Discoverable” radio button.

Step 2: Select the connectability modes. For example, select the “Connectable” radio button.

Step 3: Select the advertising type. For example, select the “Connectable Undirected” radio button.

Step 4: Set the advertising intervals.

Step 5: Select the channel map. For example, select the “Channel 37” check button, the “Channel 38” check button and the “Channel 39” check button.

Step 6: Set the advertising data. First, click on the “Adv.Data” button. Then you will see the dialog as Figure 38 shows.

Second，choose advertising type, for example, select “Flags”. Then enter the value in the “Value” line edit, for example 0x05.

Third, click on the “add” button.

Four, select an AD type, for example, select “Complete Local Name”. Then enter the value in the “Value” line edit, for example, “Quintic BLE”, as Figure 39 shows.

Five, click on the “add” button.

At last, click on the “ok” button.

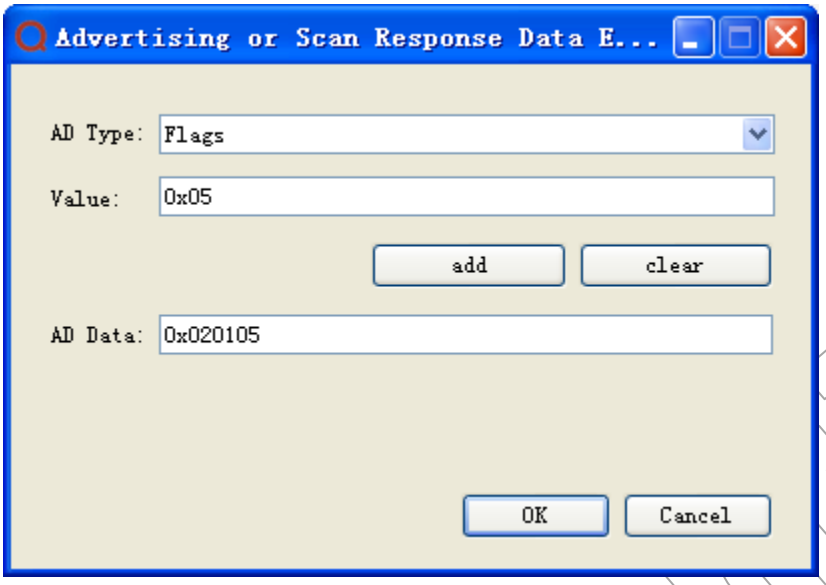


Figure 40 Set Advertising Data

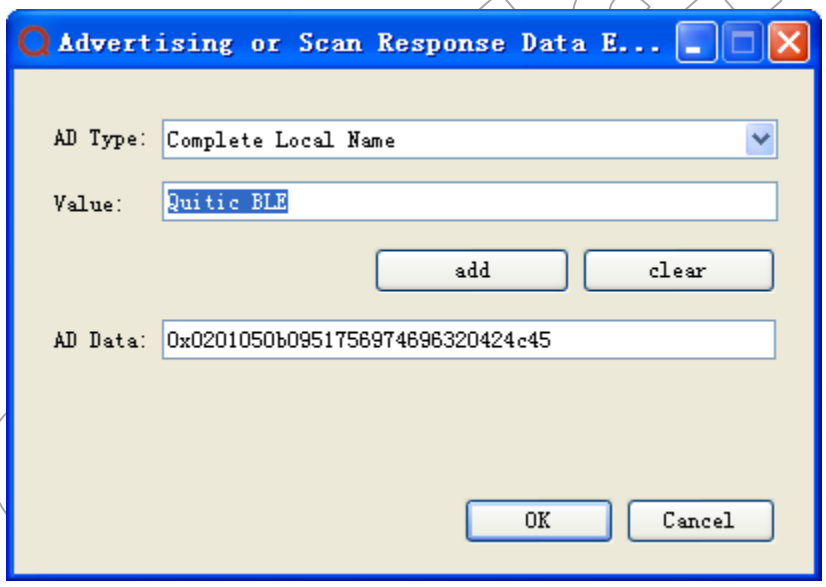


Figure 41 Set Advertising Data

Step 8: Set the scan response data. This is an optional operation. Click on the “Scan Resp.” button, and operate reference to Step 7.

At last, click on the “Advertising” button.

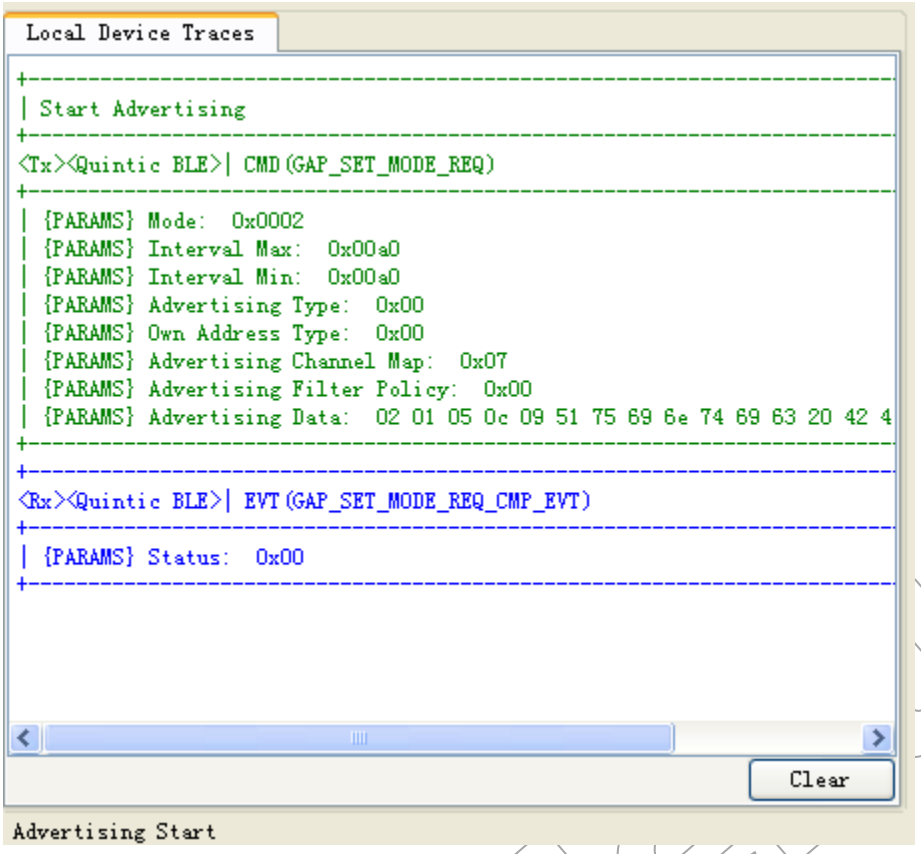


Figure 42 Trace Information

6.9 Add a Bluetooth Device to White List

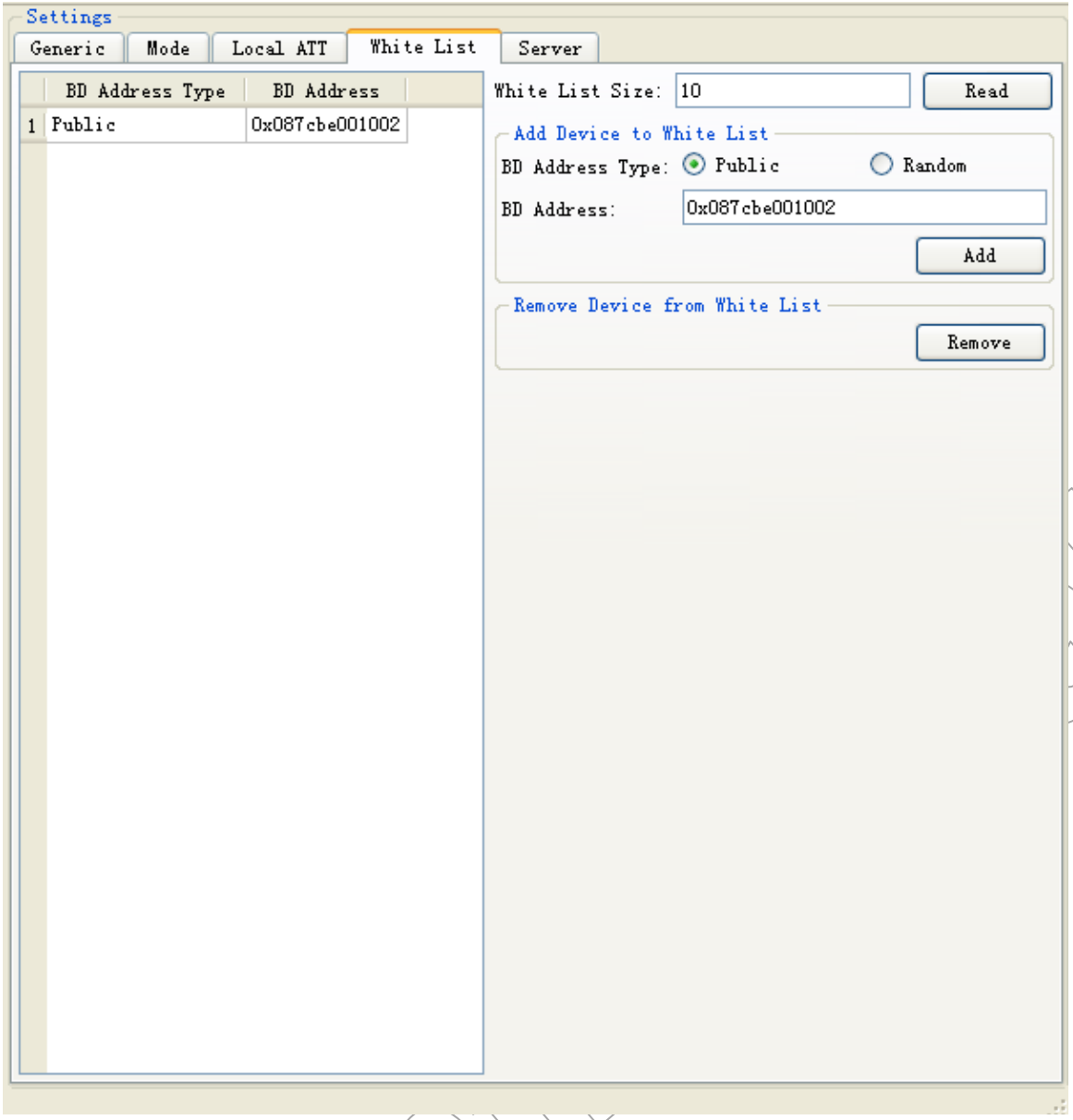


Figure 43 Add a Bluetooth Device to White List

To add a Bluetooth device to white list, please do the following steps:

Step 1: Click on the “Read” button.

Step 2: Select Bluetooth device address type.

Step 3: Enter the Bluetooth device address in the “BD address” line edit.

Step 4: Click on the “Add” button.

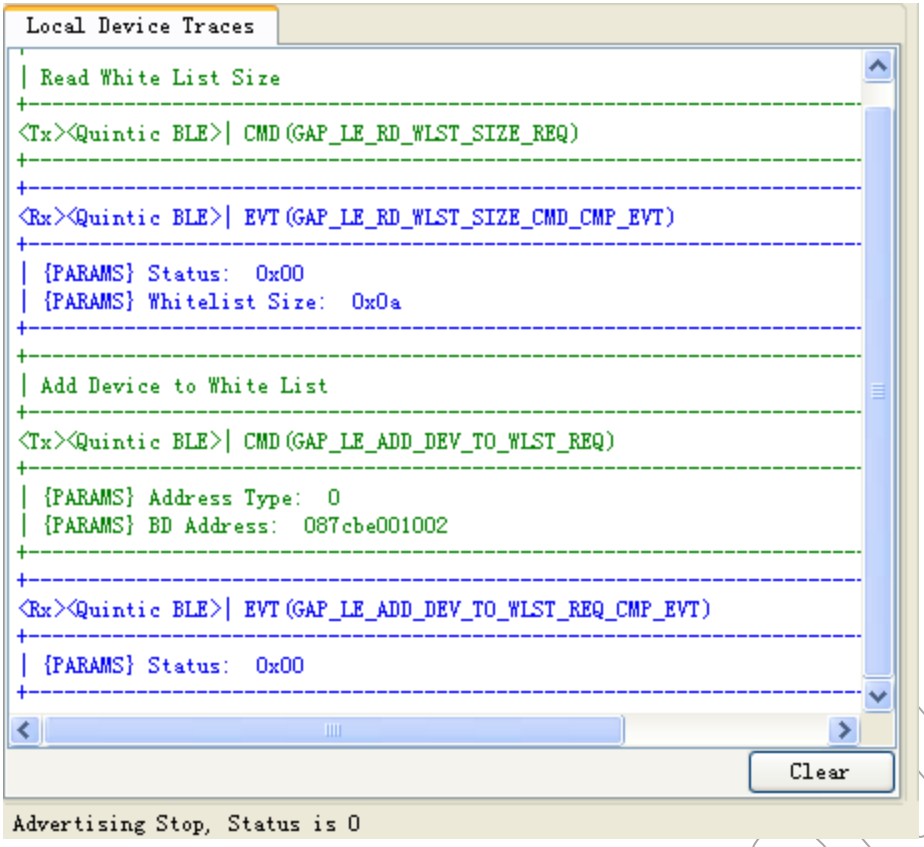


Figure 44 Trace Information

6.10 Create the Selected Service Database

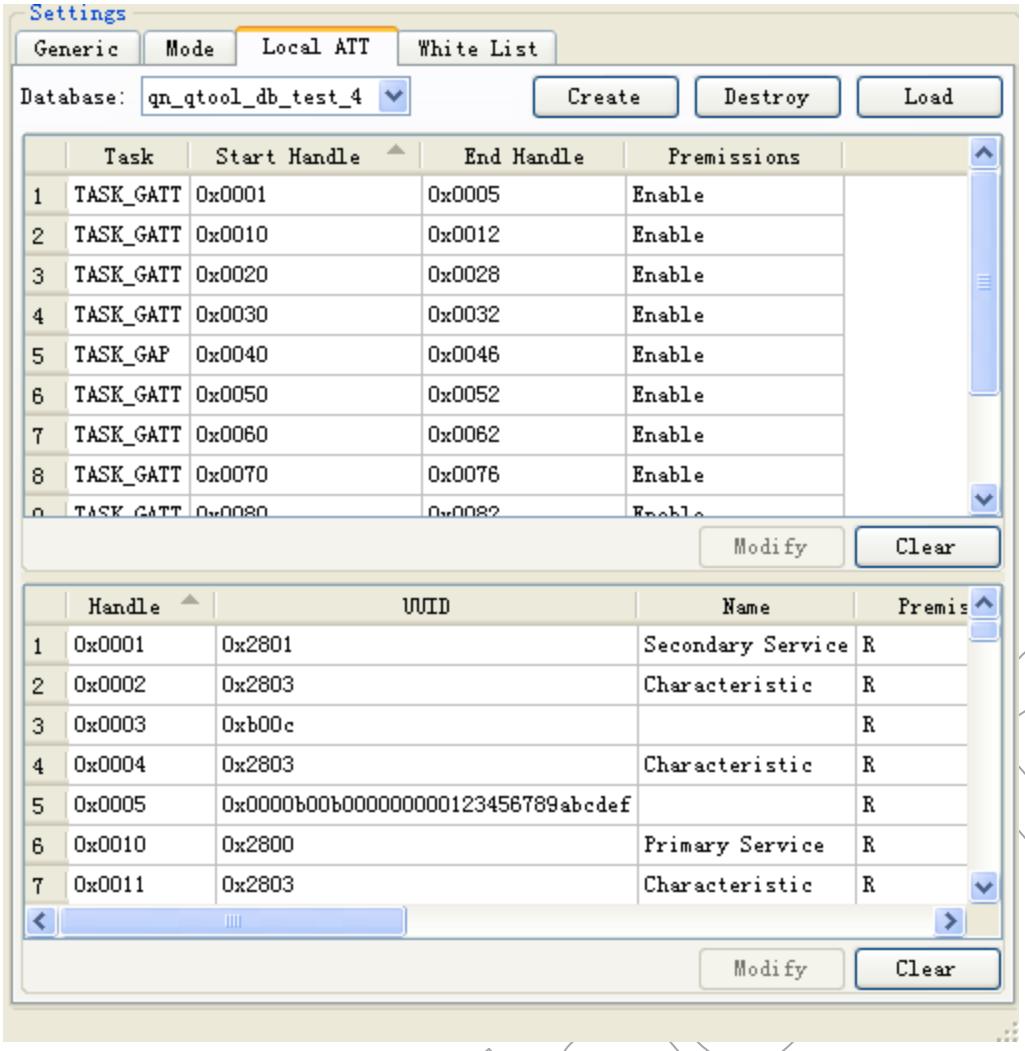


Figure 45 Create the Selected Service Database

To create the services in the database that you selected, please do the following steps:

Step 1: Click on the Database combox to select a service database. For example, select the"qn_qtool_db_test_4" service database. All the service databases are in the directory: Install directory/qdb, and they are editable.

Step 2: Click on the "Create" button.

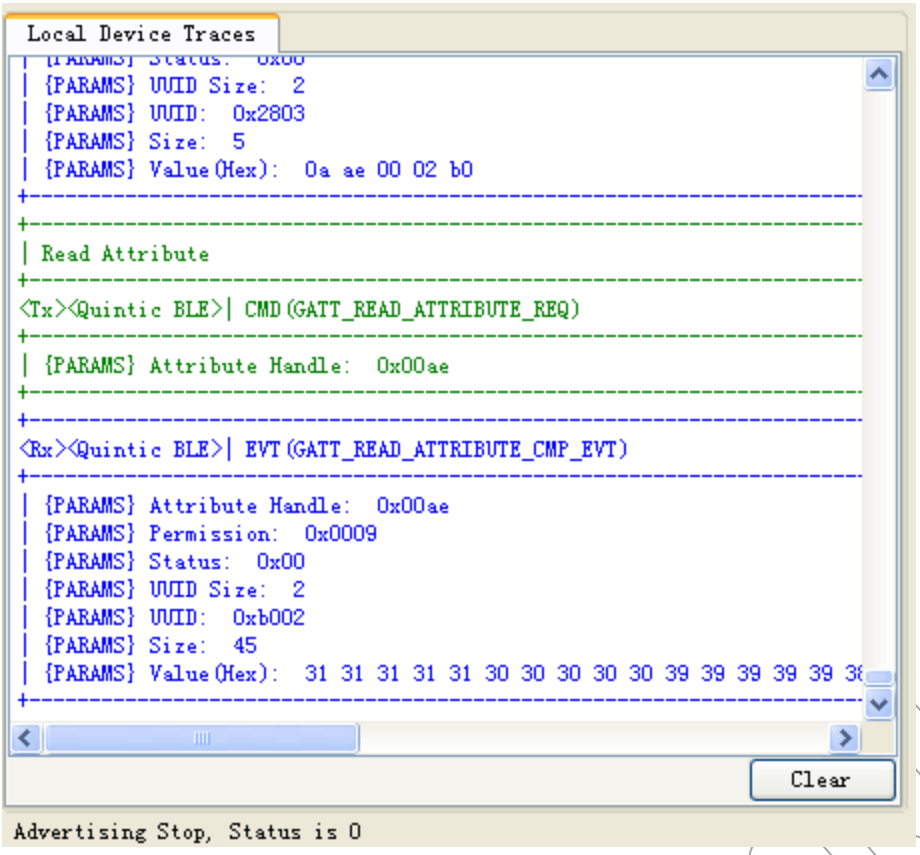
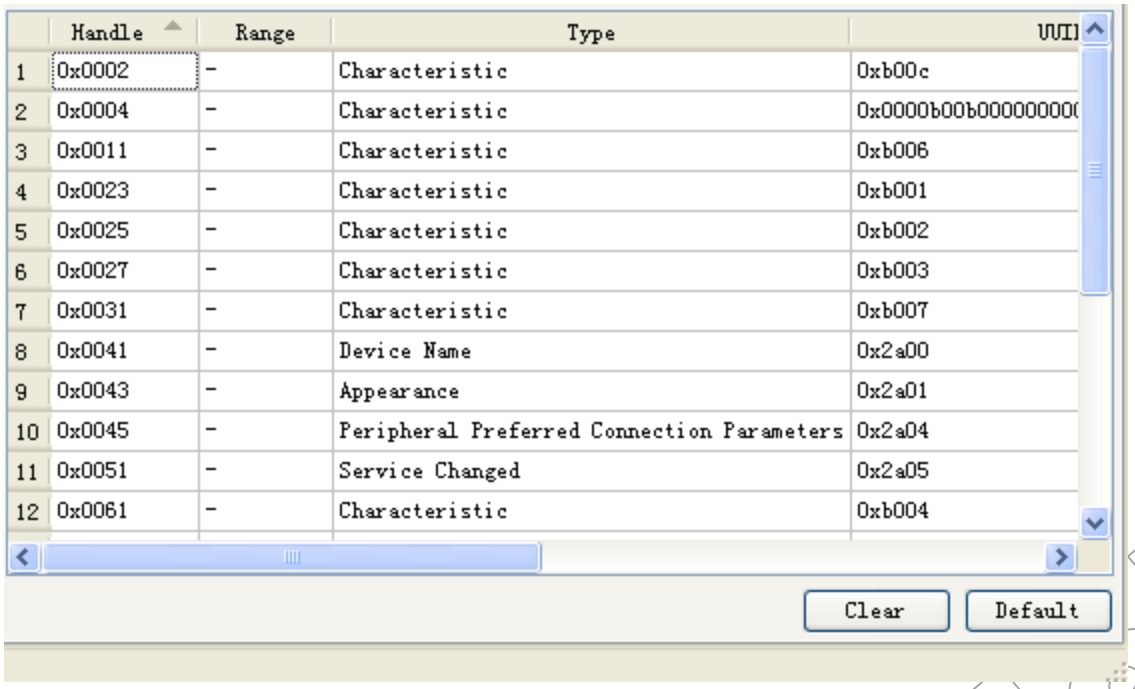


Figure 46 Trace Information

Step 3: Set the local Bluetooth device to advertising. Please references to chapter" 6.8 advertising".

Step 4: The remote device discovers the local device and establish a connection with it. Please reference to chapter "6.1 Scan" and "6.2 Connection"

Step 5: The remote device discovers all the service that we created in Step 2.Please reference to chapter "6.3 Discovery Services"



	Handle	Range	Type	UUI
1	0x0002	-	Characteristic	0xb00c
2	0x0004	-	Characteristic	0x0000b00b00000000(
3	0x0011	-	Characteristic	0xb006
4	0x0023	-	Characteristic	0xb001
5	0x0025	-	Characteristic	0xb002
6	0x0027	-	Characteristic	0xb003
7	0x0031	-	Characteristic	0xb007
8	0x0041	-	Device Name	0x2a00
9	0x0043	-	Appearance	0x2a01
10	0x0045	-	Peripheral Preferred Connection Parameters	0x2a04
11	0x0051	-	Service Changed	0x2a05
12	0x0061	-	Characteristic	0xb004

Clear Default

Figure 47 Services That the Remote Device Find

7. Profile

7.1 Services Table

	Services
1.	Device Information Service
2.	Battery Service
3.	Blood Pressure Service
4.	Immediate Alert Service
5.	Glucose Service
6.	Heart Rate Service
7.	Health Thermometer Service
8.	Link Loss Service
9.	Immediate Alert Service
10	Tx Power Service
11.	Current Time Service
12.	Next DST Change Service
13.	Reference Time Update Service
14.	Scan Parameters Service
15	Alert Notification Service
16	Phone Alert Status Service
17	Cycling Speed and Cadence Service
18	Running Speed and Cadence Service

Table 7.1: Services

7.2 Profile Table

	Profiles	Services
1.	Blood Pressure Profile	1.Blood Pressure Service 2.Device Information Service
2.	Find me Profile	Immediate Alert Service
3.	Glucose Profile	1.Glucose Service 2.Device Information Service
4.	Heart Rate Profile	1.Heart Rate Service 2.Device Information Service
5.	Health Thermometer Profile	1.Health Thermometer Service 2. Device Information Service

6.	Proximity Profile	1.Link Loss Service 2. Immediate Alert Service 3.Tx Power Service
7.	Time Profile	1.Current Time Service 2.Next DST Change Service 3.Reference Time Update Service
8.	Scan Parameters Profile	Scan Parameters Service
9.	Alert Notification Profile	Alert Notification Service
10.	Phone Alert Status Profile	Phone Alert Status Service
11.	Cycling Speed and Cadence Profile	1.Cycling Speed and Cadence Service 2.Device Information Service
12	Running Speed and Cadence Profile	1.Running Speed and Cadence Service 2.Device Information Service

Table 7.2: Profiles and Services

7.3 Overview

7.3.1 Device Information Service

The Device Information Service exposes manufacturer and/or vendor information about a device.

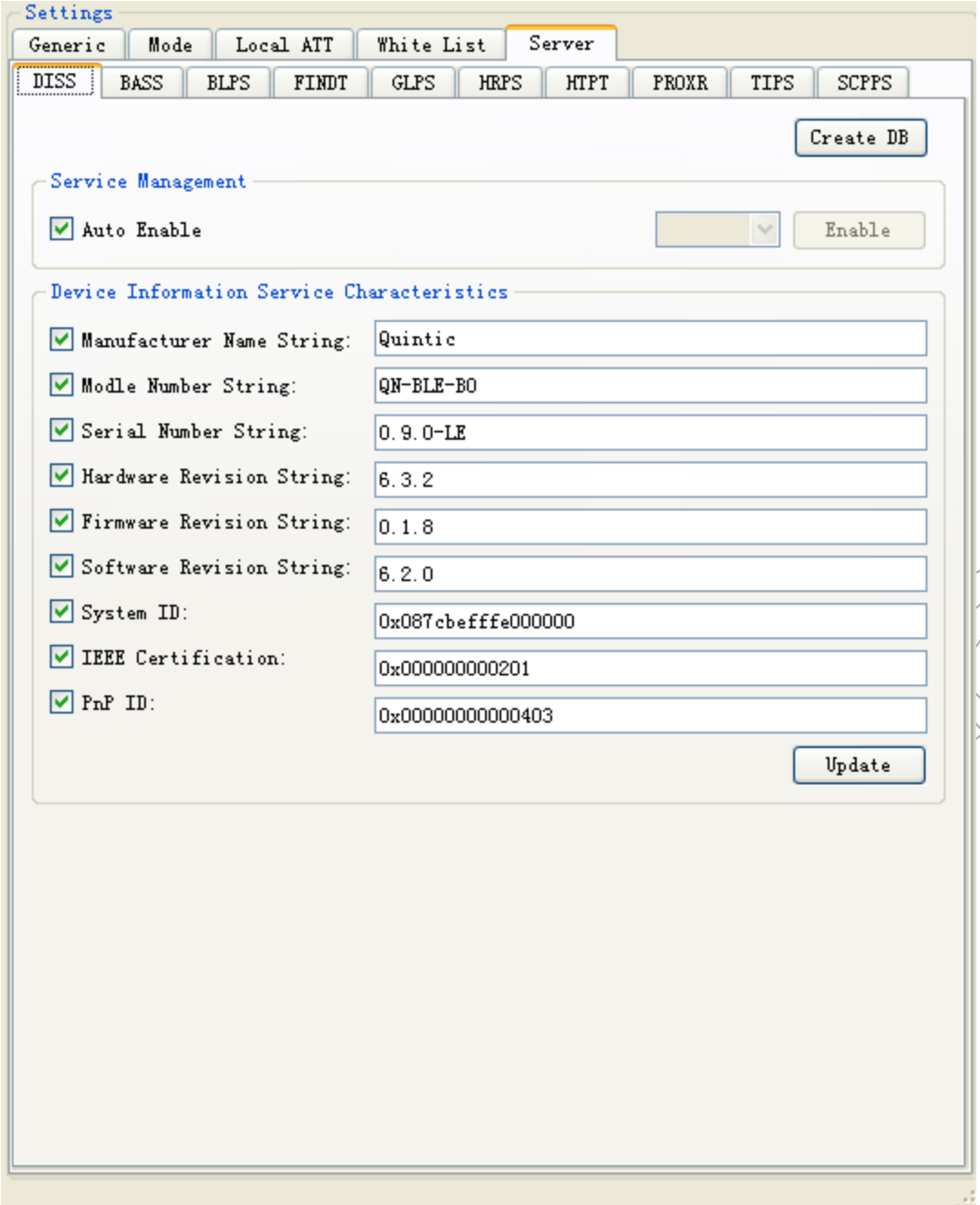


Figure 48 User Interface of Device Information Service

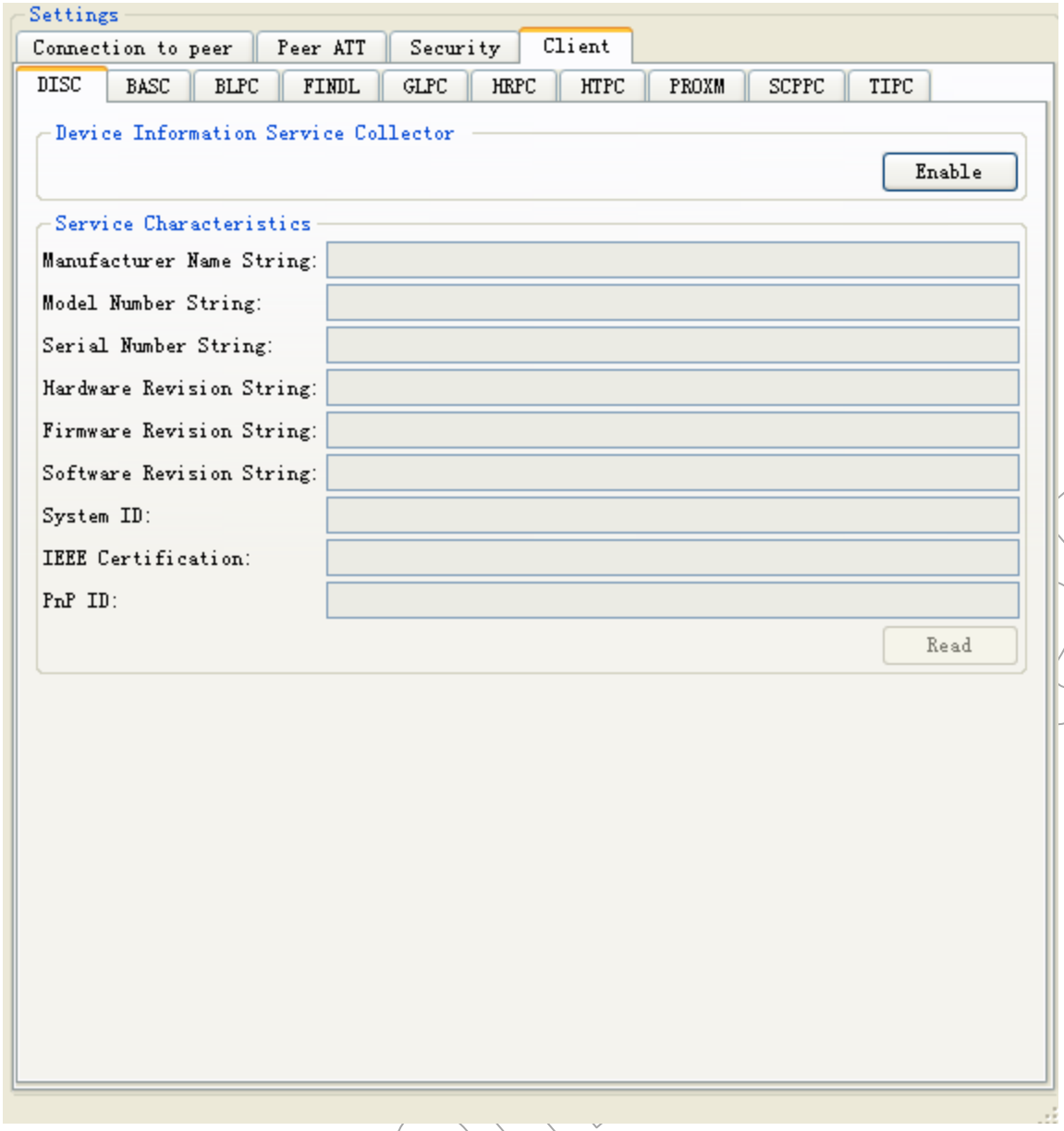


Figure 49 User Interface of Device Information Client

7.3.2 Battery Service

The Battery Service exposes the state of a battery within a device.

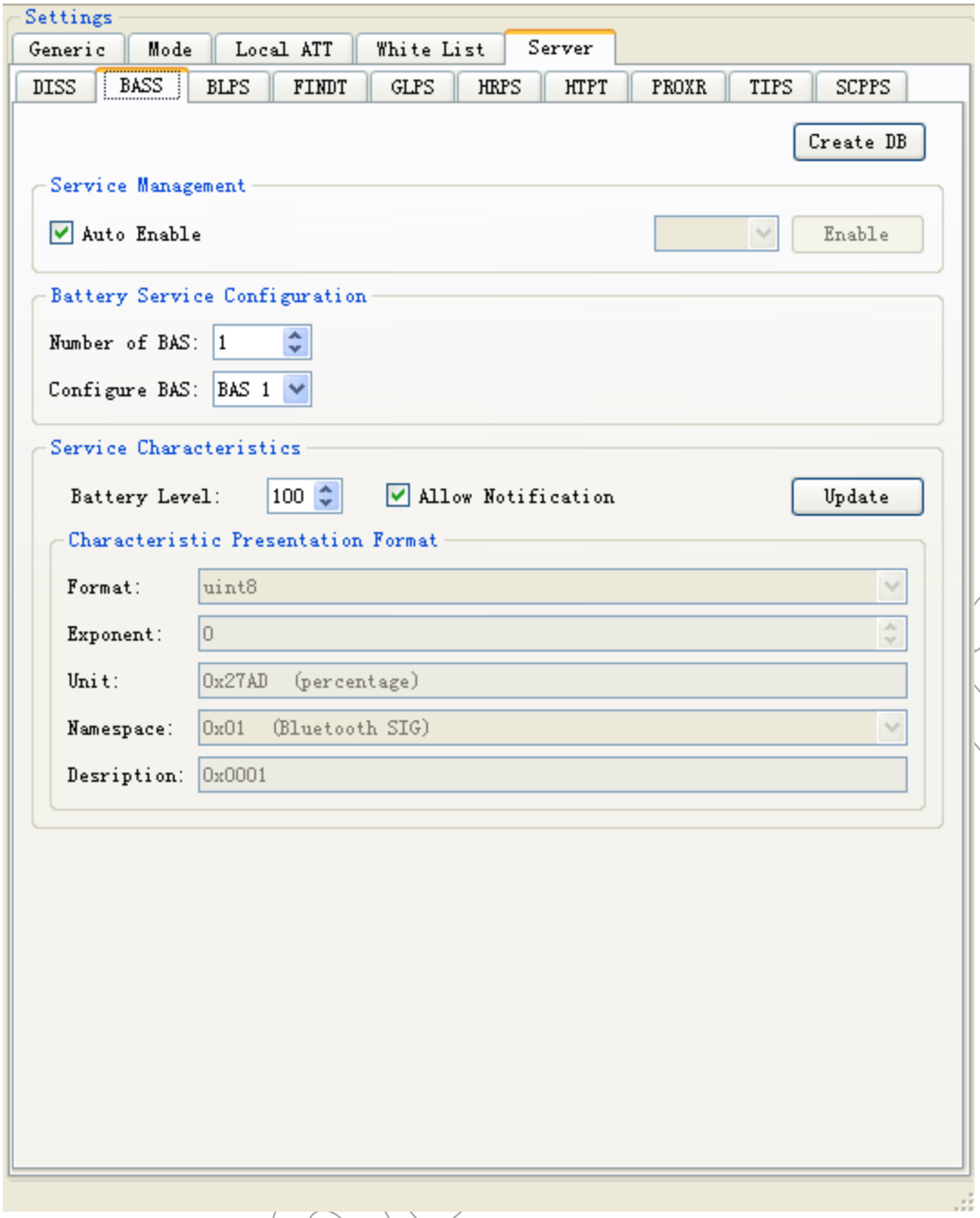


Figure 50 User Interface of Battery Service

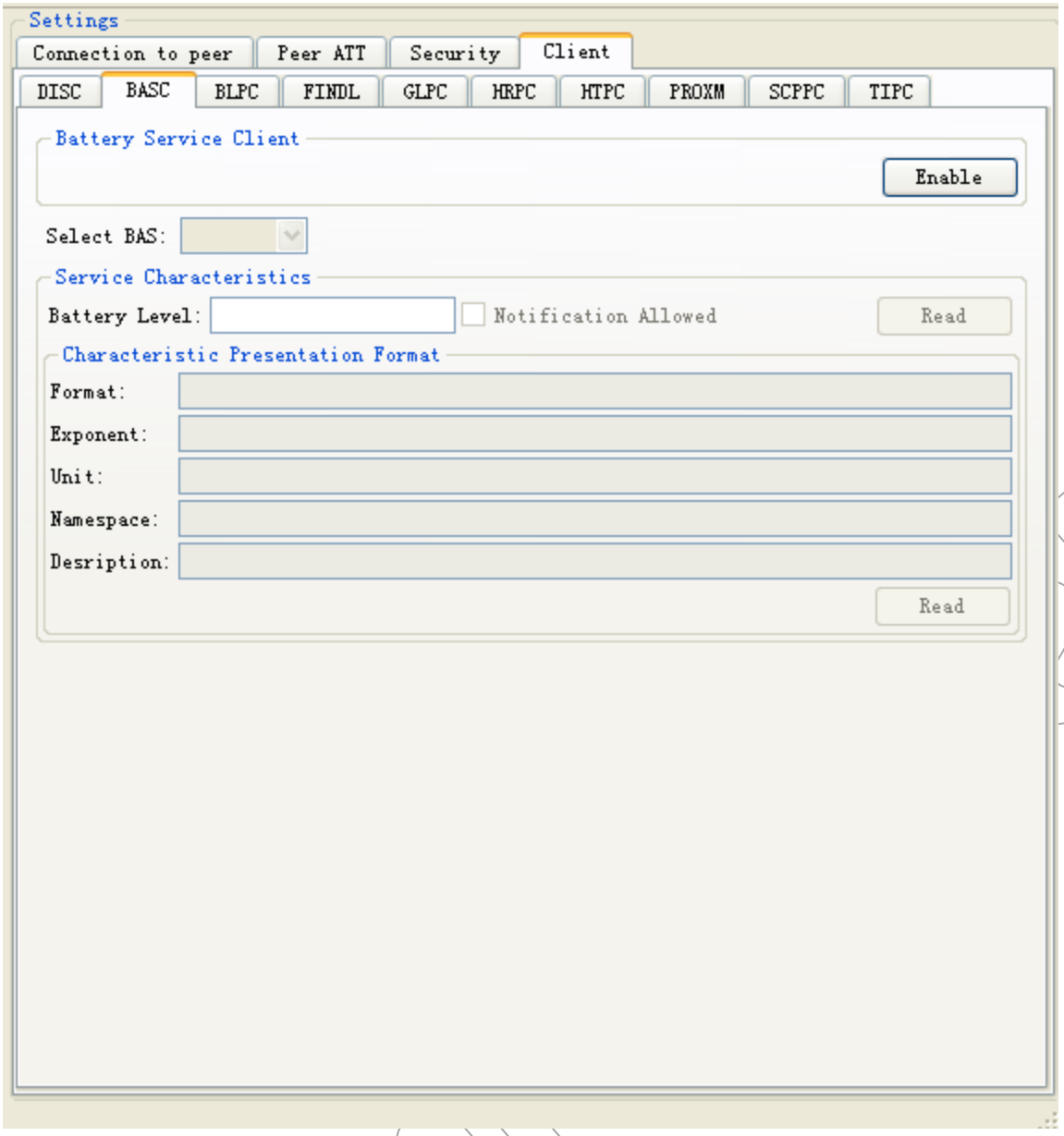


Figure 51 User Interface of Battery Client

7.3.3 Blood Pressure Profile

The Blood Pressure Profile is used to enable a device to obtain blood pressure measurement and other data from a non-invasive blood pressure sensor that exposes the Blood Pressure Service.

The profile defines two roles: Blood Pressure Sensor and Collector. A Blood Pressure Sensor instantiates the Blood Pressure Service and the Device Information Service.

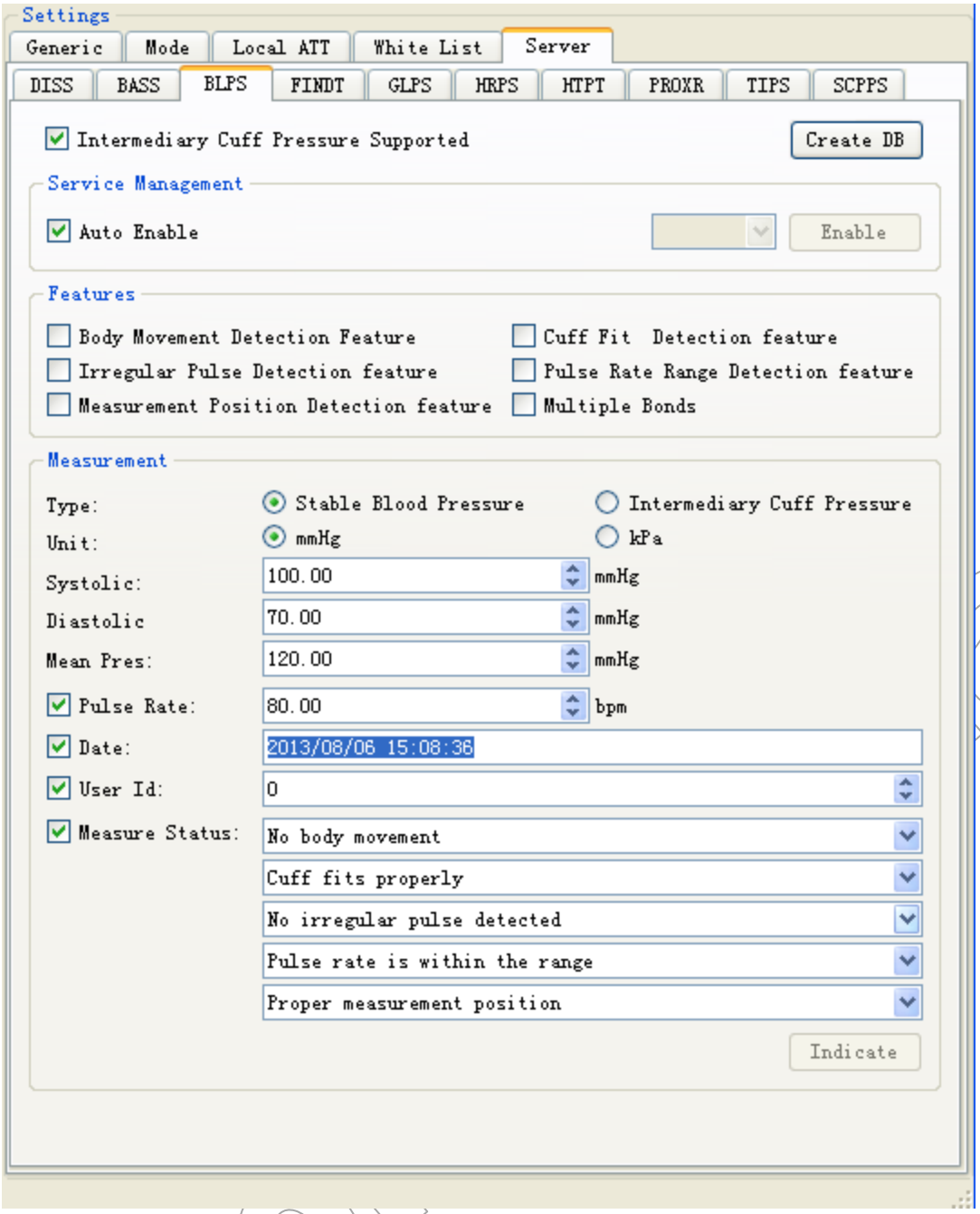


Figure 52 User Interface of Blood Pressure Sensor

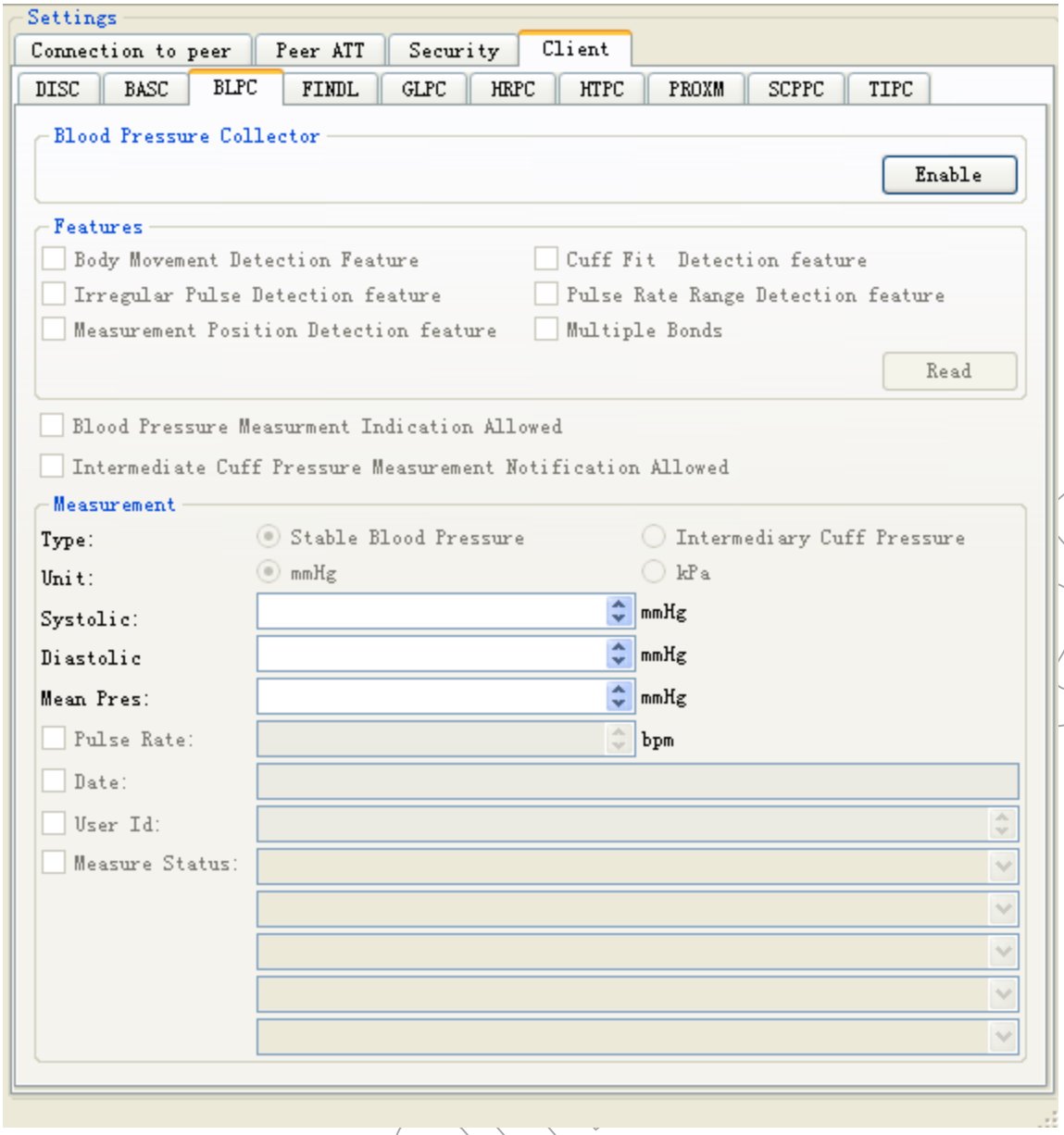


Figure 53 User Interface of Blood Pressure Collector

7.3.4 Find Me Profile

The Find Me profile defines the behavior when a button is pressed on one device to cause an alerting signal on a peer device. The profile defines two roles: Find Me Locator and Find Me Target. The Find Me Target has an instance of the Immediate Alert service.

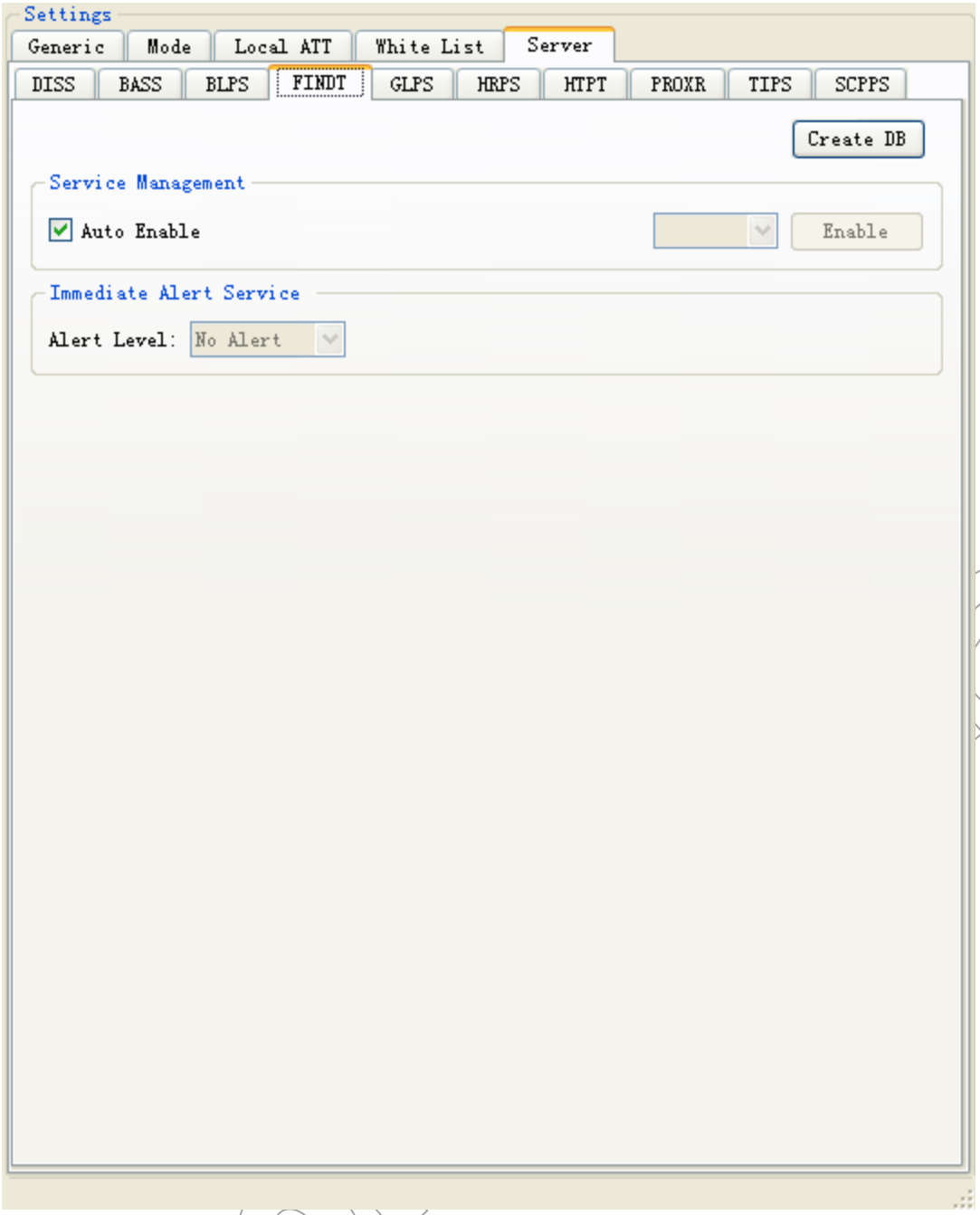


Figure 54 User Interface of Find Me Target

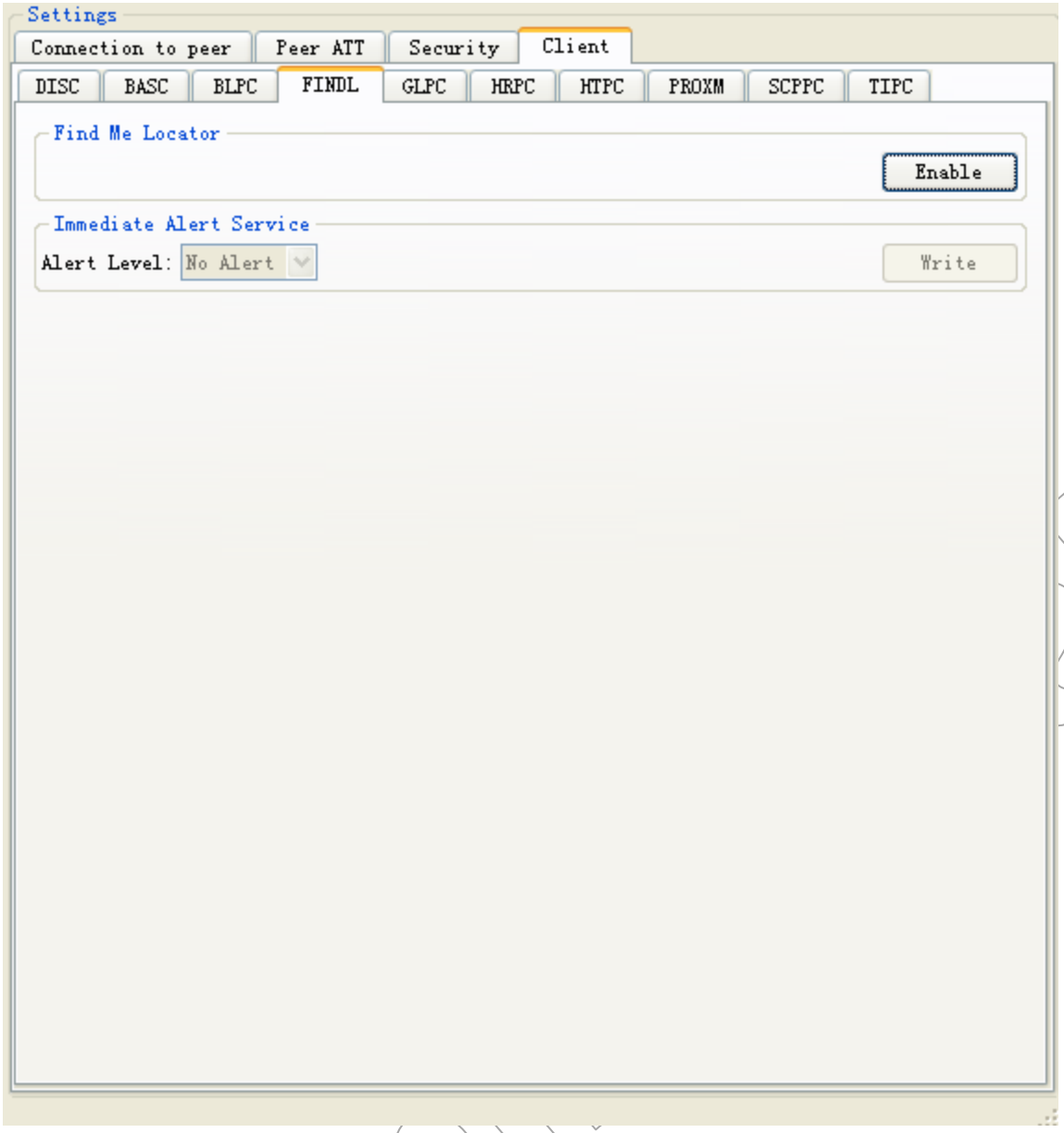


Figure 55 User Interface of Find Me Locator

7.3.5 Glucose Profile

The Glucose Profile is used to enable a device to obtain glucose measurement and other data from a Glucose Sensor that exposes the Glucose Service. The profile defines two roles: Glucose Sensor and Collector. A Glucose Sensor instantiates the Glucose Service and the Device Information Service.

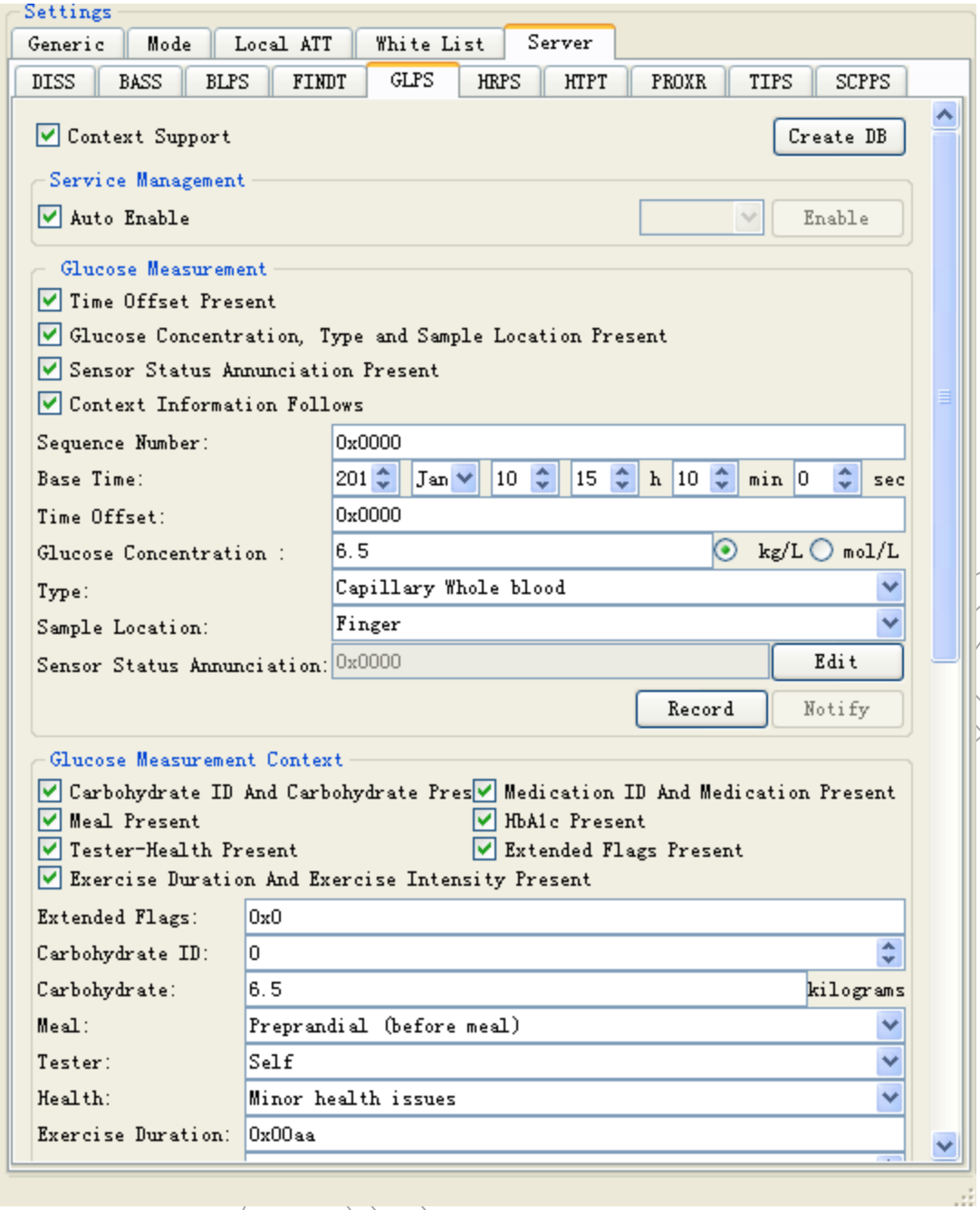


Figure 56 User Interface of Glucose Sensor

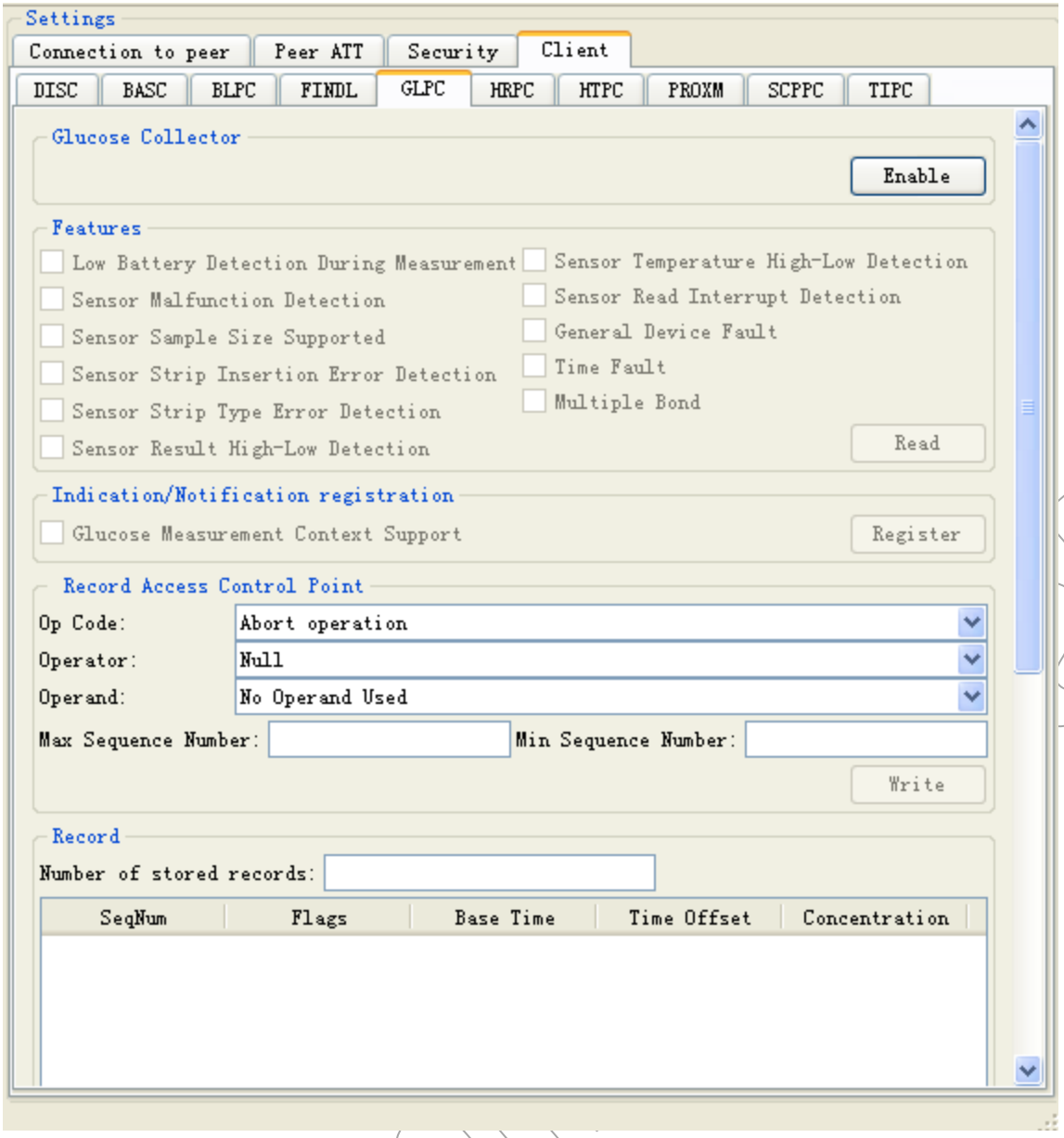


Figure 57 User Interface of Glucose Collector

7.3.6 Heart Rate Profile

The Heart Rate Profile is used to enable a data collection device to obtain data from a Heart Rate Sensor that exposes the Heart Rate Service. The profile defines two roles: Heart Rate Sensor and Collector. A Heart Rate Sensor instantiates one and only one Heart Rate Service and instantiates one Device Information Service.

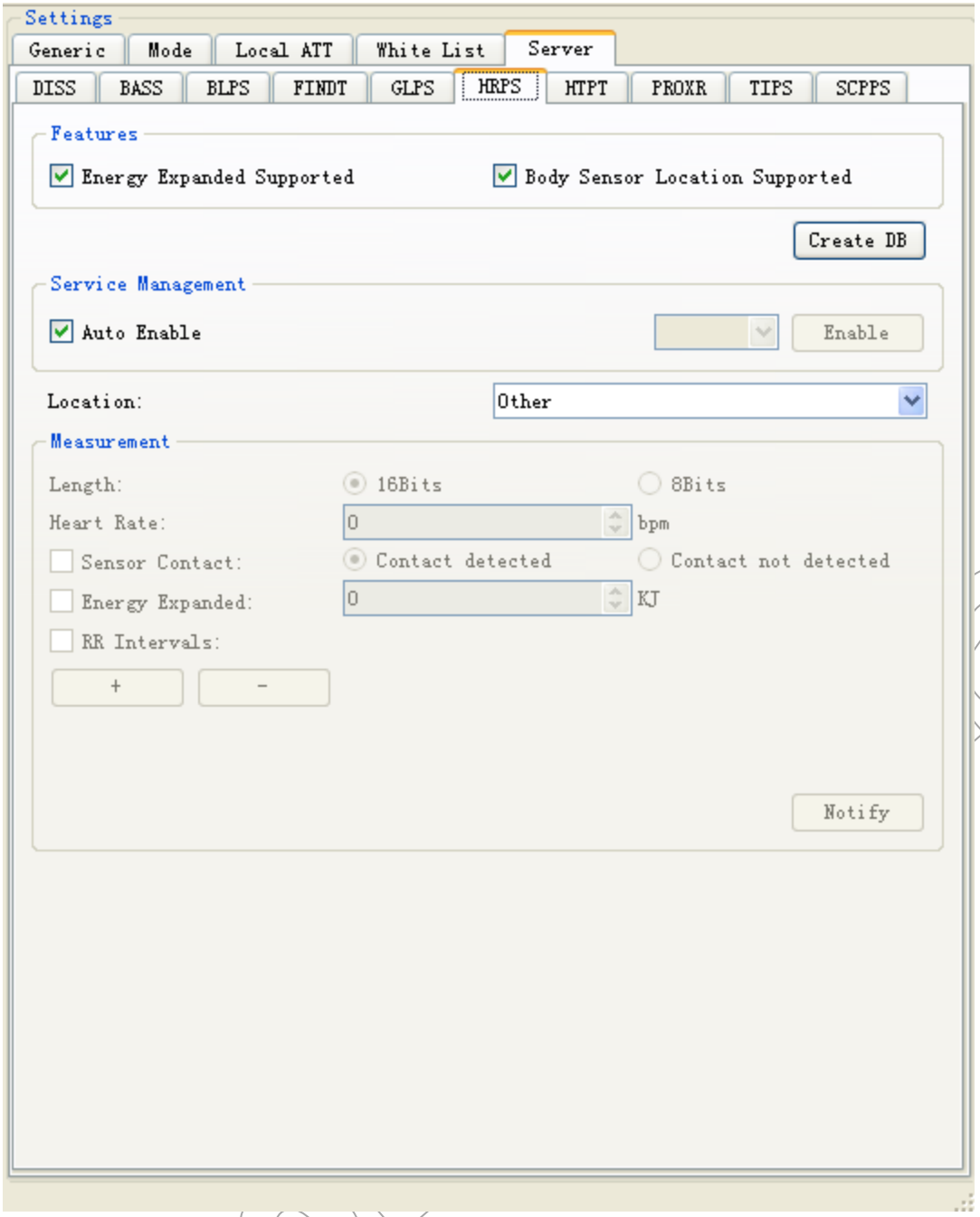


Figure 58 User Interface of Heart Rate Sensor

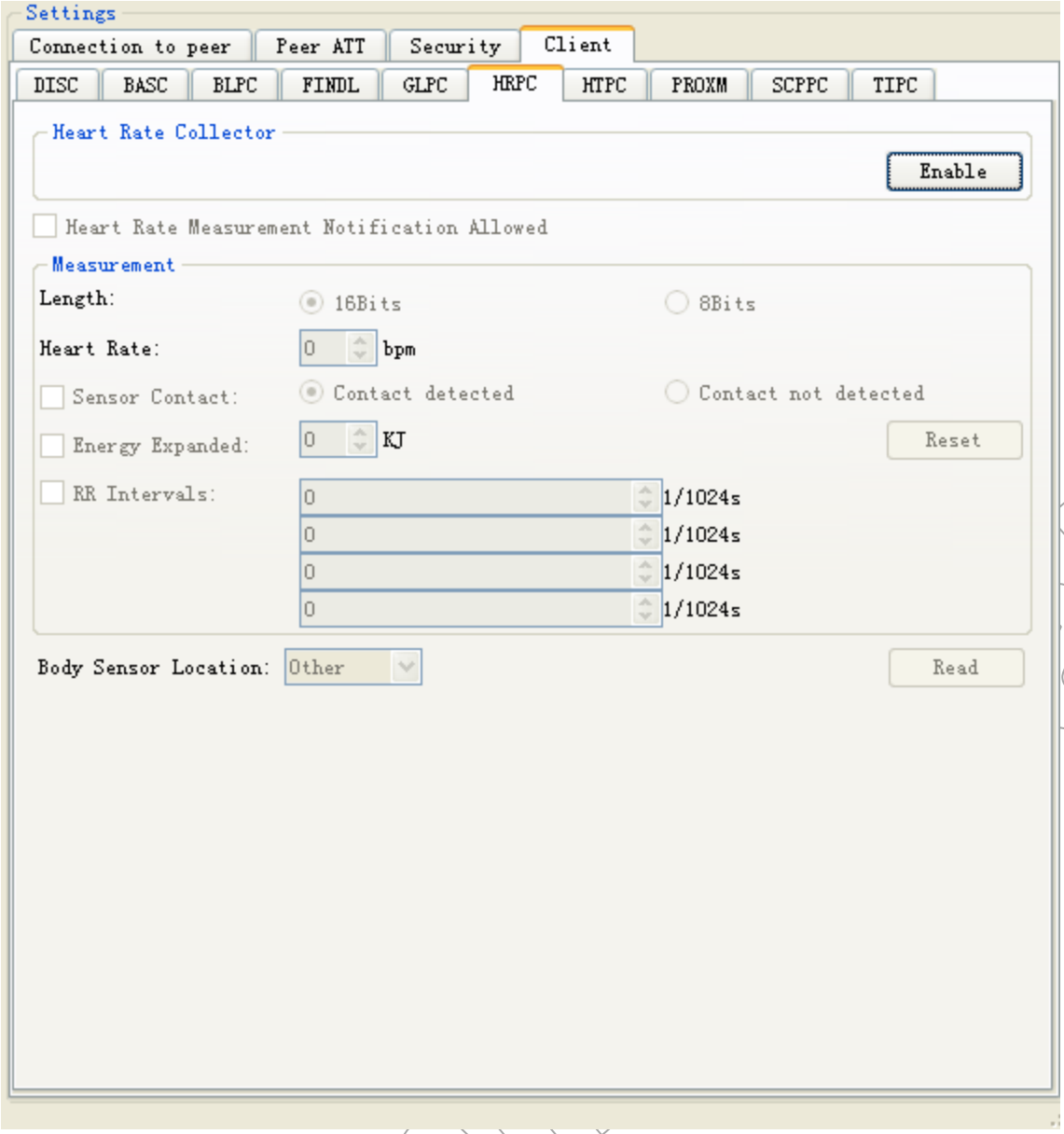


Figure 59 User Interface of Heart Rate Collector

7.3.7 Health Thermometer Profile

The Health Thermometer Profile is used to enable a data collection device to obtain data from a thermometer sensor that exposes the Health Thermometer Service. The profile defines two roles: Thermometer and Collector. A Thermometer instantiates one and only one Health Thermometer Service and instantiates one Device Information Service.

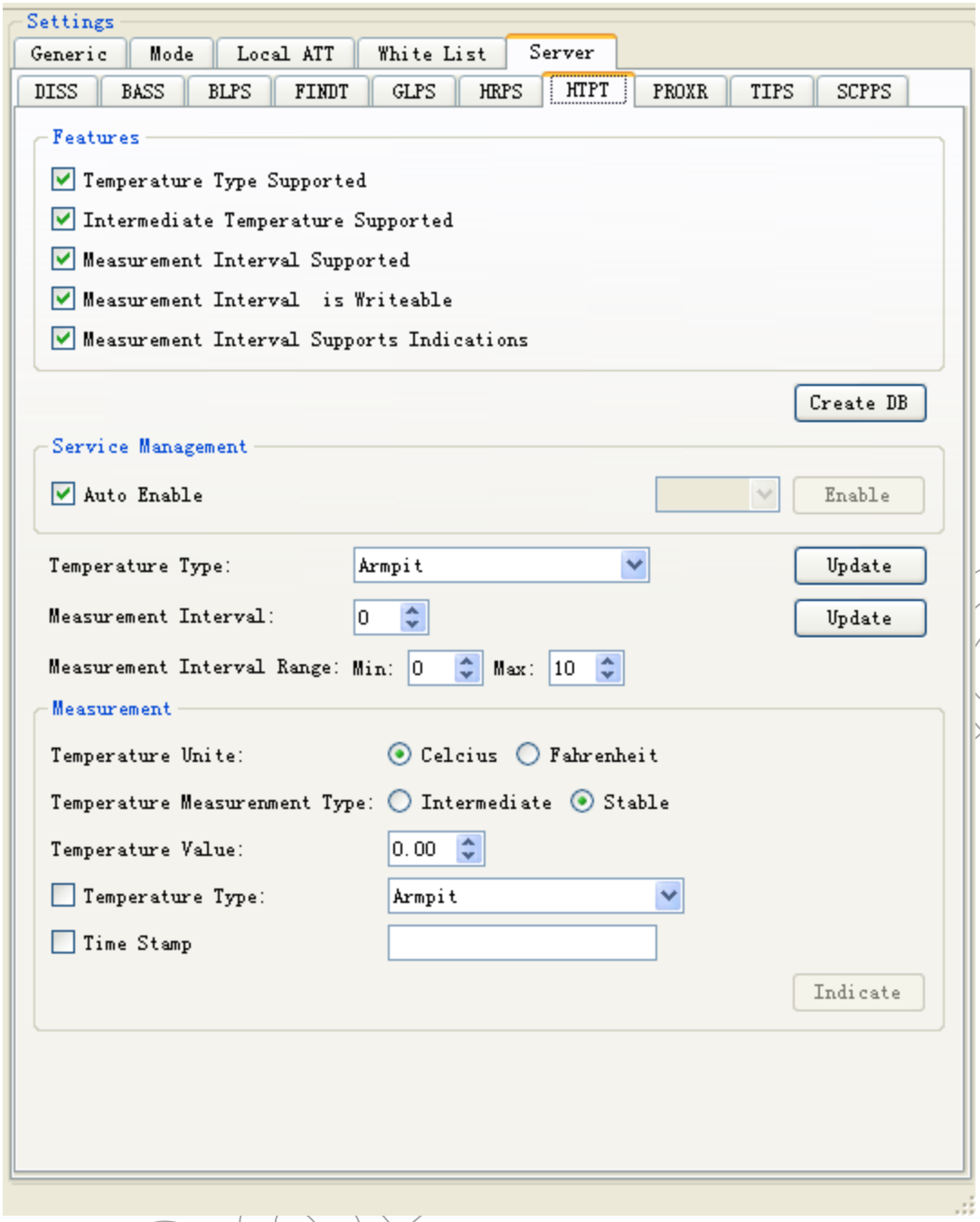


Figure 60 User Interface of Thermometer

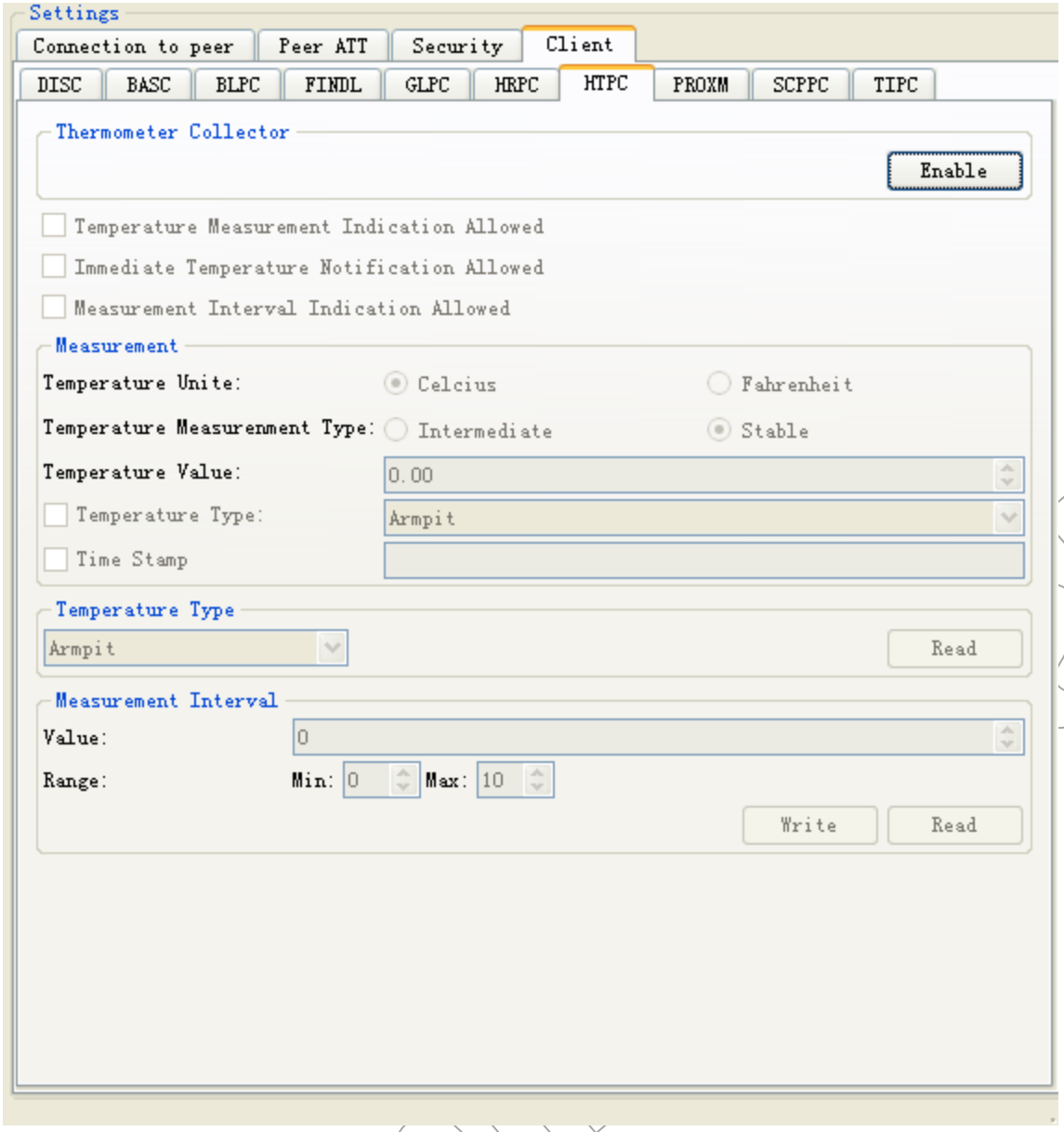


Figure 61 User Interface of Collector

7.3.8 Proximity Profile

The Proximity profile defines the behavior when a device moves away from a peer device so that the connection is dropped or the path loss increases above a preset level, causing an immediate alert. The profile defines two roles: Proximity Monitor and Proximity Reporter. The Proximity Reporter has an instance of the Link Loss service, and optionally both the Immediate Alert and the Tx Power service.

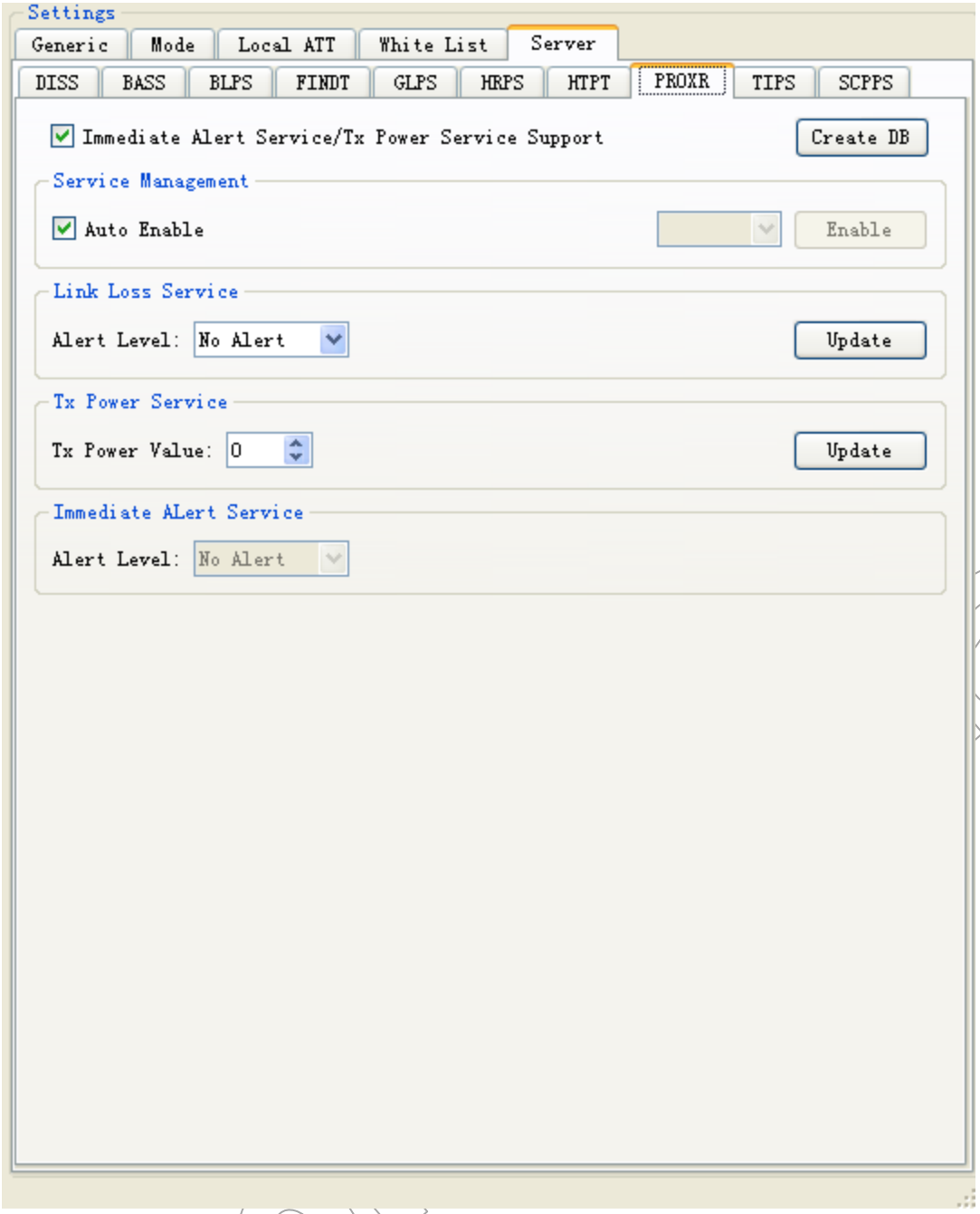


Figure 62 User Interface of Proximity Reporter

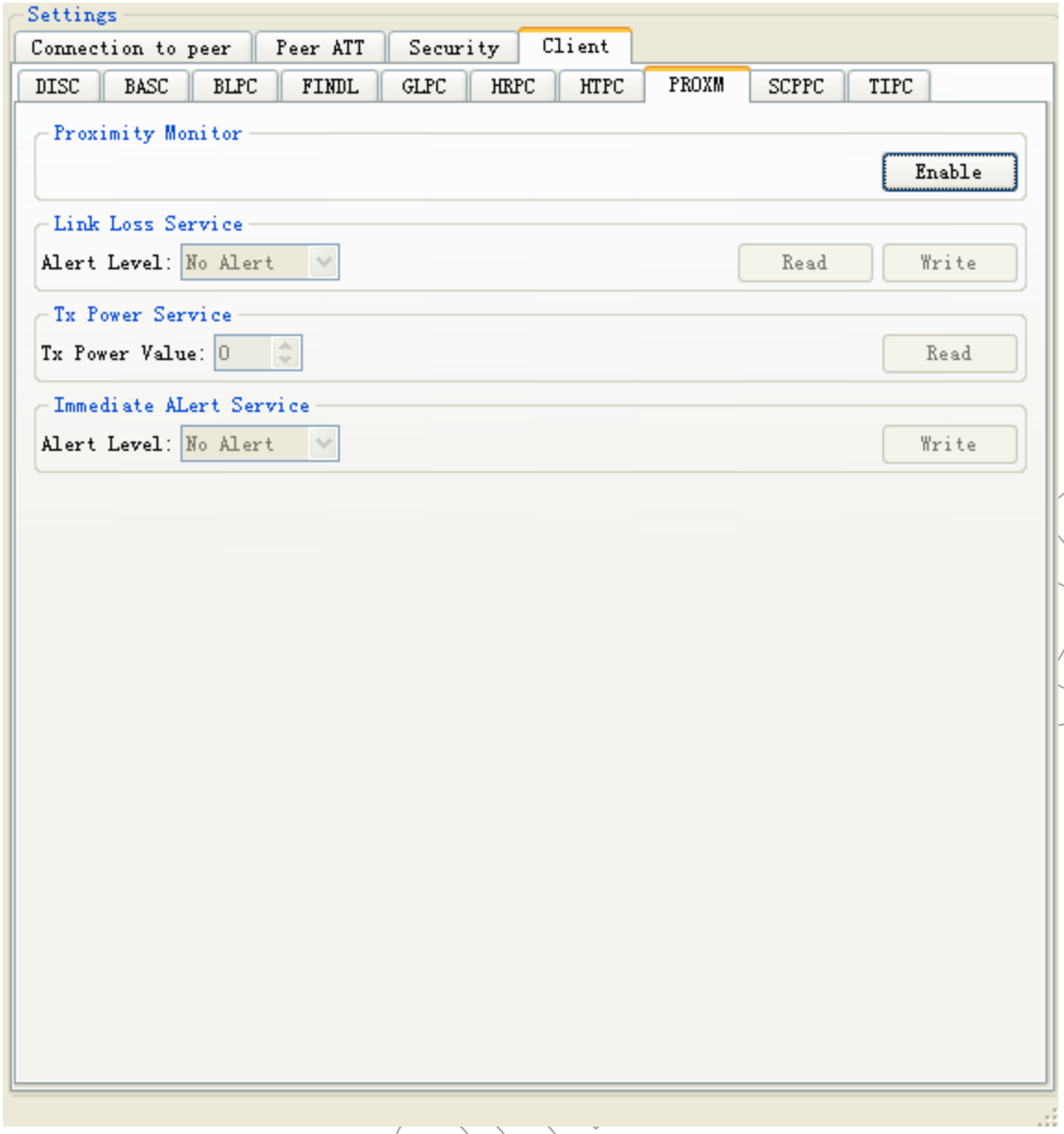


Figure 63 User Interface of Proximity Monitor

7.3.9 Time Profile

The Time profile is used to obtain the date and time, and related information such as time zone as exposed by the Current Time service in the peer device. The profile defines two roles: Time Server and Time Client. The Time Server has an instance of the Current Time Service, and optionally an instance of the Next DST Change Service and an instance of the Reference Update Time Service.

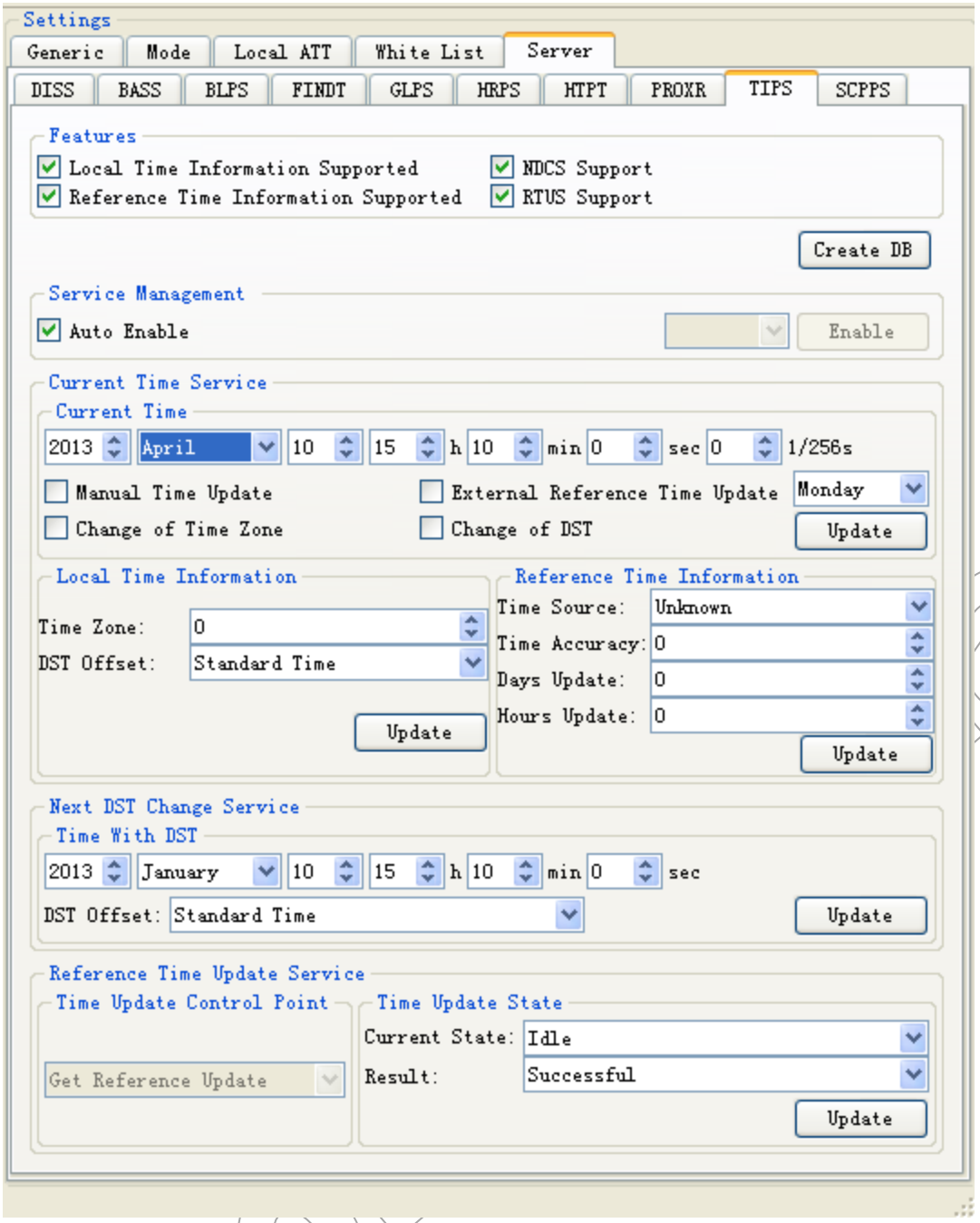


Figure 64 User Interface of the Time Server

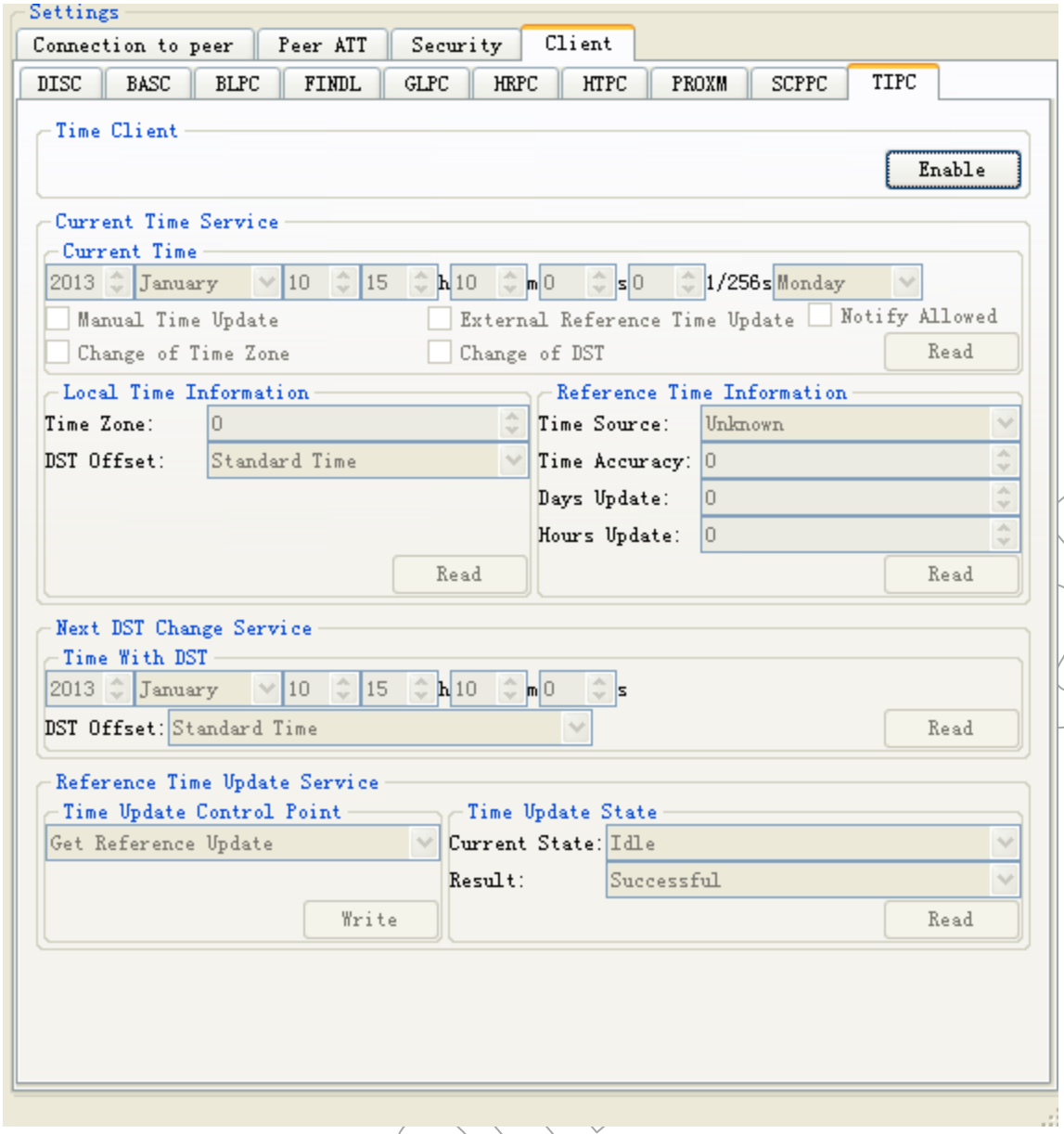


Figure 65 User Interface of the Time Client

7.3.10 Scan Parameter Profile

The Scan Parameters Profile is used to provide devices with information to assist them in managing their connection idle timeout and advertising parameters to optimize for power consumption and/or reconnection latency. This profile defines two roles: Scan Client and Scan Server. The Scan Server has a single instance of the Scan Parameters Service.

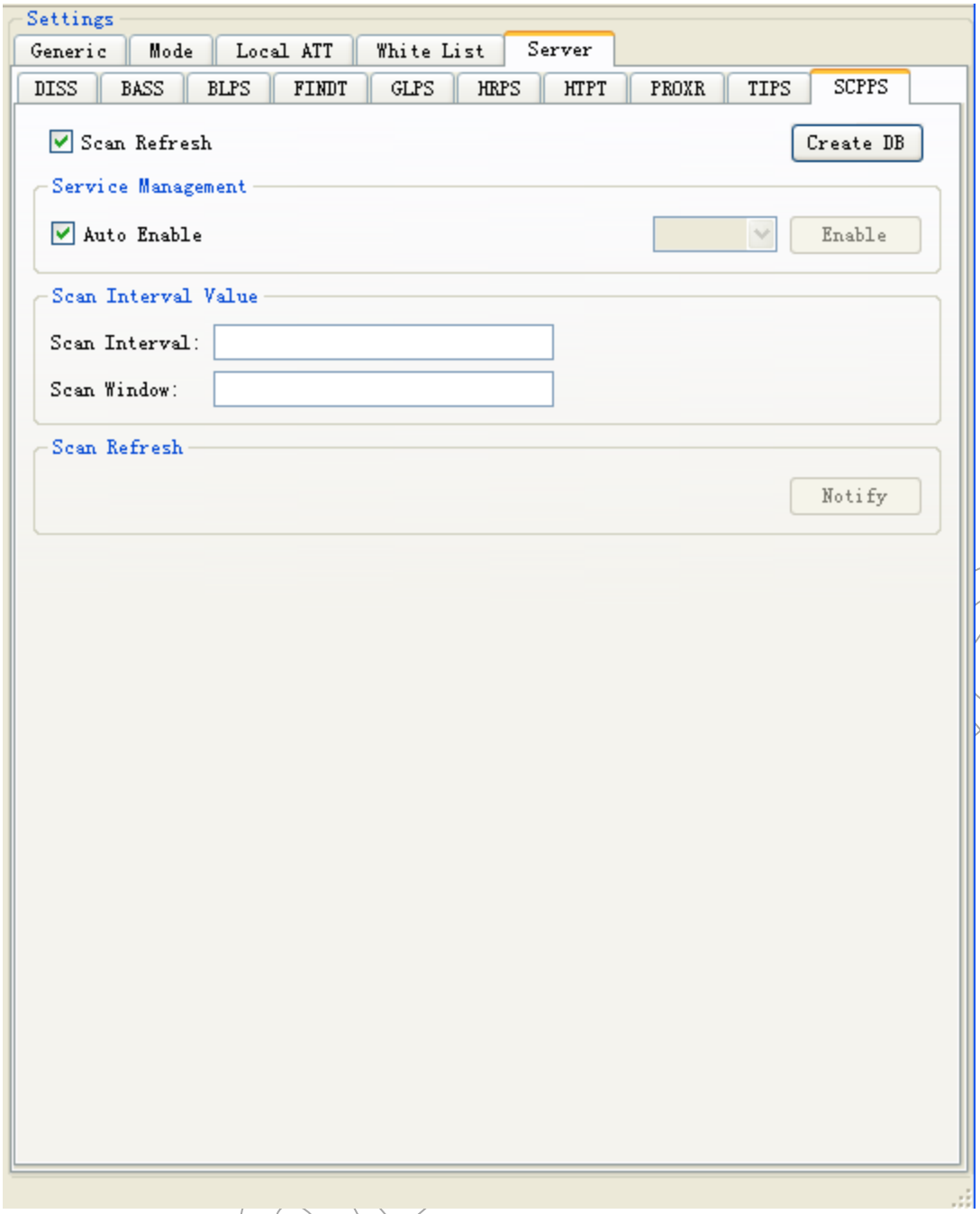


Figure 66 User Interface of the Scan Server

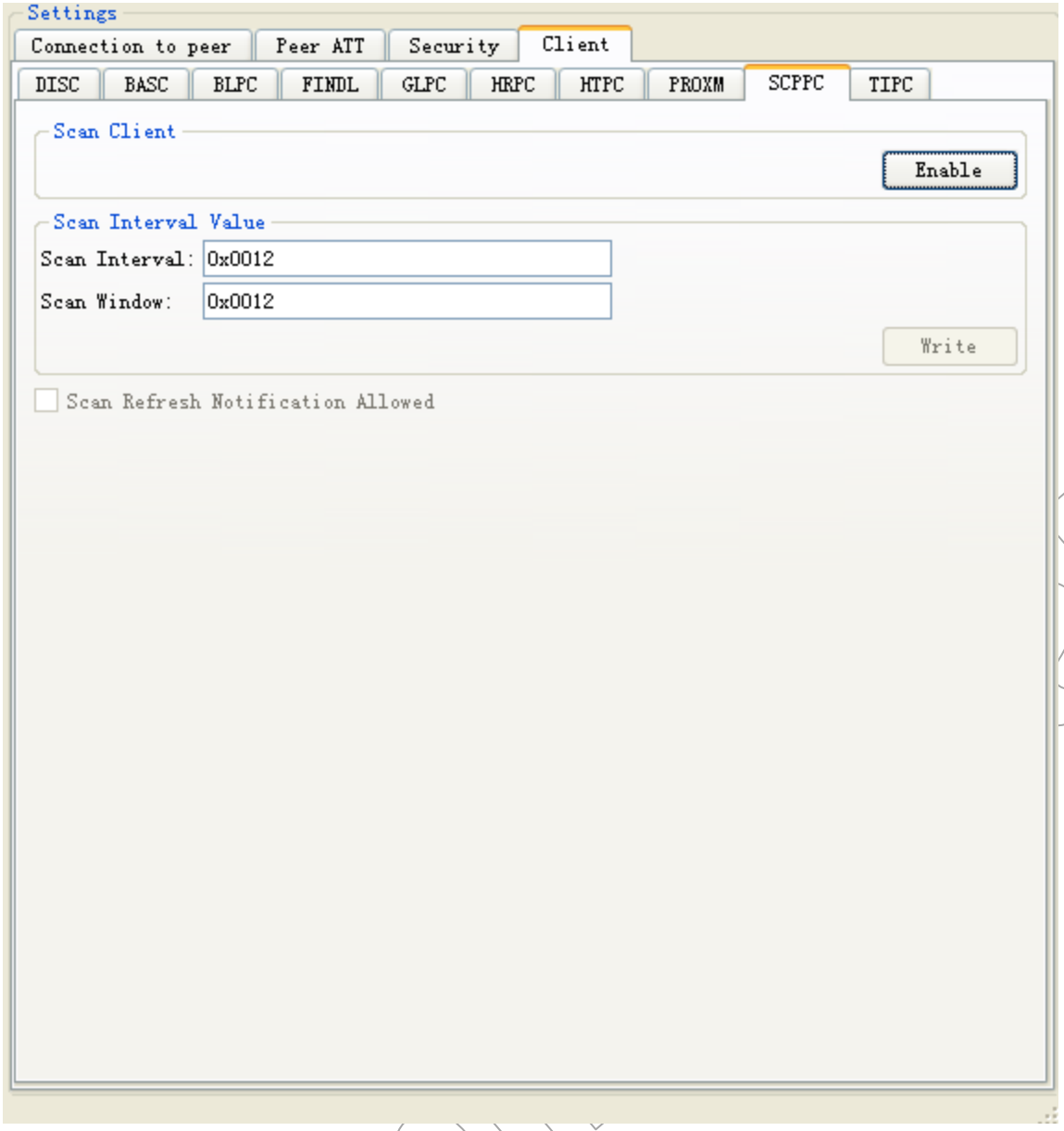


Figure 67 User Interface of the Scan Client

7.3.11 Alert Notification Profile

The Alert Notification profile allows a device like a watch to obtain information from a cellphone about incoming calls, missed calls and SMS/MMS messages. The profile defines two roles: the Alert Notification Server and the Alert Notification Client.

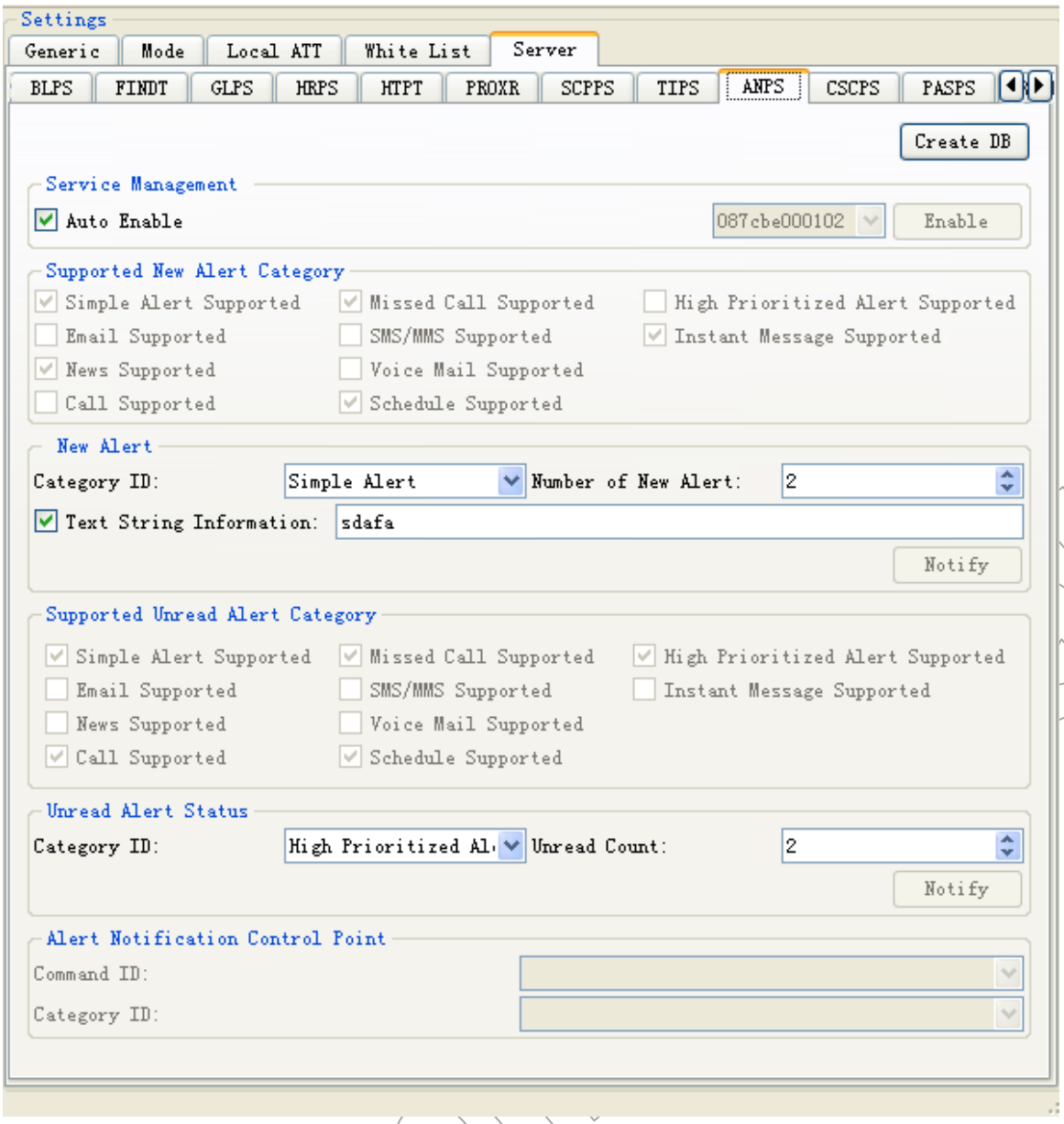


Figure 68 User Interface of the Alert Notification Server

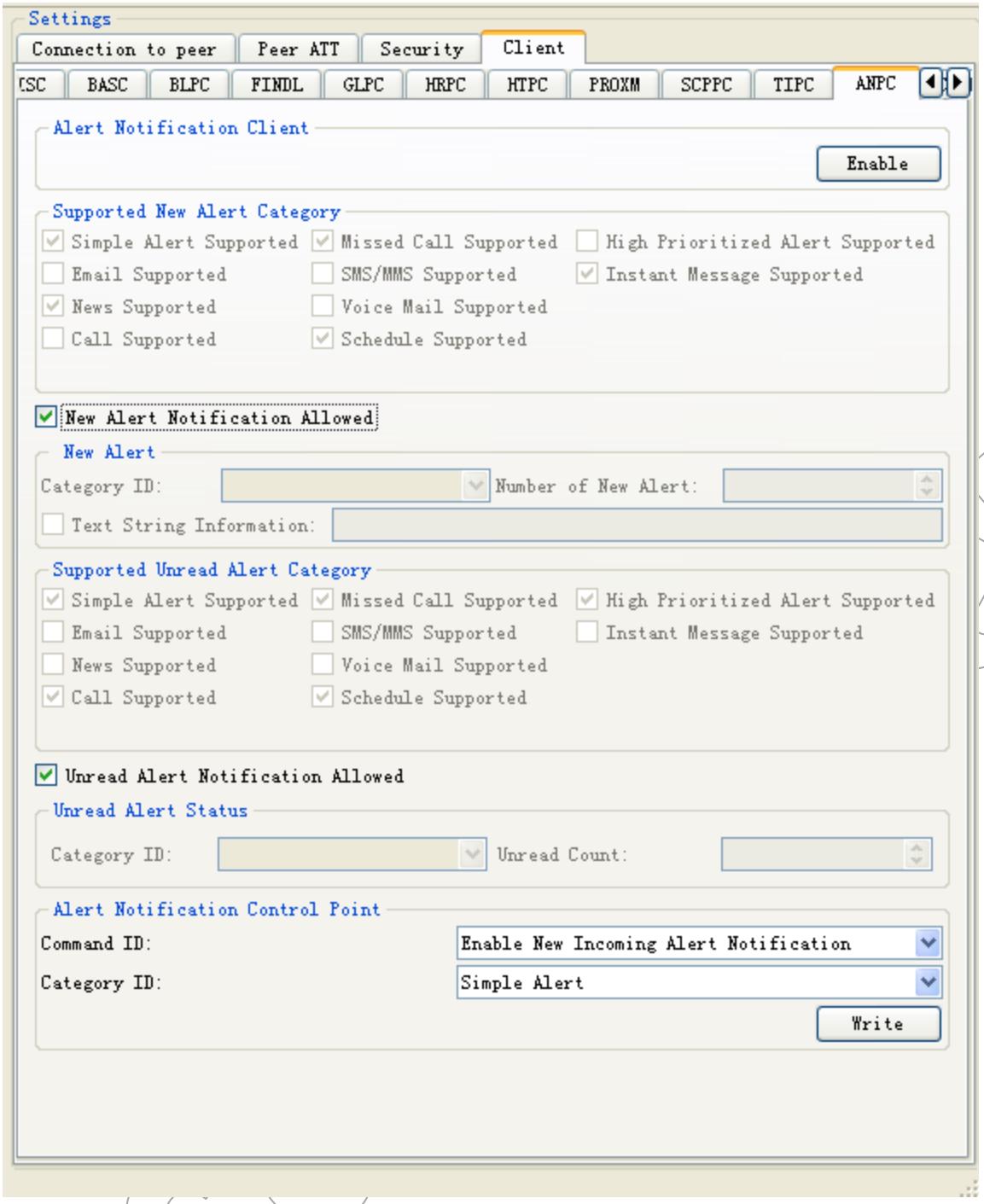


Figure 69 User Interface of the Alert Notification Client

7.3.12 Phone Alert Status Profile

The Phone Alert Status profile is used to obtain the Phone Alert Status exposed by the Phone Alert Status service in the peer device. The Profile defines two roles Phone Alert Server and Phone Alert Client.

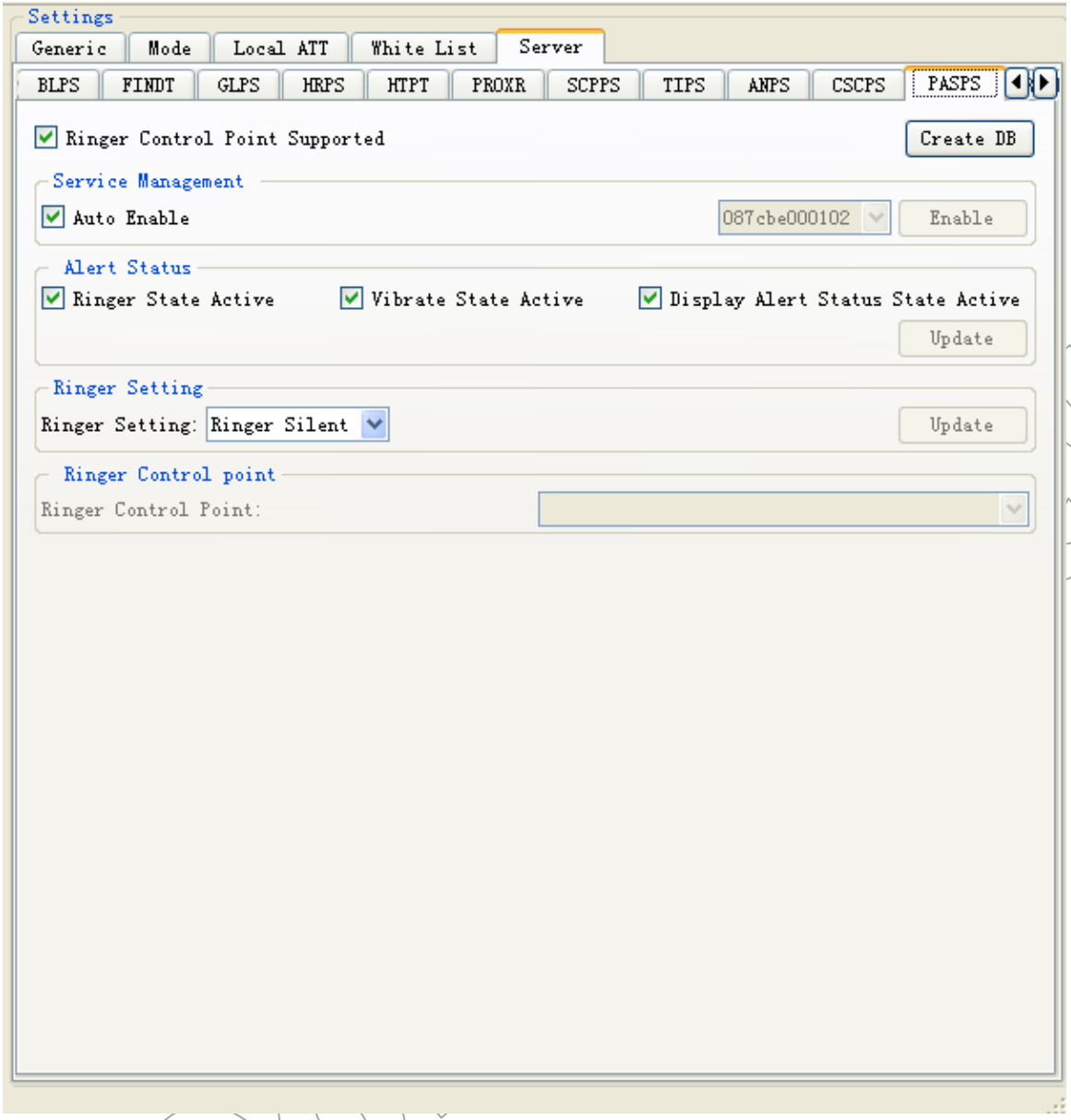


Figure 70 User Interface of the Phone Alert Server

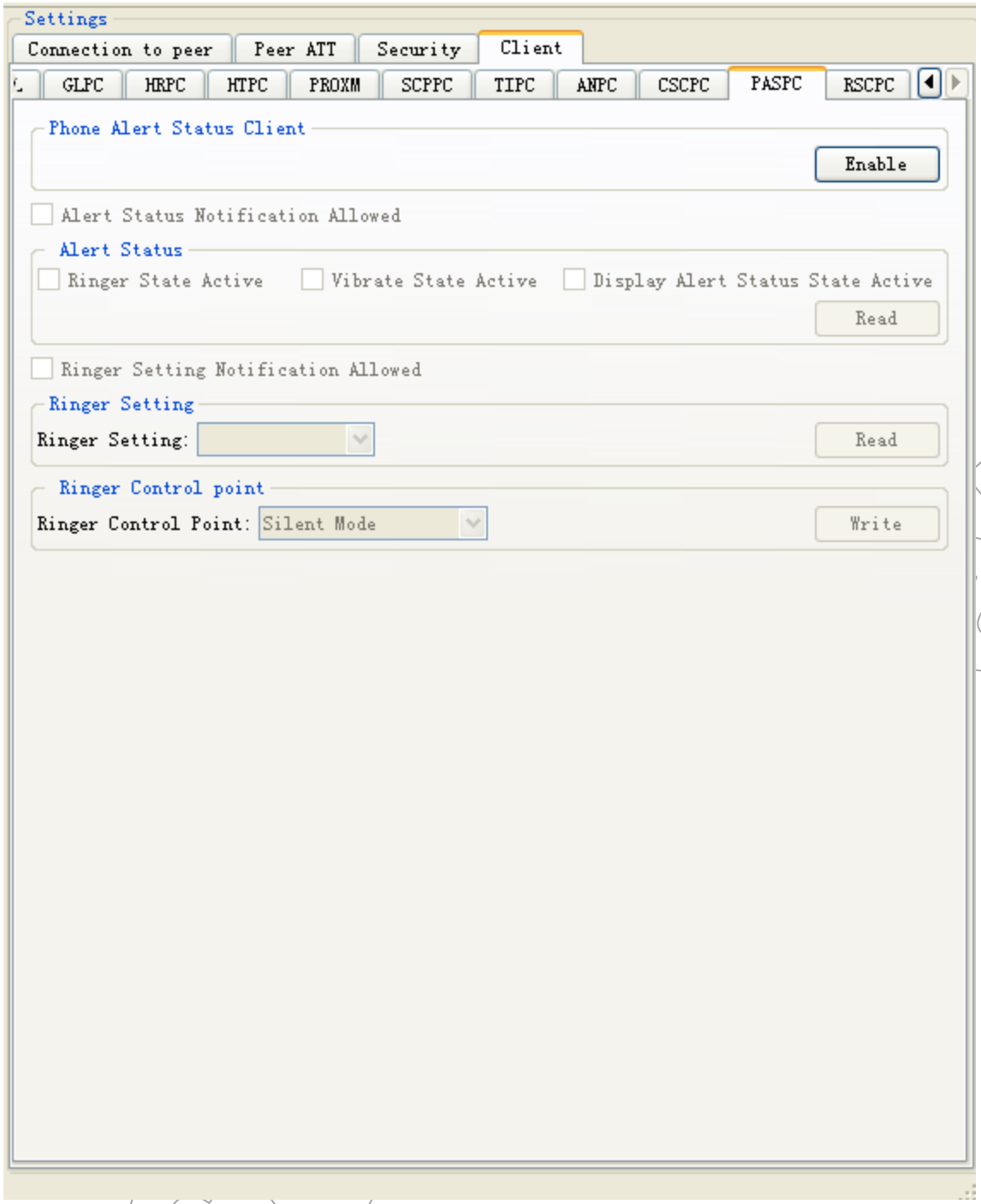


Figure 71 User Interface of the Phone Alert Client

7.3.13 Cycling Speed and Cadence Profile

The Cycling Speed and Cadence Profile is used to enable a data collection device to obtain data from a Cycling Speed and Cadence Sensor (CSC Sensor) that exposes the Cycling Speed and Cadence Service. The profile defines two roles: CSC Sensor and Collector.

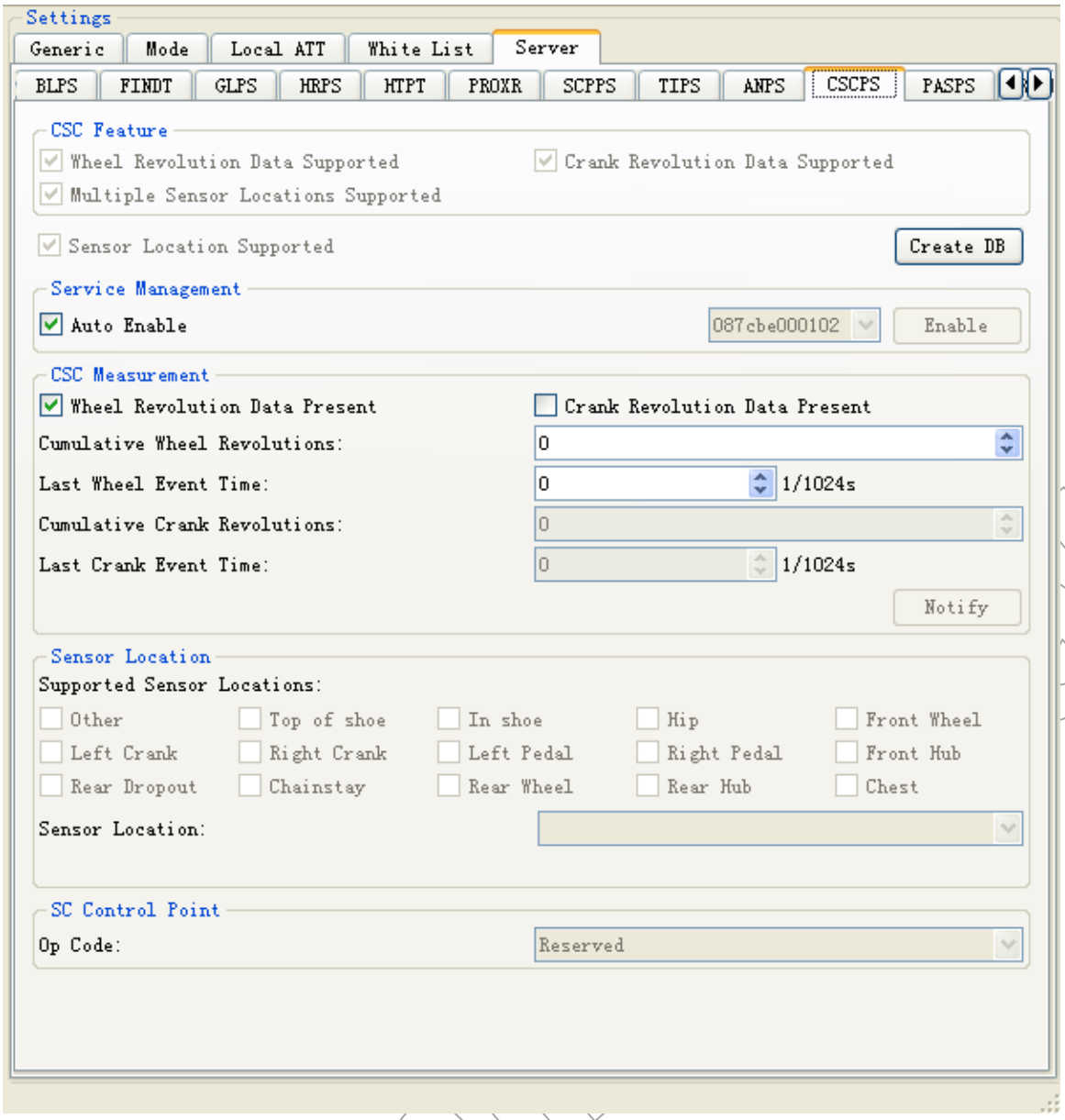


Figure 72 User Interface of the CSC Sensor

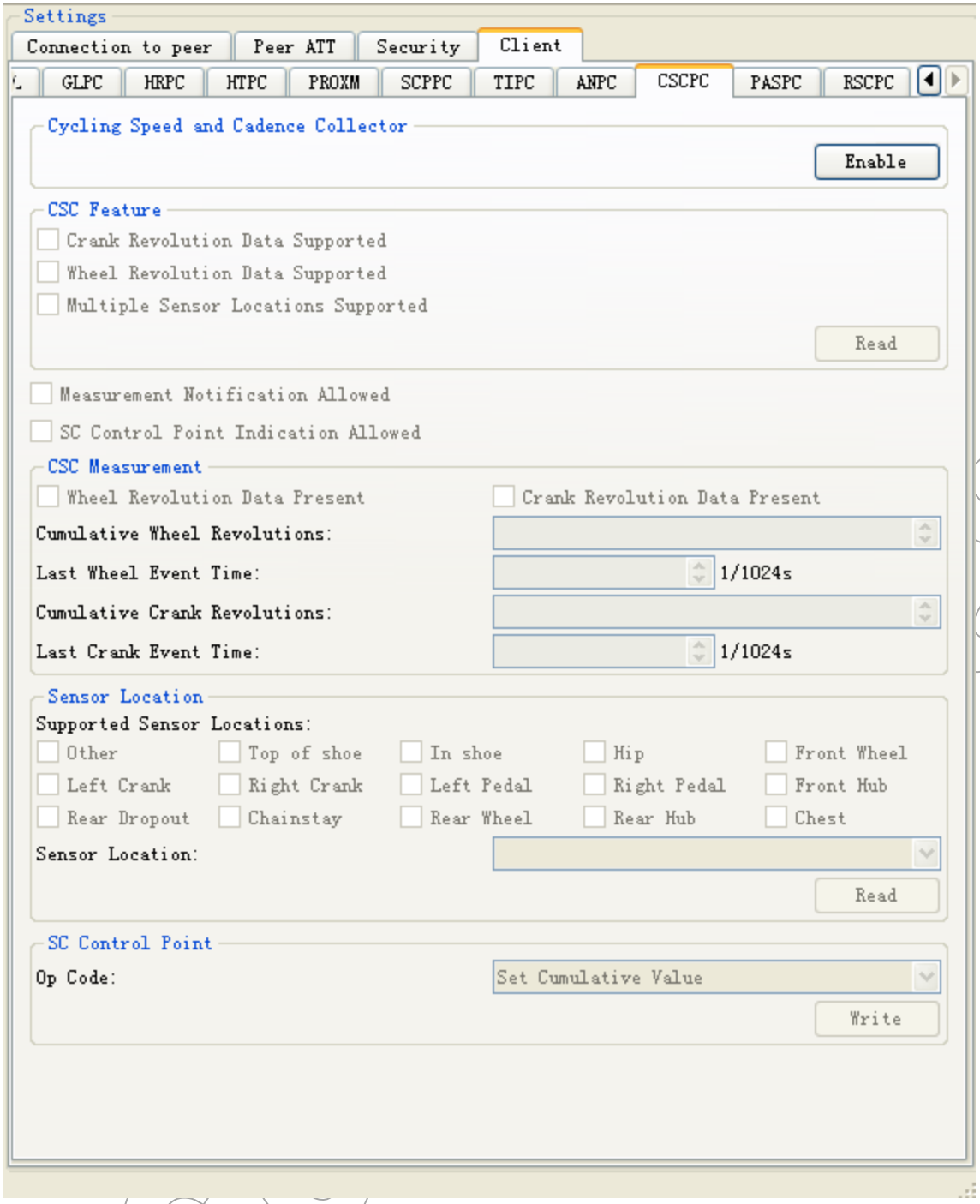


Figure 73User Interface of the CSC Collector

7.3.14 Running Speed and Cadence Profile

The Running Speed and Cadence Profile is used to enable a data collection device to obtain data from a Running Speed and Cadence Sensor (RSC Sensor) that exposes the Running Speed and Cadence Service. The profile defines two roles: RSC Sensor and Collector.

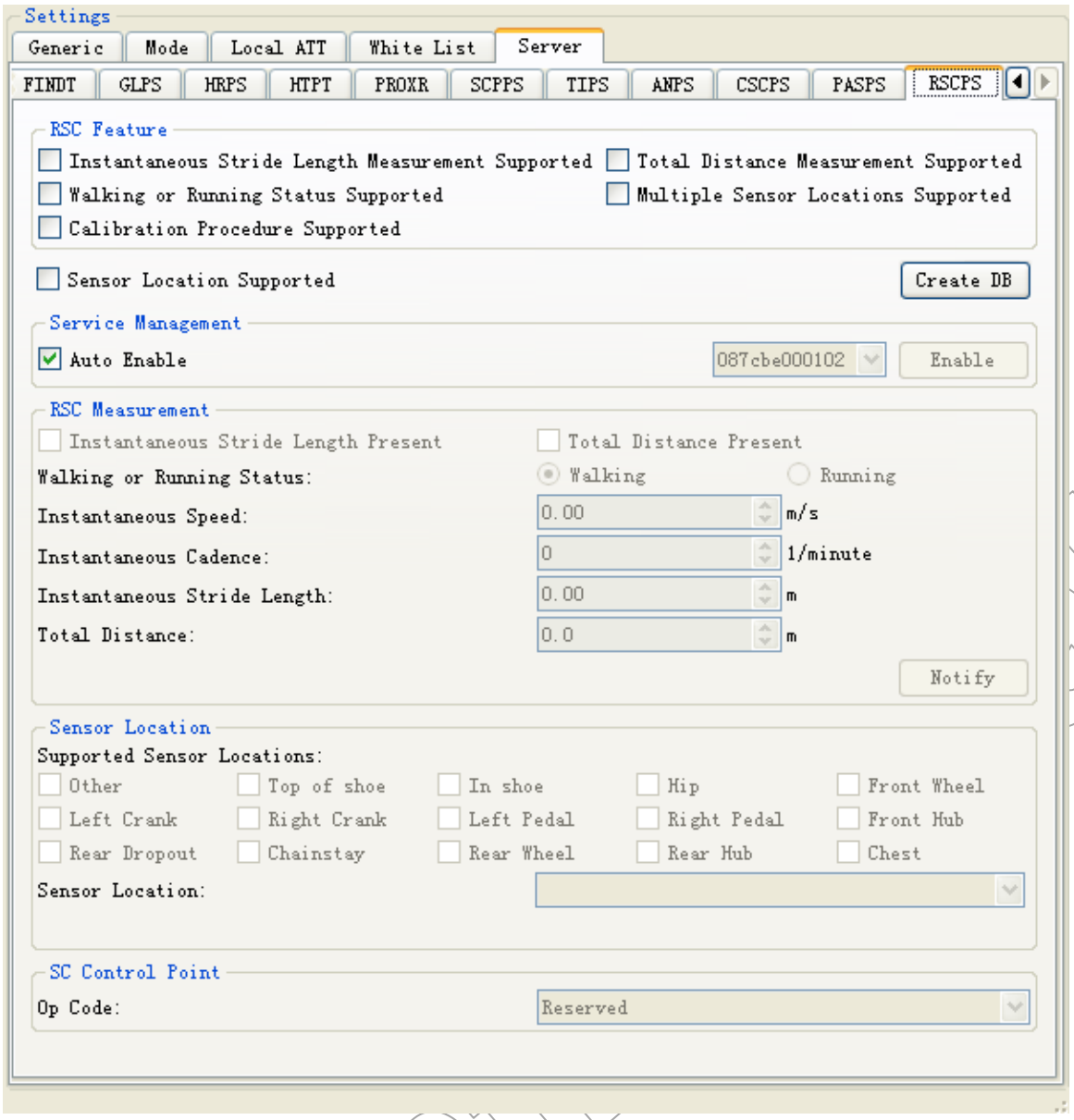


Figure 74 User Interface of the RSC Sensor

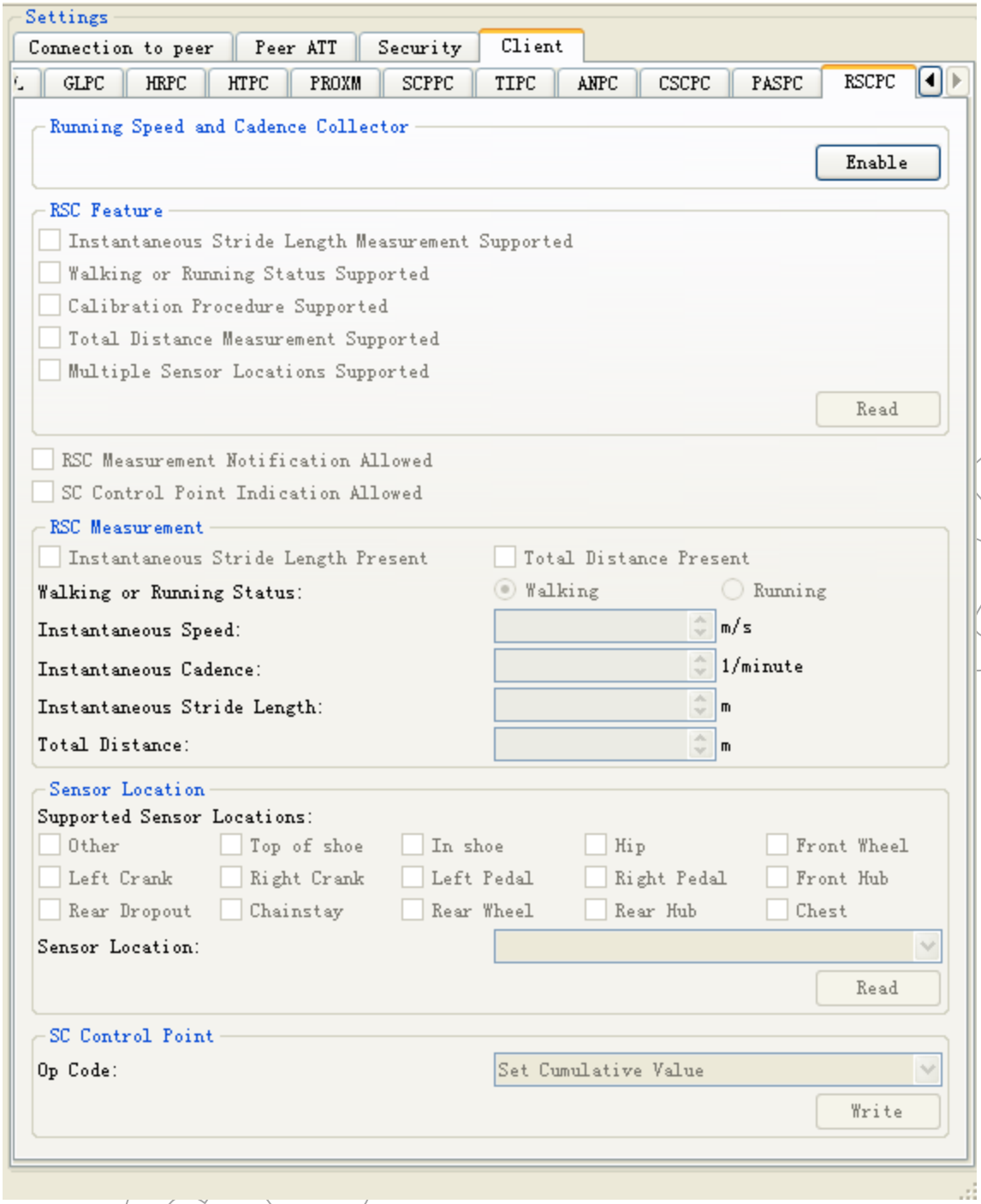


Figure 75 User Interface of the RSC Collector

7.4 Operations

7.4.1 Create

First, select the services and features that are optional. And then click the “Create DB” button.

7.4.2 Enable

There are two ways of enable all the services that a GATT Server instantiates: auto enables and manual enable.

Auto enable all the services .First, please check the “Auto Enable” checkbox before create all the services. And after the connection with a GATT Client is established, all the services will be auto enabled.

Manual enable all the services. First, create all the services. Second, advertising and establish a connection with a GATT Client. At last, choose one of the devices that the local device connected, and then click the “Enable” pushbutton.

7.4.3 Read

If a characteristic is readable, maybe it is updatable except for some read only features. If set a new characteristic value on the user interface of the GATT Server, and click the corresponding “Update” pushbutton. When read the characteristic again by the GATT Client, the characteristic value changes.

Before reading the character value, please make sure that the service of the characteristic is enabled.

For example:

1. Set the battery level and click the “Update” button, on the user interface of battery service. As Figure 74 shows:

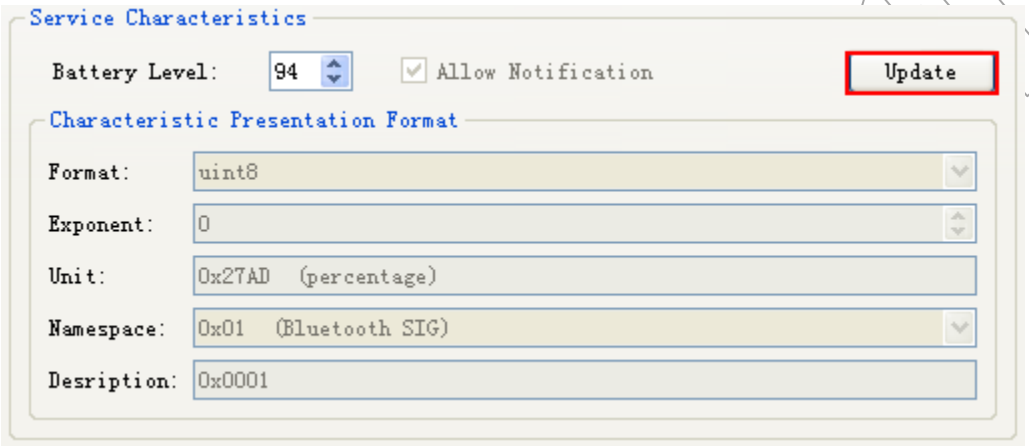


Figure 76 Update

2. Click the “Read” button on the user interface of battery client. As Figure 75 shows:

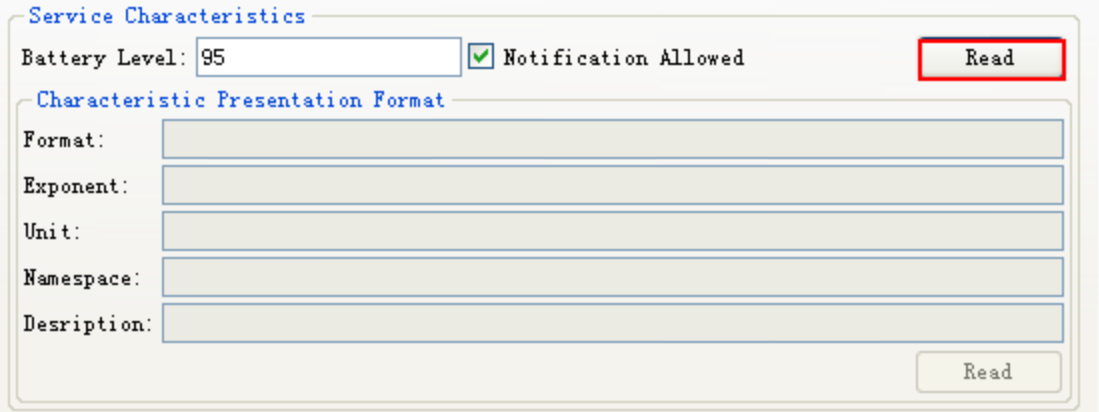


Figure 77 Read Operation

3. Result

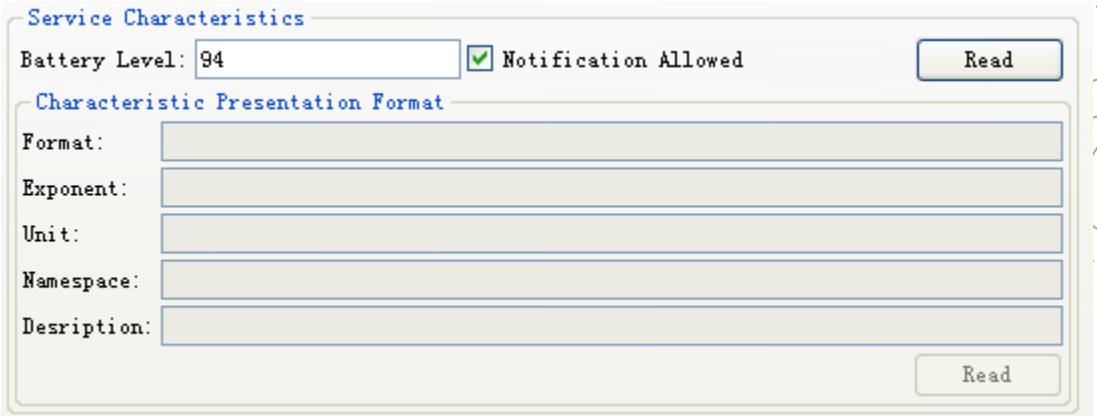


Figure 78 Result

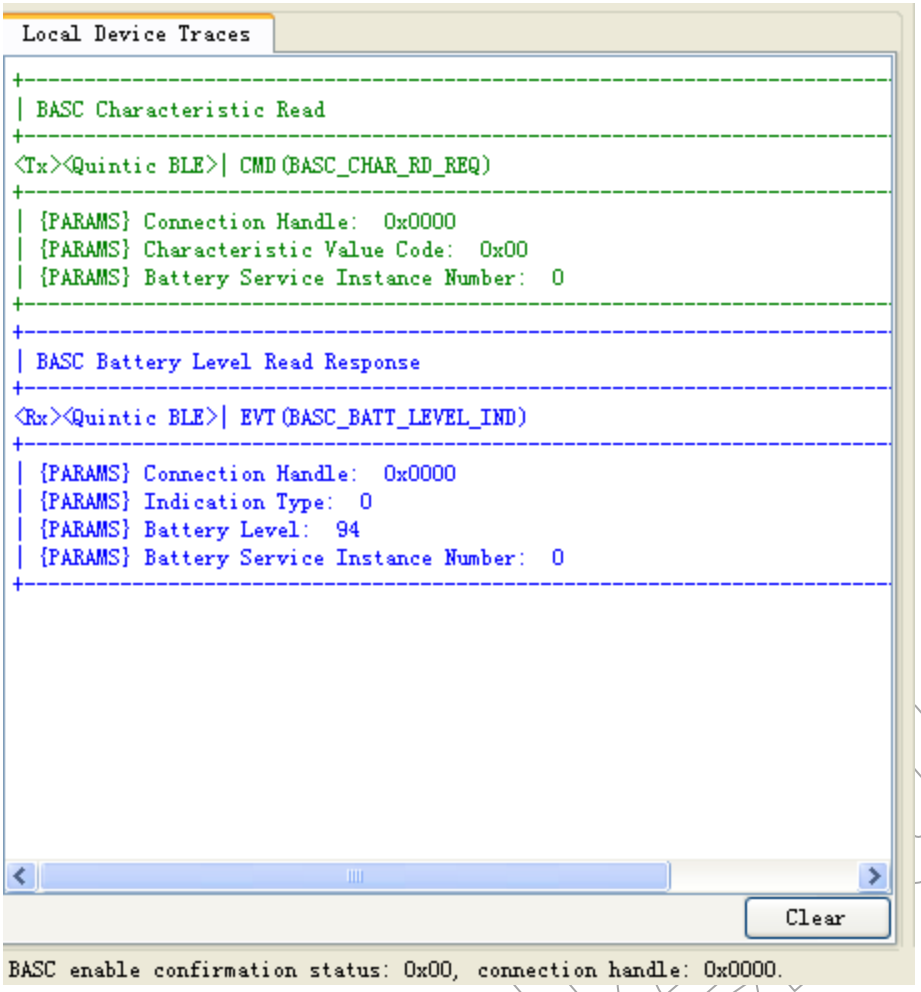


Figure 79 Trace Information

7.4.4 Write

If a characteristic is writable, and when write a new value to the characteristic, the result of the operation is shown on the user interface of the GATT Server.

For example:

1. Set the alert level and click the "Write" button on the user interface of the find me locator.

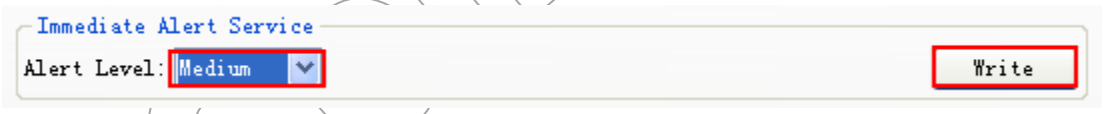


Figure 80 Write Operation

2. Result

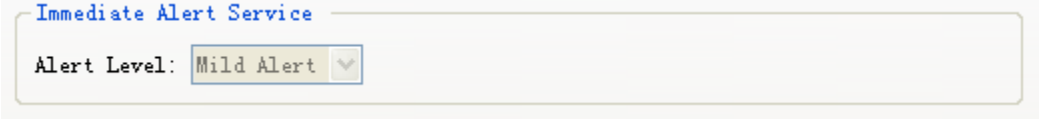


Figure 81 Result

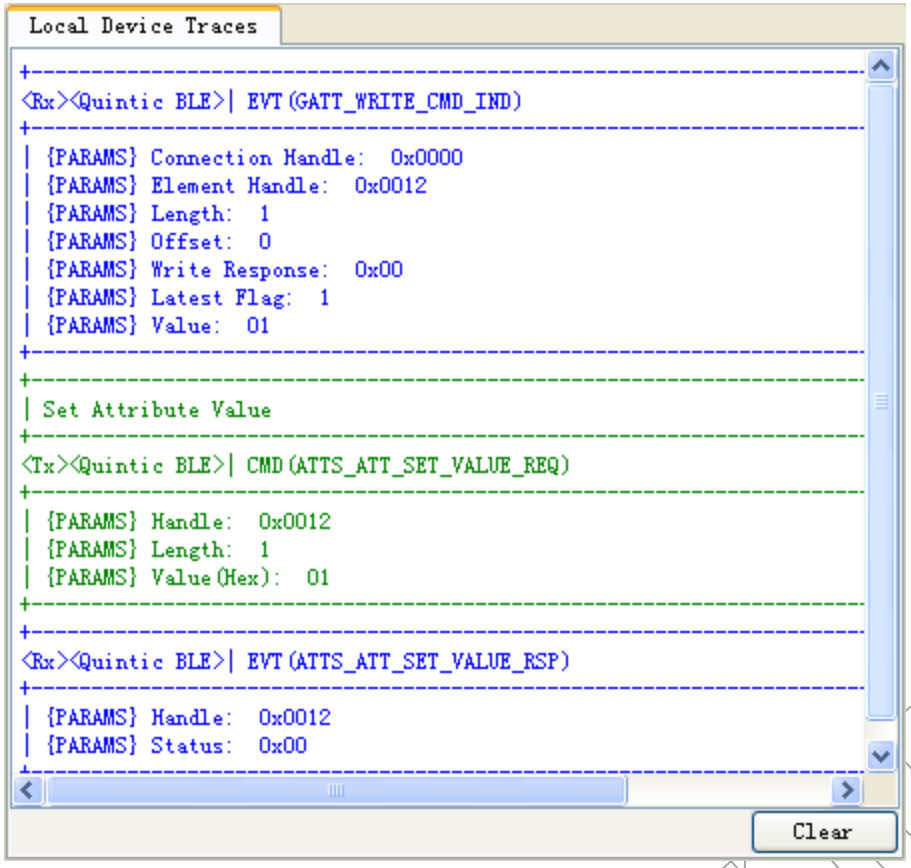


Figure 82 Trace Information

7.4.5 Indicate

If a characteristic has the property of indicate, the GATT Client should write a value to the GATT Server to enable the indication property of the characteristic. And then click the corresponding "Indicate" pushbutton on the user interface of the GATT Server. The GATT Server will indicate the characteristic value to the GATT Client.

For example:

1. Check the "Blood Pressure Measurement Allowed" checkbox on the user interface of the blood pressure collector.

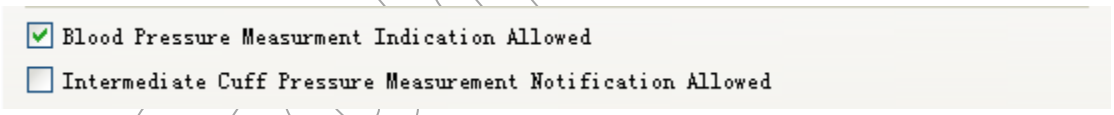


Figure 83 Enable Blood Pressure Measurement Indications

2. Set the blood pressure measurement and click the "Indicate" pushbutton on the user interface of the blood pressure sensor.

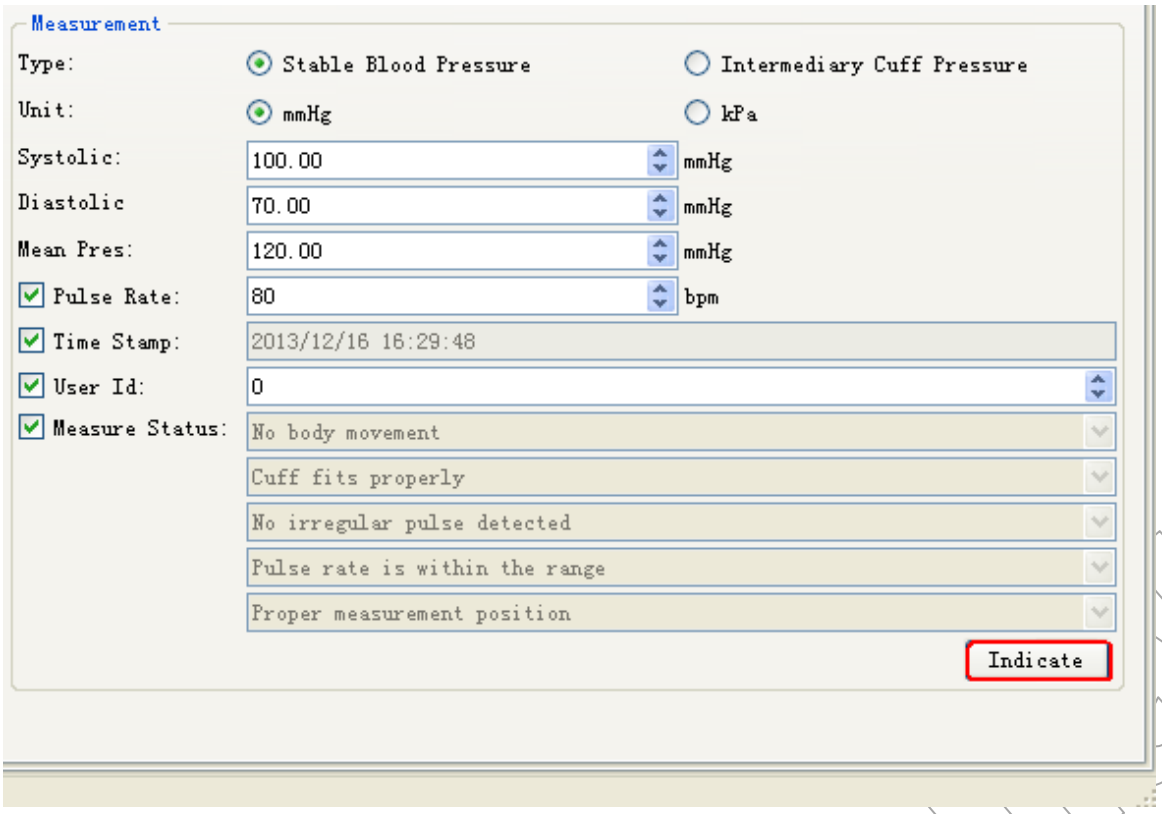


Figure 84 Indicate Operation

3. Result

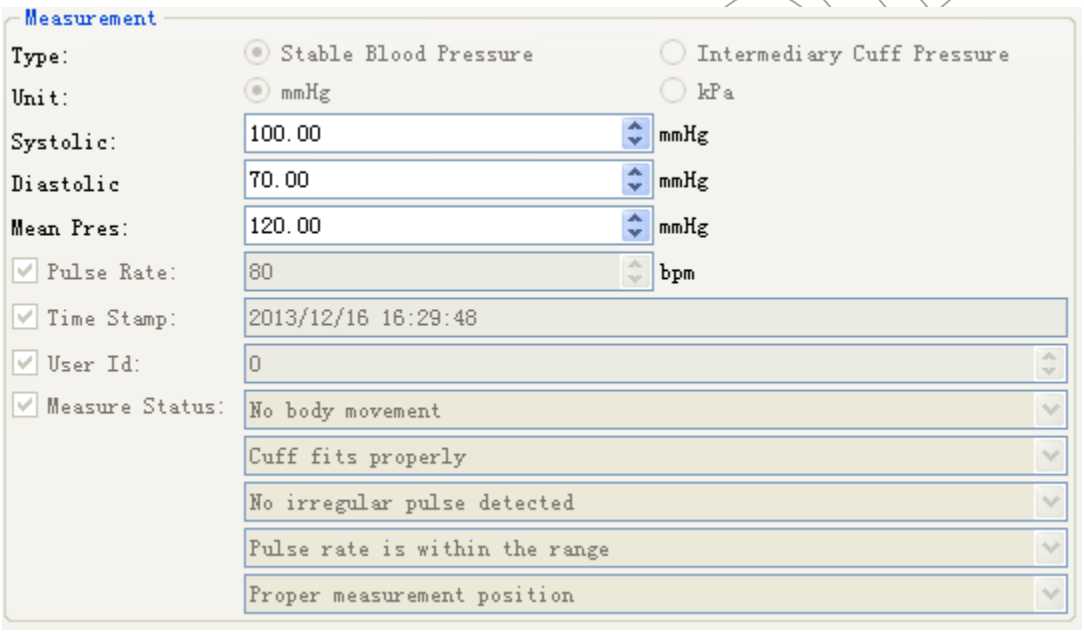


Figure 85 Result

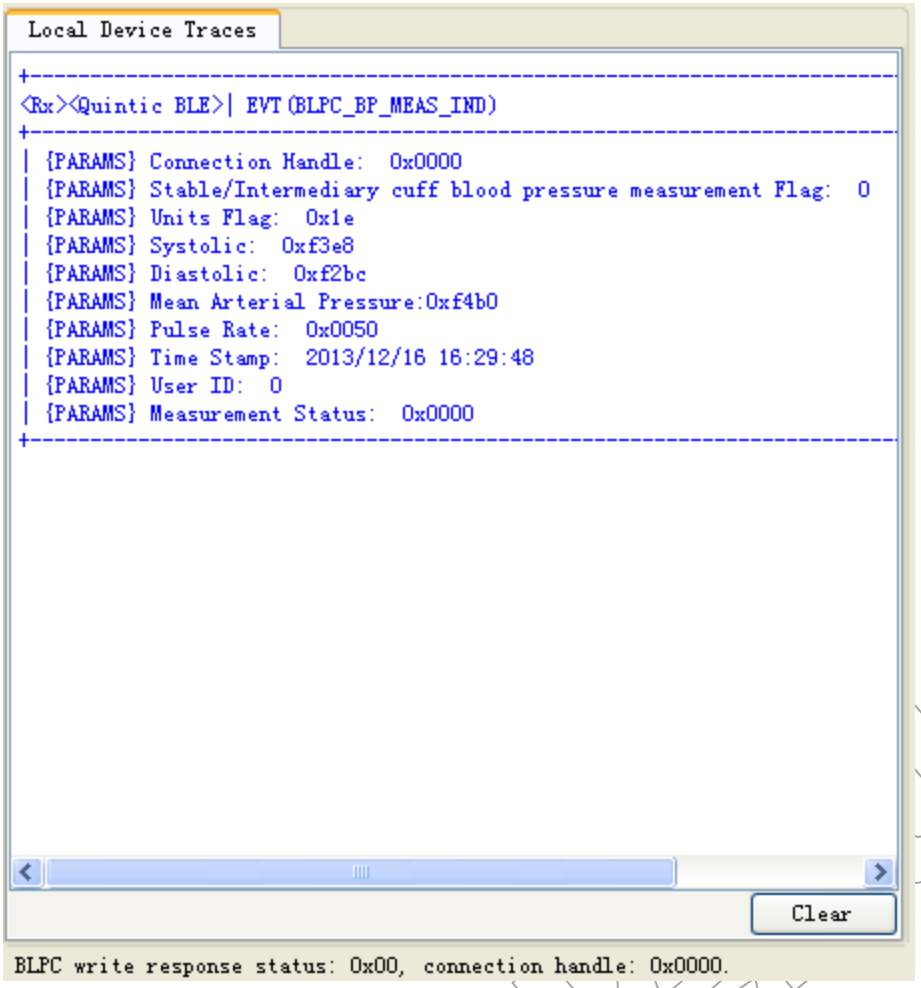


Figure 86 Trace Information

7.4.6 Notify

If a characteristic has the property of notify, the GATT Client should write a value to the GATT Server to enable the notification property of the characteristic. And then click the corresponding "Notify" pushbutton on the user interface of the GATT Server. The GATT Server will Notify the GATT Client of characteristic value .

For example:

1. Check the "Notification Allowed" checkbox on the user interface of battery client.

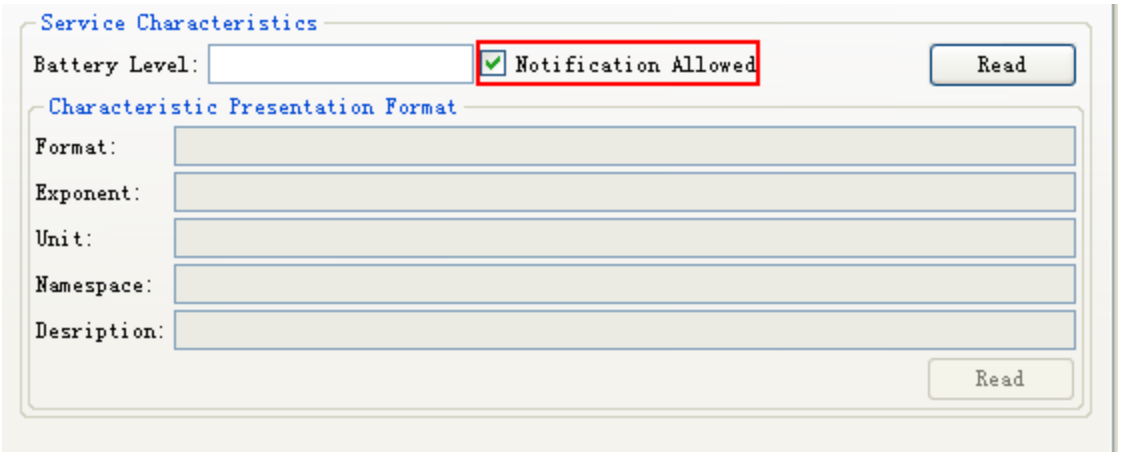


Figure 87 Allow Notification

2. Set the battery level and click the “Notify” pushbutton on the user interface of the battery client.

Figure 88 Notify Operation

3. Result

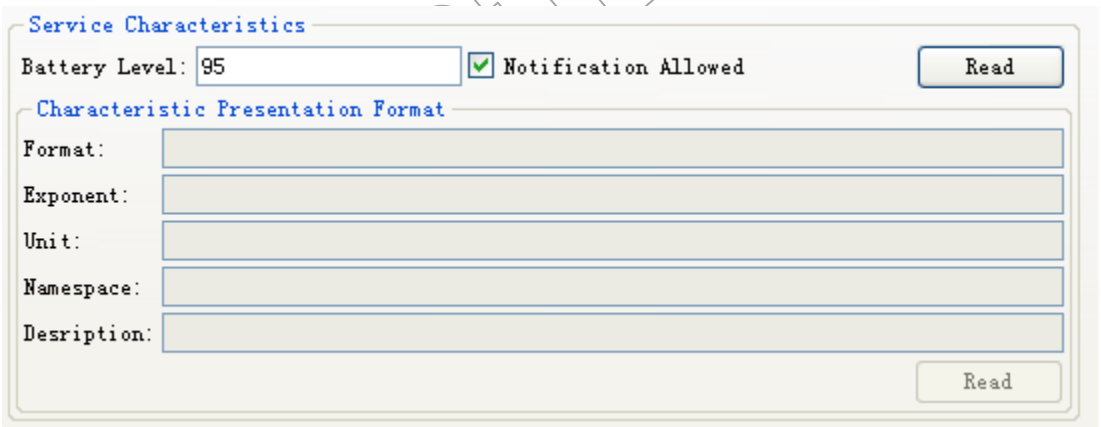


Figure 89 Result

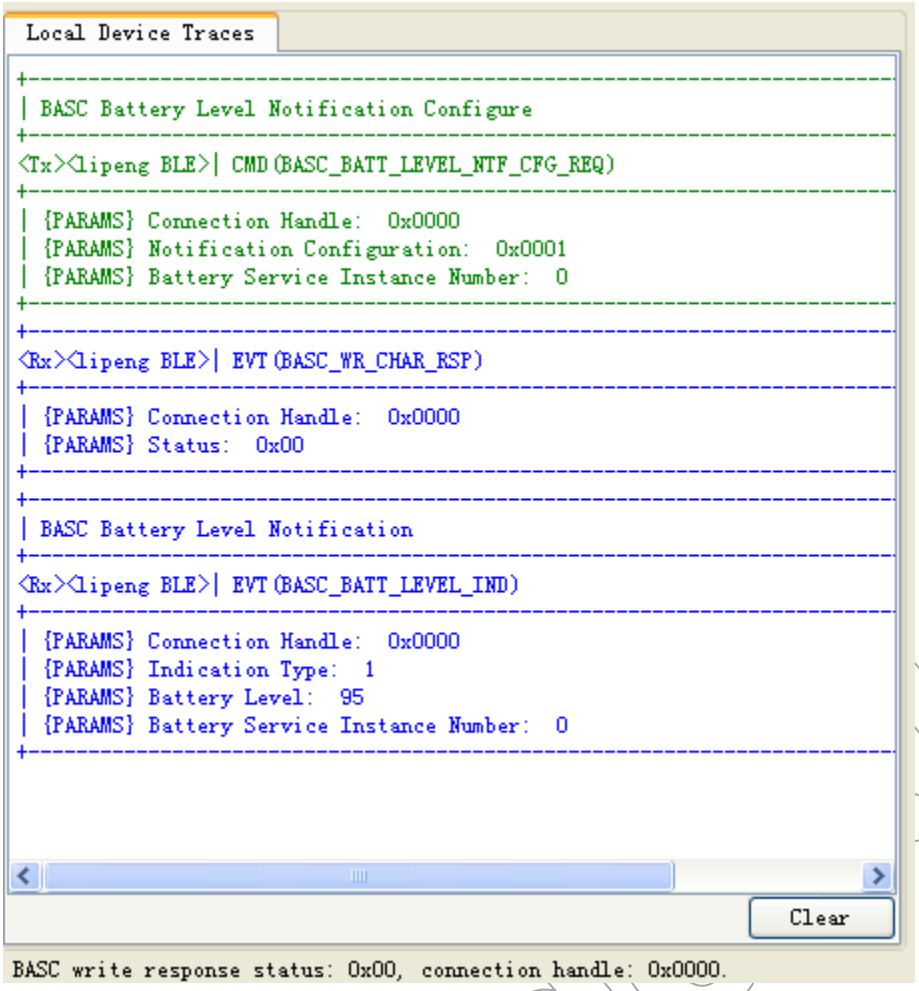


Figure 90 Trace Information

7.5 Profile Test Operation

7.5.1 Proximity Profile

1. Click the “Create DB” pushbutton on the user interface of the proximity reporter.

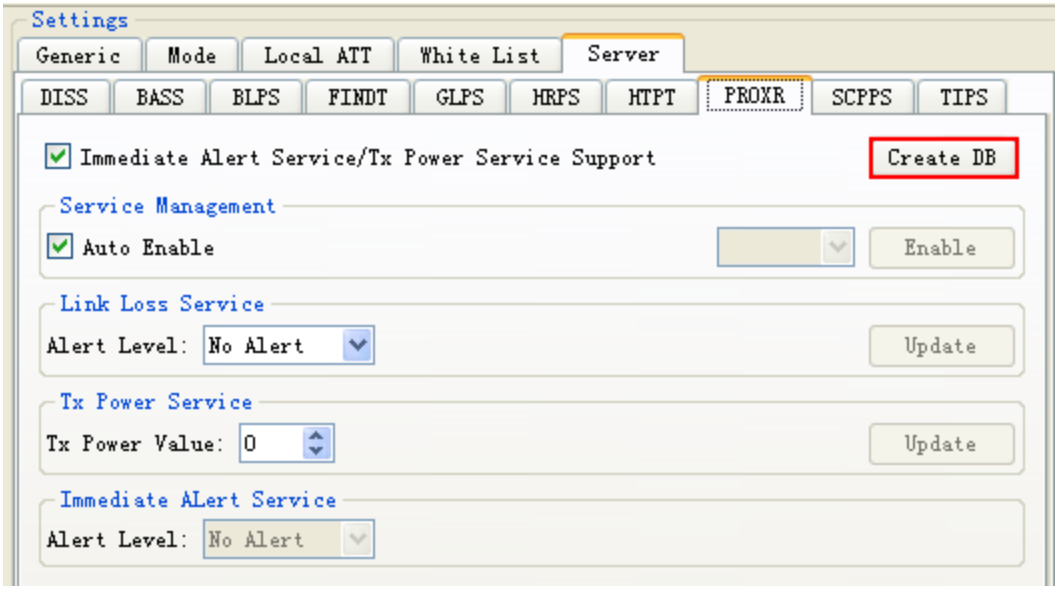


Figure 91 Create DB

2. Set the “Tx Power Value” and Click the “Update” pushbutton.

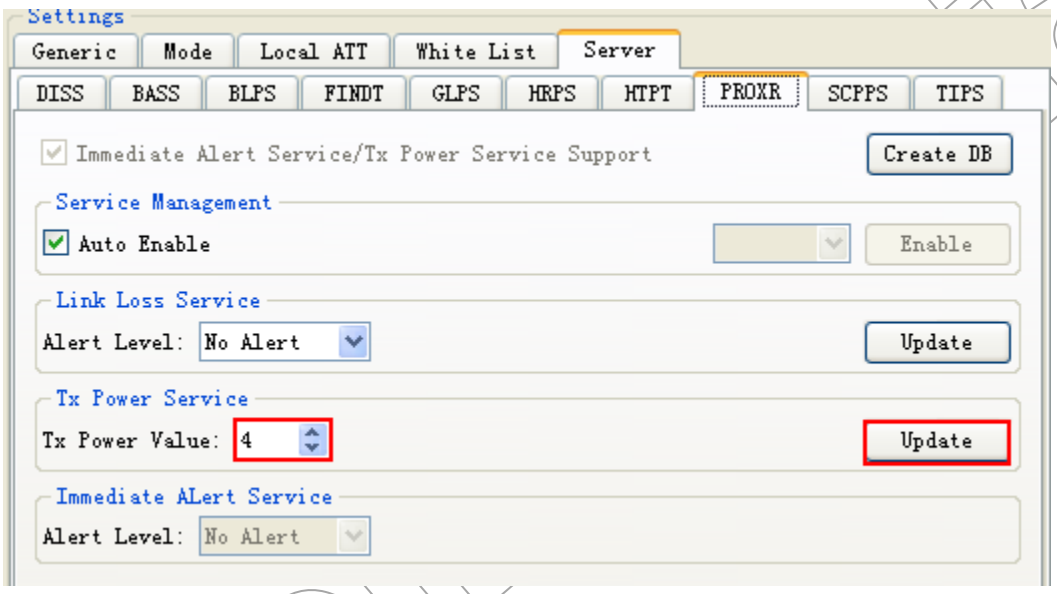


Figure 92 Set Tx Power Value

3. Click the “Advertising” pushbutton.

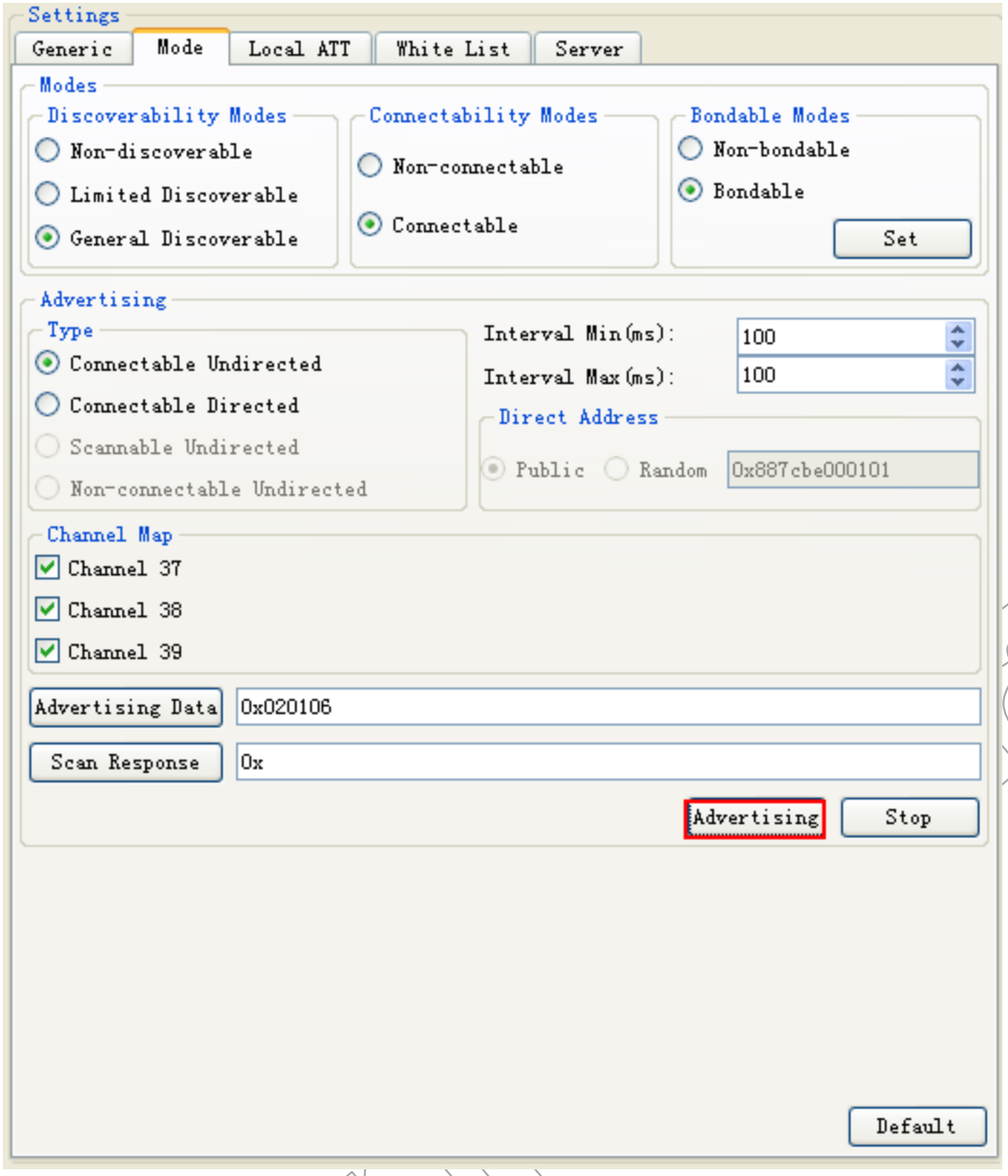


Figure 93 Advertising

4. Start a new QTool, and Click the “Scan” pushbutton on the “Generic” tab of the client.

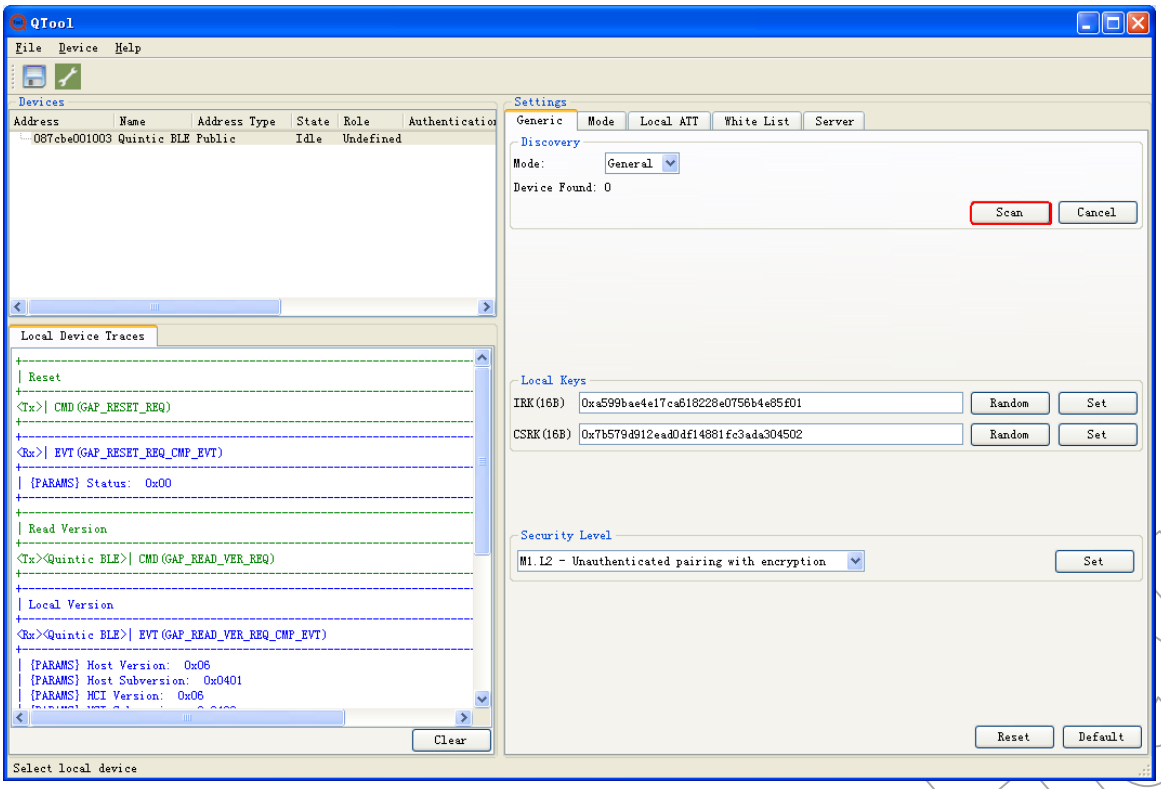


Figure 94 Scan

5. Select the device that we created services of the proximity reporter. And then click the "Connect" pushbutton.

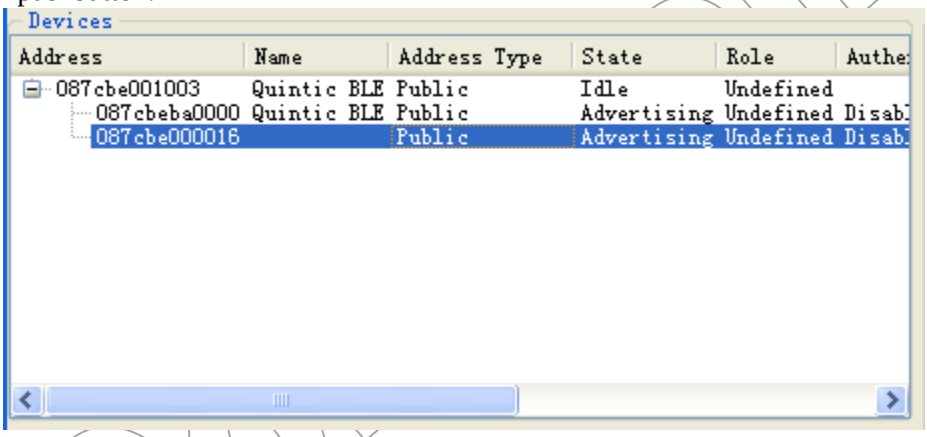


Figure 95 Select device

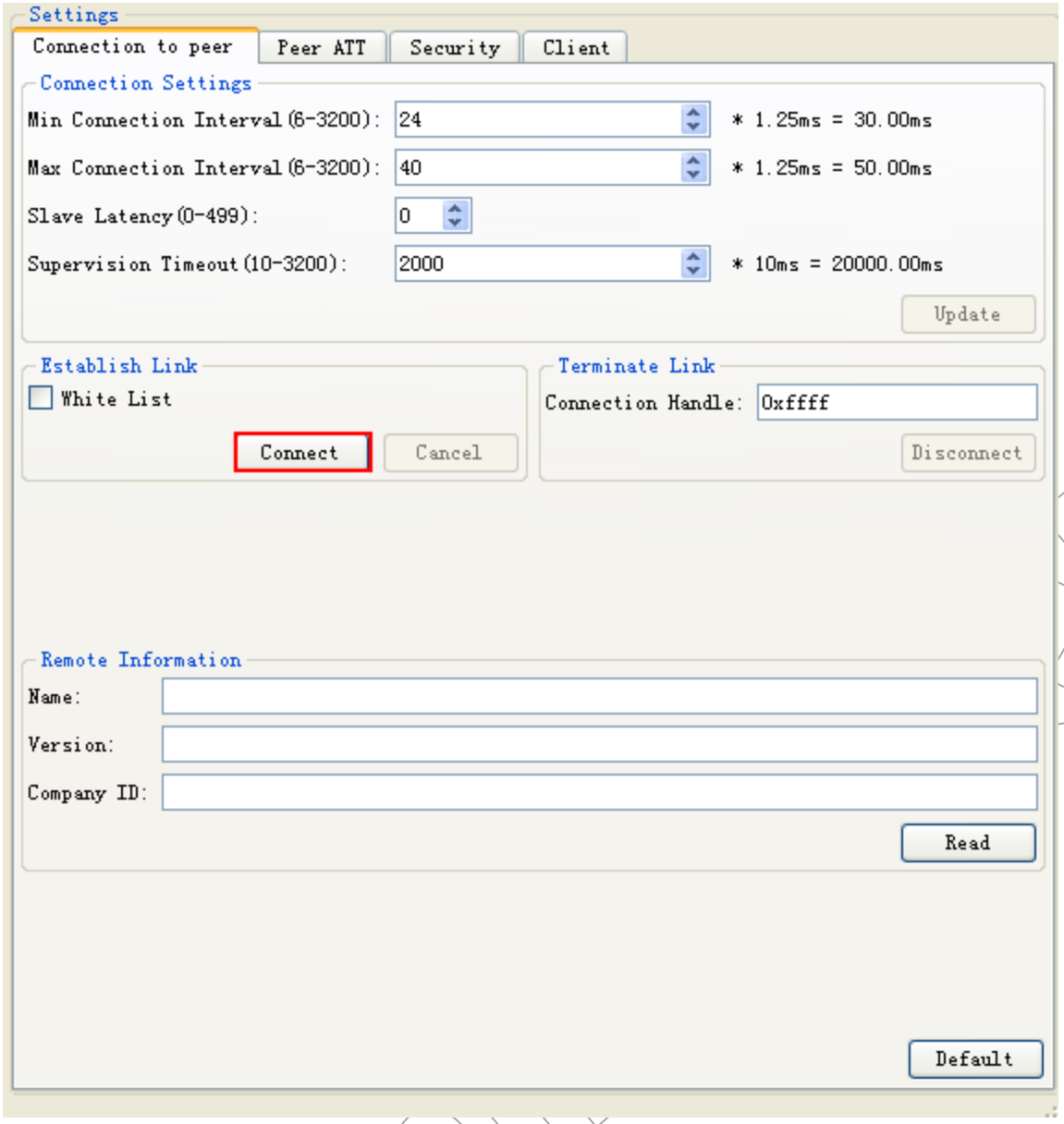


Figure 96 Connect

6. Click the “Enable” pushbutton on the user interface of the proximity monitor.

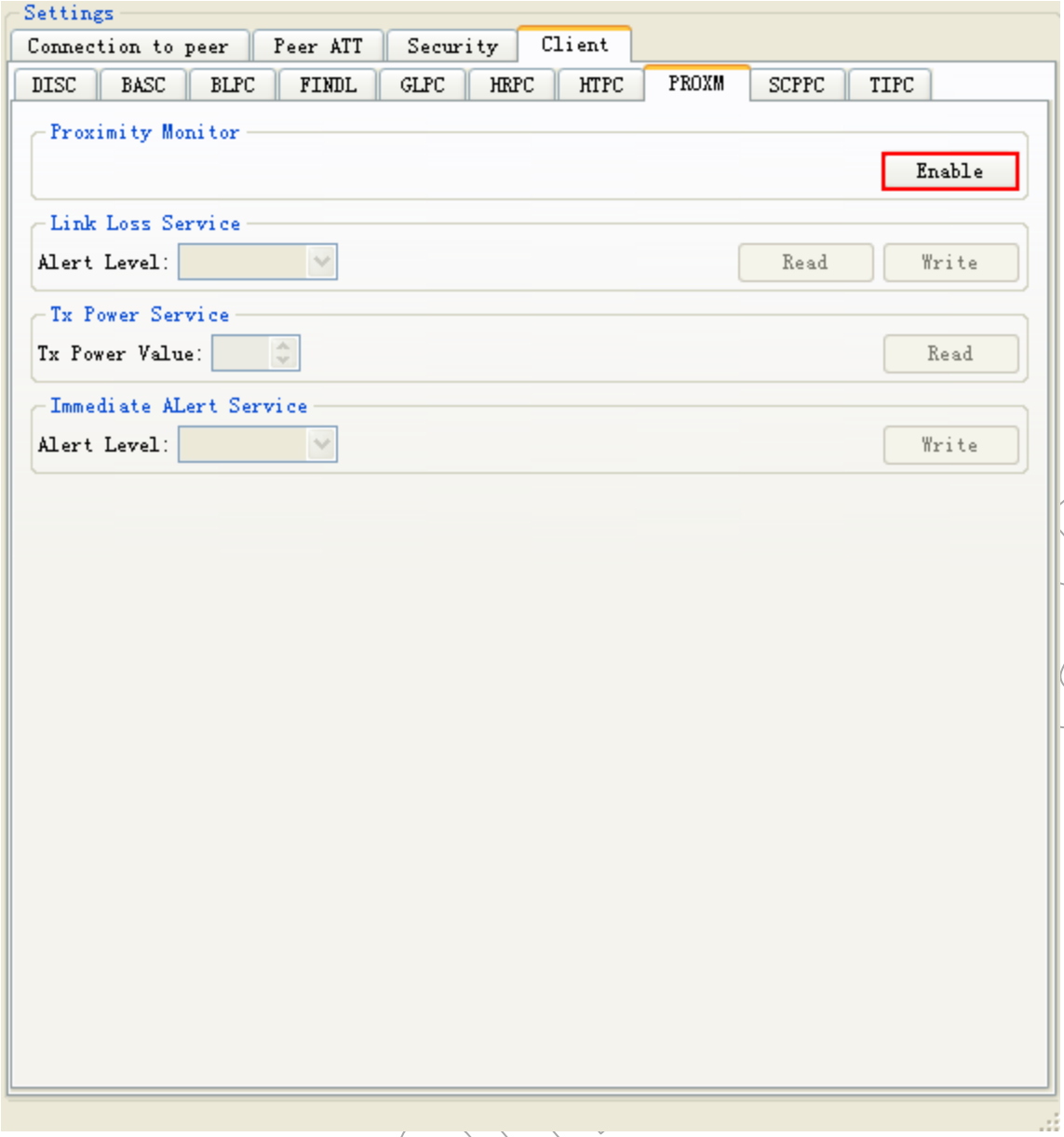


Figure 97 Enable

7. Click the “Read” button in the “Link Loss Service” group. Click the “Read” button in the “Tx Power Service” group.

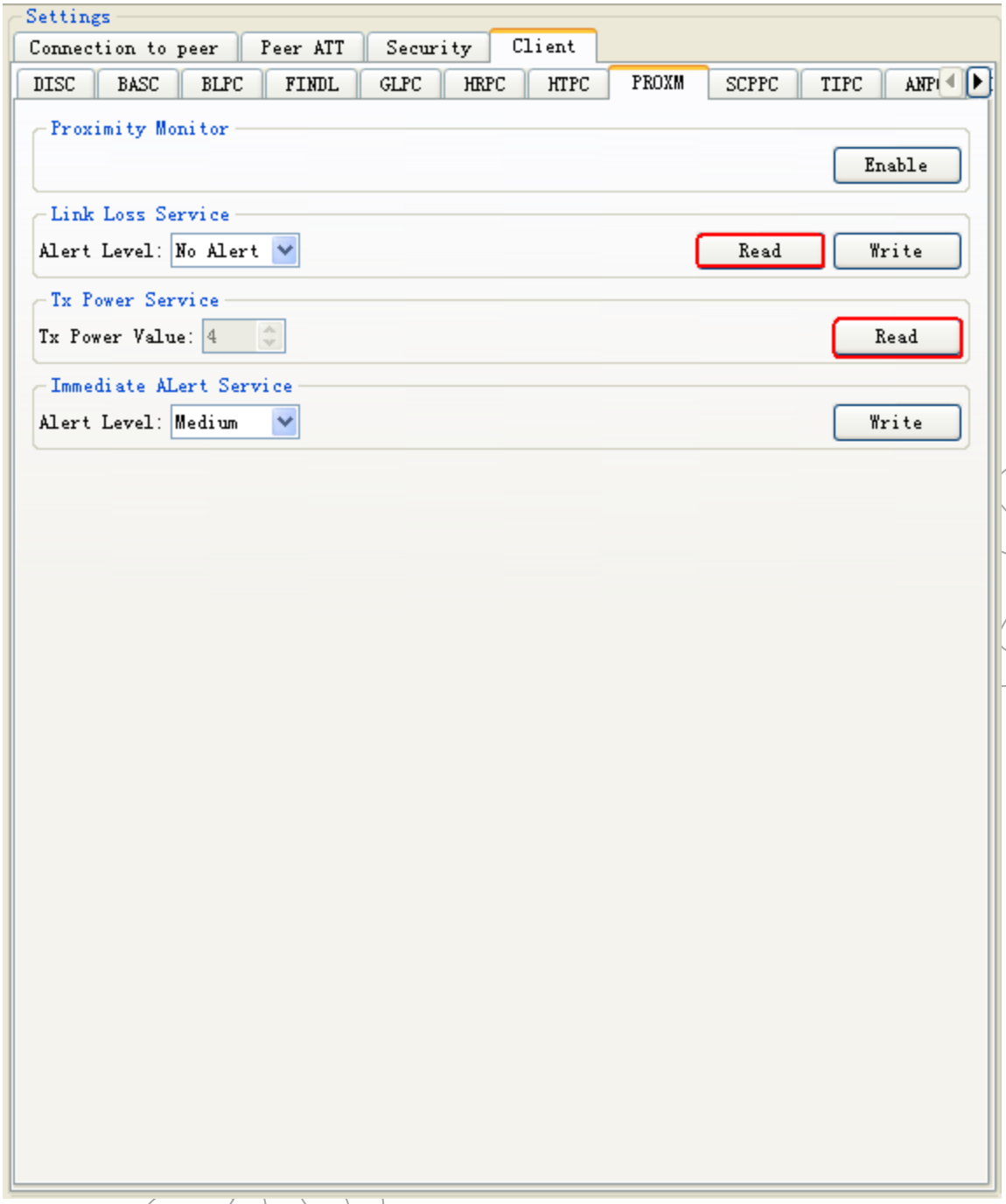


Figure 98 Read

8. Set the alert level and click the “Write” button both in the “Immediate Alert Service” and “Link Loss Service” group.

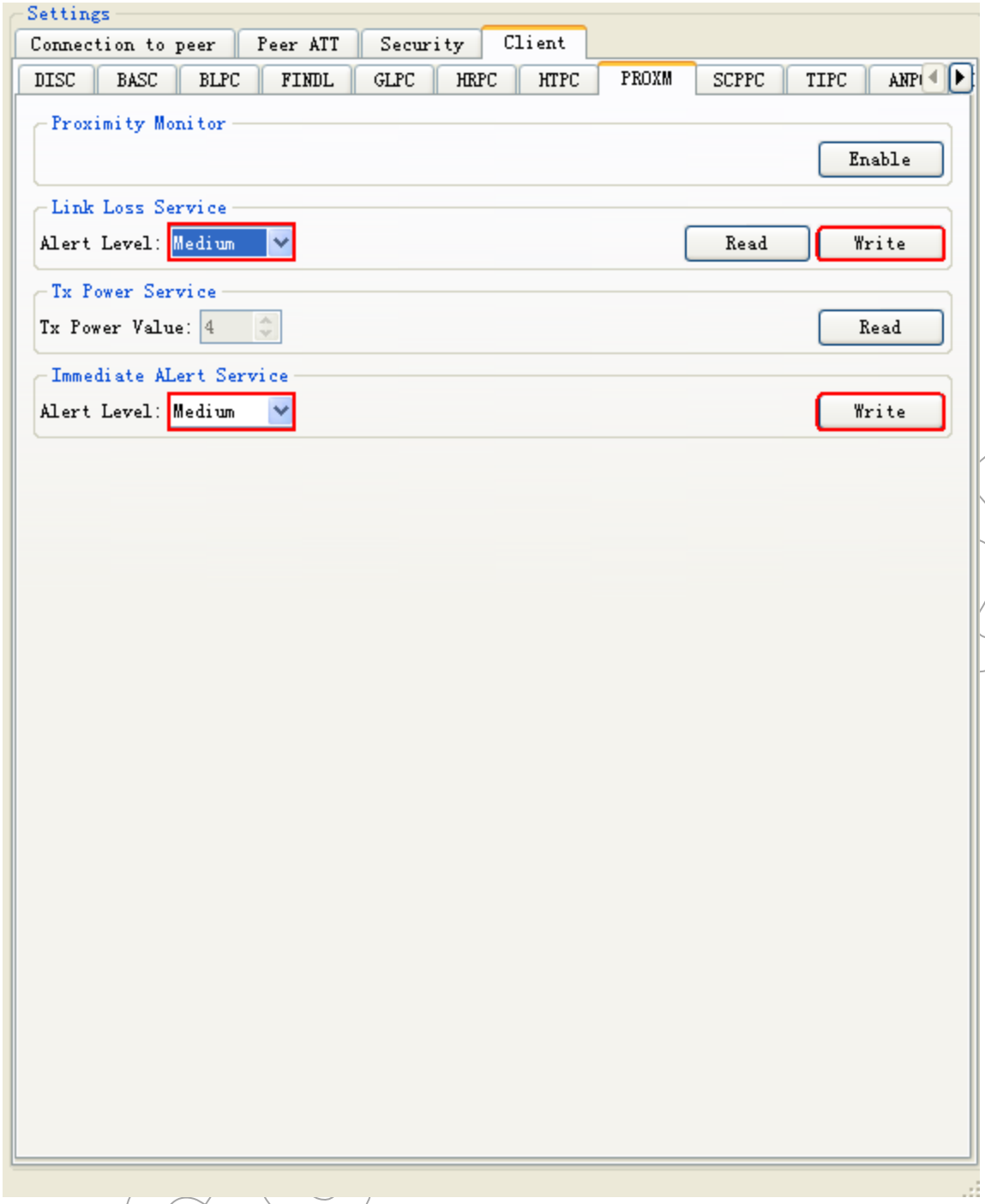


Figure 99 Write

9. Result

Figure 100 Result

7.5.2 Glucose Profile

1. Click the “Edit” pushbutton in the “Glucose Features” group and select the supported features.

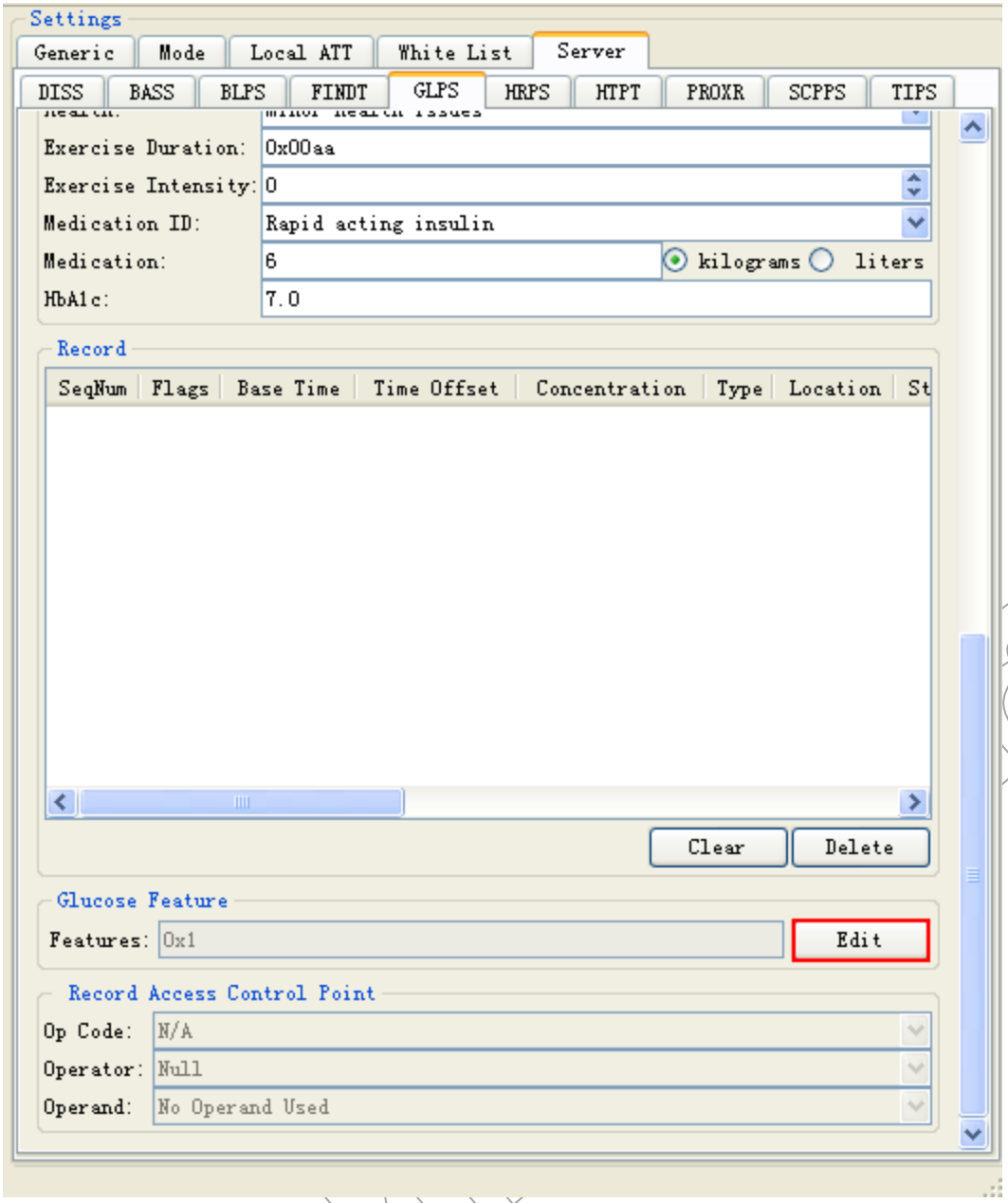


Figure 101 Edit Glucose Feature

2. Click the “Create DB” pushbutton on the user interface of the glucose sensor.

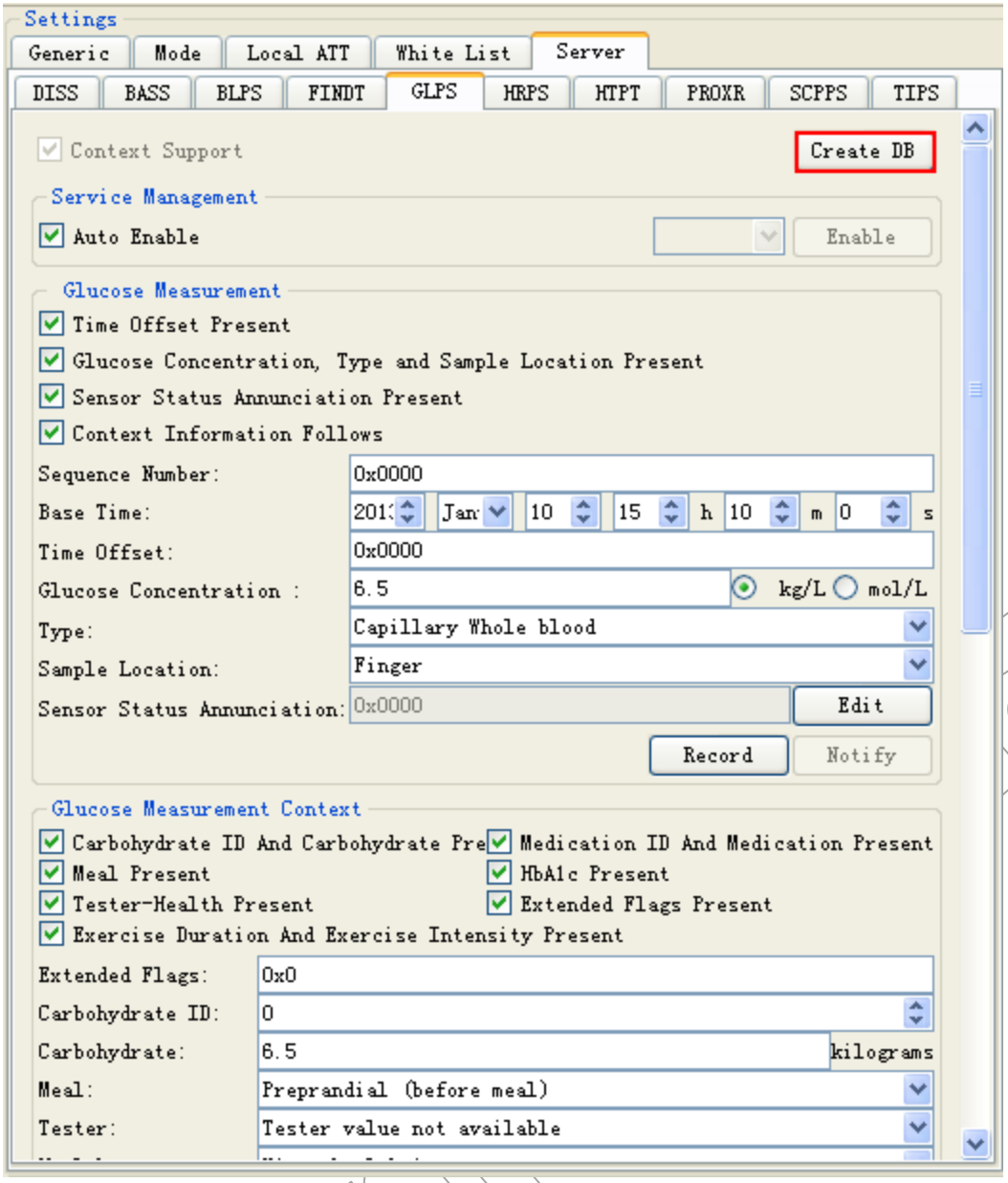


Figure 102 Create DB

3. Click the “Advertising” pushbutton.

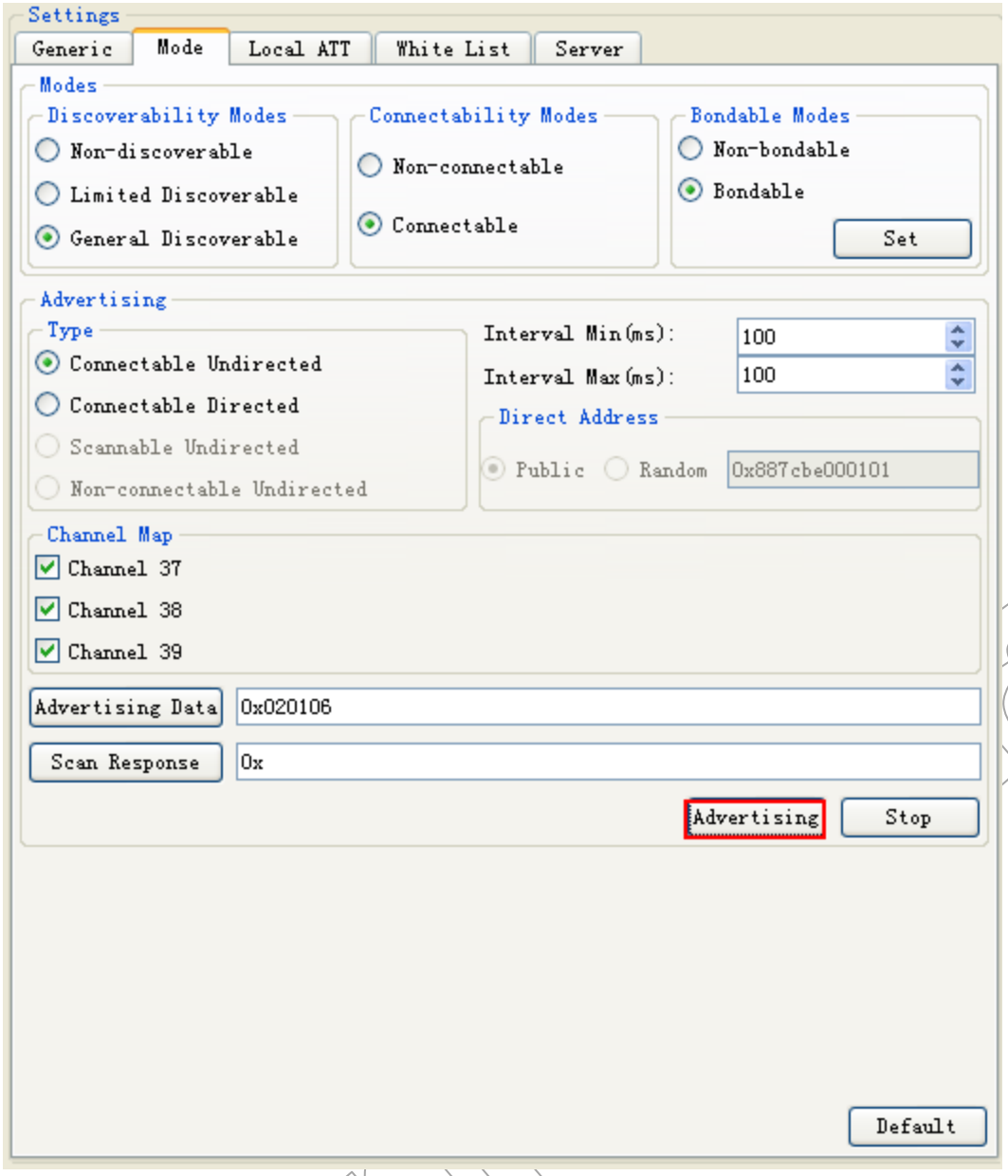


Figure 103 Advertising

4. Start a new QTool, and click the “Scan” pushbutton on the “Generic” tab.

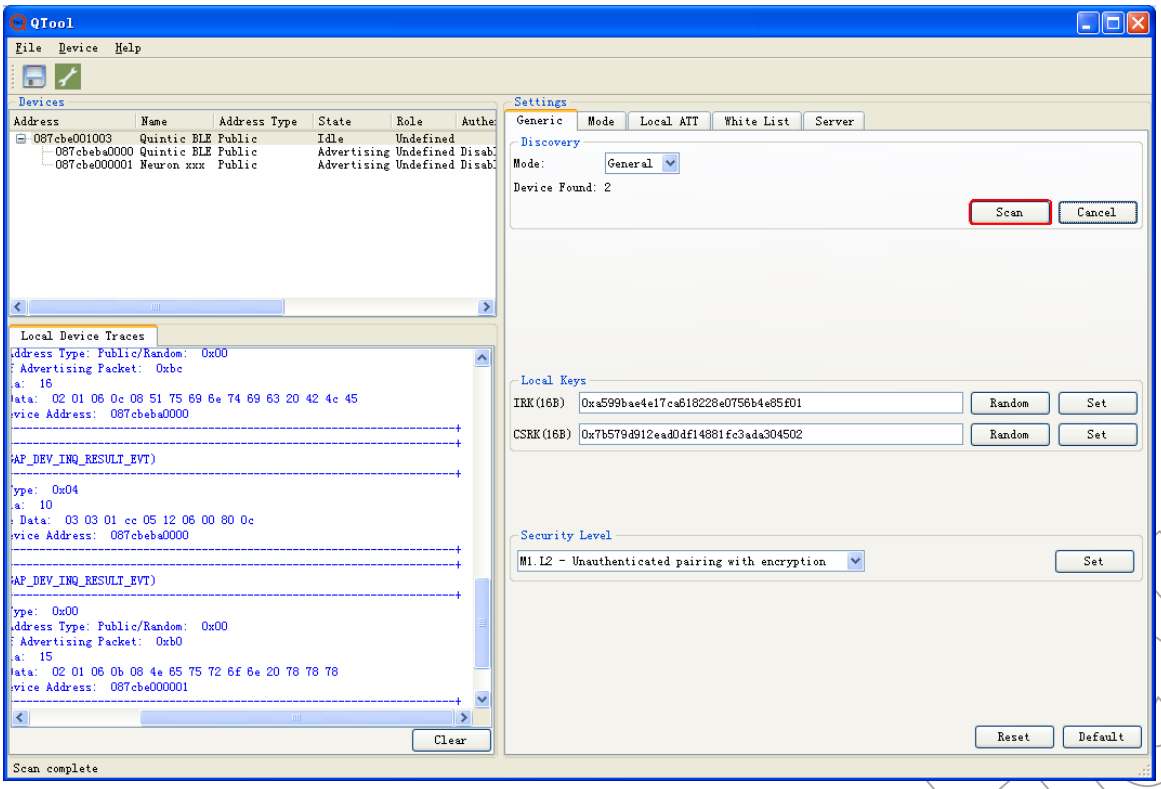


Figure 104 Scan

5. Select the device that we created services of the Glucose Sensor. And then click the “Connect” pushbutton.

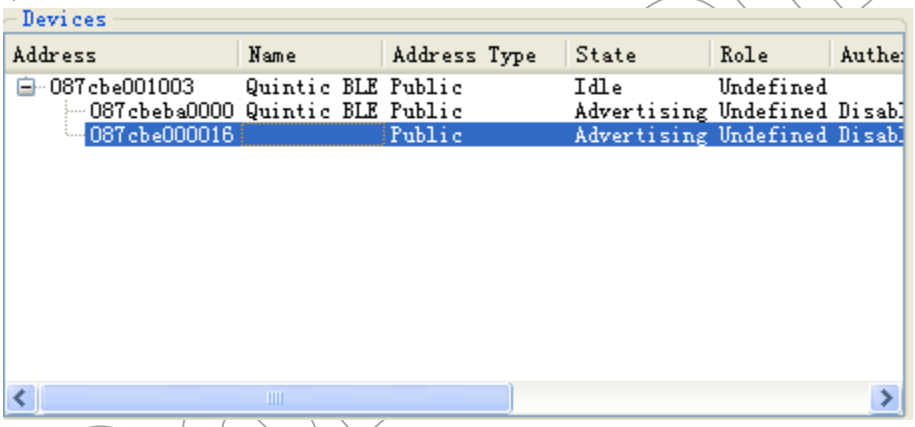


Figure 105 Select device

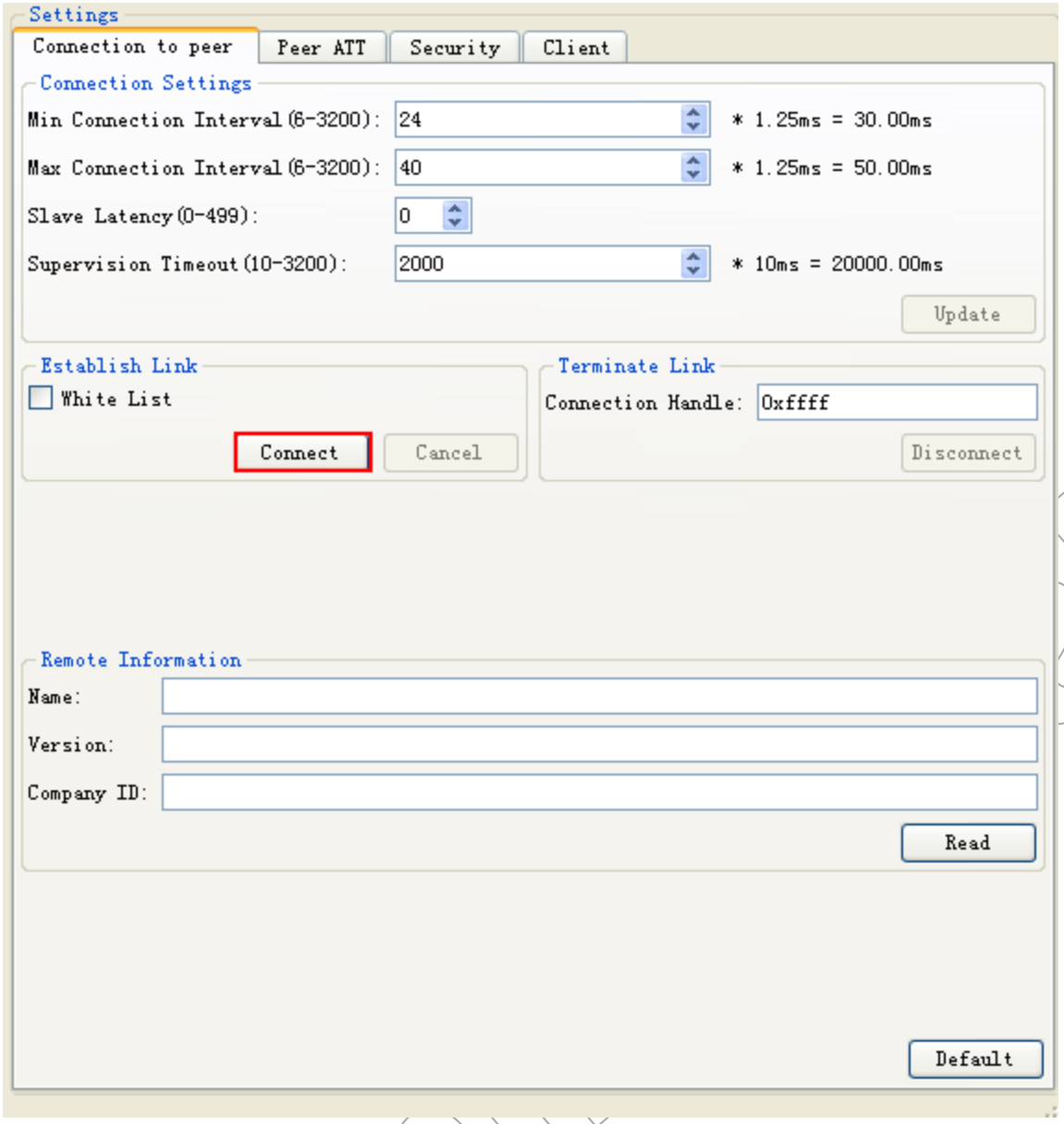


Figure 106 Connect

6. Click the “Enable” button on the user interface of the glucose collector.

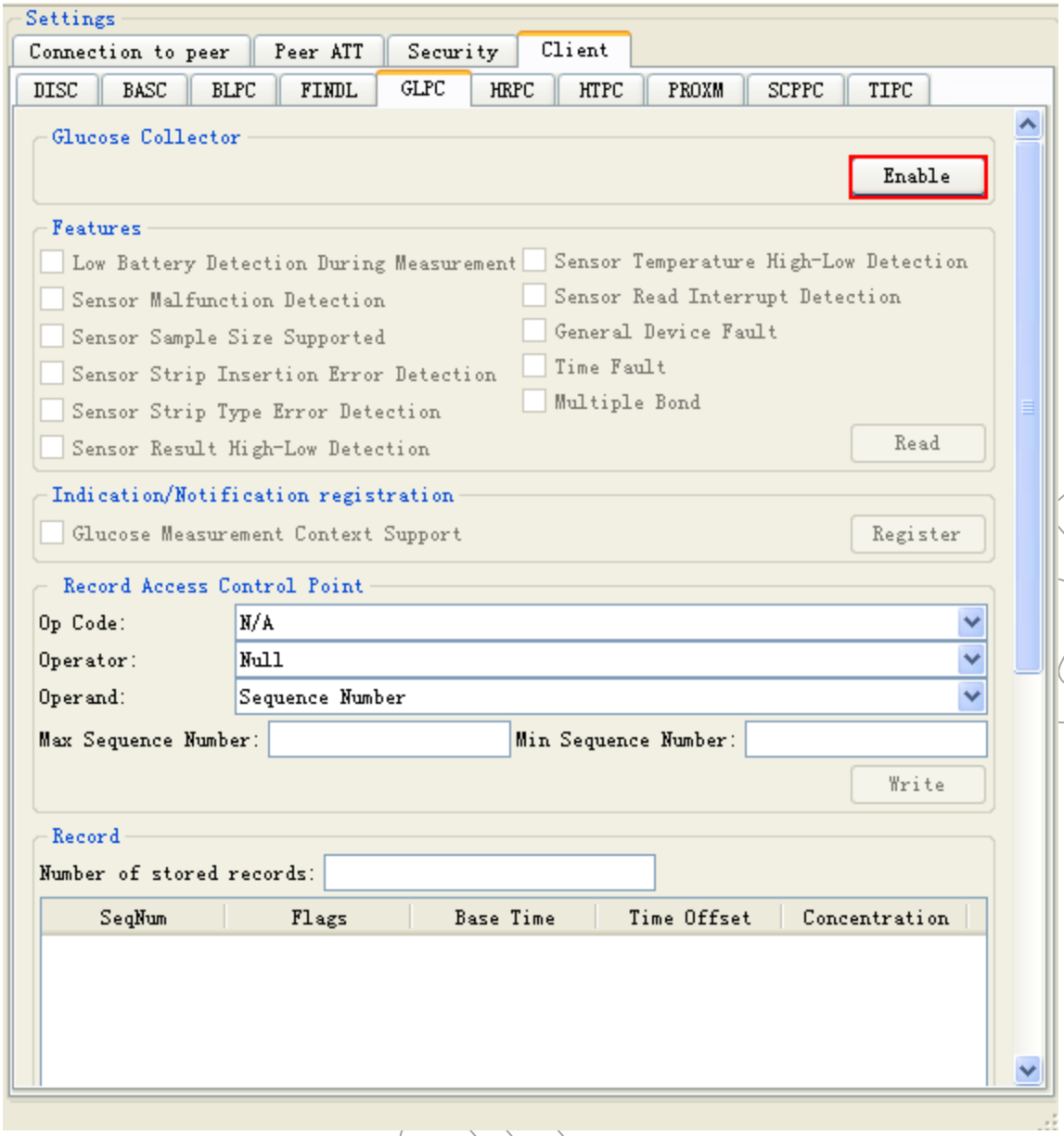


Figure 107 Enable

7. Set the “Glucose Measurement” group and “Glucose Measurement Context” group. And Click the “Record” pushbutton to add a glucose record.

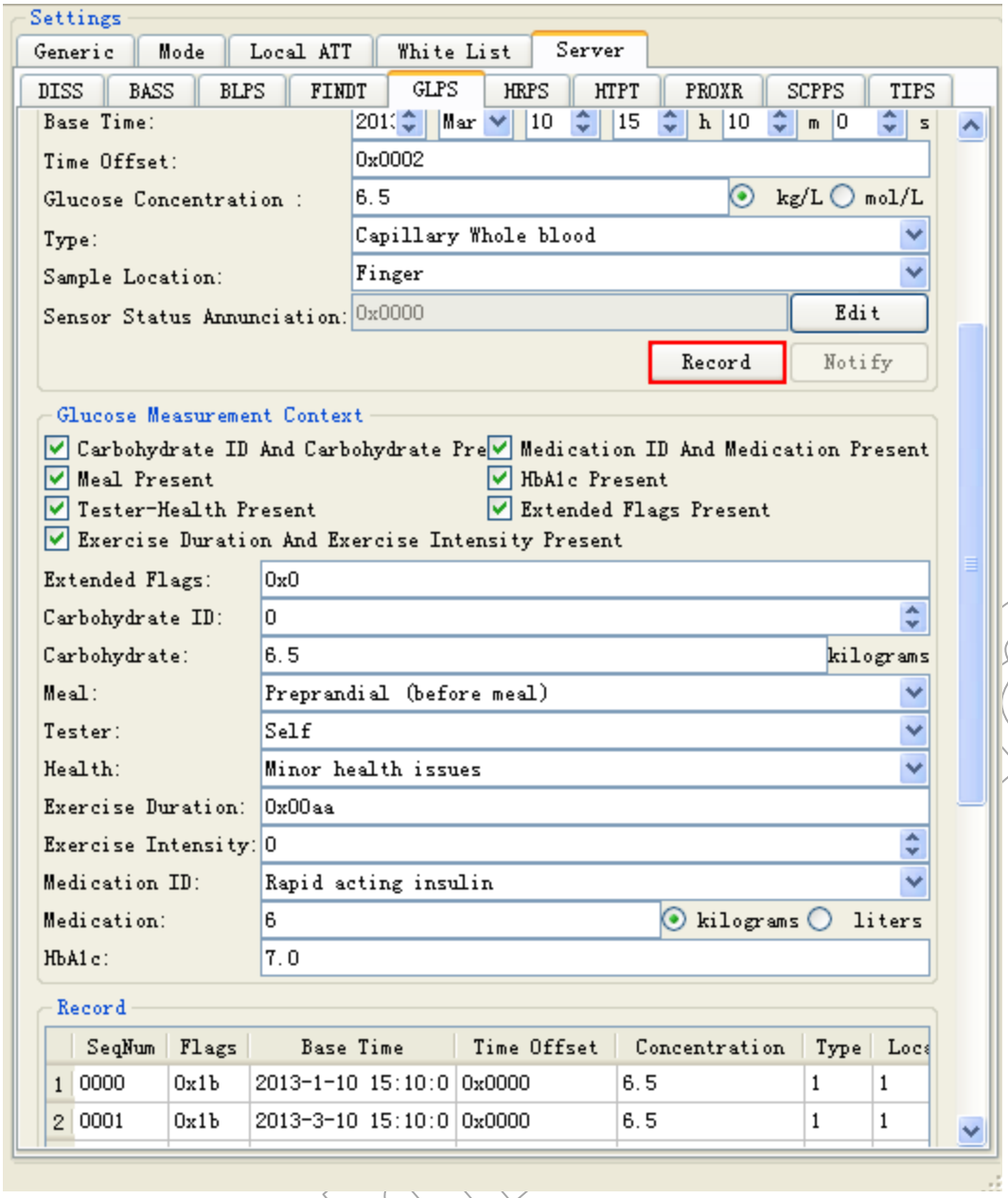


Figure 108 Add Glucose Record

8. Click the “Read” pushbutton.

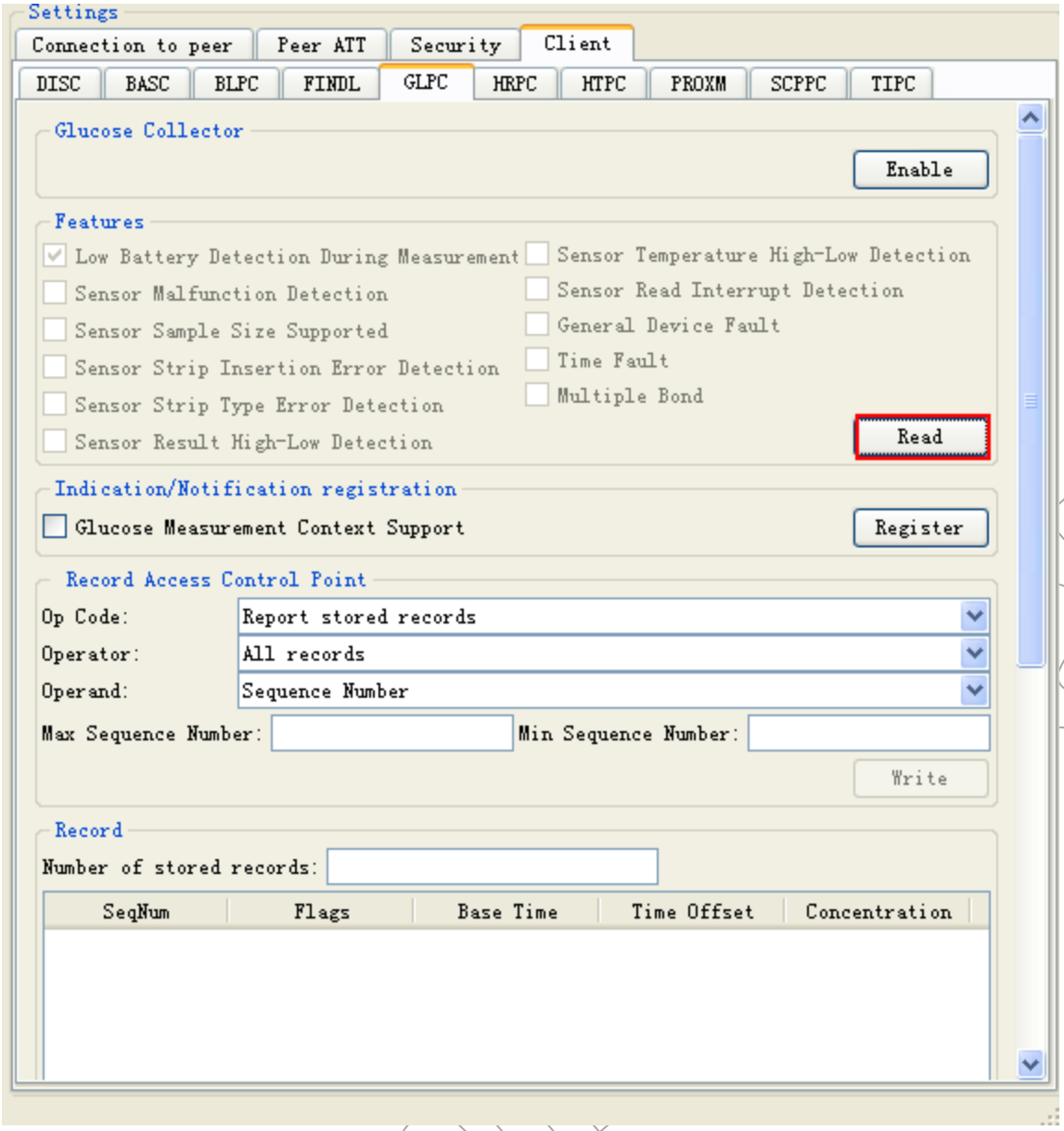


Figure 109 Read

9. Check the "Glucose Measurement Context Support" checkbox. Click the "Register" pushbutton to enable glucose measurement and glucose measurement context notification, and record access control point indication.

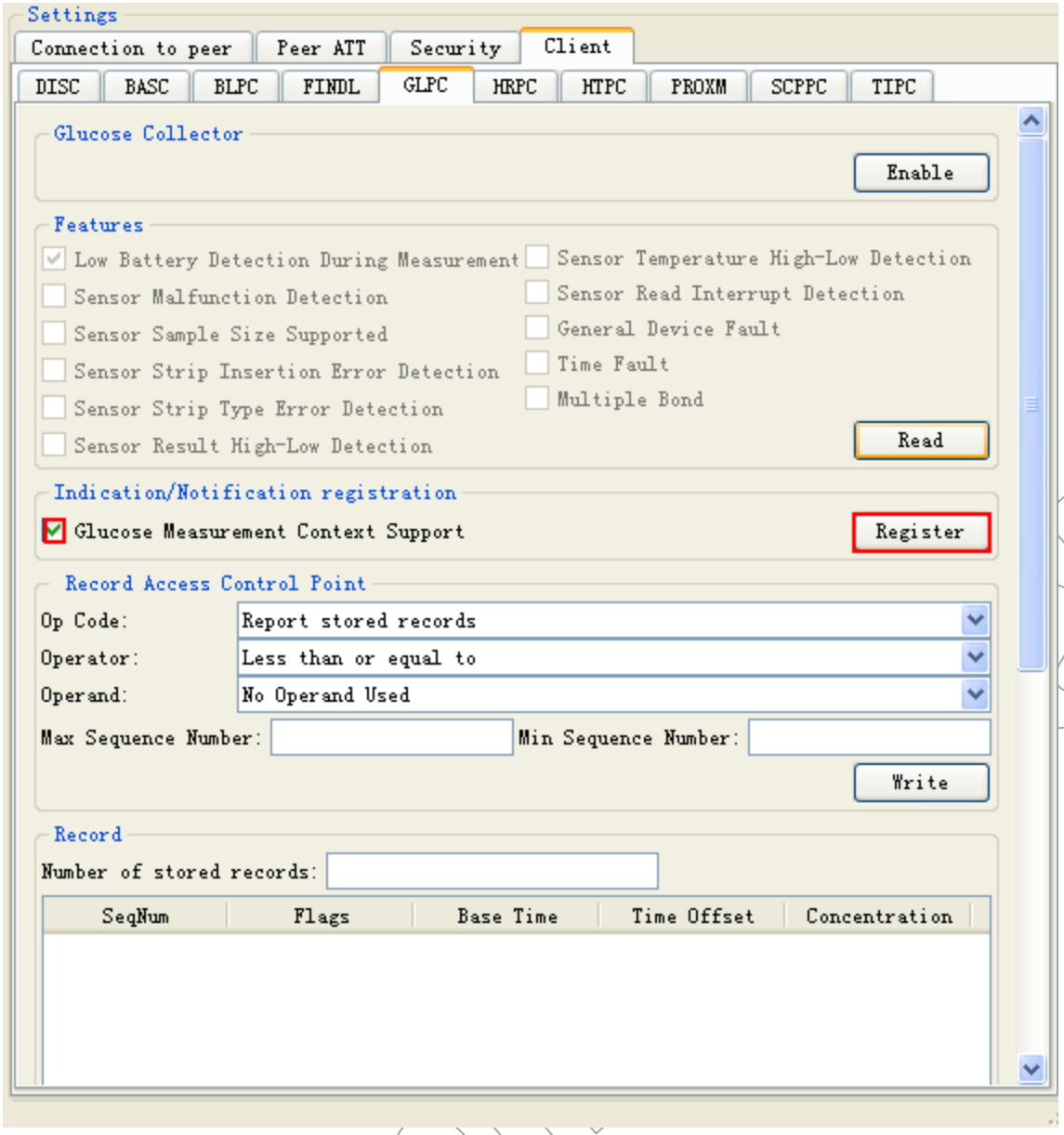


Figure 110 Register

10. Click the “Pair” pushbutton.

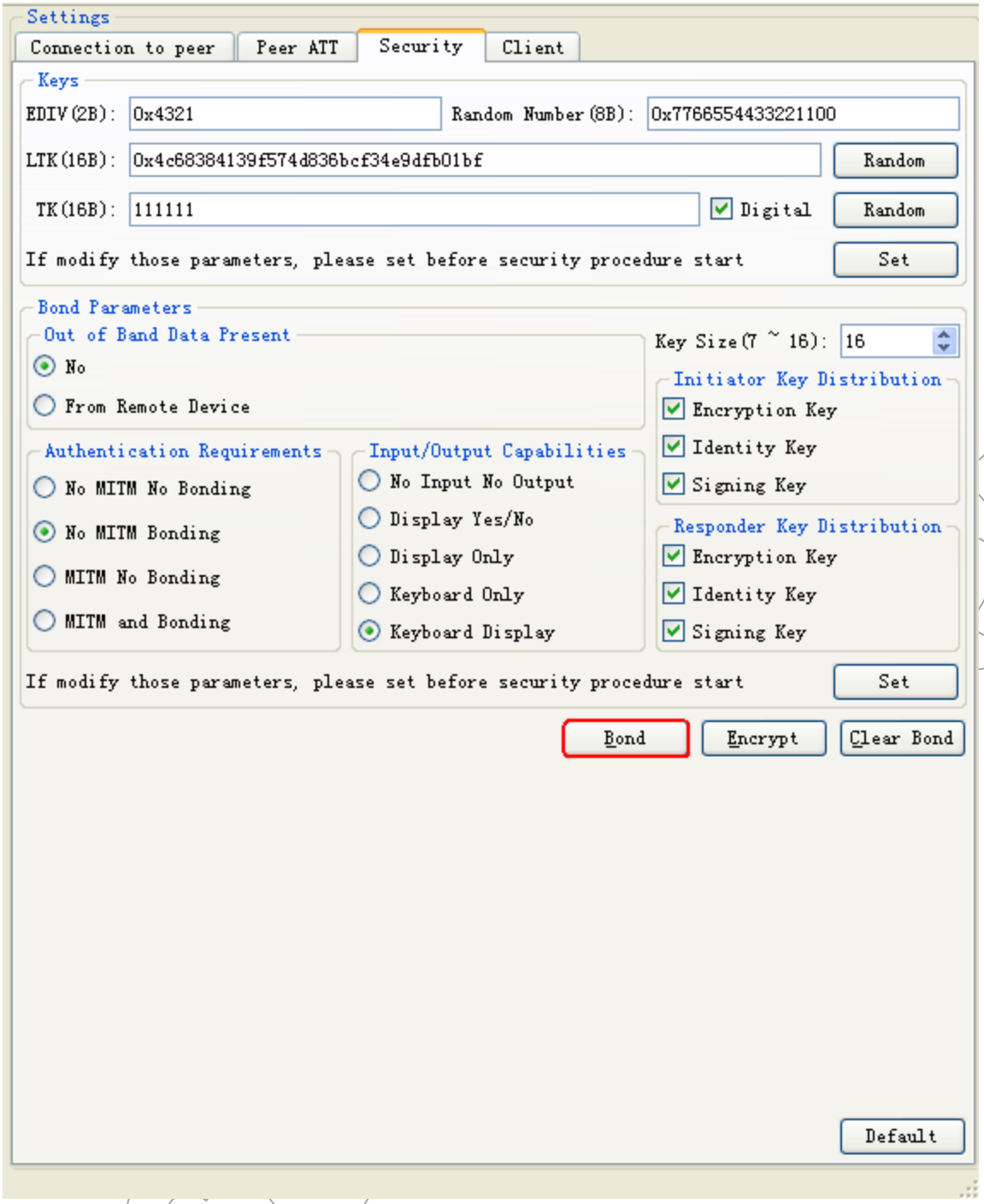


Figure 111 Pair

11. Set the “Record Access Control Point” group and click the “Write” pushbutton.

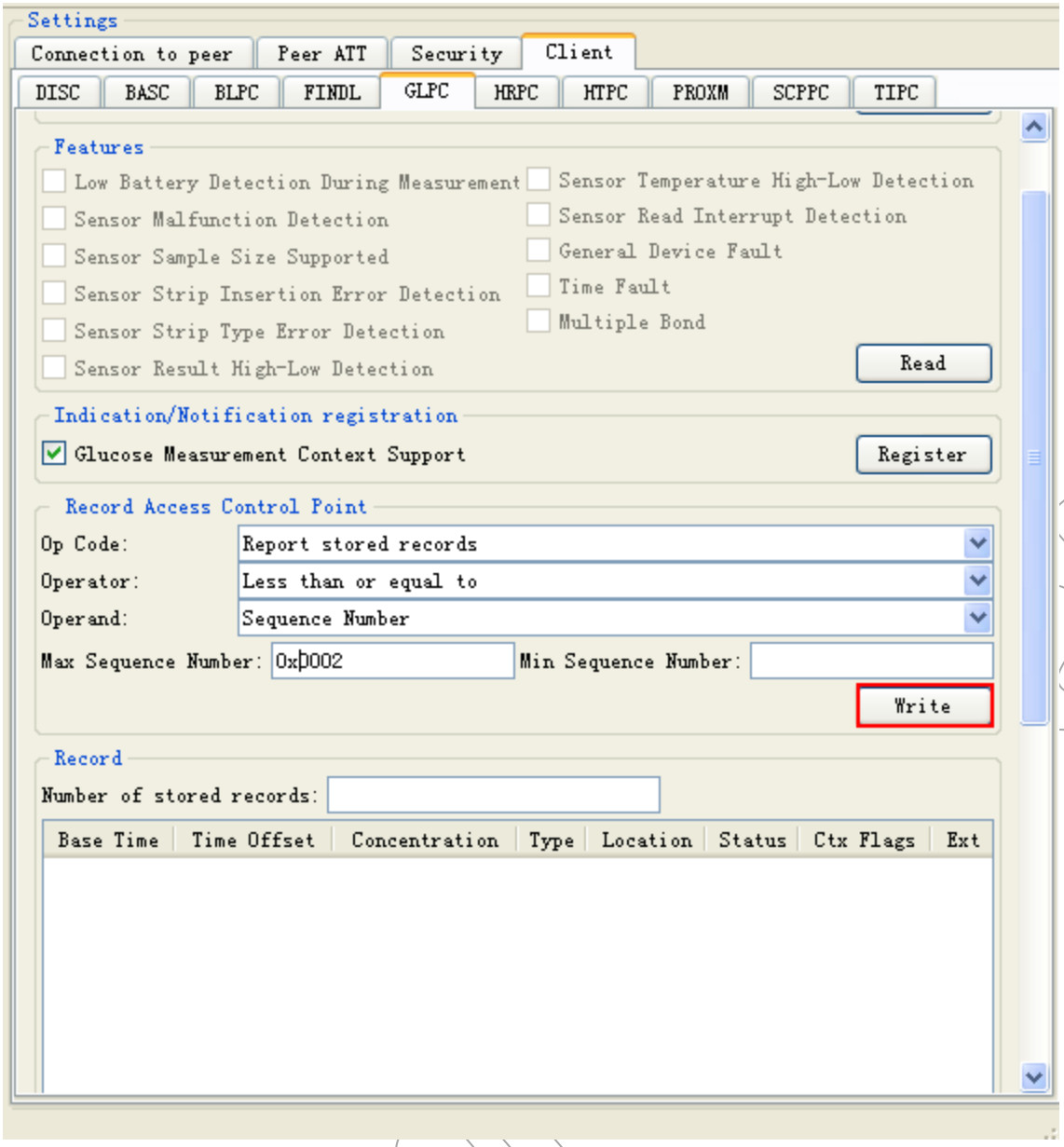


Figure 112 Write

12. Result

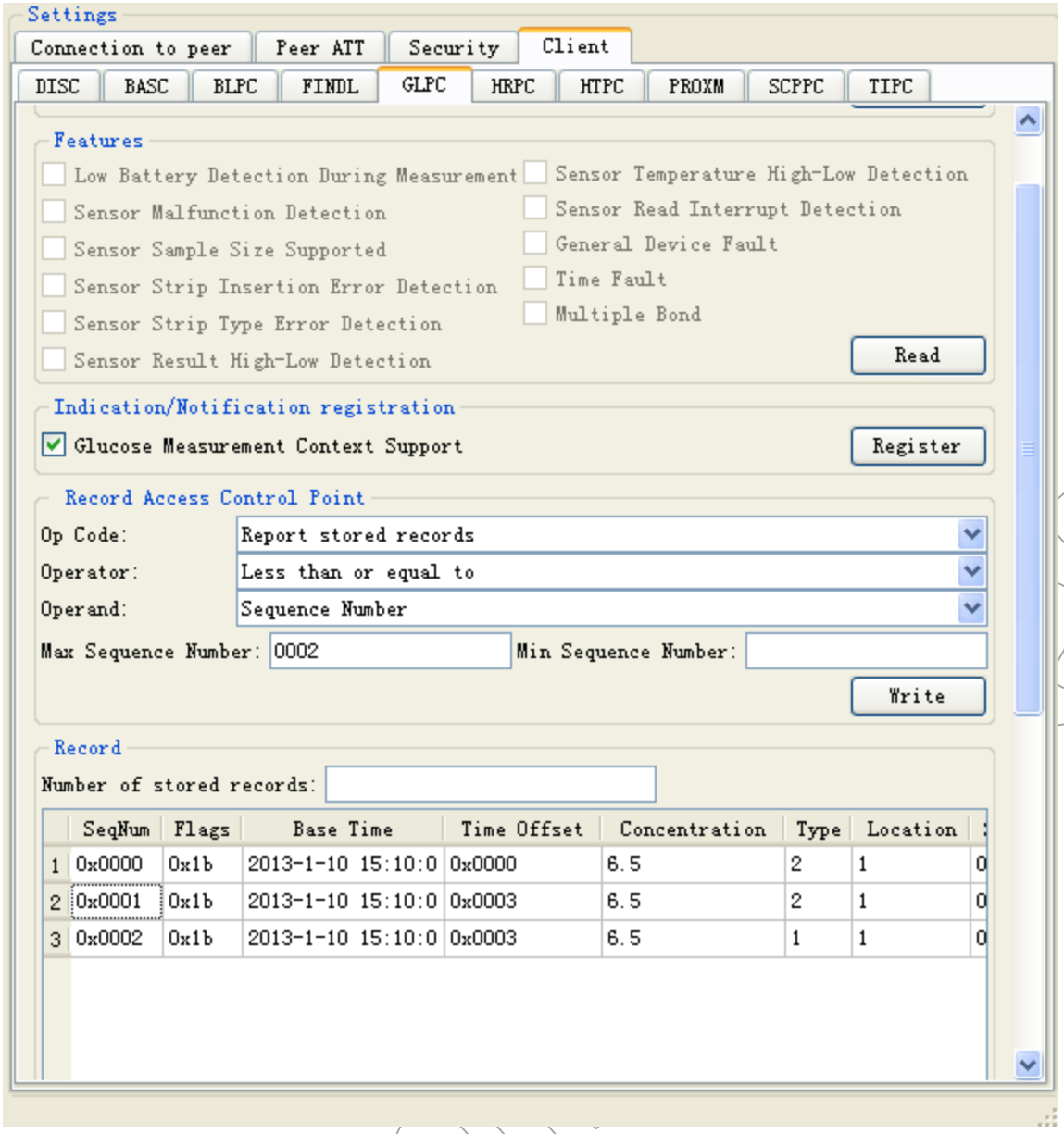


Figure 113 Result

7.5.3 Alert Notification Profile

1. Set the supported new alert categories and the supported unread alert categories.

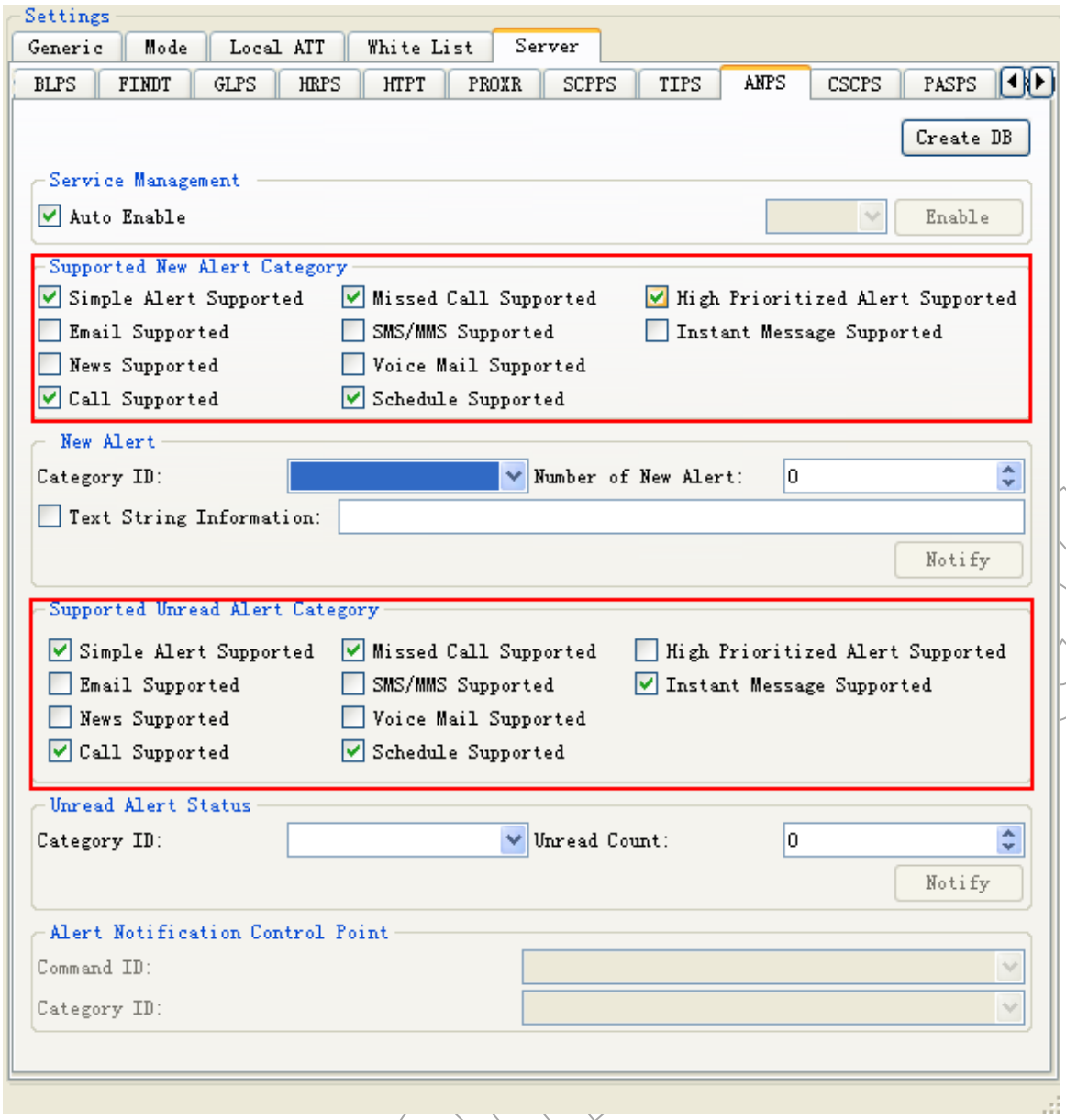


Figure 114 Set the Supported categories

2. Click the “Create DB” pushbutton on the user interface of the Alert Notification Server.

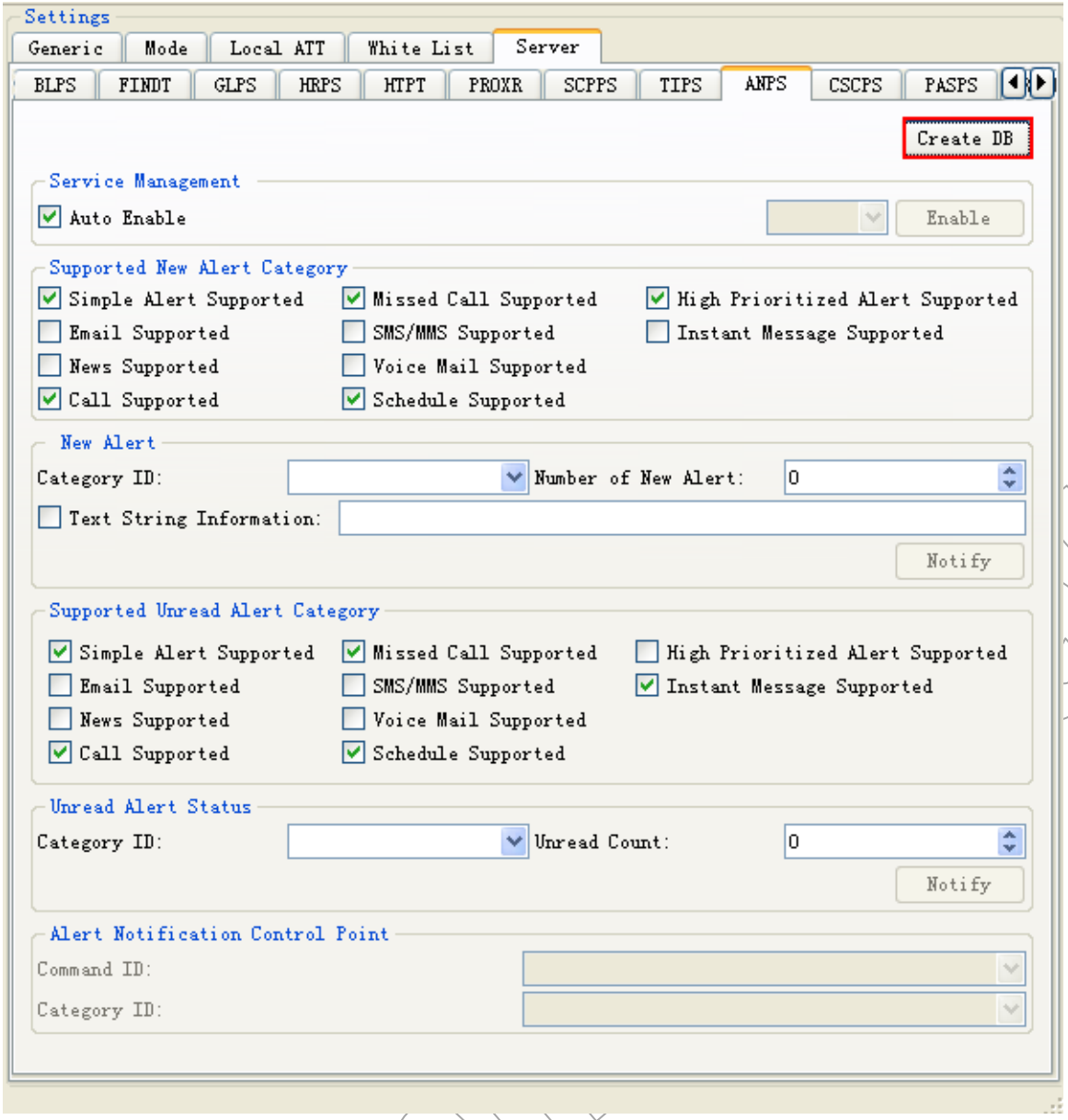


Figure 115 Create DB

3. Click the “Advertising” pushbutton.

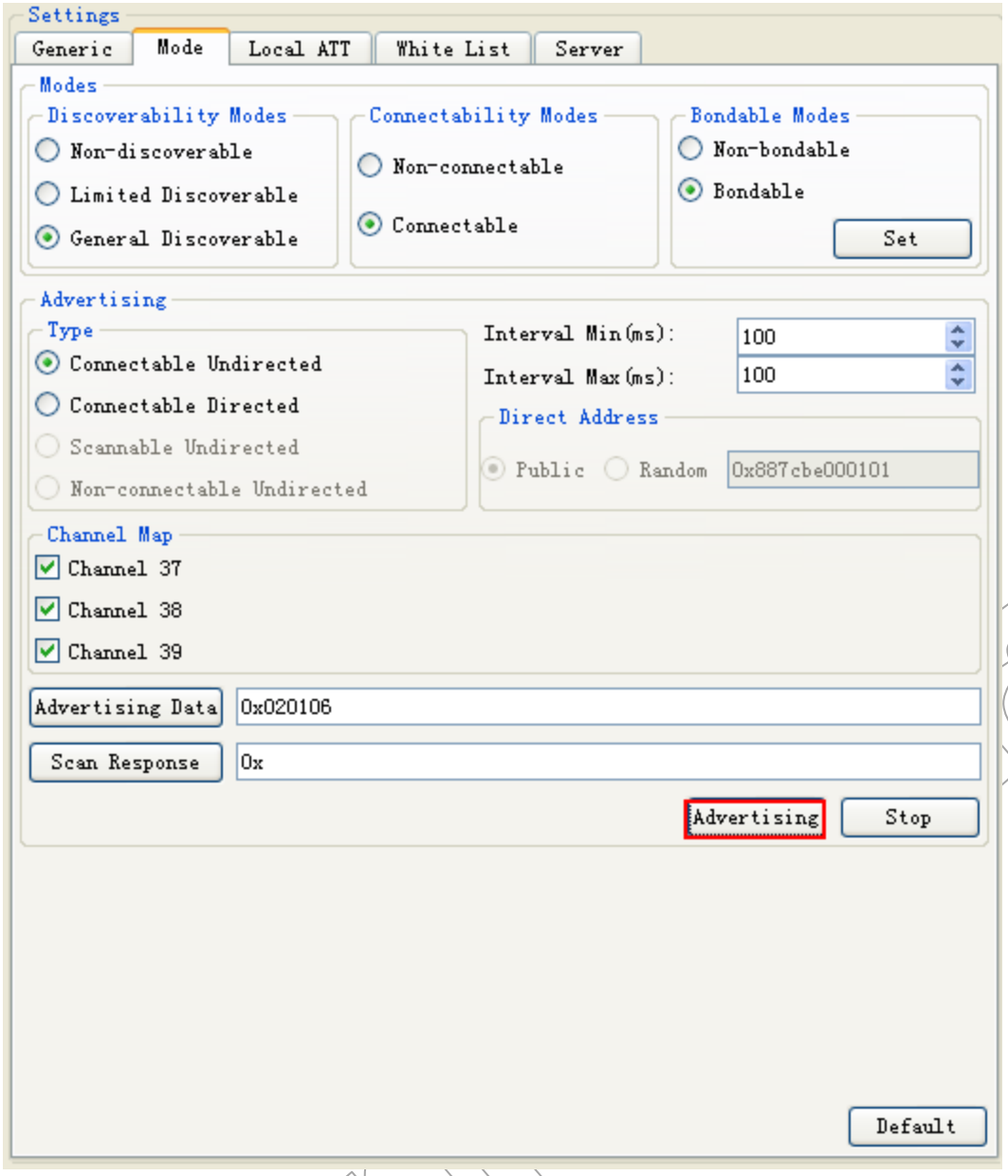


Figure 116 Advertising

4. Start a new QTool. Click the “Scan” pushbutton on the “Generic” tab.

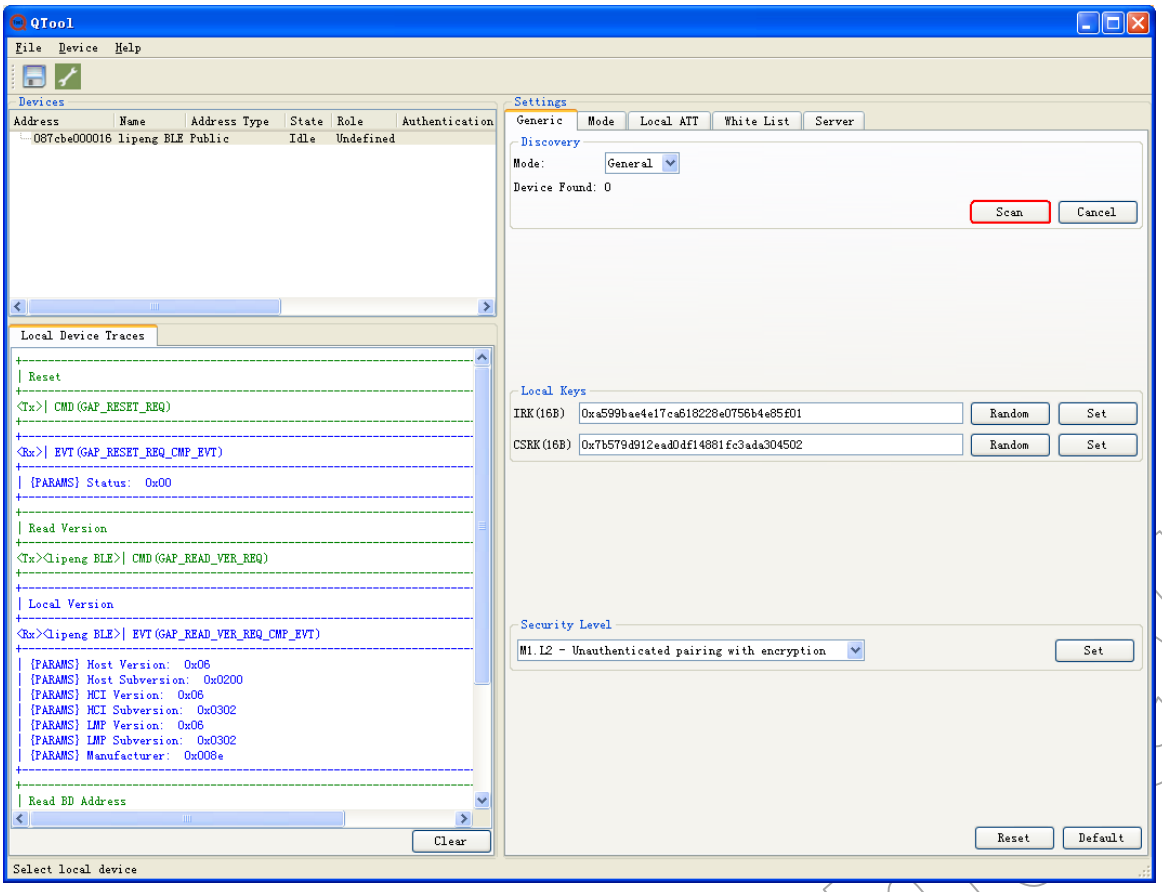


Figure 117 Scan

5. Select the device that we created the Alert Notification Service. And then click the “Connect” pushbutton.

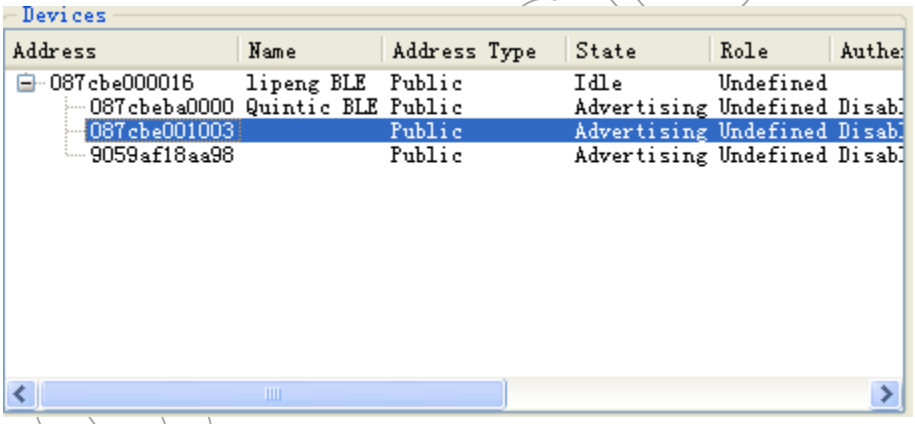


Figure 118 Select device

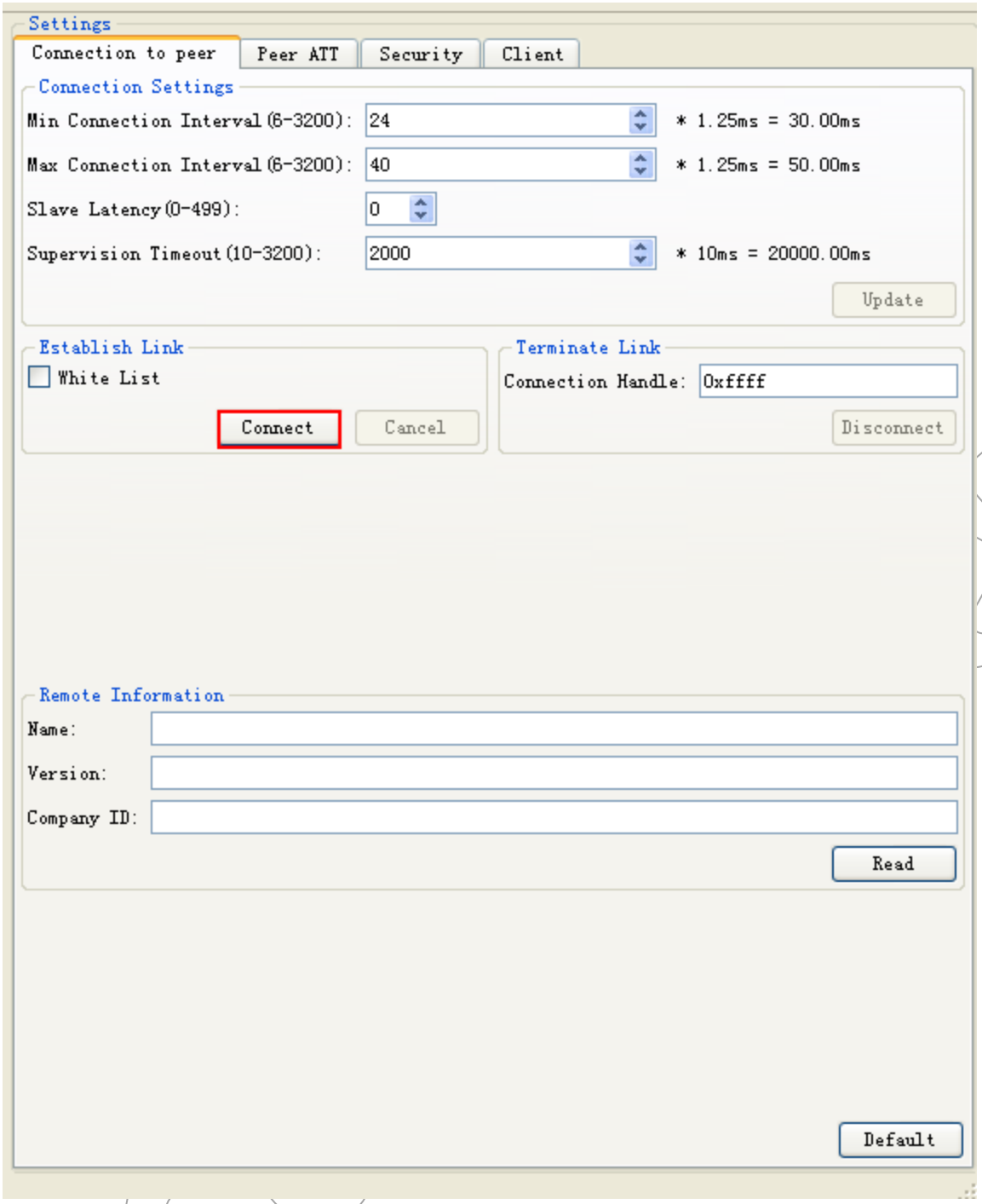


Figure 119 Connect

6. Click the “Enable” button on the user interface of the Alert Notification Client.

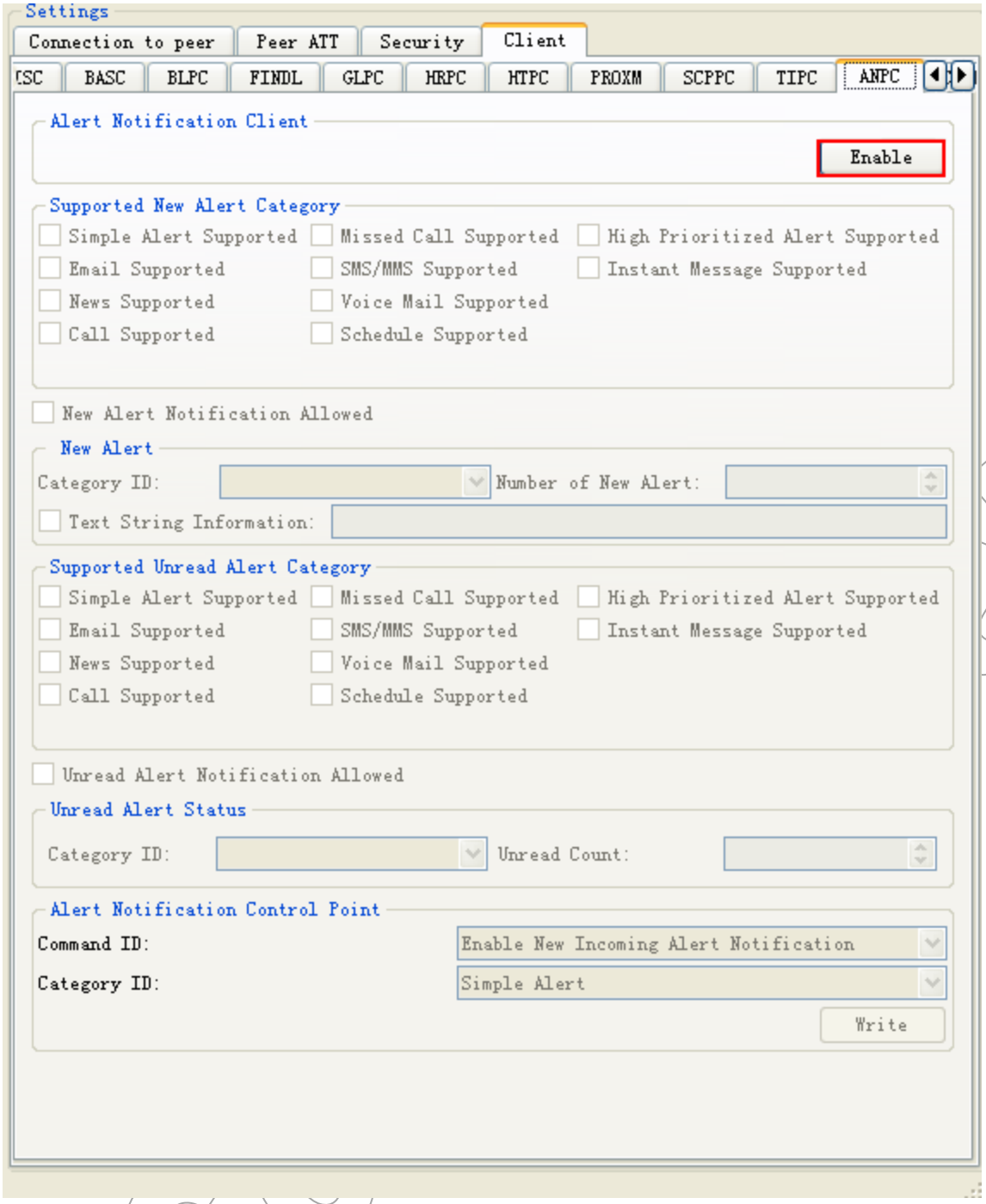


Figure 120 Enable

7. Check the “New Alert Notification Allowed” checkbox.

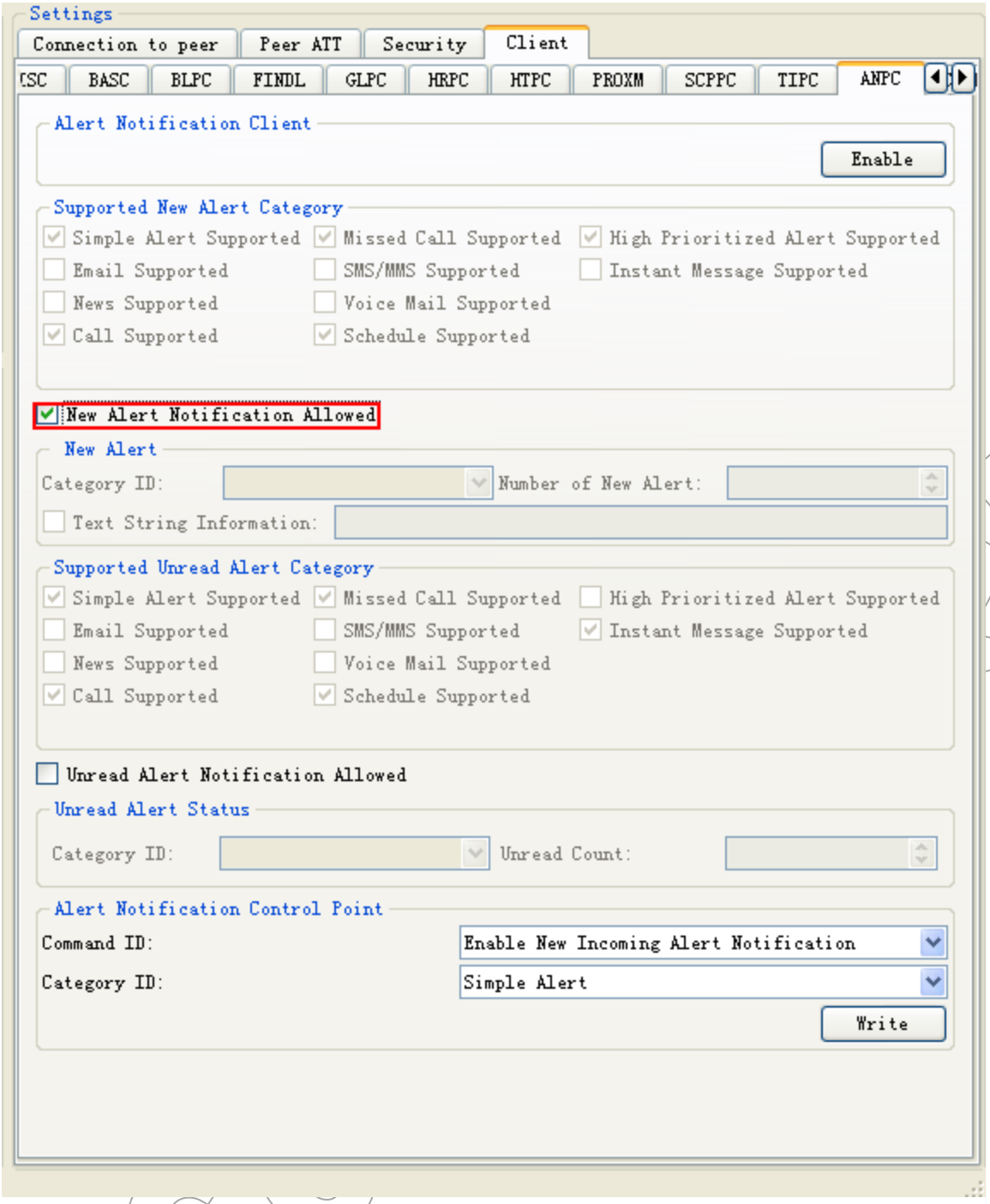


Figure 121 Enable New Alert Notification

7. Set the “Alert Notification Control Point” group. Click the “Write” pushbutton.

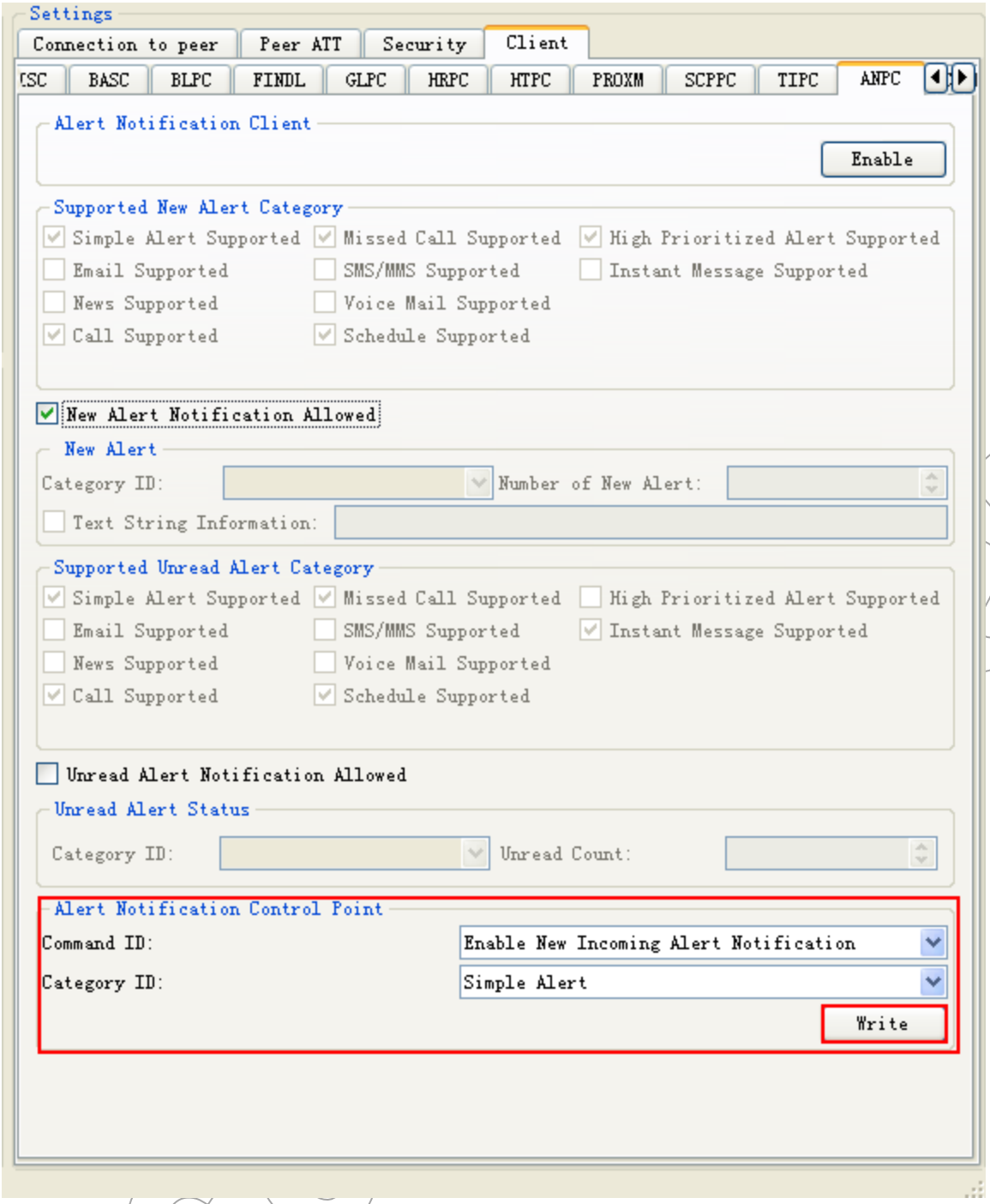


Figure 122 Enable New Simple Alert Notification

8. Set the “New Alert” group and click the “Notify” pushbutton.

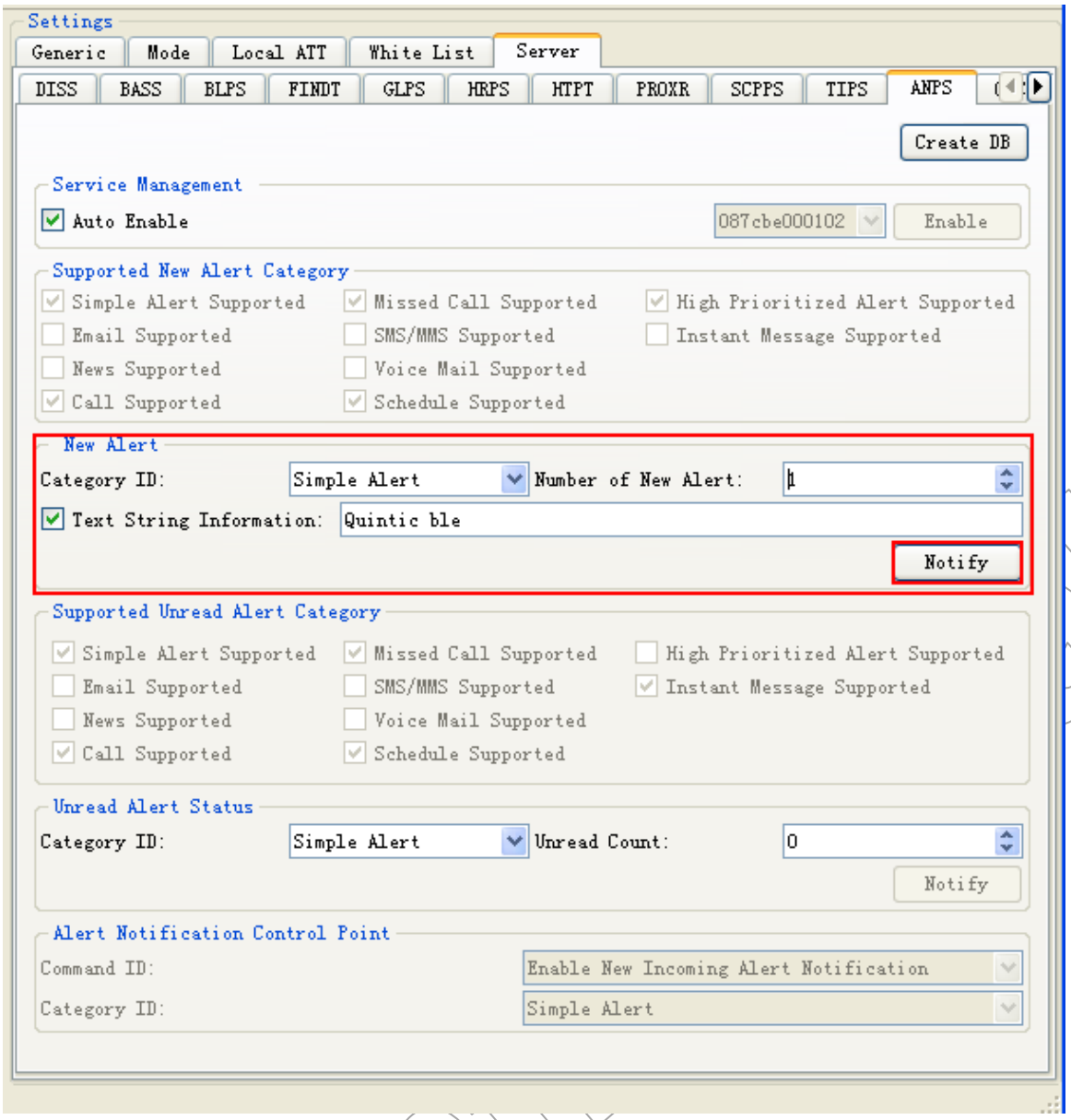


Figure 123 Notify

9. Result

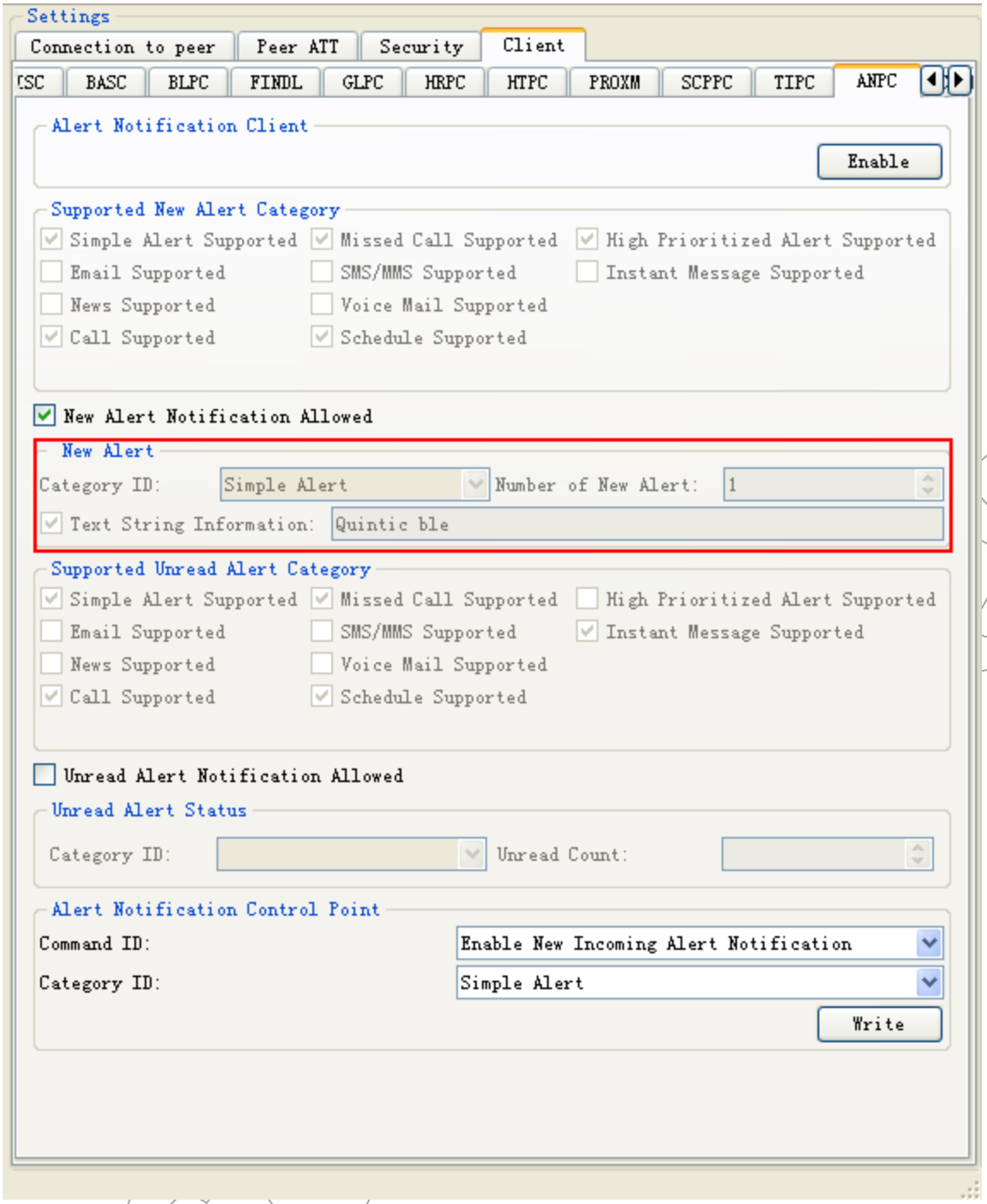


Figure 124 Result

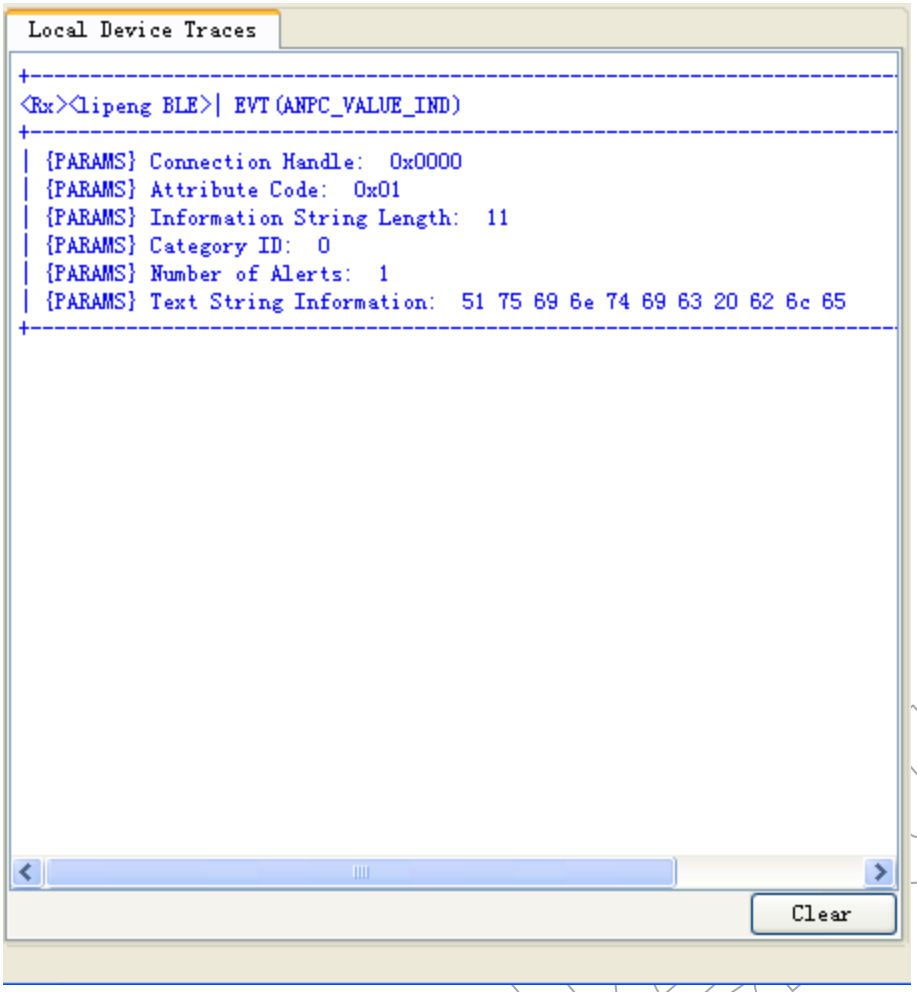


Figure 125 Trace Information

Release History

REVISION	CHANGE DESCRIPTION	DATE
0.1	Initial	2013-5-17
0.2	Add Getting started description and Figure 1	2013-5-21
0.3	Add “update” button in “Connection Settings” Group	2013-05-30
0.4	Add Mode tab, Local ATT tab and White List tab	2013-06-18
0.5	Advertising ,add a BD to white list and create the selected service database	2013-06-19
0.6	Update Figure 6 and Figure 7	2013-07-11
0.7	Add chapter 7	2013-08-07
0.8	Update chapter 7 and add four new profiles	2013-08-29
0.9	Update UI and trace information	2013-12-17
1.0	Update Figures to the latest, add 4.1.5 and 4.2.4	2014-01-10