

Using the BT85x Series with Linux and Windows

Relevant to Laird # BT850-SA, BT850-ST, BT851, and associated DVKs

Application Note

v1.0

INTRODUCTION

The BT85x Series are Laird's latest generation of USB HCI Dual Mode (Classic BT and BLE) products based on the Cypress CYW20704 A2 chipset. This application note demonstrates basic operation with the USB Bluetooth radio on a Linux machine and on a Microsoft Windows machine. You must obtain the Bluetooth stack from your preferred solution provider.

REQUIREMENTS

- BT850 development board (Laird part # DVK-BT850-SA or DVK-BT850-ST)
- BT851 USB Bluetooth adapter
- Microsoft Windows 7 or newer
- Ubuntu 16.04 Linux
- Compatible Bluetooth stack

Notes: Ubuntu 16.04 is used as the testing platform (Kernel version 4.4.0-31). The BlueZ stack (v 5.37) is included. The USB driver was also tested in v4.12.6 kernel and v4.4.21-v7 kernel.

The Microsoft Bluetooth stack on Windows 8 or newer supports Bluetooth Low Energy (BLE). Only Classic Bluetooth is supported on Windows 7.

PREPARATION

Before plugging the BT850/BT851 into the computer, it is important to check if there is any existing Bluetooth radio on the computer.

Linux

Before plugging the BT860 development board to the computer, type **hciconfig** to find out if there are any existing Bluetooth radios. If you find one, close it by typing the following: **hciconfig hciX down** (Figure 1).

Typically, *hci0* is the first Bluetooth device on the computer. Superuser permissions should be required.

```
test@test-ThinkPad-T60p:~$ hciconfig
hci0:  Type: BR/EDR  Bus: USB
       BD Address: 00:1A:7D:11:88:86  ACL MTU: 1021:7  SCO MTU: 64:1
       UP RUNNING
       RX bytes:601 acl:0 sco:0 events:38 errors:0
       TX bytes:3059 acl:0 sco:0 commands:38 errors:0

test@test-ThinkPad-T60p:~$ sudo hciconfig hci0 down
[sudo] password for test:
test@test-ThinkPad-T60p:~$ hciconfig
hci0:  Type: BR/EDR  Bus: USB
       BD Address: 00:1A:7D:11:88:86  ACL MTU: 1021:7  SCO MTU: 64:1
       DOWN
       RX bytes:601 acl:0 sco:0 events:38 errors:0
       TX bytes:3059 acl:0 sco:0 commands:38 errors:0
```

Figure 1: Disable existing computer existing Bluetooth device

Windows

Use the Device Manager feature in the Windows control panel. Right-click on the Bluetooth radio to disable it (Figure 2)

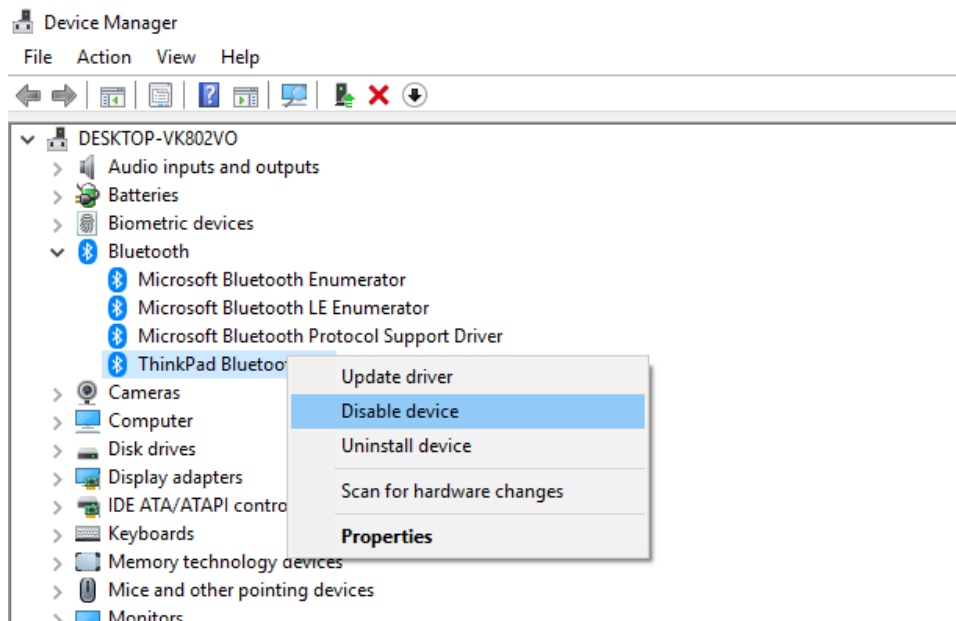


Figure 2: Disable existing computer existing Bluetooth device on a Windows 10 machine

OPERATION

Once the USB Bluetooth radio/adaptor is inserted into the computer, it should be automatically recognized by the host computer.

Linux

The USB interfaced radio should be recognized by the host. The BlueZ Bluetooth stack assigns the hci name (Figure 3). Bluetooth operation may require root privilege on the Linux computer.

```
[ 205.704070] usb 2-2: new full-speed USB device number 2 using uhci_hcd
[ 205.897150] usb 2-2: New USB device found, idVendor=04b4, idProduct=f901
[ 205.897159] usb 2-2: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 205.897166] usb 2-2: Product: CYW20704A2
[ 205.897171] usb 2-2: Manufacturer: Cypress Semi
[ 205.897177] usb 2-2: SerialNumber: 001723000001
[ 206.174263] usbcore: registered new interface driver btusb
test@test-ThinkPad-T60p:~$ hciconfig
hci0: Type: BR/EDR Bus: USB
      BD Address: 00:17:23:00:00:01 ACL MTU: 1021:8 SCO MTU: 64:1
      UP RUNNING PSCAN ISCAN
      RX bytes:849 acl:0 sco:0 events:69 errors:0
      TX bytes:5028 acl:0 sco:0 commands:69 errors:0
```

Figure 3: BT850/851 is recognized by BlueZ

Windows

The BT850/851 is recognized as a Generic Bluetooth Adapter. Bluetooth LE Enumerator states that the BLE connectivity is supported (Figure 4).

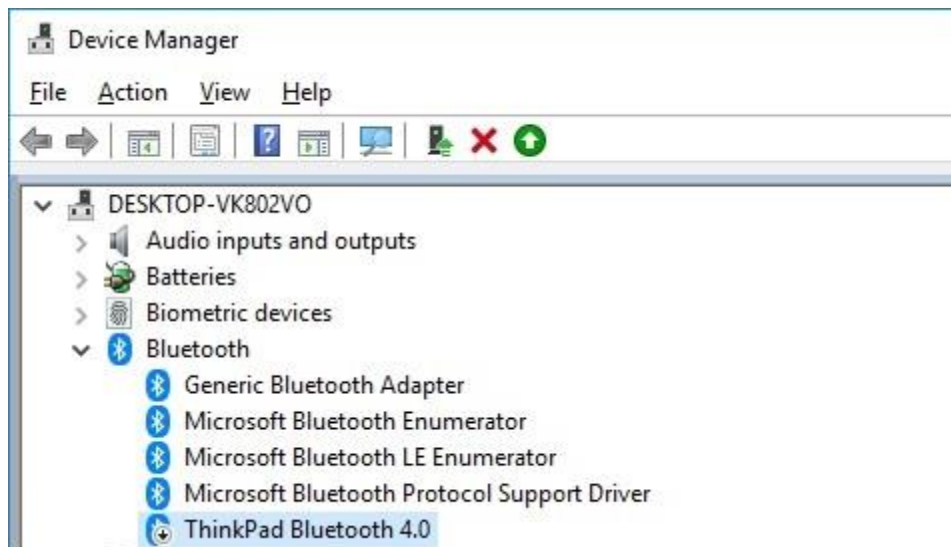


Figure 4: BT850/BT851 is recognized on a Windows 10 machine

Operation of Classic Bluetooth in Linux

With the device initialized, you can test Bluetooth functionality from the command prompt. To test scanning, you must have a nearby device (such as a tablet or smartphone) set to be discoverable.

The command to initialize a scan is:

```
hcitool scan
```

When a scan is initialized, the terminal returns found devices in the following format:

```
Scanning ...  
[MAC Address]    Friendly_Name
```

If there are discoverable devices nearby, they appear in this list as they are discovered (Figure 5).

```
test@test-ThinkPad-T60p:~$ hcitool scan  
Scanning ...  
40:2C:F4:91:9E:EB    HONGLR9LB3X6  
7C:7D:3D:50:17:DC    HUAWEI WATCH 0570  
F4:7B:5E:ED:08:92    [TV]Samsung LED55  
00:16:A4:0B:F3:C4    Laird BT900
```

Figure 5: A Laird module is found

To demonstrate the RFCOMM connection, a Laird BT900 module was used, which is already configured as discoverable and connectable. Simple secure mode must also be enabled (Figure 6).

```
test@test-ThinkPad-T60p:~$ hciconfig hci0 sspmode  
hci0:  Type: BR/EDR  Bus: USB  
       BD Address: 00:17:23:00:00:01  ACL MTU: 1021:8  SCO MTU: 64:1  
       Simple Pairing mode: Enabled  
test@test-ThinkPad-T60p:~$ sudo rfcomm connect /dev/rfcomm0 00:16:A4:0B:F3:C4 1  
Connected /dev/rfcomm0 to 00:16:A4:0B:F3:C4 on channel 1  
Press CTRL-C for hangup
```

Figure 6: Make a RFCOMM connection to the module

Operation of Bluetooth Low Energy in Linux

The hcitool commands to scan Bluetooth Low Energy are distinct from those used in classic Bluetooth connections. To initiate a BLE scan from the terminal, issue the following command:

```
#hcitool lescan
```

The terminal returns the following:

```
LE Scan ...  
[MAC Address] - [BLE device]
```

```
test@test-ThinkPad-T60p:~$ sudo hcitool lescan
LE Scan ...
00:16:A4:0B:F3:C4 LAIRD BT900
00:16:A4:0B:F3:C4 (unknown)
44:55:EB:7F:0B:29 (unknown)
44:55:EB:7F:0B:29 (unknown)
```

Figure 7: Scan for BLE devices

Operation of Bluetooth in Windows

In Windows Settings, select **Add Bluetooth or Other device** to display the list of Bluetooth devices that are in discoverable mode (Figure 8).

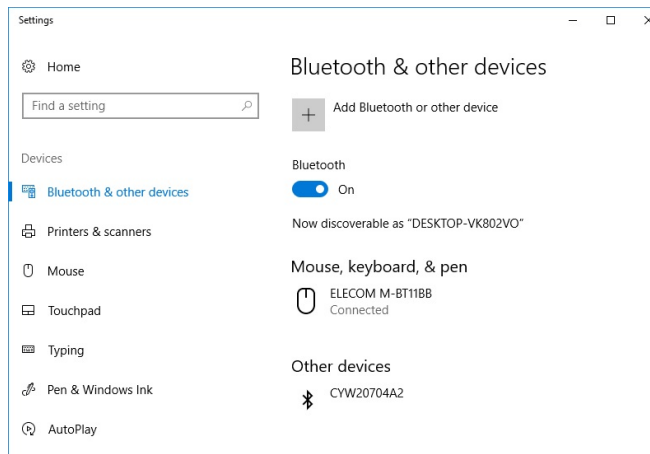


Figure 8: Add a Bluetooth device in Windows 10

Once the desired device is shown, click on it to connect (Figure 9).

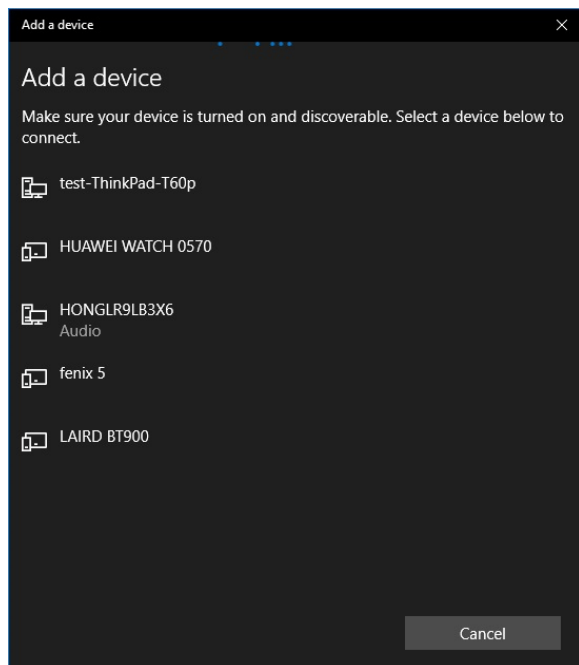


Figure 9: Discoverable near-by Bluetooth devices

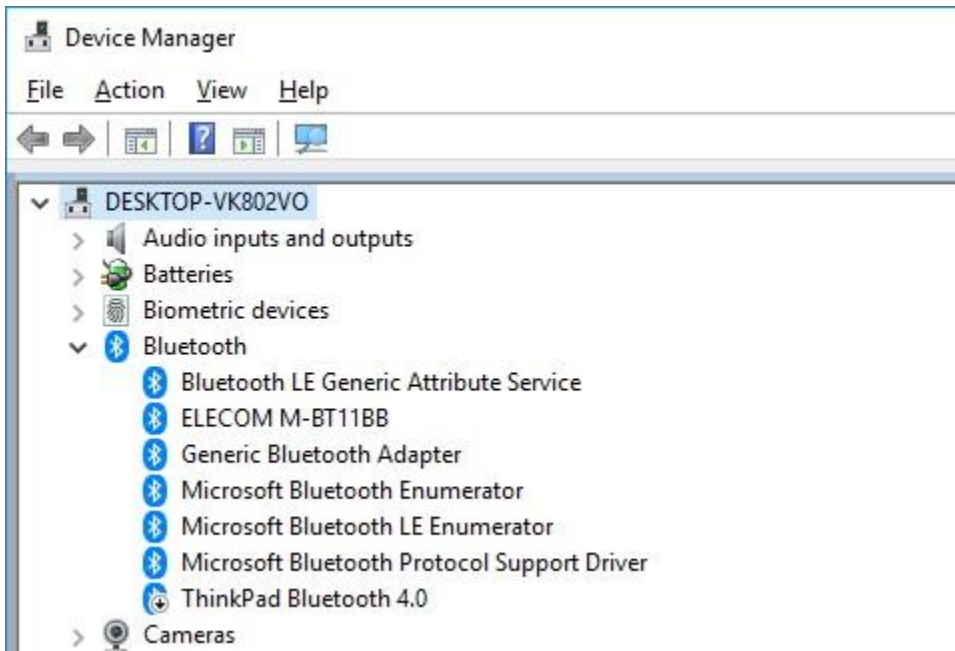


Figure 10: A BLE mice “ELECOM M-BT11BB” is connected

REVISION HISTORY

Version	Date	Notes	Contributors	Approver
1.0	TBD	Initial Release	Raymond Au	Jonathan Kaye