Legacy BT Profile Integration with BlueZ Stack

SSD50NBT/MSD50NBT/M2SD50NBT

Application Note *v1.0*

INTRODUCTION

Laird's SSD50NBT/MSD50NBT/M2SD50NBT support BT function. The BT chipset inside this module is CSR8811 and the interface it can support is BCSP (BlueCore Serial Protocol) which was developed by CSR. To run in Linux host platform, it cannot run with Bluedroid BT stack, because Bluedroid doesn't support BCSP, but H4 (HCI UART Transport Layer). The best candidate Laird would recommend to integrate with SSD50NBT/MSD50NBT/M2SD50NBT is BlueZ stack in Linux platform. This application note explains how to integrate BT in Laird SSD50NBT/MSD50NBT/M2SD50NBT module with BlueZ stack.

BLUEZ STACK INSTALL

To install the BlueZ stack, follow these steps:

1. Ensure that the following APT (Advanced Packaging Tool) libraries have been properly installed on the host side:

   sudo apt-get update

   sudo apt-get install libusb-dev libdbus-1-dev libglib2.0-dev libudev-dev libical-dev libreadline-dev

2. Choose from the following BlueZ versions to run and untar the file in your system:

   wget bluez-5.41.tar.xz

   tar xvf bluez-5.41.tar.xz

3. Run the following command to install BlueZ into your system:

```
cd bluez-5.41
sudo ./configure --disable-systemd --enable-tools
sudo make
sudo make install

sudo mv /usr/local/sbin/hciconfig /usr/sbin
sudo mv /usr/local/bin/gatttool /usr/sbin
```

4. Load the **DWM-W311.psr** BT configuration file and bring up the HCI interface:

```
bccmd -t BCSP -d /dev/ttyUSB0 psload –reset DWM-W311.psr
hciattach /dev/ttyUSB0 bcsp 921600
hciconfig hci1 up
```


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LEGACY BLUETOOTH PROFILES

The following describes two Bluetooth profile commands:

hcitool dev	Once the HCI interface is up, use this command to display available local devices.
hcitool scan	Use this command to inquire about remote Bluetooth devices. The device name is printed for each discovered device.

The following link provides additional **hcitool** commands: http://linux.die.net/man/1/hcitool

Serial Port Profile

To setup a Serial Port Profile (SPP) connection, use the **rfcomm** command.

The following is an example of connecting a Bluetooth device with MAC address **00:16:A4:00:E3:36**

rfcomm connect ***/dev/rcfomm0 00:16:A4:00:E3:36***

With the rfcomm command, you can either listen in a specific channel or bind the RFCOMM device to a remote Bluetooth device. In addition, the binding can be released by using the following command:
rfcomm release <dev>

The following link provides additional **rfcomm** commands: http://linuxcommand.org/man_pages/rfcomm1.html

Human Interface Device Profile

To support the Human Interface Device Profile (HID), run "**hidd"** which is the Bluetooth HID daemon in Linux.

The following describes HID profile commands:

hidd --server	Use to start the HID server
hidd —connect<bdaddr>	Use to connect remote HID devices
hidd —kill<bdaddr>	Use to terminate the HID connection
hidd —killall	Use to terminate *all* connections
hidd —show	Use to list all current HID connections

The following link provides additional **hidd** commands: http://linuxcommand.org/man_pages/hidd1.html

Personal Area Networking Profile

The Personal Area Networking (PAN) profile is client-server network architecture with two roles:

- **PAN User (PANU)** – A Bluetooth device that communicates as a client with a Group Ad-hoc Network (GN), a Network Access Point (NAP), or with another Bluetooth device through a point-to-point connection.
- **Group Ad-hoc Network (GN) Role** – Enables two or more PAN Users (PANU) to interact with each other through a wireless network without using additional networking hardware.

To implement PAN you must have **PAND** (the BlueZ Bluetooth PAN daemon) and BNEP (Bluetooth Network Encapsulation Protocol).

Note: Typically, our module acts as a PANU rather than GN.

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The following shows how to connect a PANU to a GN (00:37:5C:67:D3:02):

```
#modprobe bnep
#pand --connect 00:37:5C:67:D3:02
```

If the device functions in the GN role:

```
#modprobe bnep
#pand --listen --role GN
```

After the connection is established (which may take a few seconds), a virtual network interface (**bnep0**) is created on both nodes. This interface can be configured, like any network interface, by using **ifconfig**:

```
# ifconfig bnep0 10.0.0.1
```

Here is more detail of pand commands for your reference: http://linuxcommand.org/man_pages/pand1.html

Advance Audio Distribution Profile

PulseAudio is a networked low-latency sound server for Linux, POSIX, and Windows systems. To run the Advanced Audio Distribution Profile (A2DP 1.3), make sure that PulseAudio is running before attempting a Bluetooth connection. If it isn't running, it won't be advertising for A2DP support; this leads to a connection failure in some devices such as Bluetooth headsets.

For most of Linux systems, PulseAudio should be installed by default. If it's not available in your host, you may manually install it by using the following:

```
#apt-get install pulseaudio
```

Note: The PulseAudio package has some dependencies with Bluetooth and SBC packages. You may need to install the SBC package (SBC Decoder version 1.3) if it is missing from your host. If this is the case, use the following link to get the SBC package: http://www.kernel.org/pub/linux/bluetooth/sbc-1.3.tar.gz

The following command tells PulseAudio to load a module that handles Bluetooth device discovery:

```
#sudo pactl load-module module-bluetooth-discover
```

The command below tells PulseAudio to switch the last device connected as the default audio sink/output:

```
#sudo pactl load-module module-switch-on-connect
```


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You can add **/etc/pulse/default.pa** to automatically switch the PulseAudio sink to BlueZ:

```
.ifexists module-bluetooth-discover.so

load-module module-bluetooth-discover

.endif

.ifexists module-switch-on-connect.so

load-module module-switch-on-connect

.endif
```

After setting, you must reload the **PulseAudio** daemon.

```
#pulseaudio –k

#pulseaudio –start
```

The following links provide more detailed **PulseAudio** and **pactl** commands:

- http://linux.die.net/man/1/pulseaudio
- http://linux.die.net/man/1/pactl

Audio/Video Remote Control Profile

The BlueZ project provides several CLI clients that allow users to use some of the supported profiles. For example, bluetooth-player command allows you to remotely control media players through the Audio/Visual Remote Control Profile (AVRCP). Here is more detail of commands for your reference,

#bluetooth-player

- **list** – Available players
- **show** – Player information
- **select** – Select default player
- **play** – Start playback
- **pause** – Pause playback
- **stop** – Stop playback
- **next** – Jump to next item
- **previous** – Jump to previous item
- **fast-forward** – Fast forward playback
- **rewind** – Rewind playback
- **equalizer <on/off>** – Enable/Disable equalizer
- **repeat <singletrack/alltrack/group/off>** – Set repeat mode
- **shuffle <alltracks/group/off>** – Set shuffle mode
- **scan <alltracks/group/off>** – Set scan mode
- **change-folder** – Change current folder
- **list-items** – List items of current folder
- **search "string"** – Search items containing string
- **queue <item>** – Add item to playlist queue
- **show-item <item>** – Show item information

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USEFUL TOOLS FOR BLUETOOTH DEBUGGING

The following are useful tools for Bluetooth debugging:

- **hcidump** – Use this to dump all HCI events and commands. Make a dump file readable by using Wireshark:

```
hcidump -R -w <dest_file>
```

  The following provides more details on the hcidump command:
  http://www.linuxcommand.org/man_pages/hcidump8.html

- **hcitool** – Provides a simplified way to send commands to the HCI device.

  To launch an arbitrary command that is not present in the command list, use **cmd**. For example:

```
hcitool cmd 0x03 0x000A 0x01
```

  The following provides more details on the hcitool command:
  http://linuxcommand.org/man_pages/hcitool1.html

REVISION HISTORY

Version	Date	Notes	Approver
1.0	09 Aug 2016	Initial Release	Miles Chung