Bluetooth Integration
ST60

Application Note

INTRODUCTION

The following table shows the six interface options available with the ST60:

<table>
<thead>
<tr>
<th>Interface</th>
<th>Wi-Fi</th>
<th>Bluetooth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>SDIO</td>
<td>UART</td>
</tr>
<tr>
<td>Available</td>
<td>SDIO</td>
<td>SDIO</td>
</tr>
<tr>
<td>Available</td>
<td>PCIE</td>
<td>UART</td>
</tr>
<tr>
<td>Available</td>
<td>PCIE</td>
<td>USB</td>
</tr>
<tr>
<td>Available</td>
<td>USB</td>
<td>UART</td>
</tr>
<tr>
<td>Available</td>
<td>USB</td>
<td>USB</td>
</tr>
</tbody>
</table>

For all options, the firmware must first be loaded by a Wi-Fi driver; you must complete the Wi-Fi backports integration prior to completely the Bluetooth integration.

Note: There is only one firmware for Wi-Fi and Bluetooth initialization.

HARDWARE SETUP

The ST60 interface is controlled by the CONFIG_HOST[2-0] pins ().

<table>
<thead>
<tr>
<th>CONFIG_HOST [2-0]</th>
<th>Wi-Fi</th>
<th>BT</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>SDIO</td>
<td>UART</td>
</tr>
<tr>
<td>001</td>
<td>SDIO</td>
<td>SDIO</td>
</tr>
<tr>
<td>010</td>
<td>PCIE</td>
<td>USB 2.0</td>
</tr>
<tr>
<td>011</td>
<td>PCIE</td>
<td>UART</td>
</tr>
<tr>
<td>100</td>
<td>USB 2.0</td>
<td>UART</td>
</tr>
<tr>
<td>101</td>
<td>USB 2.0</td>
<td>USB 2.0</td>
</tr>
</tbody>
</table>

To set up the proper interfaces for Wi-Fi and Bluetooth, you must configure the high/low of these three pins.

BUILDING BACKPORTS

To build both the Wi-Fi and Bluetooth drivers in backports, use the defconfig-sterling60 build option.

#untar package
tar xf backports-laird-7.0.0.139.tar.bz2 -C projects/
cd projects/laird-backport-7.0.0.139/
# From the backports directory
make defconfig-sterling60
make

Note: To prevent duplicated definitions, you may need to disable or build as module for the Bluetooth options in kernel config.

LOADING WI-FI DRIVERS

To load the Wi-Fi drivers, you must copy the firmware into the host device. To do this, follow these steps:

1. Create the 60 Firmware folder.
2. Copy the firmware from the extracted folder to the 60 Firmware folder.
3. Create a symlink that points to the firmware.
   Refer to the applicable option below:

SDIO-UART

```bash
cp regulatory_sterling60.db /lib/firmware/
ln -s /lib/firmware/regulatory_sterling60.db /lib/firmware/regulatory.db
mkdir /lib/firmware/lrdmwl
cp 88W8997_ST_sdio_uart_v8.5.23.55.bin /lib/firmware/lrdmwl
cd /lib/firmware/lrdmwl
ln -s 88W8997_ST_sdio_uart_v8.5.23.55.bin 88W8997_sdio.bin
```

SDIO-SDIO

```bash
cp regulatory_sterling60.db /lib/firmware/
ln -s /lib/firmware/regulatory_sterling60.db /lib/firmware/regulatory.db
mkdir /lib/firmware/lrdmwl
cp 88W8997_ST_sdio_sdio_v8.5.23.55.bin /lib/firmware/lrdmwl
cd /lib/firmware/lrdmwl
ln -s 88W8997_ST_sdio_sdio_v8.5.23.55.bin 88W8997_sdio.bin
```

PCIE-USB

```bash
cp regulatory_sterling60.db /lib/firmware/
ln -s /lib/firmware/regulatory_sterling60.db /lib/firmware/regulatory.db
mkdir /lib/firmware/lrdmwl
cp 88W8997_ST_pcie_usb_v5.4.23.1.bin /lib/firmware/lrdmwl
cd /lib/firmware/lrdmwl
ln -s 88W8997_ST_pcie_usb_v5.4.23.1.bin 88W8997_pcie.bin
```

PCIE-UART

```bash
cp regulatory_sterling60.db /lib/firmware/
ln -s /lib/firmware/regulatory_sterling60.db /lib/firmware/regulatory.db
mkdir /lib/firmware/lrdmwl
cp 88W8997_ST_pcie_uart_v5.4.23.1.bin /lib/firmware/lrdmwl
cd /lib/firmware/lrdmwl
```

```bash
ln -s 88W8997_ST_pcie_uart_v5.4.23.1.bin 88W8997_pcie.bin
```
ln -s 88W8997_ST_pcie_uart_v5.4.23.1.bin 88W8997_pcie.bin

**USB-UART**

```
cp regulatory_sterling60.db /lib/firmware/
ln -s /lib/firmware/regulatory_sterling60.db /lib/firmware/regulatory.db
mkdir /lib/firmware/lrdmwl
cp 88W8997_ST_usb_uart_v8.6.23.55.bin /lib/firmware/lrdmwl
cd /lib/firmware/lrdmwl
ln -s 88W8997_ST_usb_uart_v8.6.23.55.bin 88W8997_usb.bin
```

**USB-USB**

```
cp regulatory_sterling60.db /lib/firmware/
ln -s /lib/firmware/regulatory_sterling60.db /lib/firmware/regulatory.db
mkdir /lib/firmware/lrdmwl
cp 88W8997_ST_usb_usb_v5.6.23.4.bin /lib/firmware/lrdmwl
cd /lib/firmware/lrdmwl
ln -s 88W8997_ST_usb_usb_v5.6.23.4.bin 88W8997_usb.bin
```

4. Load the following four .ko files. Note that they must be loaded in sequence.
```
insmod compat/compat.ko
insmod net/wireless/cfg80211.ko
insmod net/mac80211/mac80211.ko
insmod drivers/net/wireless/laird/lrdmwl/lrdmwl.ko
```

5. Load the following applicable fifth .ko file.
   For SDIO in Wi-Fi:
   ```
   insmod drivers/net/wireless/laird/lrdmwl/lrdmwl_sdio.ko
   ```
   For PCIE in Wi-Fi:
   ```
   insmod drivers/net/wireless/laird/lrdmwl/lrdmwl_pcie.ko
   ```
   For USB in Wi-Fi:
   ```
   insmod drivers/net/wireless/laird/lrdmwl/lrdmwl_usb.ko
   ```

**BLUETOOTH INITIALIZATION**

For Bluetooth initialization, follow the applicable option below.

Option 1: SDIO-UART/PCIE-UART/USB-UART

1. Load the Bluetooth drivers.
   ```
   insmod net/bluetooth/bluetooth.ko
   insmod drivers/bluetooth/hci_uart.ko
   ```

2. Bring up the Bluetooth interface.
   The following is an example in IMX platform with flow control enabled. The TTY interface depends on which interface is wired to the ST60 module from the host.
   ```
   hciattach /dev/ttymxc1 any -s 3000000 3000000 flow dtron
   ```
If using an FTDI chipset to transfer UART to USB interface, then use this command to bring up ttyUSB0 (normally no flow control for this).

```bash
hciattach /dev/ttyUSB0 any 3000000 1
```

**Option 2: SDIO-SDIO**

1. Load the Bluetooth drivers.
   ```bash
   insmod net/bluetooth/bluetooth.ko
   insmod drivers/Bluetooth/btmrvl.ko
   insmod drivers/Bluetooth/btmrvl_sdio.ko
   ```

2. Use the `hciconfig` command to find the HCI0 interface.

**Option 3: PCIE-USB/USB-USB**

1. Load the Bluetooth drivers.
   ```bash
   insmod net/bluetooth/bluetooth.ko
   insmod drivers/Bluetooth/btmrvl.ko
   insmod drivers/Bluetooth/btusb.ko
   ```

2. Use the `hciconfig` command to find the HCI0 interface.

---

**REVISION HISTORY**

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Notes</th>
<th>Contributor(s)</th>
<th>Approver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>19 Jul 2019</td>
<td>Initial Release</td>
<td>Miles Chung</td>
<td>Jay White</td>
</tr>
<tr>
<td>1.1</td>
<td>03 Dec 2019</td>
<td>Changed USB-USB options from <em>Not Available</em> to <em>Available</em>. Fixed typos.</td>
<td>Miles Chung</td>
<td>Jay White</td>
</tr>
</tbody>
</table>