Using Virtual Serial Port Service (vSP) with *smart* BASIC

Quick Start Guide ***v1.0***

INTRODUCTION

This guide demonstrates how to load and run a *smart*BASIC Virtual Serial Port service sample application (**upass.vsp.sb**) onto the BL600 development board. The sample application advertises a serial port service. When the BL600 is connected to a central role device, the application accepts data over the air and passes it to the UART. Any data arriving at the UART are also sent over the air to the central device. If the UART is isolated from the host and TX&RX and CTS&RTS are shorted together, any data received from the central unit are looped back by this application; that is, all data received are sent back to the central device.

VSP OVERVIEW

The module can present a Virtual Serial Port (vSP) service in the local GATT Table consisting of two mandatory characteristics and two optional characteristics. One mandatory characteristic is the RX FIFO to which the GATT client writes in order to send data to the module. The other is the TX FIFO through which data is sent from the module via a notification. These characteristics both consist of an attribute taking up to 20 bytes. Of the optional characteristics, one is the ModemIn which consists of a single byte; only bit 0 is used as a CTS type function. The other is ModemOut, also a single byte, which is notifiable only and is used to convey an RTS flag to the central device. The UUIDs of the service and characteristics are shown in Table 1.

Table 1: VSP Service and Characteristic UUIDs

VSP Service or Characteristic	UUID
VSP Service	569a**1101**-b87f-490c-92cb-11ba5ea5167c
RX FIFO Characteristic	569a**2001**-b87f-490c-92cb-11ba5ea5167c
TX FIFO Characteristic	569a**2000**-b87f-490c-92cb-11ba5ea5167c
ModemIn Characteristic	569a**2003**-b87f-490c-92cb-11ba5ea5167c
ModemOut Characteristic	569a**2002**-b87f-490c-92cb-11ba5ea5167c

Typically, the GATT client writes '1' to the ModemIn characteristic, letting the BL600 know that the GATT client can accept data. The BL600 then sends data via the TX FIFO characteristic until the value of ModemIn changes to '0'. Conversely, the BL600 writes '1' to the ModemOut characteristic via notification, letting the GATT client know that the BL600 can accept data. The GATT client can then send data to the BL600 via the RX FIFO characteristic. Figure 1 gives a visual representation of this.

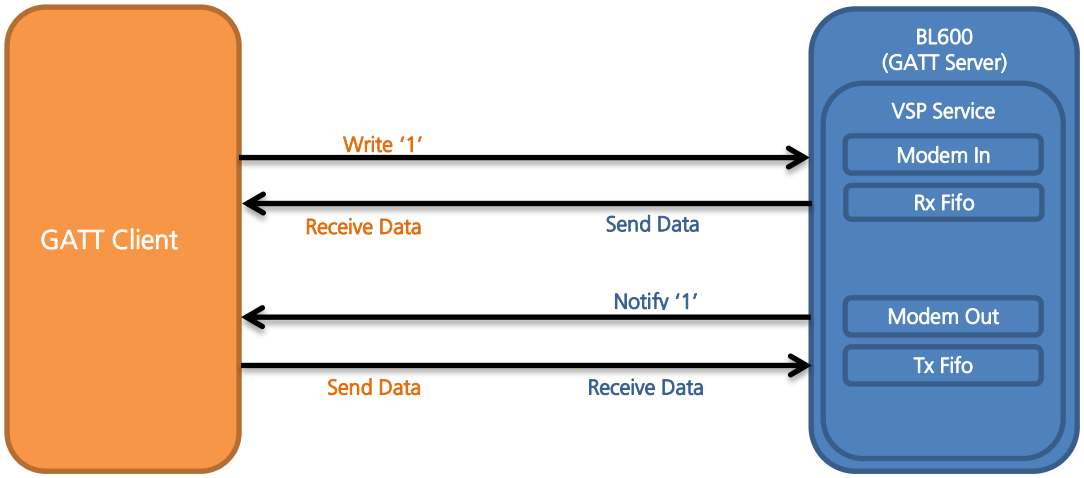

Figure 1: Usage of characteristics and data flow

REQUIREMENTS

- PC running Windows XP or later
- UWTerminal 6.50 or later
- DVK-BL600 Development Kit loaded with at v1.2.54.0 firmware or later (see **Note**)
- **upass.vsp.sb** *smart* BASIC sample application and **cli.upass.vsp.sblib** library
- USB A to mini B cable
- iPad 3/ iPhone 4S or newer with BT4.0 support
- Internet connection on iOS device (to download the **BL600 Serial** application)
- DVK_BL600 User Manual
- FTDI Drivers http://www.ftdichip.com/Drivers/VCP.htm (for some versions of Windows)

Note: The latest BL00 firmware and upgrade documentation is available here: http://www.lairdtech.com/Products/Embedded-Wireless-Solutions/Bluetooth-Radio-Modules/bl600-series#productGroupTabs-2147488080

DEVELOPMENT KIT SETUP

To setup the BL600 development kit, follow these steps:

1. Configure the BL600 development kit to the following settings (Figure 2):
   - DC/USB power source switch (SW4) – USB
   - VCC_1V8/VCC_3V3 switch (SW5) – VCC_3V3
   - CR2033/VCC_3V3/1V8 switch (SW6) – VCC_3V3/1V8

Figure 2: Switch and jumpers position

2. Connect one end of the mini USB cable to CON4 on the development board and the other end of the cable to your PC.
3. Follow the on-screen prompts. Depending on your version of Windows, you may need to install the FTDI drivers. When complete, the development board appears in the Windows device manager as a *USB Serial Port*. Note the COM port number.
4. Extract UWTerminal to a selected folder and run **UwTerminal.exe**.

5. Configure the COM port with the port number seen in the device manager with the following settings (Figure 3):
   - Baudrate – 9600
   - Stop Bits – 1
   - Data Bits – 8
   - Handshaking – None

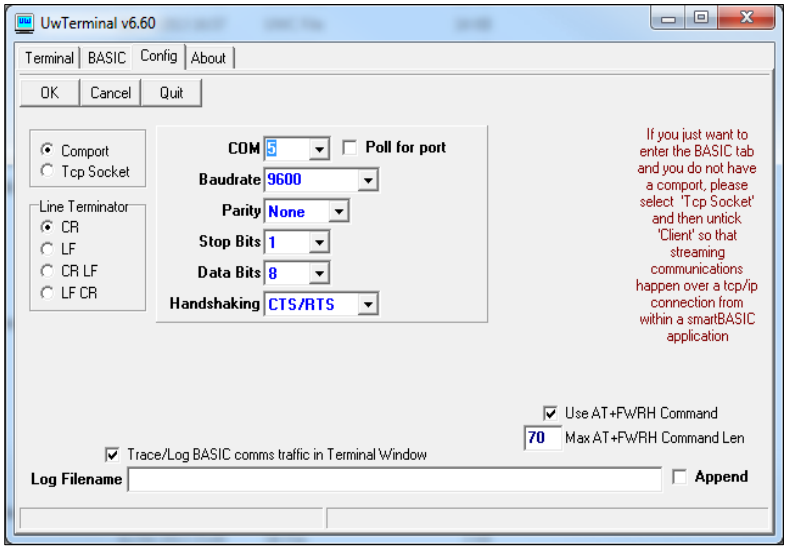

Figure 3: Comms Settings

6. Confirm that you can communicate with the development board by typing *at* and press enter. The module responds with 00 (Figure 4).

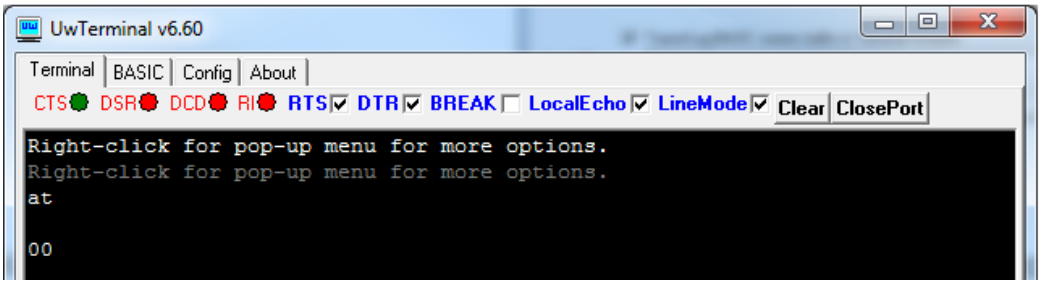

Figure 4: Comms OK

LOADING A *SMART* BASIC APPLICATION

Note: When swapping between profiles on the same device, it may be necessary to clear any existing pairings on the module and iOS device. On the BL600, this can be done with the command **at+btd***. On the iOS device, this can be done in the Bluetooth settings panel.

To load a *smart* BASIC application, follow these steps:

1. Ensure the cross compiler is located in the same folder as UWTerminal. Its name is similar to XComp_BL600r2_CA0D_1DA6, where *CA0D_1DA6* indicates a hash key. Each firmware version requires its corresponding cross compiler with a matching hash key.
2. To compile and load a *smart* BASIC application, right-click in the main UWTerminal window and select **XCompile + Load** (Figure 5).

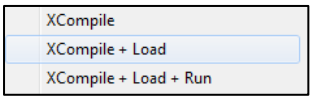

Figure 5: Right-click menu

3. Locate and open the **upass.vsp.sb** application located in the supplied *smart*BASIC *_sample_Apps* folder. When the application is successfully compiled and loaded, the console displays **+++ DONE +++** (Figure 6).

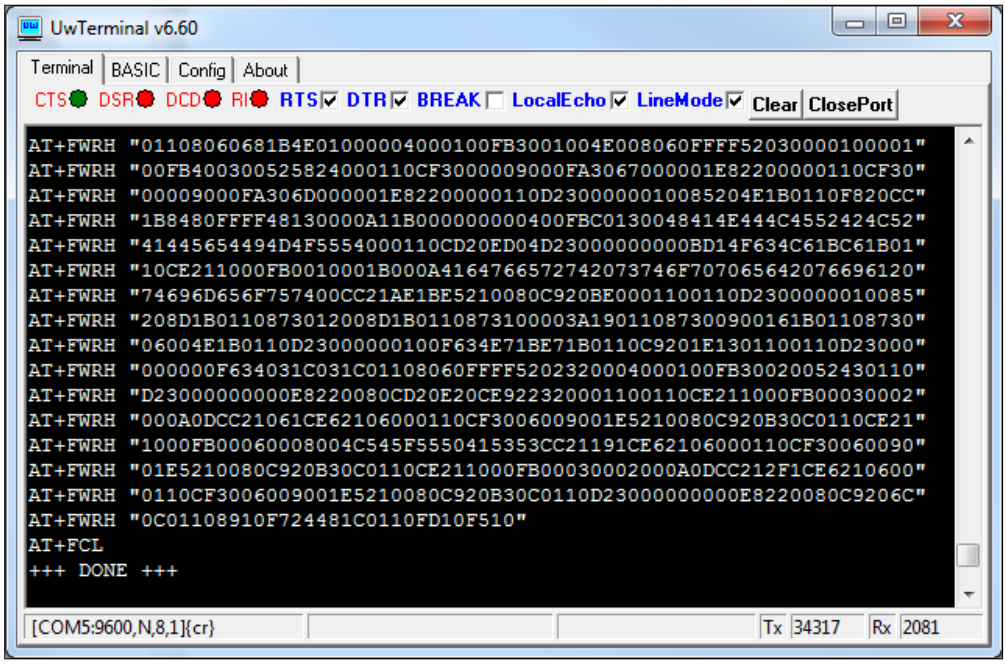

Figure 6: Compiled and loaded

If the correct version of cross compiler is not present, an error displays as shown in Figure 7.

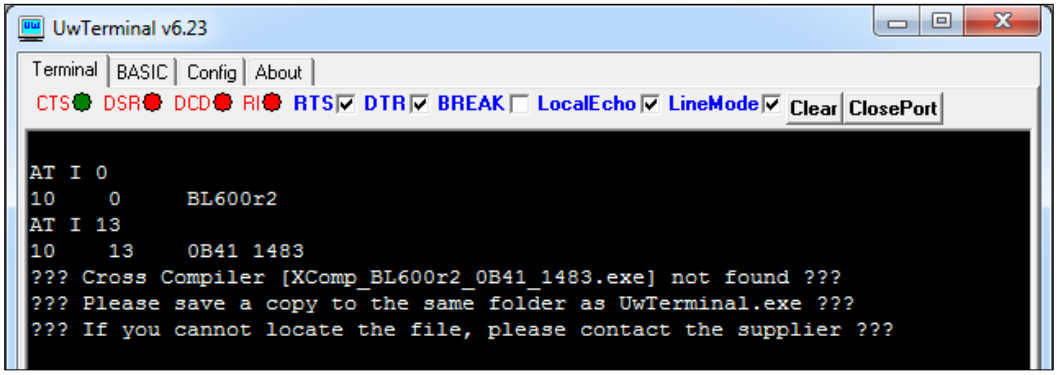

Figure 7: Cross compiler error

4. Locate the correct version and place it in the same folder as UWTerminal.
5. Confirm that **upass.vsp.sb** is loaded by using the command **at+dir** (Figure 8).

Note: The file extension is truncated from files copied onto the BL600 module. Therefore, when **upass.vsp.sb** is copied to the device, its name becomes **upass**.

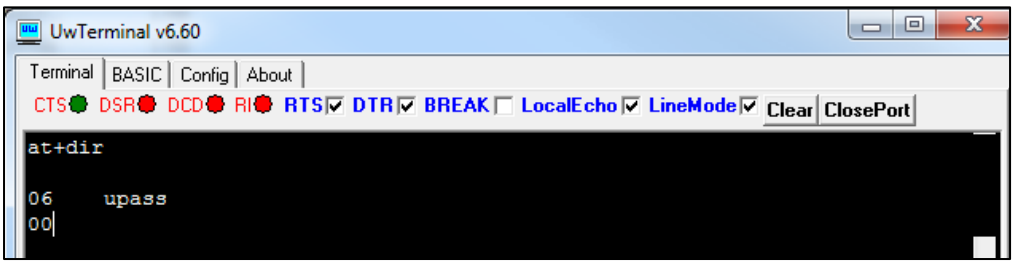

Figure 8: Directory showing "upass" app loaded

iPad/iPhone Setup

For iPad/iPhone setup, follow these steps:

1. Download the BL600 Serial app. If you are searching for the application on an iPad, you may need to click the **iPhone Apps** tab in the App Store. The BL600 Serial application can be found here.
2. Install BL600 Serial, the Laird Technologies utility from Apple's App Store (Figure 9). Ensure that Bluetooth is enabled in the device settings.

Figure 9: BL600 Serial app installed

Development Kit Setup to Autorun UPASS

In this application we use external UART loop back to test the Virtual Serial Port service. First we must rename our application as *$autorun$* to ensure it runs automatically after every power cycle or whenever reset is applied (Figure 10). For more information on autorun, refer to the BL600 *smart*BASIC User Manual.

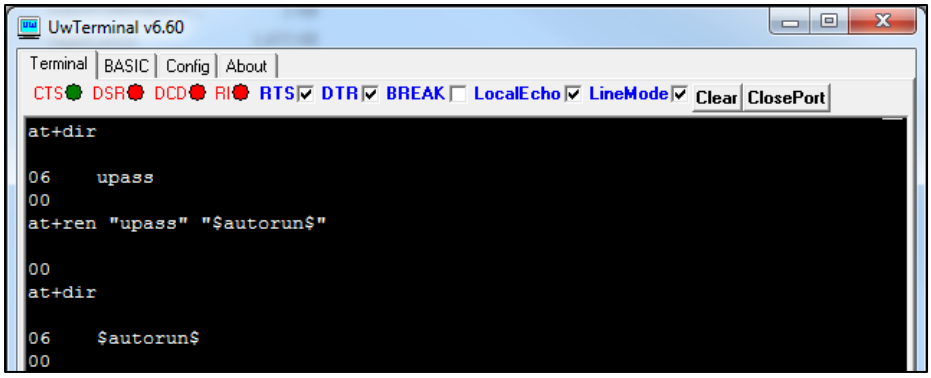

Figure 10: Renaming upass as autorun

Now that we have our application renamed as $autorun$ and ready to go, we must configure the development board to work in hostless mode. To do this, follow these steps:

1. First we need to isolate the UART from the host (FTDI chip) by switching CON13 to the position labelled as 1234.
2. Use the jumpers link TX&RX, CTS&RTS as shown in Figure 11.
3. Set the J6 (the three way jumper) to the autorun position.

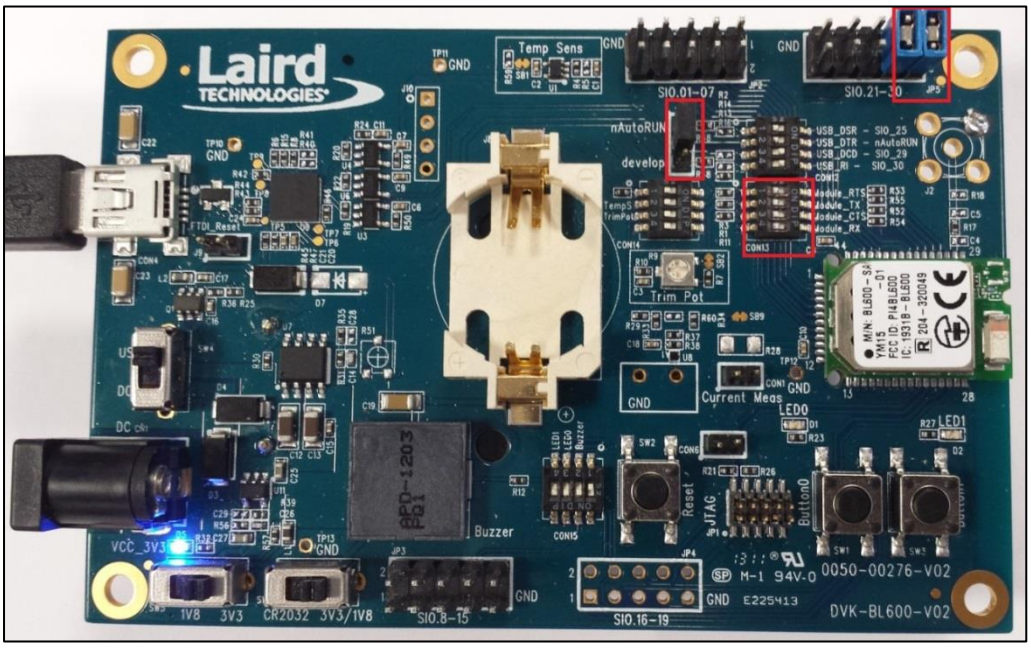

Figure 11: Host less autorun configuration

4. Start the **BL600UART Serial** application on your iPhone.
5. Start the **upass** application by pressing the rest button on the development board. The module starts advertising Virtual Serial Port Service.
6. On the iPhone, press **Connect**.
7. Click in the space next to the Send button and type a text to be sent.
8. Click send to send the data to the module.

The sample application **upass** receives the data and sends it through the UART. When the data arrives at the UART through the external loop back, it sends this data back to the host (as shown in Figure 12, Figure 13, Figure 14).

Figure 12: Starting the application

Figure 13: Connection

Figure 14: Loop back

Figure 14 shows the transmitted text followed by the echoed text:

```
HELLO BL600HELLO BL600
```

REFERENCES

For more information on Virtual Serial Port as well as any *smart*BASIC commands used in this application note, refer to the following documents:

- Virtual Serial Port sample application upass.vsp.sb (included with firmware files in Laird's Bluetooth Firmware Download Center)
- Virtual Serial Port Library cli.upass.vsp.sblib (included with firmware files in Laird's Bluetooth Firmware Download Center)
- BL600 smartBASIC User Guide (for FW v1.5.62.0 Revision 3 or for FW v1.2.54.0 Revision 7)