# vSP and SPP Server Application Note

## BT900

*Application Note* *v1.2.0*

## INTRODUCTION

This application note explains how to use the BT900 as a Serial Port Profile (SPP) and Virtual Serial Port (vSP) server and bridge the connection to the uart in either pure cable replacement mode or command driven mode.

This enables Classic Bluetooth devices and Bluetooth Low Energy devices to connect to the BT900 for bi-directional communication via SPP and VSP respectively.

For more information on SPP and VSP consult the "Introduction" and "Detailed setup instructions" sections in the "How to Set Up vSP and SPP" application note for the BT900. The guide is divided into the following sections:

- Requirements
- Setup Instructions
- Establishing a Connection
- Bridging UART to Wireless Port
- Customization

## REQUIREMENTS

- PC running Windows XP or later
- UwTerminal or UwTerminalX (available from the software downloads tab of the BT900 product page)
- Laird BT900 Development Kit or BT900-US Dongle with firmware version 9.1.7.3 or later.
- BLE Central device – i.e. BL620, Smartphone, PC, a Dual Mode BT device (if using vSP)
- BT Classic device (if using SPP)
- FTDI Drivers http://www.ftdichip.com/Drivers/VCP.htm (if not included with the OS)

## SETUP INSTRUCTIONS

To prepare your setup, follow these steps:

1. Plug in the BT900 DVK/US Dongle to a PC. If using the BT900 DVK, plug it into the PC using the provided USB-to-Mini USB cable. The DVK has an FTDI USB-UART chip on board. When connected, Windows 7 or later should install the driver automatically. The driver is also available from the FTDI website.
2. Locate and note the COM port in Windows Device Manager. The COM port number varies on each computer (Figure 1).

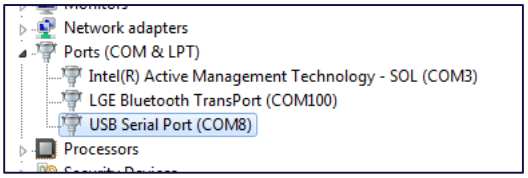


***Figure 1: Device manager***

3. Visit the Laird BT900 Github website to download the sample applications
4. On the Github pages, scroll down and click the 'Download as zip' button on the right, and unzip it to a folder on your computer (such as C:\Laird\BT900).

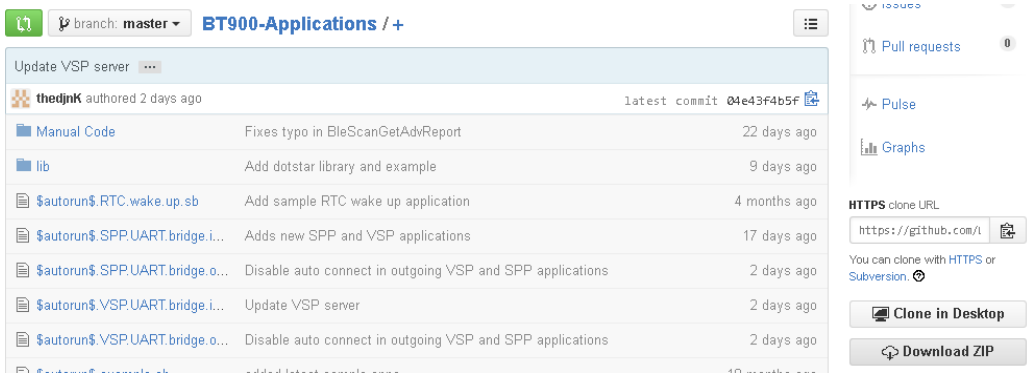


*Figure 2: Github download link*

5. Download UwTerminalX from the Laird website and unzip it to a folder of your choice.
6. Open UwTerminalX and click **Accept** in the tab it starts in.
7. Set the COM port number found in Step 2. Set the BT900 to the default settings of **115200 bps, none, 1, 8, CTS/RTS.**
8. Ensure **Enable Online XCompile** is checked and click OK to enter into the "Terminal" tab.

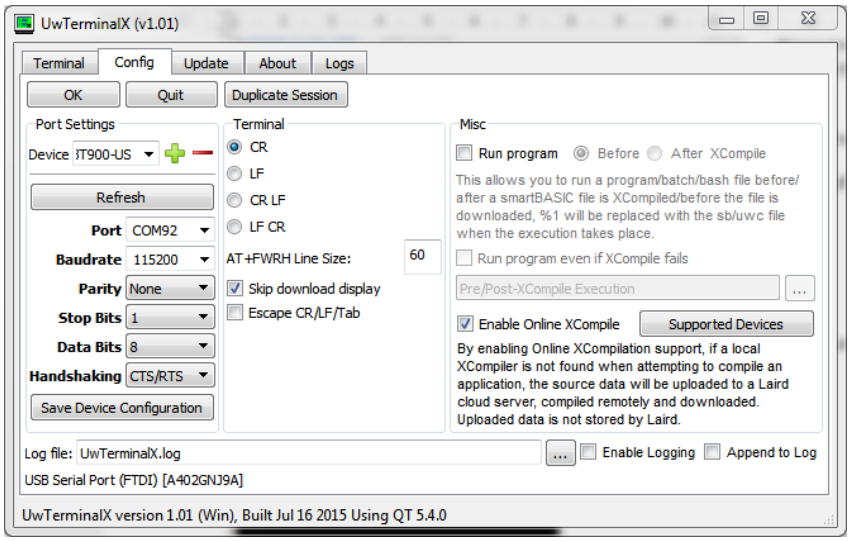


***Figure 3: UwTerminalX configuration page***

9. Type **AT I 3** and press **Enter** to confirm the module is accessible. Module will return the firmware version as shown in Figure 4 if it is accessible.

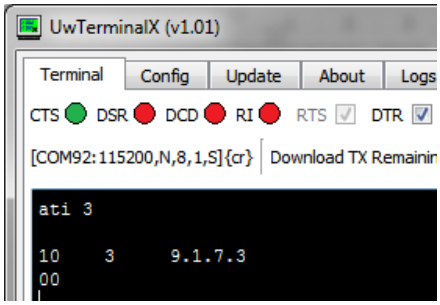


***Figure 4: BT900 firmware version***

10. If using a BT900 DVK board ensure that the current measurement track is not cut at point SB9, or if it is then ensure a jumper is fitted across the CON1 junction.

## ESTABLISHING A CONNECTION

**1.** Right click and select **XCompile + Load + Run**. In the file selection dialog select the file *vspspp.server.at.sb* and click open. It will be compiled, loaded and then it will run automatically. (To run the application again after exiting out of it, type **vspspp** into the Terminal window and press **Enter**).

**2.** With the application running, put the module into Connectable mode by typing command **AT*CONN 1** and pressing **Enter**.

Classic Bluetooth and BLE devices will now be able to see the BT900 under the name *VSPSPP_Server_BT900.* Classic Bluetooth devices will have to pair with the BT900 before establishing an SPP connection. By default, BLE devices can connect to the BT900 without pairing, but instructions for changing this can be found in the Customization section. After pairing with or connecting to the BT900, you will see ***BOND <BT Address>** and/or ***CONN <BT Address>**. Classic Bluetooth devices may have to connect to the BT900 again after bonding.

| | |
|---|---|
| **Note**: | In this application, the BT900 may only be in one connection at a time, VSP or SPP, not both. |

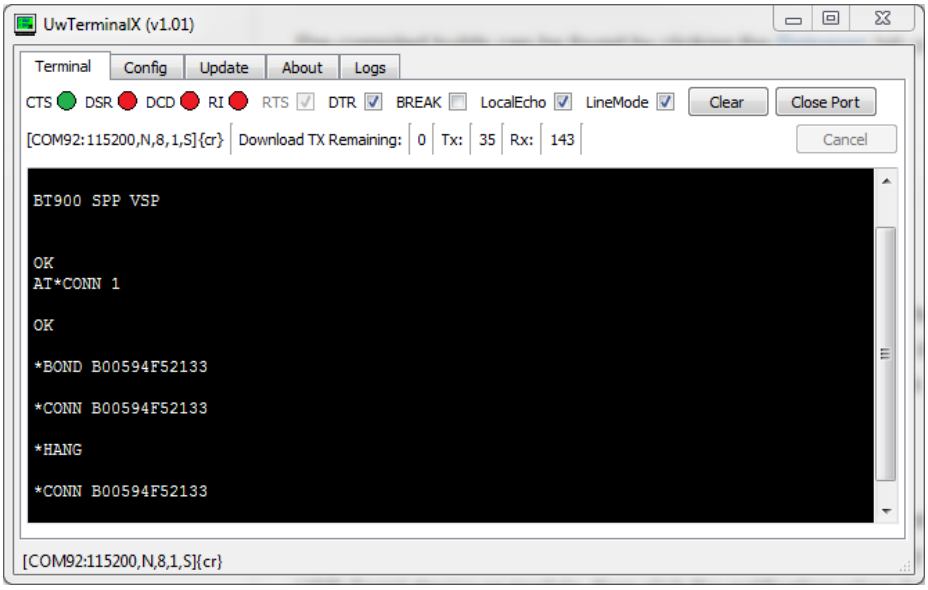


***Figure 6: Bonding and Connecting to the BT900***

## Bridging UART to Wireless Connection

After establishing an SPP or VSP connection, bridging the UART to the wireless connection will allow data received at the UART to be sent over the wireless connection and vice versa. This is done automatically upon successful connection, but can also be done manually by typing **AT*DATA** and pressing **Enter**.

To return to command mode, make sure LineMode is unticked in UwTerminalX and type **^^^**. For this to work you must leave at least 150ms between each key press. While in command mode, data received from the wireless port will not be sent to the UART. Enter the command **AT*DATA** again and press **Enter** to return to bridged mode.

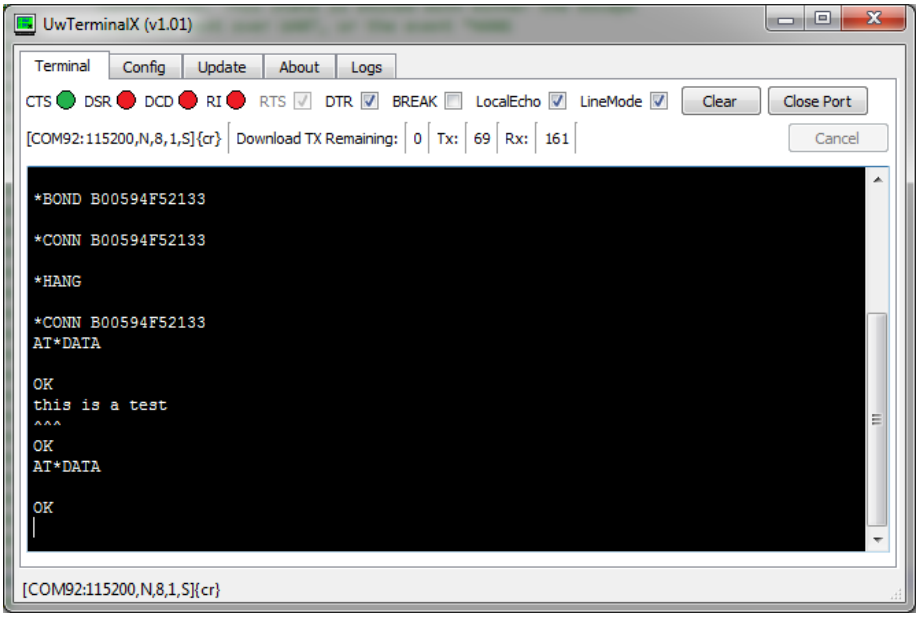


***Figure 7: Switching between Bridged and Command modes***

### Disconnecting

To disconnect from the connected device, while in Command mode, enter the command **AT*DROP** and press **Enter**. Upon disconnection, the module will enter into the connectable state.

## CUSTOMISATION

### Adding Functionality

Included with this application is a file containing generic hook functions which are called on specific events. These are provided blank for you to specify custom behaviour on these events. The hooks **OnUartData** and **OnWirelessData** come with the data that was received at that time. The **OnConnection** and **OnBond** hooks come with the address of the device that has connected to/bonded with the BT900, and the type of connection, VSP or SPP. The hook **OnHangup** will be called when there is a disconnection and the hooks **OnModuleInitPre** and **OnModuleInitPost** are provided to modify the startup behaviour.

These hooks can be found in the file *vspspp.customisation.sblib*.

If you want pure cable replacement behaviour where all it does is wait for either an SPP or a VSP connection and the bridges the uart to that connection, then delete *vspspp.customisation.sblib* and recreate it by copying and renaming *vspspp.customisation.purecable.template.sblib*.

### Customising AT Commands

The AT commands for this application are specified as #defines on lines 105-110 in the file *vspspp.server.at.sb*. By changing these strings you can customise the command set. For example to change the command **AT*DROP** to **at+discon**, change the AT string defined on line 105 to **"at"** and the DISCONNECT string defined on line 108 to **"discon"**.

By default, the command structure is **AT*_COMMAND_**, but note that the application will accept any symbol and not just the ***** symbol.

### Require Bonding for VSP Connections

By default, BLE devices can make a VSP connection to a BT900 running this application without bonding. To enforce bonding for VSP connections, change the value of the #define **BLE_VSP_REQUIRE_ENCRYPTION** on line 52 in *vspspp.customisation.sblib* to **1**.

## REVISION HISTORY

| Version | Date | Notes | Approver |
|---|---|---|---|
| 1.0 | 7 August 2015 | Initial Release | Jonathan Kaye |
| 1.1.0 | 27 October 2015 | Added Pure cable replacement | Mahendra Tailor |
| 1.2.0 | 9 Nov 2015 | Minor edits | Jonathan Kaye |