

WHISPER MODE

Application Note

v1.0

INTRODUCTION

The goals of this document include the following:

- To explain how to use Laird's BL600 module in whisper mode pairing.
- To test the Whisper Mode functionality through the use of a BT v4.0-enabled iOS device.

OVERVIEW

Security is a critical issue in wireless communication. In Bluetooth Low Energy (BLE), when two devices wish to communicate securely, Simple Secure Pairing is used. This process establishes a secret link key to correctly authenticate devices. However, in most cases the pairing process itself is carried out on the same exposed wireless medium and is therefore still vulnerable to interceptions and attacks.

To enhance security and ease during the pairing process, Laird developed a unique approach which involves the transmission power being significantly decreased while pairing is in progress. This ensures that pairing is not completed unless the devices are within a relatively close proximity to each other. This behavior is known as Whisper Mode Pairing. This proximity-enhanced security adds the extra level of trust that can be used to authenticate BLE devices. An additional benefit of Whisper Mode is that end users of products that are implementing Laird's BL600 can be certain they are connecting to the correct, intended remote device by simply bringing them into close proximity. Finally, Laird's whisper mode may decrease footprint and BOM costs for OEMs by removing requirements for additional wireless technologies, such as Near Field Communications (NFC); it provides similar attributes from within the BL600 module.

Whisper mode pairing is achieved with the function `BleTxPwrWhilePairing()`. This function, called once at startup, sets the transmit power of all packets that are transmitted while pairing is in progress. Radial measurements have shown that setting the pairing transmit power to -55 creates a 'bubble' with a radius of about 30 cm, outside which pairing will not succeed. This should be decreased even further if the BL600 is covered by the final product enclosures which affect the radio's overall RF performance.

REQUIREMENTS

- PC running Windows XP or later
- UWTerminal 6.50 or later
- Sample apps as deployed with the firmware's zip file and specifically the application stored in the file "htss.health.thermometer.sensor.SB"
- USB A to mini B cable
- BL600 devkit with firmware version 1.5.62.0 or later
- iOS device with BT4.0 support (e.g. iPad 3/iPhone 4S/iPad mini or newer)
- Internet connection on the iOS device (to download the BL600 app)

Note: This application note assumes that you are familiar with how to download *smartBASIC* applications onto the BL600 using the UWTerminal utility. If not, refer to the module's user guide and specifically to the chapter "Getting Started". You can access the BL600 user guide from the Embedded Wireless Solutions Support Center:

https://laird-ews-support.desk.com/?b_id=1945#docs

CONFIGURING AND LOADING THE *SMART*BASIC APPLICATION

To configure the *smart*BASIC application, follow these steps:

1. Open the *htss.health.thermometer.sensor.sb* application that is located in the supplied *smartBASIC_sample_Apps* folder.
2. Navigate to the end of the file, and add the line `rc = BleTxPwrWhilePairing(-55)` before the `WaitEvent` statement (line 341). This function sets the transmitted power to -55 dBm during pairing.
3. Save the *smart*BASIC application and load it into the BL600 using UWTerminal.

```
339 OnStartup ()
340 rc=StartAds(ADV_IND)
341 rc=BleTxPwrWhilePairing(-55)
342 '///-----
343 '/// Wait for a synchronous event.
344 '/// An application can have multiple <WaitEvent> statements
345 '///-----
346 WaitEvent
```

IOS DEVICE SETUP

To set up the iOS device, follow these steps:

1. Install the BL600 app from the Apple App Store (Figure 1). If you are searching for the application on an iPad, you may need to click the **iPhone Apps** tab in the App Store.

BL600 by Laird Technologies: <https://itunes.apple.com/qb/app/bl600/id594855763?mt=8>

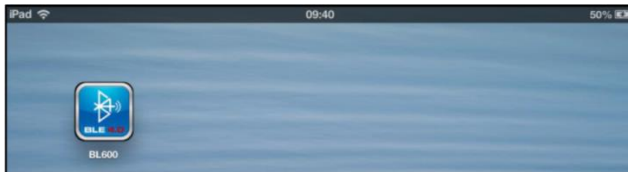


Figure 1: Installed BL600 app

2. Ensure Bluetooth is enabled in the device settings.
3. Once installed, run the BL600 application on your iOS device.
4. Select **Sensors > Temperature**. (Figure 2)

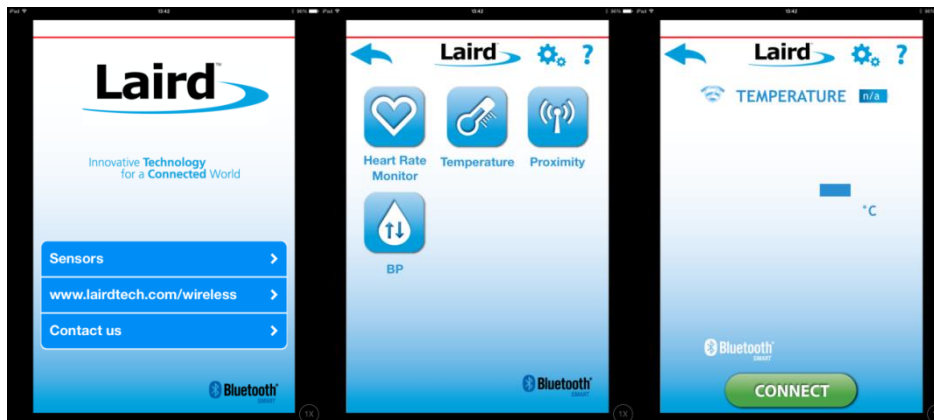


Figure 2: BL600 App – Home screen, sensors menu, temperature

TESTING WHISPER MODE PAIRING

To test whisper mode functionality, follow these steps:

1. Inside UWTerminal, type `htss` followed by return in the main window to run the application. The module initialises, advertisements begin, and the log is printed to the console (Figure 3).

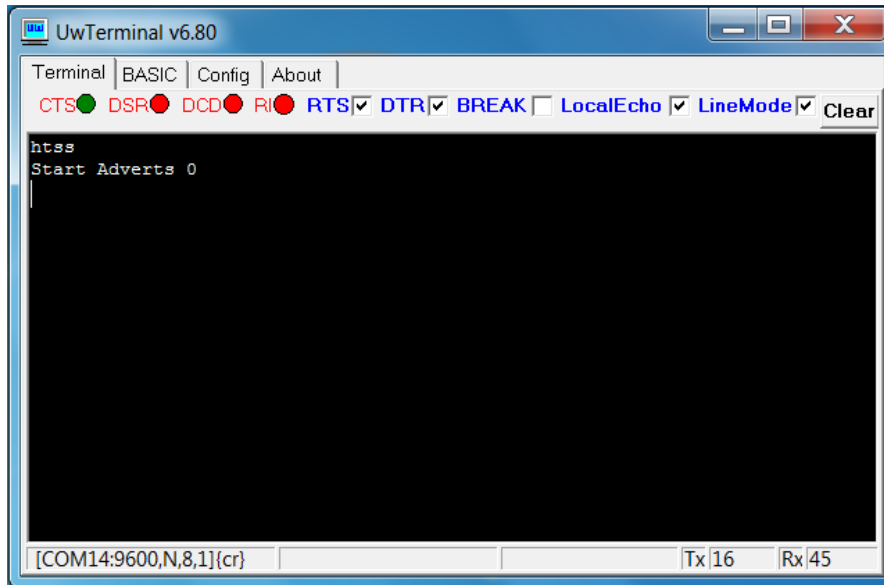


Figure 3: UWTerminal showing the `htss` program starting

2. Press **Connect** on the iOS device.

Notice that even though a connection occurs (Figure 4), no results display on the iOS device's screen; this indicates that it has not paired to the BL600 module.

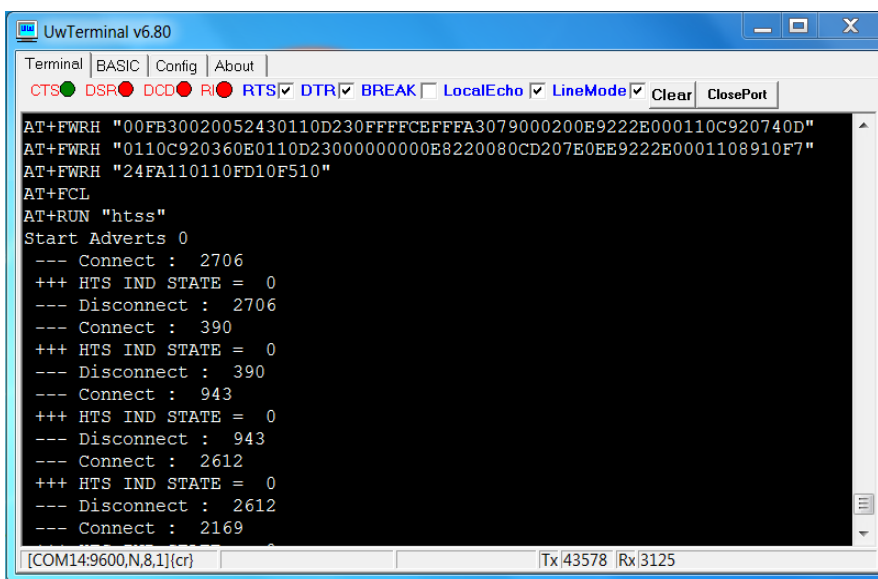


Figure 4: UWTerminal updated to show that a connection has occurred

BL600 Whisper Mode

Application Note

- Slowly move the iOS device closer to the module until the pairing request notification pops up (Figure 5). This does not occur unless the devices are a few inches apart. When you press **Pair** on the iOS device, the screen updates to show the temperature reading sent by the BL600 module.

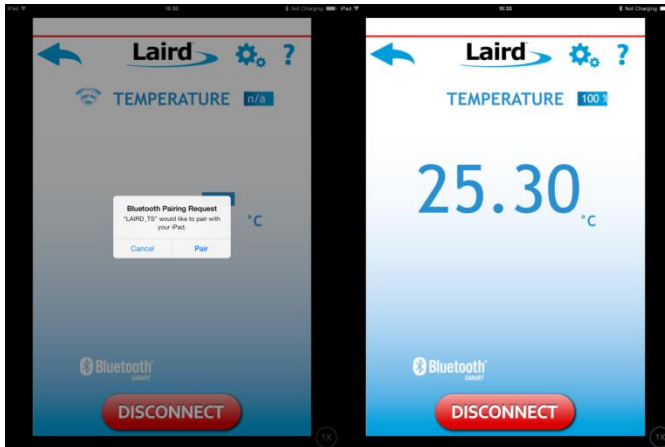


Figure 5: The iOS device indicating the pairing process is achieved in close proximity

The completion of the pairing process is also captured by the UWTerminal log screen, which should be updated to show that an encrypted bonding has occurred and that the two devices have now been paired. (Figure 6)

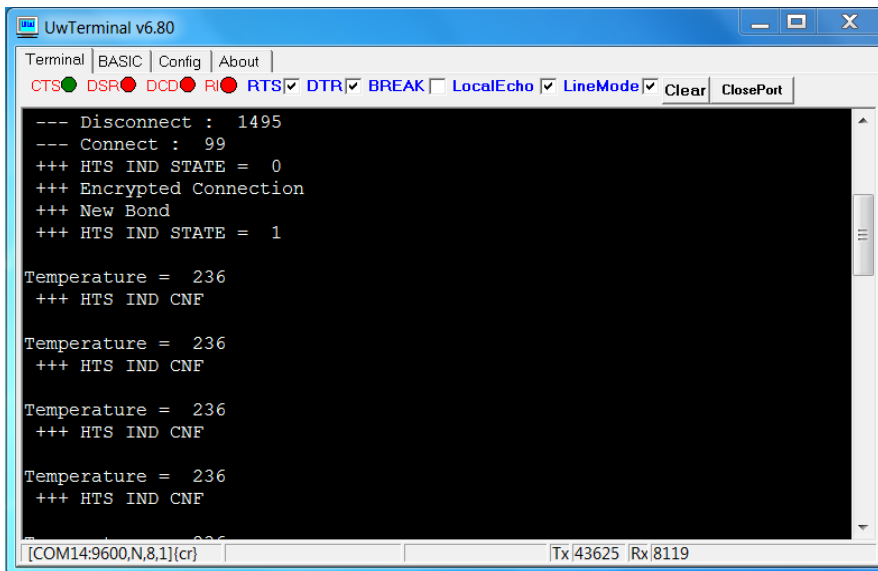


Figure 6: UWTerminal updated to show that pairing has occurred

ADDITIONAL INFORMATION

Additional documentation and information relating to firmware is available from the Laird Embedded Wireless Solutions Support Center: https://laird-ews-support.desk.com/?b_id=1945

... As well as the Laird website at:

<http://www.lairdtech.com/products/bl600-series>.

REVISION HISTORY

Revision	Date	Description	Approved By
1.0	08 Jan 2015	Initial Release	Jonathan Kaye