Quick Start Guide

Laird WB45NBT
Version 1.2

global solutions: local support™

REVISION HISTORY

Version	Revision Date	Change Description	Approval
1.0	22 July 2014	Initial Release	Andrew Chen
1.1	21 Nov 2014	Removed paragraph on Starting WebLCM from the Laird CLI	Andrew Chen
1.2	7 July 2015	Added Note on No Serial Communication	Steve DeRosier

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INTRODUCTION TO THE LAIRD WB45NBT

The Laird WB45NBT Wireless Bridge module is a wireless communications subsystem that may be integrated into a variety of host devices via a number of available electronic and logical interfaces.

Interfaces	Features	Specifications
▪ Fast Ethernet ▪ Serial UART ▪ USB ▪ SPI ▪ I2C ▪ 80 pin board with mating options ▪ Mounting holes	▪ ARM9 processor (396 MHz) ▪ 64 MB of LPDDR (Lower Power DDR) memory ▪ 128 MB of NAND flash storage	▪ Length: 40 mm ▪ Width: 40 mm ▪ Height: 3.8 mm

PRODUCT DESCRIPTION

The Laird WB45NBT provides complete enterprise-class Wi-Fi connectivity with an integrated TCP/IP stack, full support for IEEE 802.11a/b/g/n and Bluetooth 4.0 dual-mode air standards, and a fully integrated security supplicant providing 802.11i/WPA2 Enterprise authentication, data encryption, and BT protocol stacks.

The WB45NBT is a fully integrated module with RF shielding and three U.FL type antenna connectors. The Main antenna (for Wi-Fi) and the Auxiliary antenna (for Bluetooth) work separately to get the best coexistence performance.

Note: For additional information on the hardware aspects of the WB45NBT, please refer to the *Hardware Integration Guide* download on the WB45NBT Product Page.

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QUICK START GUIDE – WB45NBT

Inventory of Equipment

Qty.	Item
1	WB45NBT device
1	BB45NBT Breakout board
2	U.FL ultra-micro coax cable male to male SMA plus 2 nuts and washers
2	Dual band 2.5G and 5G antenna with reverse female SMA connector
4	Standoffs and nuts
3	Small Philips head screws
1	USB A to micro USB 1m cable
1	1m CAT 5 e cable
1	USB-to-RS232 DB9/DB25 adapter
1	Micro USB to USB A type convertor
1	Power supply 12V 1A negative center with wall (US/European) adapter cable

Additional Required Tools

Qty.	Item
1	Small Philips head jeweler's screw driver

Hardware Installation and Configuration

To assemble the WB45NBT evaluation kit, follow these steps:

1. Attach the standoffs to the underside of the BB45NBT board.

2. Connect the 2 U.FL coax cables to the 2 U.FL connecters on the underside of the WB45NBT board. Figure 1 shows the location of the Wi-Fi and Bluetooth antennas.

   Note: To prevent damage, you must connect the U.FL ultra-micro coax cables to the connectors on the WB45NBT prior to fitting the WB45NBT to the BB45NBT evaluation board.
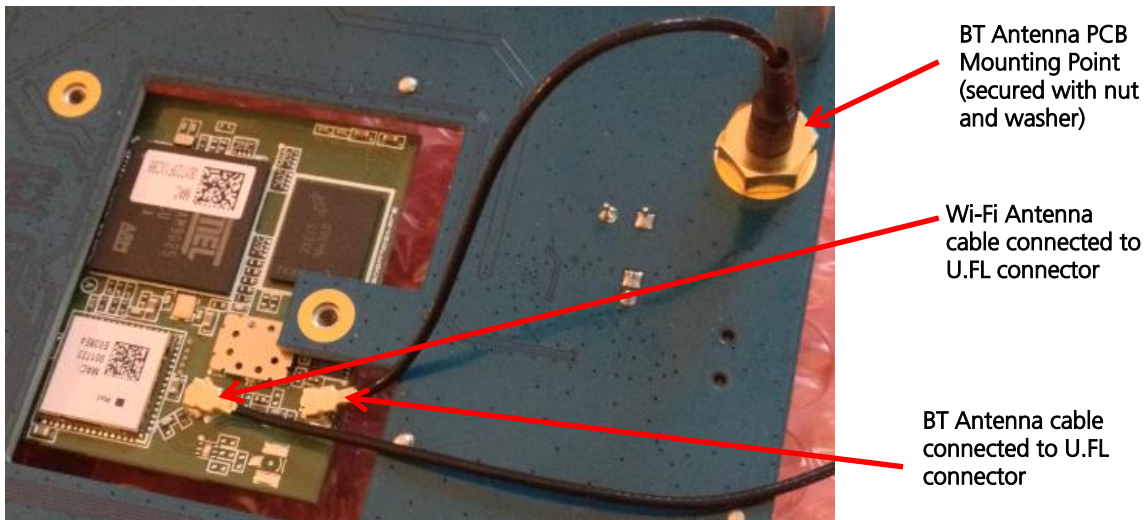
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Figure 1: Location of the Wi-Fi and Bluetooth U.FL connectors on the SDB-WB45NBT

3. Plug the WB45NBT module into the 80-pin high-density Molex connector situated near the central aperture on the BB45NBT Breakout board. Ensure that the 2 U.FL cables and SMA connectors are passed through the aperture in the BB45NBT board.

4. Using the small Philips head jeweler's screw driver, secure the WB45NBT using the 3 small Philips screws to the BB45NBT board.

5. Using the nuts and washers provided, attach the respective SMA connectors on the end of the U.FL cables to the apertures in the BB45NBT board marked **BT_ANT** and **WLAN_ANT** as shown in Figure 1.

6. Turn the BB45NBT board the correct way up and connect the dual band antennas with an SMA connector to each of the **BT-ANT** and **WLAN-ANT** SMA connectors on the top side of the BB45BNT board.

7. Connect the Wi-Fi and Bluetooth antennas to the male SMA connectors at the end of the 2 U.FL cables connected in step 2 above.

8. You can power the BB45NBT from either mains power or the USB power socket. Figure 2 shows both of these connectors and the power switch. Select which power supply you wish to employ:

    a. **DC Jack:** Ensure the **Power / USB Power** switch is set to "From USB Port." This is effectively the "off" position if you're intending to use DC power. Connect the power supply to the wall outlet and put the barrel into the **DC connector** (J3) on the BB45NBT breakout board as shown in Figure 2.

    b. **USB Port:** Ensure the **Power / USB Power** switch is set to "From DC Jack." This is effectively the "off" position if you're intending to use USB power. Connect the USB A connector to your PC or USB hub USB port. Connect the micro USB connector to the BB45NBT board USB power socket shown in Figure 2. No LEDS should be lit on the board.

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USB Power Port

RED LED - D20

Power Switch

DC Jack
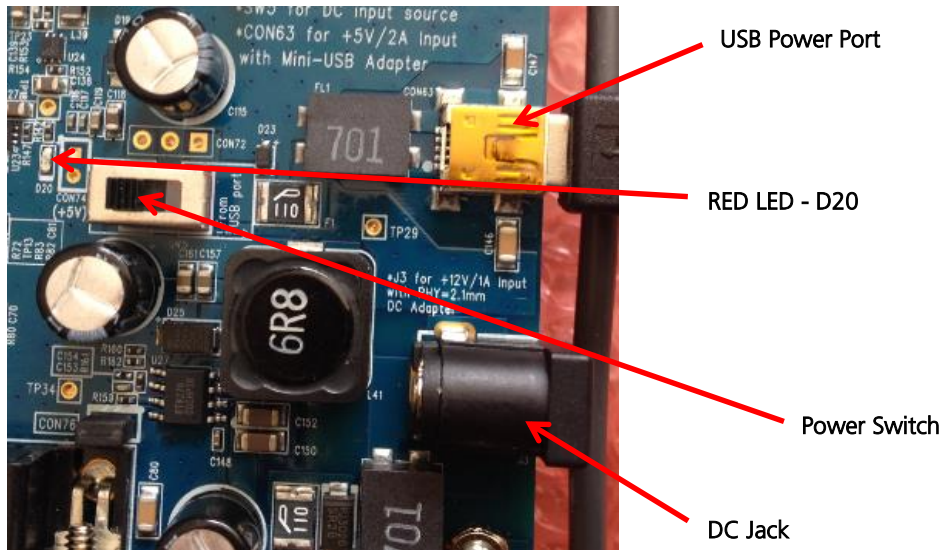
Figure 2: Alternative power sources

WB45NBT 80-Pin Connector

BT Antenna Hole

Ethernet Jack

USB

IRQ/SW1 Button

Reset Button

Wi-Fi Antenna Hole

USB power port

DC/USB Power Switch

DC Power Jack

Debug UART

UART0

UART3

See Figure 2

Figure 3: BB45NBT Evaluation Board

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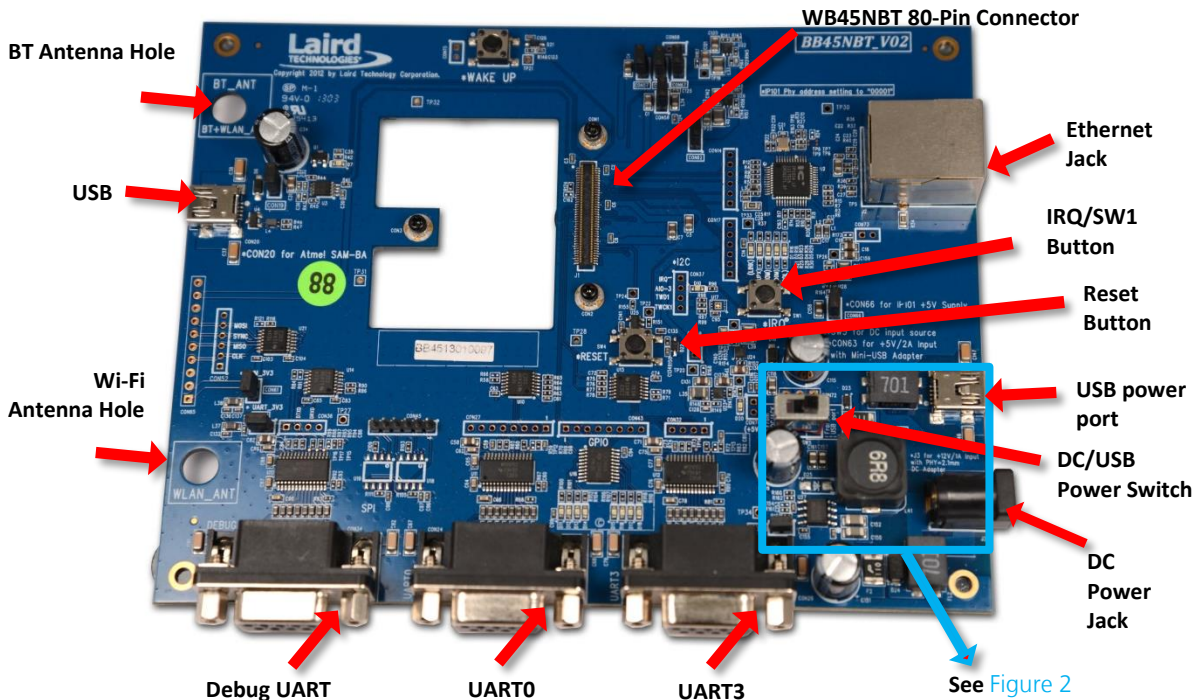## Basics of the BB45NBT Board

The Laird WB45NBT is a flexible communications module providing a variety of interfaces which are made available on the BB45NBT. Additional information regarding all interfaces and their usage and configuration is available in the WB45 Reference Manual.

The WB45NBT is configurable via either the command line or the web-based version of the Laird Configuration Manager (LCM). WebLCM is explained further in Configuring the WB45NBT with WebLCM.

This section briefly details each interface available on the BB45NBT board.

- Debug UART – used for CLI communications with the WB45NBT module
- UART0 – Spare UART
- UART 3 – unused
- USB
    – Available for either USB HOST or device / gadget operation.
    – By default, the port is in Ethernet gadget mode.
    – The IP address of the port defaults to 192.168.3.1.
    – The WebLCM is always available on this port.
- Ethernet jack
    – The WebLCM is always available on the Ethernet port
    – The IP address for this port is provided by the SHCP server the WB45NBT is connected to

Host Software Installation and Initial Communication with the BB45NBT

The following items are used in this section:

Qty.	Item
1	BB45NBT Breakout board with WB45NBT module fitted as described above
1	USB to RS232 cable
1	Power supply 9V / 1A with wall (US/European) adapter cable or USB A to Micro USB cable

To set up the WB45NBT, follow these steps:

1. Ensure you have loaded the driver for your USB-to-RS232 cable. Depending on your cable, the drivers may be automatically installed by your operating system. If they are not, you will need to download and install the device drivers for the cable.

2. Connect the USB A-type connector of the USB-to-RS232 cable to the computer. Your computer should recognize the USB-to-serial adapter and load the appropriate drivers.

3. Connect the DB9 connector of your USB-to-RS232 cable to the port marked Debug UART shown in the BB45NBT overview diagram Figure 3.

4. To send commands to the WB45NBT you will need to download and set up a terminal emulator, such as Putty or TeraTerm, on your host. Note that a variety of emulators are available.

To download and set up TeraTerm, follow these steps:

1. Navigate to the Source-Forge (TeraTerm) website: http://en.sourceforge.jp/projects/ttssh2/releases/

2. Download the emulator.

3. Run the downloaded file and navigate through the installer. Select the standard default settings when prompted.

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4. Open TeraTerm.
   Upon opening, TeraTerm prompts for connection information. We are using a serial connection (not the default TCP/IP).

5. Select **Serial**.

6. From the **Port** drop-down menu, choose the COM port which has a description similar to the USB-to-RS232 cable you are using: e.g. *Prolific Serial-to-USB Comm Port*. Remember this COM port number.

7. Set the serial port's settings to match the WB45NBT's communications protocol. To adjust settings, navigate to **Setup > Serial port**.

   Adjust the settings (as needed) according to the following:

Port	Must match the COM port of your USB-to-RS232 cable.
Baud Rate	115200 (TeraTerm defaults to 9600 baud communications)
Data	8 bit
Parity	None
Stop	1 bit
Flow Control	None

8. Press **OK** to save the settings and to return to the terminal.

   Note: Assuming all settings have been set properly, you should now be able to communicate with the WB45NBT. The terminal presented now is the Linux shell onboard the WB45NBT, and behaves likewise.

9. Slide the Power switch (shown in Figure 2) to either the **From DC Jack** or **From USB Power Port** to match your chosen method of powering the BB45NBT board to apply power to the WB45NBT. The Red LED D20 will light on the BB45NBT board.

   Wait until the WB45NBT has completed booting and you see the prompt:

   ```
   Summit Data Communications

   summit login:
   ```

10. Enter the username and password. The default user name is *root* and the default password is *summit*.

    Note: When entering the password, don't be alarmed if text or asterisks do not show. This is normal operation in Linux.

    After logging in, the following should display to indicate that you are now in the Linux shell:

    ```
    #
    ```

Important Note About "No Serial Output"

In some BB45NBT boards, the UART_3V3 jumper nearest the Debug UART port can become loose or unseated, which results in no serial output.

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If you find you have no serial output, check that this jumper is very tightly seated (Figure 4).
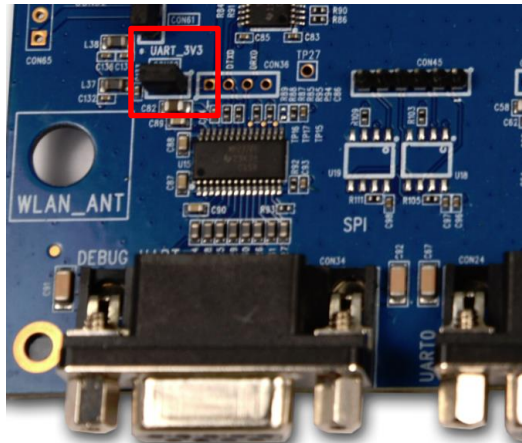

Figure 4: UART_3V3 Jumper

Laird CLI Basics

The Laird CLI provides a command line interface to control the Wi-Fi features of the WB45NBT.

The Linux shell prompt is represented by the "#" symbol. From the prompt, enter `sdc_cli` to start the Laird CLI. When the Laird CLI starts, the prompt will change to "`sdc#`".

Full information on the commands available within the CLI is available from the Laird website.

Information regarding using the CLI commands is also available by typing `help` at the `sdc#` prompt. Additional help is available for the commands **iface**, **profile**, **global** and **auto-profile** using the syntax `<command> help` at the `sdc#` prompt.

To see the status of the WB45NBT, type `status` at the `sdc#` prompt. The returned status should resemble the following.

```
Status: AP mode
  Config name: Default
  SSID:
  Channel: 0
  RSSI: 0
  Device Name:
  MAC: 00:17:23:e0:38:e4
  IP: 192.168.1.1
  AP Name:
  AP MAC:
  AP IP:
  Bit Rate: auto
  Tx Power: 0 mW
  Beacon Period: 0
  DTIM: 0
```

The WB45NBT defaults to start in AP mode. This allows the user to associate and attach to the WB45NBT as one would a normal access point and use the integrated Laird WebLCM tool to configure the WB45NBT. The Status line highlighted in yellow above shows that the WB45NBT is operating in AP mode.

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To exit from the `sdc#` prompt at any time, enter the command `exit`. You will be returned to the Linux shell prompt, `#`.

Configuring the WB45NBT with WebLCM

Once the WB45NBT is operating in AP mode, you may configure the WB45NBT using the WebLCM tool. To configure the device, complete the following steps:

1. Associate your computer with the WB45NBT by scanning the available Wi-Fi access points in your area. Connect to the wb45n_xxxxxx AP where xxxxxx is the last 3 octets of the MAC address (highlighted in blue in the status example above). For the device example above, the device's SSID name would be wb45n_e038e4.

   Note: Wi-Fi access is protected by WPA2-PSK level security. When prompted by your computer's Wi-Fi client, enter the default password, which is **lairdtech**.

2. Open your web browser and enter the IP address 192.168.1.1 in the address bar. The WebLCM server uses a secure link running over the https protocol. The certificates used will not be signed by your browser, so you will see a warning similar to that shown in Figure 5 (this example shows the warning in Google Chrome):
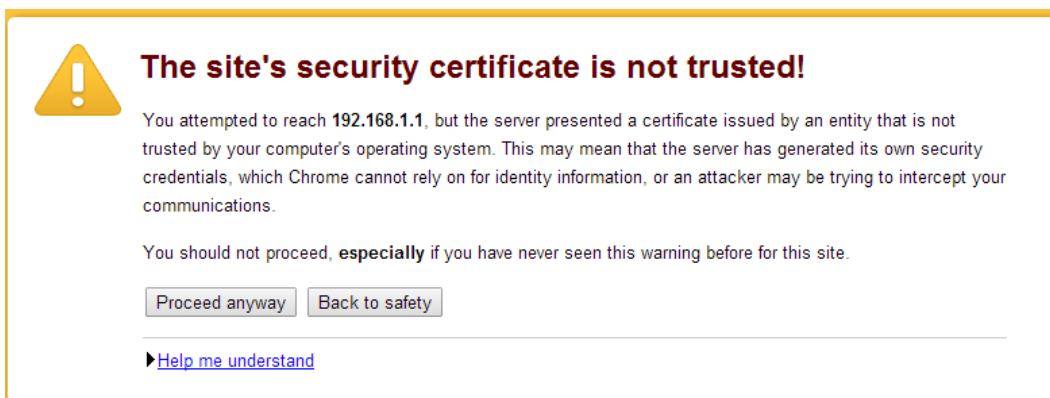

Figure 5: Accept the certificate issued by the WB45BNT

3. Click **Proceed Anyway** button (or the equivalent to "Continue" on your browser).
4. Log in to the web server. The user name is **root** and password is **summit.** When you log in, you are directed to WebLCM's **Status** tab as shown in Figure 6 .

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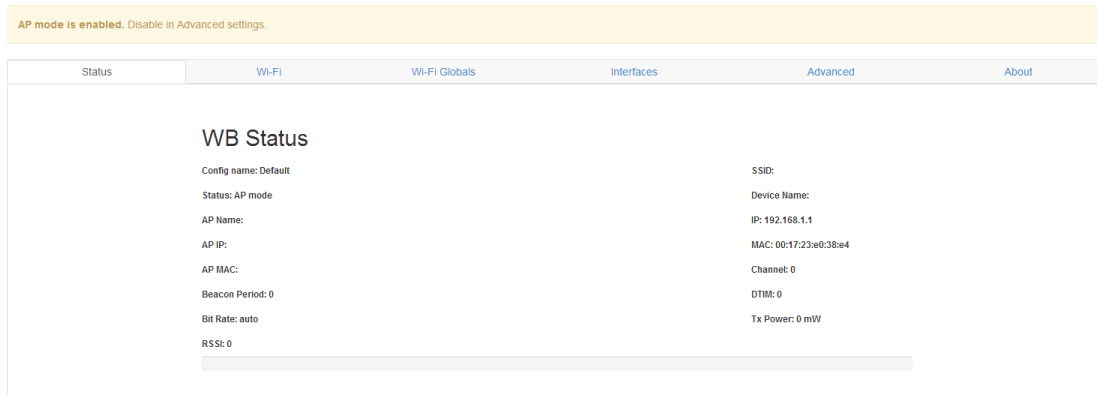Hong Kong: +852 2923 0610

Figure 6: The WebLCM Status tab

5. Click the **Wifi** tab to display the profiles page. Here, you may add your required Wi-Fi profiles.
6. When you have added a profile or profiles to the WB45NBT, you must select a profile to make active. Select the desired profile from your list and click **Activate**. The profile will now be active when AP mode is disabled.

Note: You must create an active profile prior to disabling AP mode.

7. To disable AP mode, click the **Advanced** tab and then click **Disable** in the AP Mode section.
8. Check the status of the AP connection by typing **sdc_cli status** at the command line in your terminal.

Note: The web server that hosts the WebLCM on the WB45 is passively waiting for a connection attempt to the WB45 on port 80. Once a connection attempt is made on that port, the WebLCM will become active for a period of 10 minutes. If no activity is detected for 10 minutes then the web server will return to a passive state where it is waiting for a connection on port 80.

WB45NBT File System

This section details some important contents of the WB45NBT file system. For more in depth information consult the WB45NBT reference manual.

Table 1: Main components

Directory	Content of note	Comment
/usr/bin	sdcsupp	Laird Supplicant
	sdc_cli	Laird CLI
/usr/lib	libsdc_sdk.so.1.0	Laird SDK library
	libsdc_sdk.so.1	A symbolic link to SDK library
/etc/network	wireless.sh	Networking scripts. See the WB45 reference manual for details.
/etc/init.d	startup scripts	The lowest numbered startup scripts are executed first.

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/etc/init.d/opt/	optional startup scripts	Create a symlink to the item to be started: # ln -s /etc/init.d/opt/<name-of-script> /etc/init.d
/etc/ssl	default wifi certificate location for all certificates	DO NOT put your certificates in /etc/ssl/certs directory
/lib/firmware/ath6k/AR6003/hw2.1.1	fw-4.bin	Symbolic link to the AR6003 firmware.
	fw_v3.4.0.83.bin	The AR6003 firmware

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