XBee®

865/868 LP Development Kit

Getting Started Guide

Digi XBee 865/868 LP Development Kit Getting Started Kit

(Part number 90002127 B)

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Contents

Introduction to the Digi XBee 865/868LP Development Kit

The XBee 865/868LP Development Kit is designed for simplified setup of XBee mesh networks. Additionally, this Development Kit enables you to send data between XBee modules and adjust your XBee settings quickly and easily.

Requirements

To install the software mentioned in this guide, you need a PC running Microsoft Windows 2000, XP, Vista or Windows 7.

Additional Documentation

- For more information about the software, API operations, AT command modes, or the form factor please refer to the XBee 865/868LP Product Manual.

- For more information on configuring and using the XCTU utility, please refer to the XCTU Configuration & Test Utility Software User's Guide.

Setting up the Digi XBee 865/868LP Development Kit
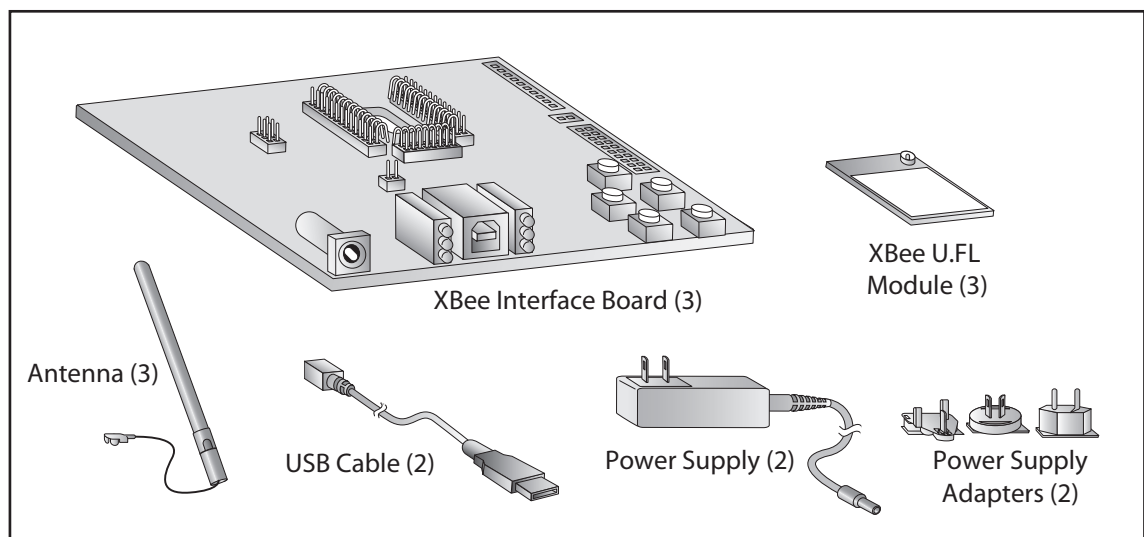
The Digi XBee 865/868LP Development Kit contains the following:

- 3 XBee 868LP Modules
- 3 XBee Interface Boards
- Antennas and Accessories

## Digi XBee 865/868LP Kit Components

Carefully unpack and verify the contents of your kit. Your kit should include the following:

XBee Interface Board (3)

XBee U.FL Module (3)

Antenna (3)

USB Cable (2)

Power Supply (2)

Power Supply Adapters (2)

Assembling Digi XBee 856/868LP Development Kit

To assemble your Development Kit, perform the following steps:

1. Install the modules on the XBee Interface Boards (XBIB) by lining the pins up with the headers and pressing the module into place.

2. Attach the dipole antennas to the modules.

3. Connect the first XBIB to your computer using a USB cable. This first device is designated as your base radio.

4. Connect the remaining modules and interface boards, and set them aside for now.
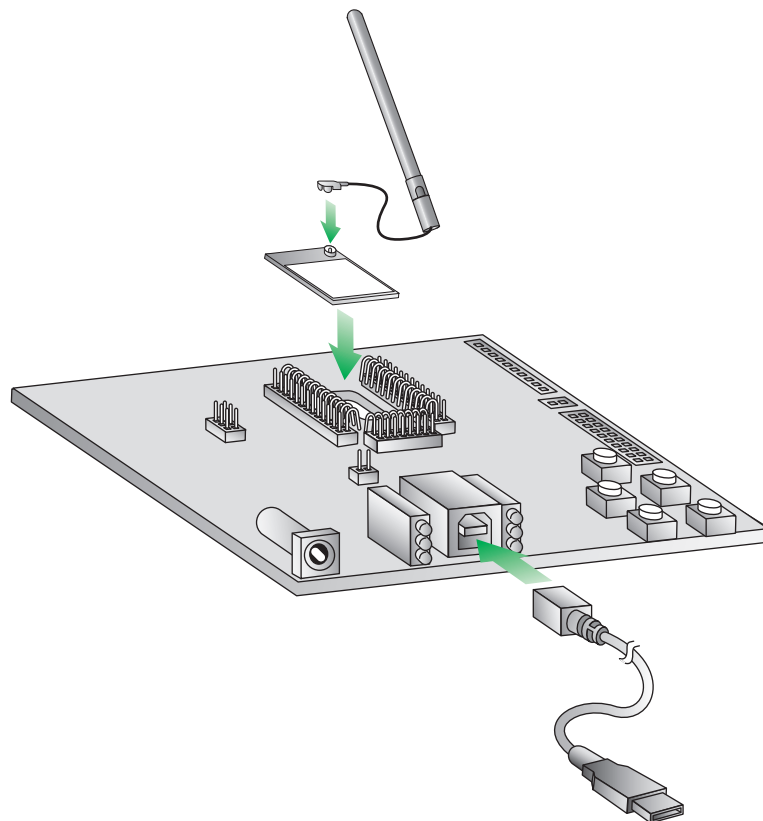
You are now ready to run the XCTU software and to begin configuring your XBee Mesh Network.

Downloading and Installing the XCTU Software

For proper kit configuration and operation, you must download and install the XCTU software (version 5.15 or later). You should install a copy of XCTU software and USB drivers on each computer that will be a part of your XBee mesh network.

Installing the USB Drivers

The XBee USB interface board is a plug-and-play device that the PC can automatically detect. If you are using Windows 7 or Vista, the USB drivers should automatically install. A notification appears in the lower right portion of your screen indicating success or failure.

If the USB drivers fail to install, please follow the USB driver installation instructions found here: www.digi.com/support/kbase/kbaseresultdetl.jsp?id=3214.

If you are using Windows 2000 or XP, download and install.To install the USB driver:

1. Download the driver setup file at:
   ftp1.digi.com/support/driver/FTDI_Windows_Driver_Setup.exe.

2. Double-click on the setup file. A window pops up during installation and automatically closes when the process is complete.

Installing the XCTU Software

You can install the XCTU software by following these instructions:

1. Download XCTU at *www.digi.com/xctu.*

2. Browse to the folder where you saved the above install file.

3. Double-click on the installer file and follow the XCTU Setup Wizard.

4. When asked if you would like to check Digi's website for firmware updates, click **Yes**.

5. After the firmware updates are complete, click **Close**. Updates may take a few minutes.

6. Start XCTU by double-clicking on the XCTU icon on your desktop, or by selecting **Start > Programs > Digi > XCTU**.

The XCTU software is now ready for use.

Testing the Communication Link and Establishing a Mesh Network

After setting up your Digi XBee 865/868LP Development Kit and installing the XCTU software, you can test the communication link and establish the mesh network. The following sections provide instructions for testing the communication link and establishing the mesh network.

Channel Mask Settings for Europe and India

By default, the CM (Channel Mask) parameter is set to 0x3FFFFFFF, which is the approved frequency range for Europe. For use in India, the CM parameter must be set to 0x0007F800 to operate in the 865 to 867 MHz frequency band. Please refer to the XBee 865/868LP Product Manual for details.

Performing a Range Test

Before running a range test, you must establish a connection with the XCTU software:

1. Double-click the XCTU shortcut on your desktop.

2. Under the PC Settings tab, select the serial COM port associated with the development boards you have just attached to your computer.

3. Verify that the baud rate and data settings match the internal settings of the devices:

- Baud Rate: 9600

- Flow Control: NONE

- Data Bits: 8

- Parity: NONE

- Stop Bits: 1

4. Click the **Test/Query** button to verify communication with the radio. A pop-up is displayed showing status and some basic information.

5. Connect power to the second radio using a power supply in a fixed location. This designates as your remote radio.
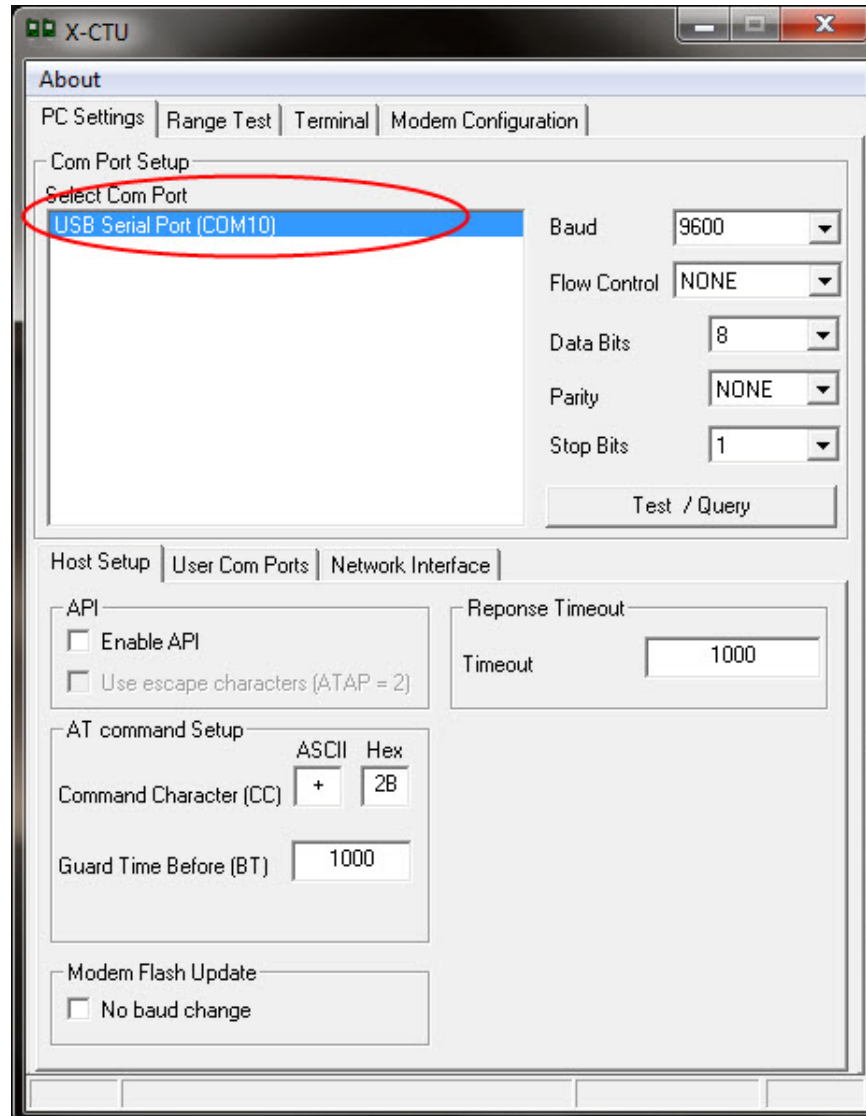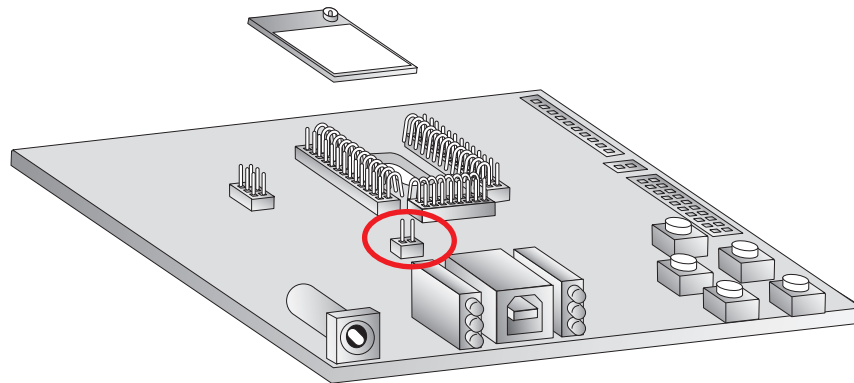
Note   The remote radio requires a P8 jumper on the XBIB loopback header.
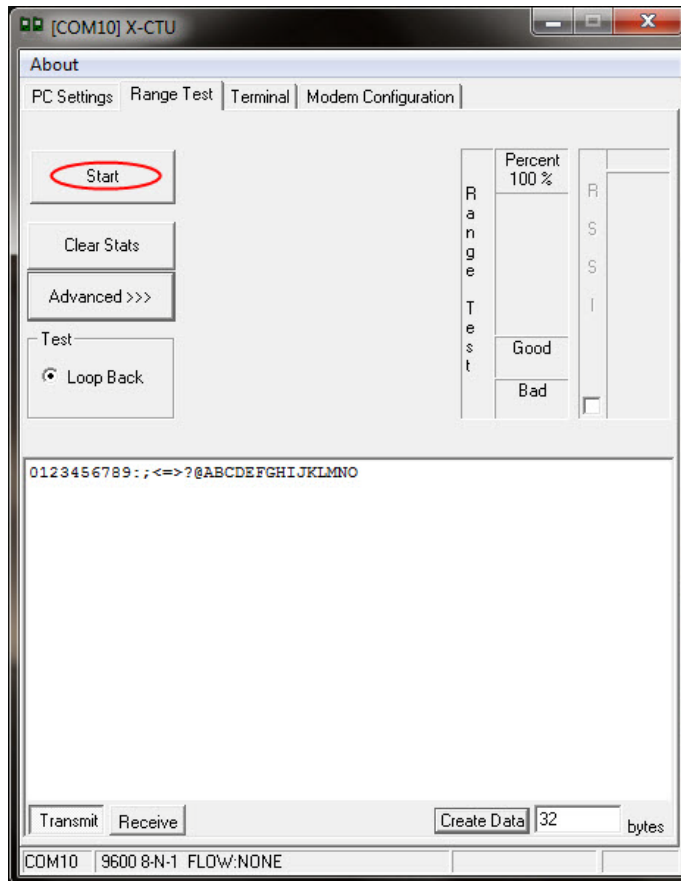
⚠️ **CAUTION!**   Ensure that the P8 jumper is not bridging the two pins together on the base radio. This could cause XCTU to stall if the jumper is populated and requests are sent to the radio.
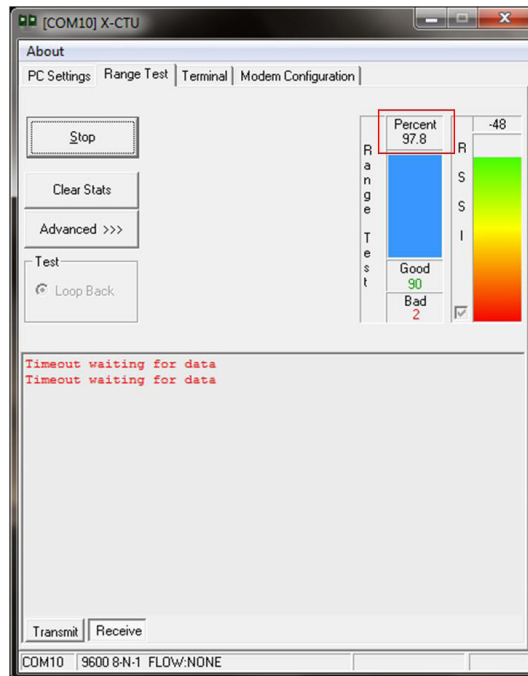
6. Select the **Range Test** tab.

7. (Optional) Check the **"RSSI"** check box to enable the Received Signal Strength Indicator.

8. Click **Start** to begin the range test.

9. Monitor the link quality by reading the Percent section on the **Range Test** tab. This section displays the running percentage of good packets sent to the receiving radio and looped back to the base.

Note As your distance increases beyond the maximum range of the radios, you start seeing greater packet loss.

10.Click **Stop** to end the range test.

The **Advanced** tab provides you with more options. If you are running the range test with several mesh radios acting as intermediaries, increase the **Data receive timeout** value to compensate for additional latency.
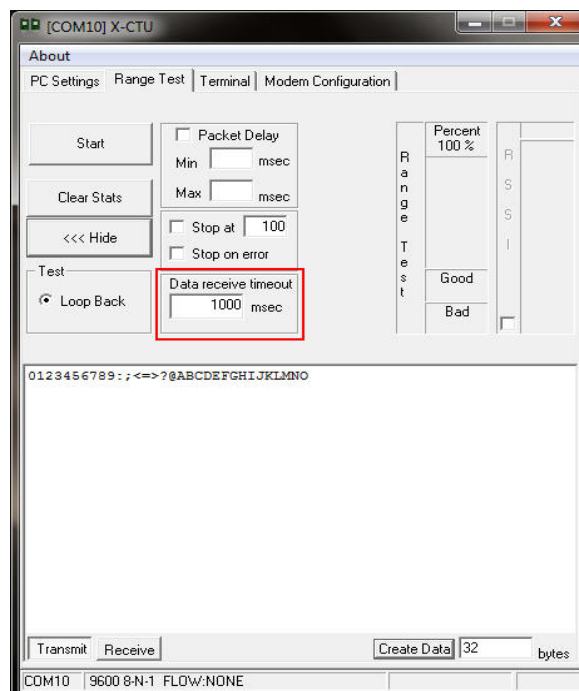
Establish a Mesh Network

After you have performed the range test using the first devices, it is time to extend your network by adding a third device and establishing a mesh network.

1. Restart the range test.

2. Move the remote device further away from the base device until the signal is lost.

3. Assemble another module and interface board.

4. Connect with a power supply and place this device halfway between the base and remote radios.

The intermediate radio bridges the gap between the remote and the base and re-establishes communication. The network troubleshoots itself by redirecting communications as soon as a pathway became available. The radios are configured for broadcast mode, so they can route information and communicate with one another automatically.

Configuring Digi XBee Radios Using XCTU

You can configure the XBee modules over-the-air using XCTU. To use this feature, the base device must be configured for API mode. The following sections provide instructions for configuring your remote XBee modules using XCTU.

Configuring the Remote XBee Modules Using XCTU

To configure the remote XBee modules using XCTU, follow these instructions:

1. On your base radio, go to the **Modem Configuration** tab in XCTU.

2. Click **Read** and the parameter types appear in the window.
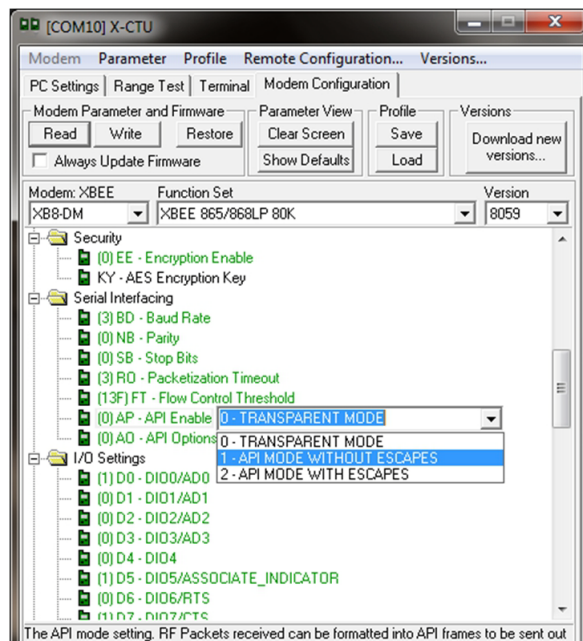
3. Set the base radio AP to 1:" Then in bullets beneath:

- In the Modem Configuration window, select the Serial Interfacing folder
- Click "AP - API Enable" and select "1 - API MODE WITHOUT EXCAPES.

For more information about the different API settings, see the API section in the user manual.

4. Click the **Write** button.

5. Next, click **Remote Configuration** in the top left-hand corner of the XCTU window. The Network window appears.

6. Click **Open Com Port** and **Discover**; a list of network nodes appears on the screen.
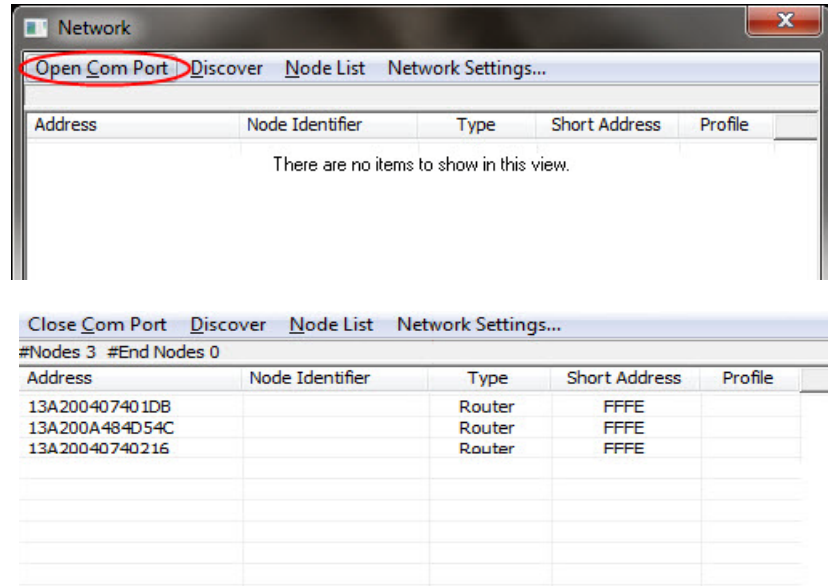

By selecting a particular node from the list, you can interact with it as if it were connected to the PC directly. Now you can Read, Write, and Restore parameters on the main XCTU window, and those changes occur over the air on the remote module selected in the Network window. Close the Network window when you have finished with remote configuration.

Changing from Mesh to Point-to-Multipoint Mode Using XCTU

By default, your modules come configured to operate in mesh mode. If you need to work a point-to-multipoint topology, changing your settings is simple.

1. Click the **Transmit Options (TO)** command in the Networking folder in your network parameters.

2. Change the setting from C0 to 40. TO is a bitmask that controls several options including acknowledgements and network topology. The top two bits of the TO parameter control how your network transmits data. Mesh mode with ACKS is C0 and point-to-multipoint mode is 40. For more information, see the AT command section in the product manual
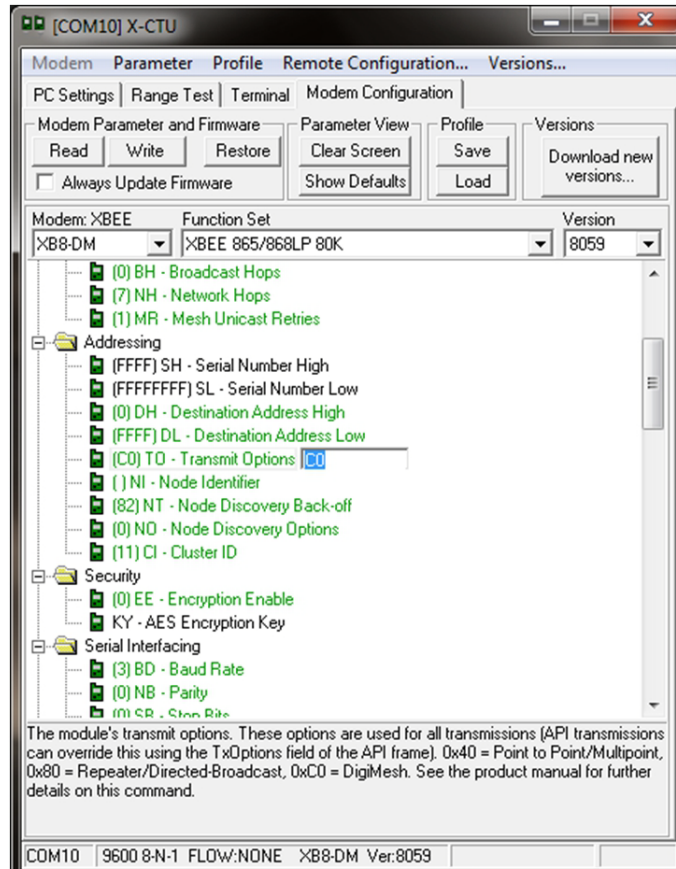
## Changing the XBee Firmware Versions using XCTU

These modules can be configured for an RF data rate of 80 Kbps or 10 Kbps with a simple firmware change. You can send information at a lower data rate to improve your receiver sensitivity which increases range.

1. Click the **Modem Configuration** tab in XCTU.

2. Select the modem type from the Modem drop-down menu that corresponds with the RF data rate desired: XB8-DM for the 80 Kbps version or XB8-DP for the 10 Kbps version. The function set auto-populates with the version associated with the selected modem type.

⚠️ **CAUTION!** DigiMesh is not available at the 10K data rate.
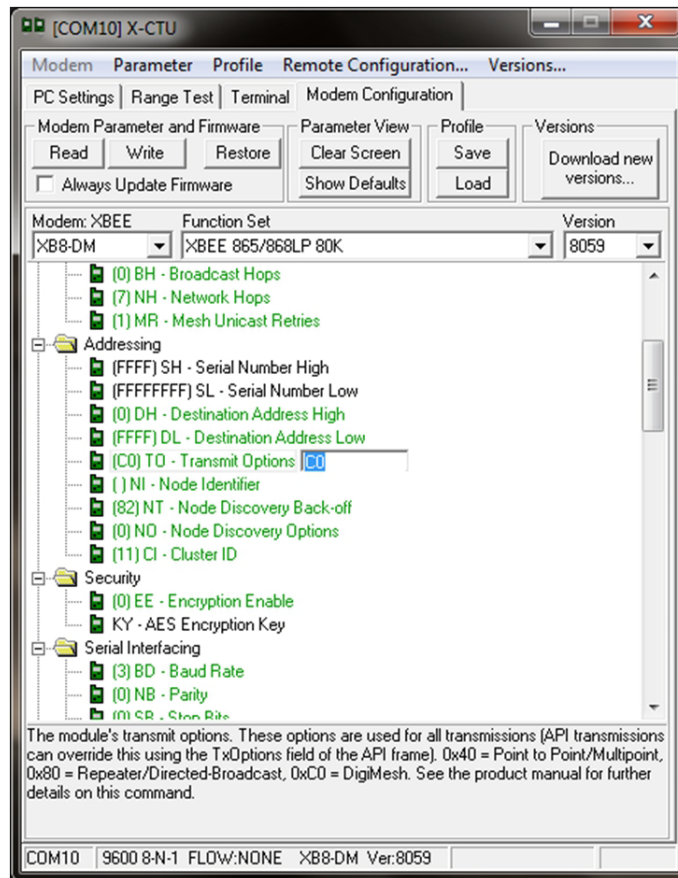
3. Select the firmware version desired from the Version drop-down menu. The default selected is the newest version of the firmware.

4. Check the **Always Update Firmware** box.

5. Click the **Write** button.

:Appendix A: Troubleshooting the Digi XBee 865/868LP Development Kit

This section provides information on resources and processes available for troubleshooting your Digi XBee 865/868LP Development Kit.

Resetting the Digi XBee 865/868LP Development Kit

Each XBee USB Development Board has a reset button as shown in the following image.
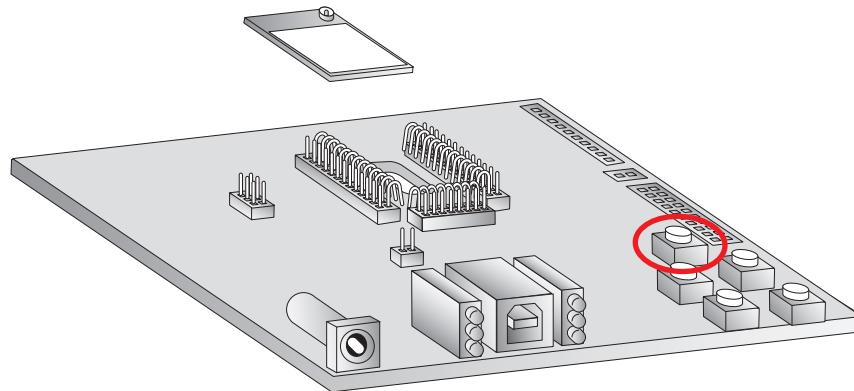
Press the reset button to reset the module. This is useful if you are having issues accessing the COM port. This also resets any parameters that were changed but not written into memory. Note that any changes written to the module are not changed when you reset it.

> **Note** The remaining buttons are connected to various I/O lines and are not used in this kit. See the product manual for more details relating to this functionality.

Troubleshooting Communication Failure between Radios

Network settings that can cause loss of communication include Baud Rate (BD), Parity (NB), and Encryption Enable (EE) among others. Check to see if these parameters are set appropriately. If you are unsure if your settings are affecting your communication, you might want to try setting your modules back to their default settings. To do so, go to the Modem Configuration tab in XCTU and click Restore.