XBee® 865/868LP Development Kit
Getting Started Guide

90002127_A
2/6/2012

©2012 Digi International Inc.
All rights reserved.

Digi, Digi International, the Digi logo, the Digi web site, a Digi International Company, XBee, and Digi XBee are trademarks or registered trademarks of Digi International, Inc. in the United States and other countries worldwide. All other trademarks are the property of their respective owners.

All other trademarks mentioned in this document are the property of their respective owners.
Information in this document is subject to change without notice and does not represent a commitment on the part of Digi International.

Digi provides this document “as is,” without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Digi may make improvements and/or changes in this manual or in the product(s) and/or the program(s) described in this manual at any time.

This document could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes may be incorporated in new editions of the publication.

Table of Contents

Using this Guide **4**

Conventions used in this Guide 4

Contact Information 4

Introduction **5**

Goals of the Kit 5

Requirements of the Kit 5

System Requirements 5

Additional Documentation 5

Part 1: Set up your XBee 865/868LP Development Kit **6**

Identify Kit Components 6

Assemble your Development Kit 7

Part 2: Download and Install X-CTU Software **8**

Installing USB Drivers 8

Installing X-CTU Software 8

Part 3: Test Communications Link and Establish a Mesh Network **9**

Perform a Range Test 9

Establish a Mesh Network 13

Part 4: Configure the Radios **14**

Configure Remote Modules 14

Change from Mesh to Point-to-Multipoint Mode 16

Change Firmware Versions 17

Appendix A: Troubleshooting 18

Resetting the XBee 865/868LP Module 18

Why are the Radios no longer communicating with one another? 18

© 2012 Digi International, Inc.

Using this Guide

Conventions used in this Guide

This icon indicates a step that has the potential to be troublesome. Further information regarding items marked with this symbol can be found in “Appendix A: Troubleshooting” on page 18.

This icon indicates a hint, or concept that is learned.

This icon indicates that a goal of the kit has been completed.

This icon indicates a warning of the potential for confusion or danger.

Contact Information

For more information about your Digi products, or for customer service and technical support, contact Digi International.

To Contact Digi International	Use
Mail	Digi International World Headquarters 11001 Bren Road East Minnetonka, MN 55343
Phone 8:00 AM - 5:00 PM (U.S. Mountain Time)	1-866-765-9885 toll-free USA and Canada 1-801-765-9885 Worldwide
Online Support	*http://www.digi.com/support/eservice/login.jsp*
Email	rf-experts@digi.com

© 2012 Digi International, Inc.

Introduction

Thank you for purchasing an XBee® 865/868LP Development Kit. This kit is designed to make it easy to set up an XBee mesh network, send data from one XBee to another, and adjust the XBee settings. Before you start working with the kit, let's cover some basics.

Goals of the Kit

As you go through the steps in this kit, you will:

1. Set up your XBee 865/868LP Development Kit.
2. Download and install X-CTU configuration software.
3. Perform a range test.
4. Establish a mesh network.
5. Configure the radios.

Requirements of the Kit

System Requirements

To install the software mentioned in this guide, you will 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* available on the Digi Support website.

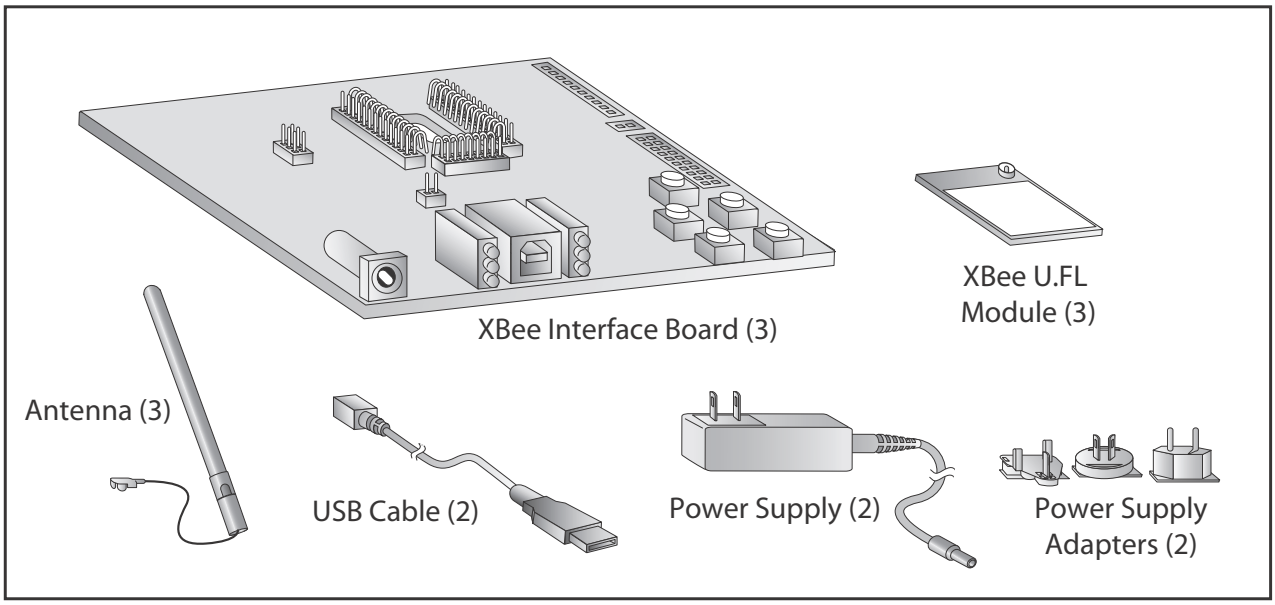
For more information on configuring and using the X-CTU utility, please refer to the *X-CTU Configuration & Test Utility Software User's Guide*.

© 2012 Digi International, Inc.

Part 1: Set up your XBee 865/868LP Development Kit

Identify Kit Components

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



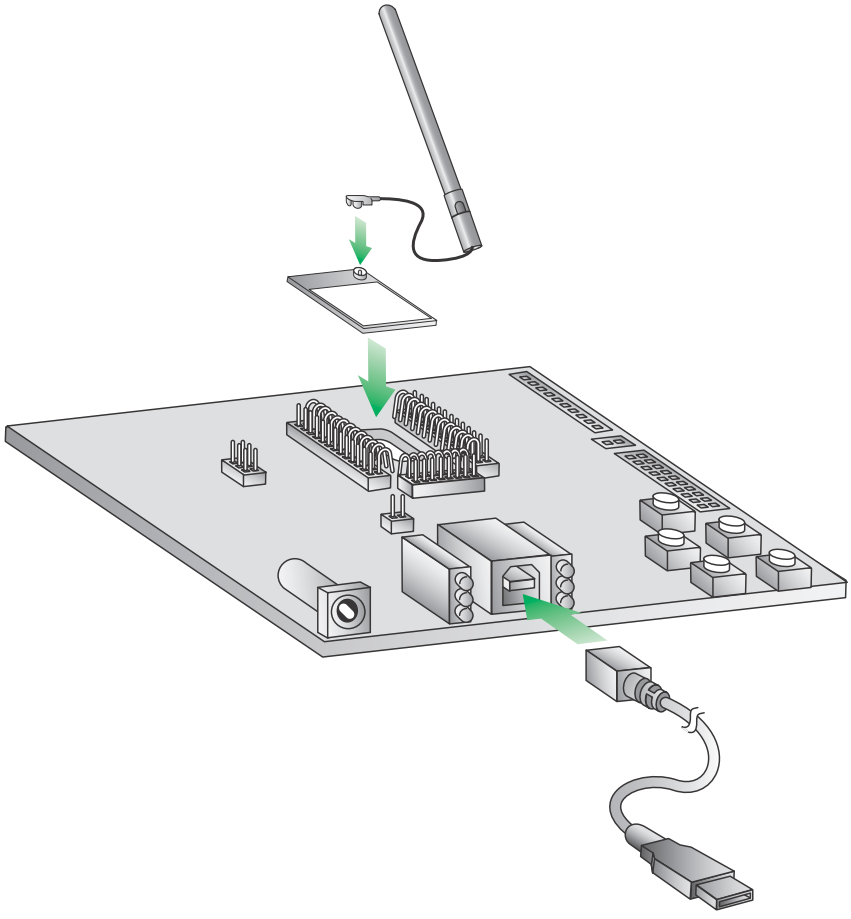
© 2012 Digi International, Inc.

Assemble your 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 will be 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 X-CTU software and to begin configuring your XBee Mesh Network.



You have just completed Goal #1 - setting up your XBee 865/868LP Development Kit.

© 2012 Digi International, Inc.

Part 2: Download and Install X-CTU Software

For proper kit configuration and operation X-CTU software (version 5.15 or later) must be downloaded and installed. A copy of X-CTU software and USB drivers will need to be installed on each computer used in conjunction with this guide.

Installing USB Drivers

The XBee USB interface board is a "plug-and-play" device that should be detected by the PC automatically. If you are using Windows 7 or Vista, the USB drivers should automatically install and a notification will appear 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: *http://www.digi.com/support/kbase/kbaseresultdetl.jsp?id=3214.*

If you are using Windows 2000 or XP, download and install the driver as per the following directions.

To install the USB driver:

1. Download the driver setup file at: *http://ftp1.digi.com/support/driver/FTDI_Windows_Driver_Setup.exe.*
2. Double-click on the setup file. A window will pop up during installation and automatically close when the process is complete.

Installing X-CTU Software

1. Download X-CTU at *www.digi.com/xctu.*
2. Browse to the folder to which you saved the above install file.
3. Double-click on the installer file and follow the X-CTU Setup Wizard.
4. When asked if you would like to check Digi's web site for firmware updates, click **Yes**.
5. After the firmware updates are complete, click **Close**. Updates may take a few minutes, please be patient.
6. Start X-CTU by double-clicking on the X-CTU icon on your desktop, or by selecting **Start > Programs > Digi > X-CTU**.

The X-CTU software is now ready to be used.

You have just completed Goal #2 - downloading and installing the X-CTU configuration software.

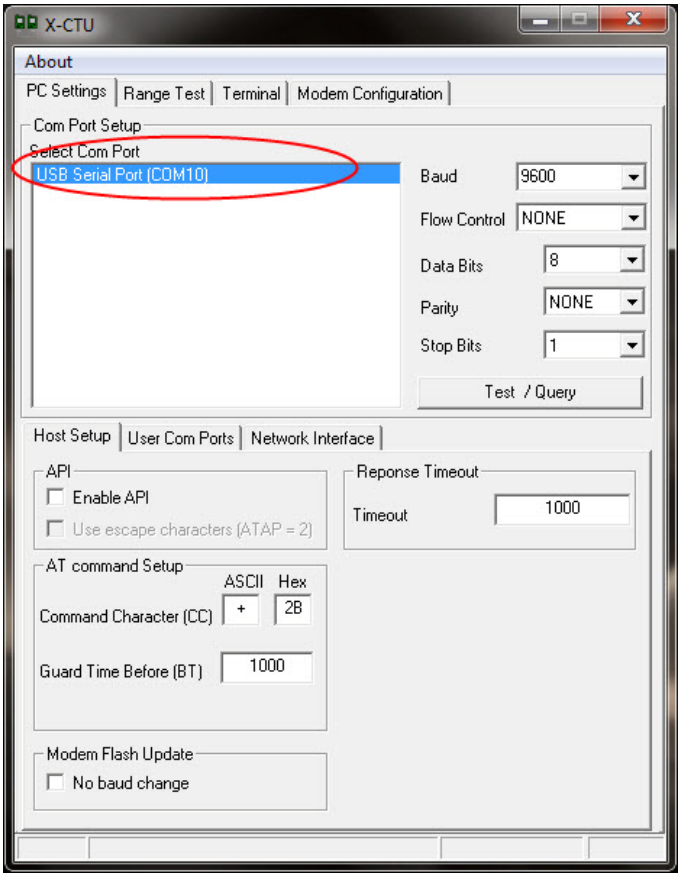
© 2012 Digi International, Inc.

Part 3: Test Communications Link and Establish a Mesh Network

Perform a Range Test

Before running a range test, you will need to establish a connection with the X-CTU software:

1. Double-click the X-CTU 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.



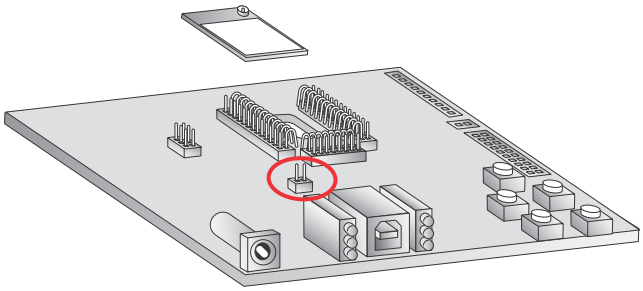
3. Verify that the baud rate and data settings match the internal settings of the devices:
   - Baud Rate: 9600
   - Flow Control: NONE
   - Data Bits: 8
   - Parity: NONE
   - Stop Bits: 1
4. Click the **Test/Query** button to verify communication with the radio. A pop-up will be displayed showing status and some basic information.

© 2012 Digi International, Inc.

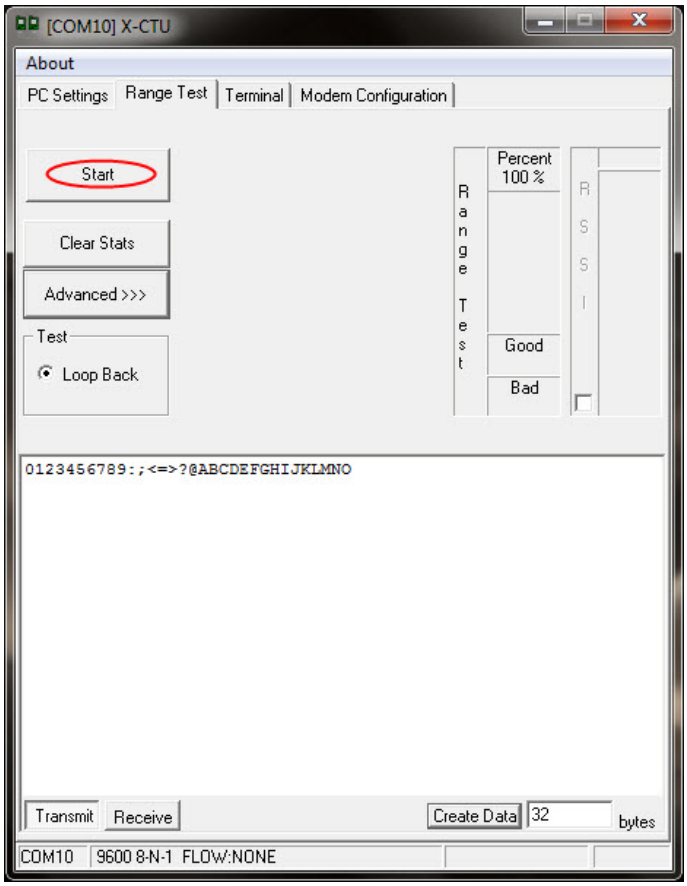
5. Apply power to the second radio using a power supply in a fixed location. This will be designated as your remote radio.

   Note: You will need to have a jumper at P8 on the loopback header on the XBIB for the remote radio.

   Ensure that the P8 jumper is not bridging the two pins together on the base radio. This could cause X-CTU to stall if the jumper is populated and requests are sent to the radio.

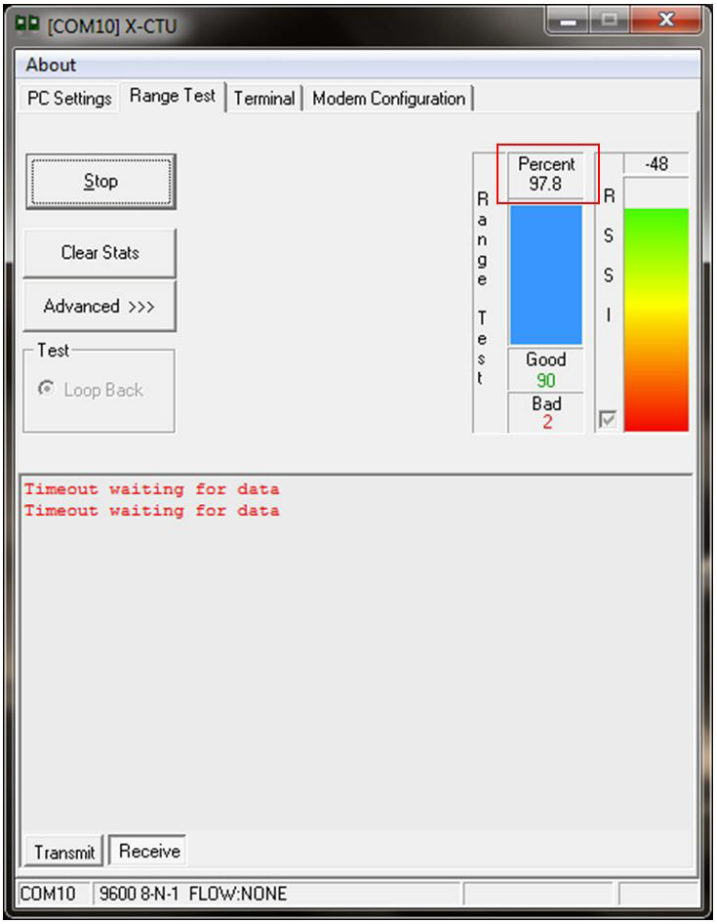


6. Select the **Range Test** tab.
7. (Optional) Check the **"RSSI" check box** to enable Received Signal Strength Indicator.
8. Click **Start** to begin the range test.



© 2012 Digi International, Inc.

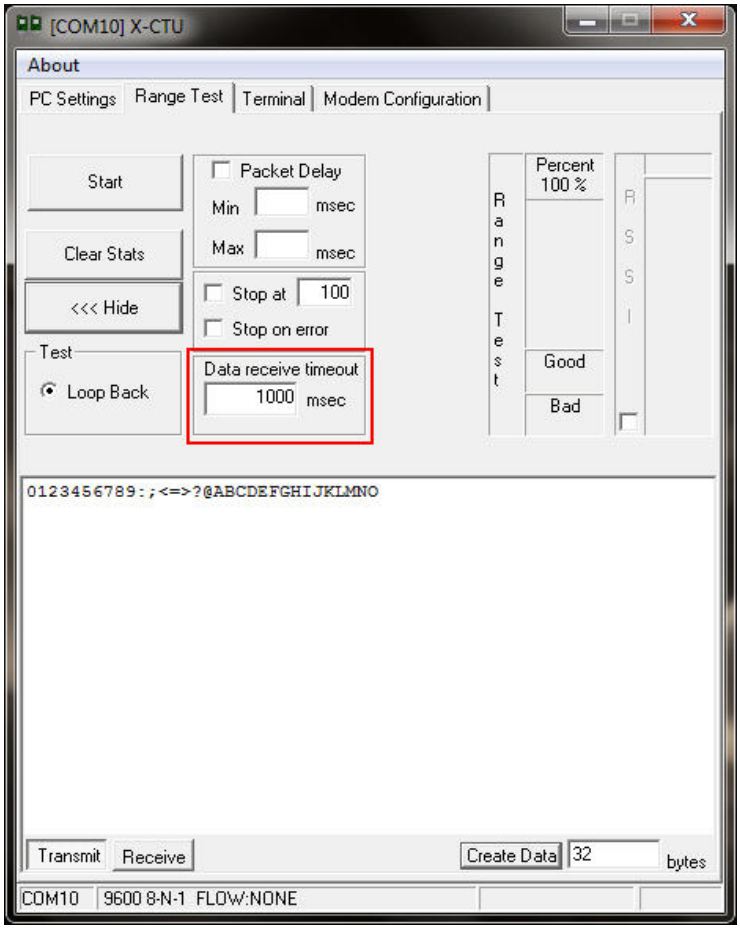
9. Monitor the link quality by reading the Percent section on the Range Test tab. This section displays the running percentage of good packets sent to the receiving radio and looped back to the base.



As your distance increases beyond the maximum range of the radios, you will 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.



You have just completed Goal #3 - performing a range test.

© 2012 Digi International, Inc.

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.

   Note: Do not put a jumper on the J8 connector of this XBIB.

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 reestablishes communication. The network "self-healed" 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.

You have just completed Goal #4 - establishing a mesh network.

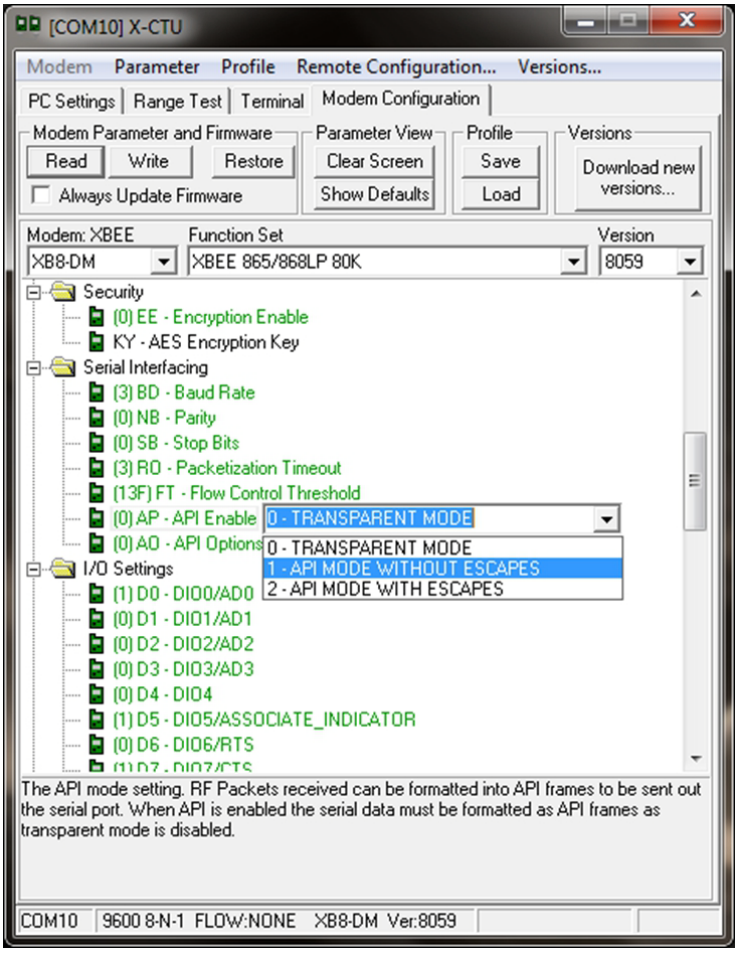
© 2012 Digi International, Inc.

Part 4: Configure the Radios

Configure Remote Modules

You can configure the XBee modules over-the-air using X-CTU. To use this feature, the base device must be configured for API mode.

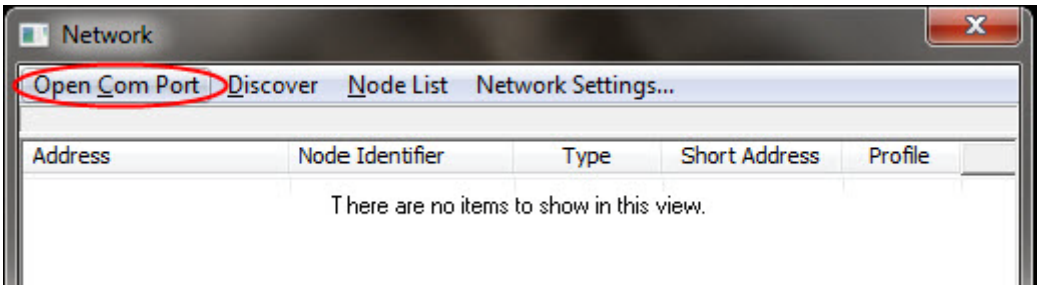
1. On your base radio, go to the Modem Configuration tab in X-CTU.
2. Click Read and the parameter types will appear in the window.

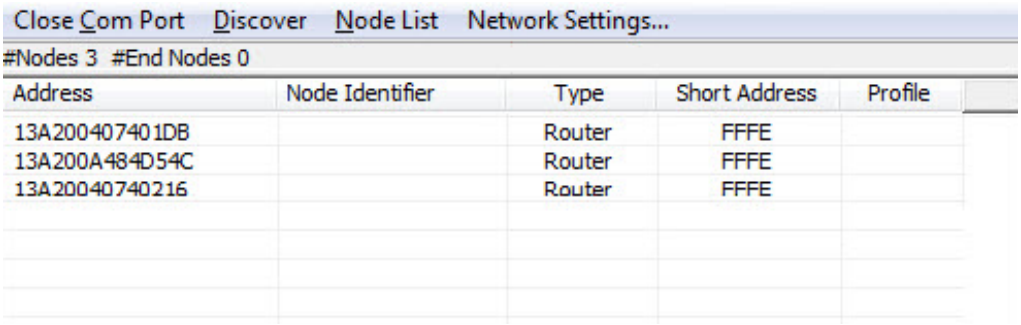


3. Set AP = 1 on your base radio by clicking on the AP command in the Serial Interfacing folder in the Modem Configuration window. For more information about the different API settings, see the API section in the user manual.
4. Click the **Write** button.
5. Next, click **Remote Configuration** in the top left-hand corner of the X-CTU window. The Network window will appear.

© 2012 Digi International, Inc.

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





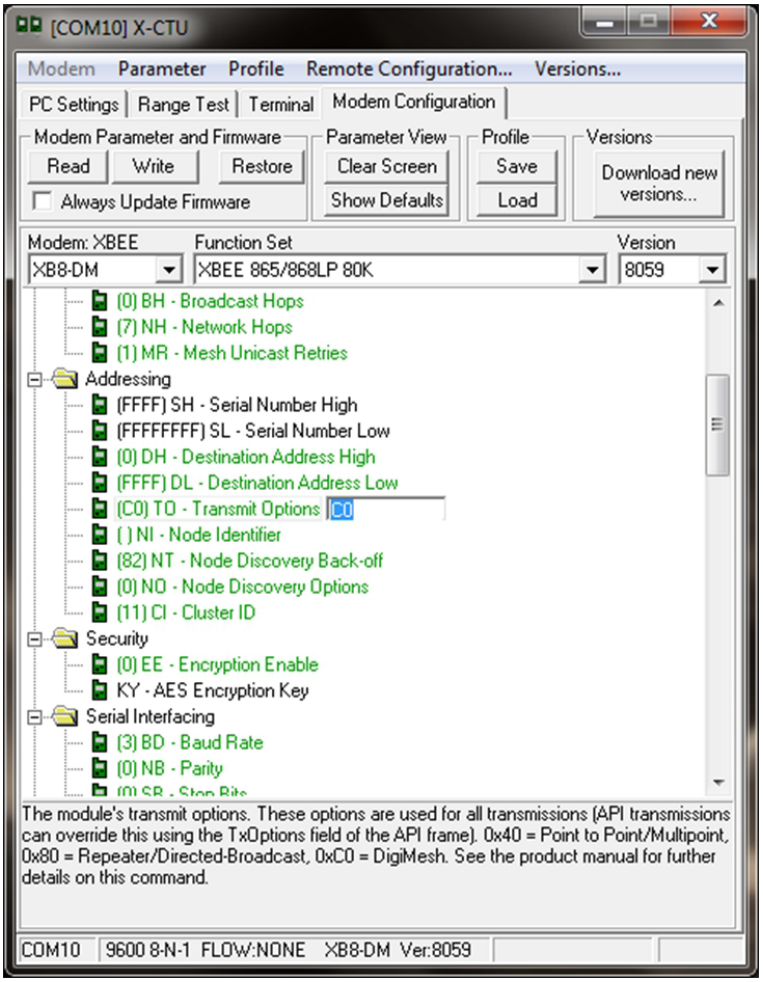
By selecting a particular node from the list, you can interact with it as if it were connected to the PC directly. Now you can Read, Write, and Restore parameters on the main X-CTU window, and those changes will occur over the air on the remote module selected in the Network window. Close the Network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

© 2012 Digi International, Inc.

Change from Mesh to Point-to-Multipoint Mode

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 on 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.



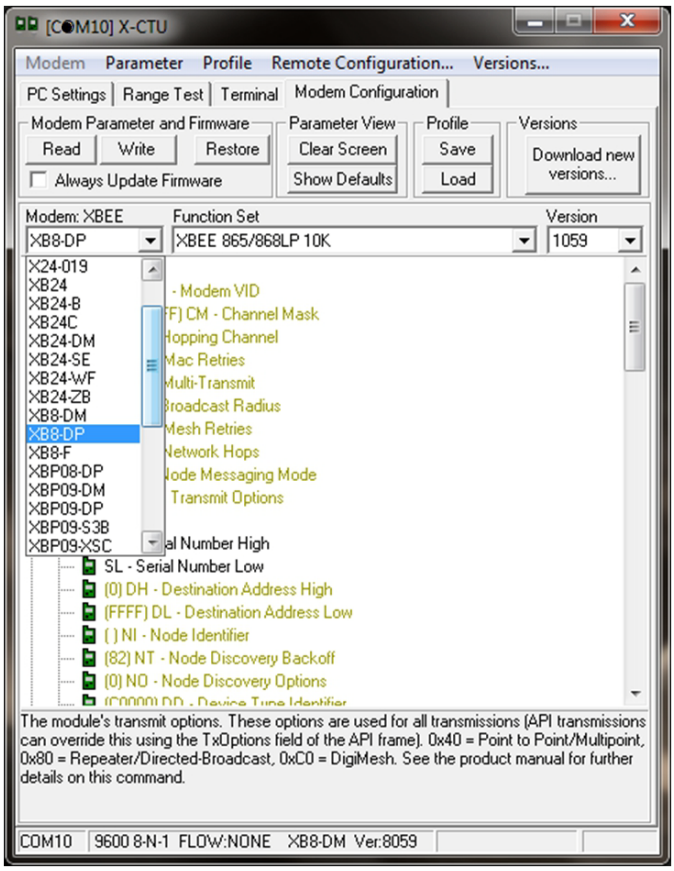
© 2012 Digi International, Inc.

Change Firmware Versions

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

1. Click on the **Modem Configuration** tab in X-CTU.
2. Select the modem type from the Modem drop-down box that corresponds with the RF data rate desired, XB8-DM for the 80 Kbps version or XB8-DP for the 10 Kbps version.

DigiMesh is not available at the 10K data rate.



3. The function set will auto populate with the version associated with the selected modem type.
4. Select the firmware version desired from the Version drop-down box. The default selected is the newest version of the firmware.
5. Check the **always update firmware** box.
6. Click the **Write** button.

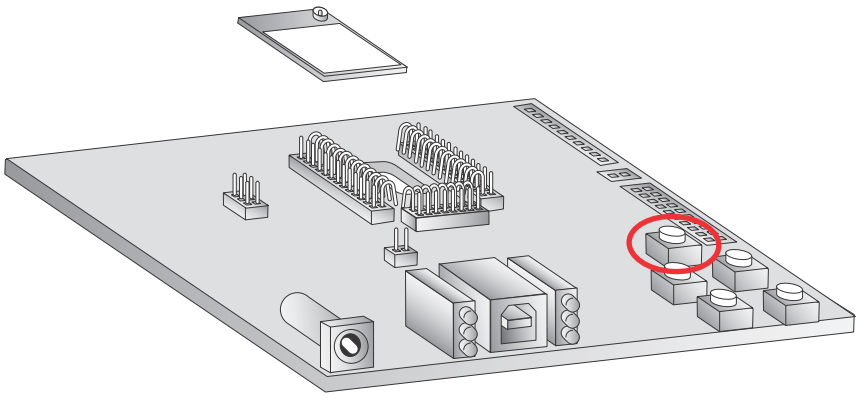
You have just completed Goal #5 - configuring the radios.

© 2012 Digi International, Inc.

Appendix A: Troubleshooting

Resetting the XBee 865/868LP Module

Each XBee USB Development Board has a reset button (located as shown below):



Pressing this button power cycles the module, but will not clear any changes written to the module. This is useful if you are having issues accessing the COM port. This will also reset any parameters that were changed but not written into memory.

> **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.

Why are the Radios no longer communicating with one another?

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 X-CTU and click Restore.

© 2012 Digi International, Inc.

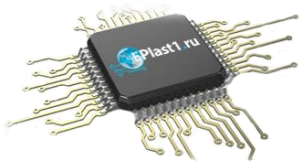
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.