



Getting Started Guide

XBee ZNet 2.5 ZigBee® Mesh Development Kit

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- Range Test

Create long-range wireless links in minutes!

Introduction

This Getting Started Guide provides step-by-step instruction on how to set up a network and test the modules' ability to transport data over varying ranges and conditions. This guide illustrates how to discover all nodes in your network and set parameters to run a Range Test.

Range Test Setup

Required Components

- (1) XBee ZNet 2.5 COORDINATOR (XB24-BWIT-002)
- (At least 1) XBee ZNet 2.5 ROUTER/END DEVICE (XB[P]24-BxIT-004).
- (1) USB Interface Board* (XBIB-U-DEV) (for interfacing between an RF module & host PC)
- (1) RS-232 Interface Board (XBIB-R-DEV) (for looping data back to the base from a remote)
- (1) PC (Windows 2000 or XP) with an available USB (or RS-232*) port. Required installations:

X-CTU Software & USB drivers.

Accessories (1 USB Cable, 1 Serial Loopback Adapter [RED] & 1 power supply)

* XBee ZNet 2.5 Development Kits (XB24-BPDK) contain three RS-232 interface boards. An RS-232 board (w/RS-232 cable and power supply) can be used in lieu of the USB board.

Software Installations

Install X-CTU Software

X-CTU is a stand-alone tool for configuring XBee modules. It is used to run the range test and is included in the Hardware and Software Setup CD. X-CTU can also be found on the website at <http://www.digi.com/support/productdetl.jsp?pid=3352&osvid=57&tp=4&s=316>.

To install X-CTU:

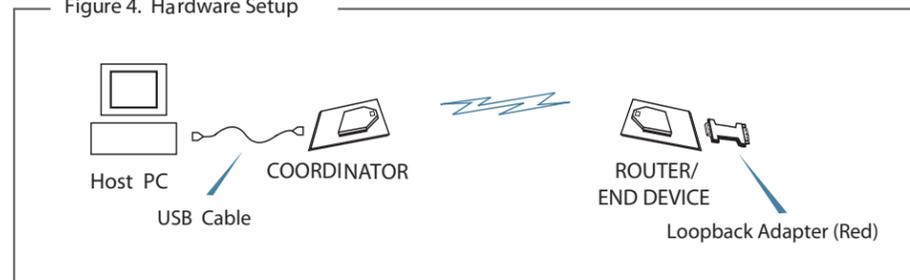
1. Insert the Hardware and Software Setup CD in the PC's CD/DVD drive.
2. On the Home page, click Modules, Sensors, & Adapters Documentation Software.
3. Click XBee Module.
4. Click Install X-CTU.
5. When installation completes, start X-CTU by selecting:
Start>Programs>Digi>X-CTU.
The X-CTU interface is opened.

Run Range Test (continued)

3. The Serial Loopback Adapter should be placed on the ROUTER/END DEVICE whose 64-bit address has been entered with the ATDH and ATDL parameters from the COORDINATOR. [Figure 4]

* The 64-bit address is physically printed on each XBee module (see white label attached to the shield on the bottom).

Figure 4. Hardware Setup



4. Select the "Range Test" tab.
 - 4a. (Optional) Check the "RSSI" checkbox to enable the Received Signal Strength Indicator.

5. Click the 'Start' button to begin the range test.

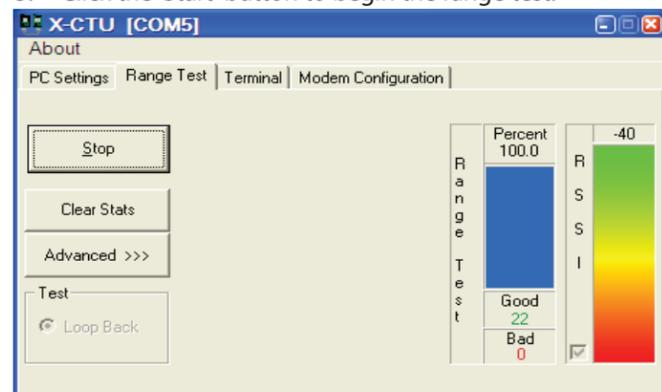


Figure 5

6. Move the ROUTER/END DEVICE (with red Serial Loopback Adapter) away from the COORDINATOR to find the maximum range of the wireless link. The percentage of good/bad packets will be displayed in the "Percent" box. [Figure 5]
7. Change the Loopback Adapter to any other ROUTER/END DEVICE and repeat steps 1-6 if desired.
8. Mesh networking capabilities can be observed by moving the ROUTER/END DEVICE that you are communicating with out of range of the COORDINATOR. Power another ROUTER/END DEVICE between the COORDINATOR and the out of range ROUTER/END DEVICE to reestablish communications. Messages are now being routed through the new ROUTER/END DEVICE.

Contact Digi International

(Office hours are 8am – 5pm U.S. Mountain standard time)

Toll-free phone U.S.A. & Canada: (866) 765-9885 Worldwide: (801) 765-9885

Live chat: www.digi.com Online support: <http://www.digi.com/support/eservice/login.jsp>



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Software Installations (continued)

Install USB Drivers

The USB interface board is a “plug-and-play” device that should be detected by the PC automatically. To interface between the USB interface board and a PC, two drivers must be installed: a USB driver and a virtual COM port driver that makes the USB port look and perform like a physical COM port. After the modem is detected, a wizard for installing the USB driver is launched. The USB driver is included on the Hardware and Software Setup CD.

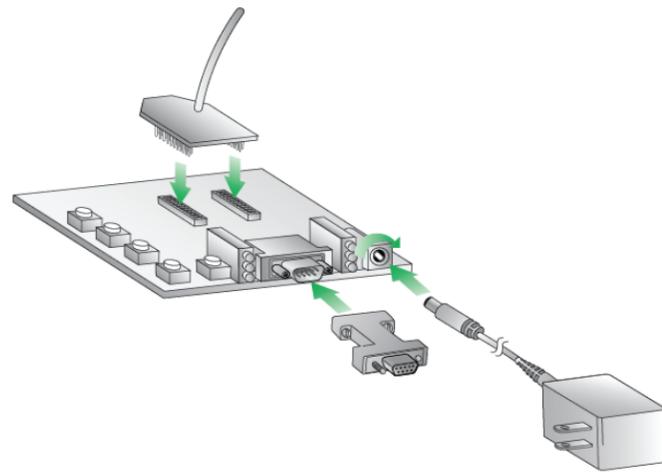
Use the following steps to install the two USB drivers:

1. Connect the XBee to a PC using a USB cable. The Found New Hardware Wizard dialog box is displayed.
2. Verify that the Hardware and Software Setup CD is inserted into the drive.
3. Select Install from a specific list or location (Advanced), and then click Next.
4. Select Search for the best driver in these locations and search removable media (CD-ROM). Click Next. A Hardware Installation Windows Logo Testing alert box is displayed.
5. Click Continue Anyway.
6. Click Finish.
7. You will be prompted to install another driver, the virtual COM port driver. Repeat steps 3 through 6 to install this driver.

Node Discovery

Discovery of All Nodes in a Network

1. Mount XBee modules to the USB & RS-232 development boards.
 - ▶ The module mounted to the USB board should be the COORDINATOR (XB24-BWIT-002). The modules mounted to the RS-232 boards are all ROUTER/END DEVICES (XB[P]24-BxIT-004).
2. Connect the U.FL (snap-on) and RPSMA (threaded) antennas to the appropriate XBee modules.
3. Connect power supplies and power on all other radios.
4. Under the “PC Settings” tab select the COM port to which your COORDINATOR is attached. Also select
 - Baud: 9600
 - Flow Control: Hardware
 - Data Bits: 8
 - Parity: NONE
 - Stop Bits: 1.



NOTE: If the COORDINATOR is powered on, as the other radios are turned on, their red LEDs will blink at a rate of twice per second, indicating they have joined the network.

5. On the Terminal tab, enter command mode. This mode eliminates over-the-air communications for the XBee module, and allows internal communication with the XBee module parameters. If command mode is entered, an OK message is displayed. There is a one-second “guard time” before and after entering command mode, and a ten-second timeout. To enter command mode, enter +++ with no carriage return. [Figure 1]

6. From X-CTU, while in command mode (command mode will automatically be exited with 10 seconds of inactivity), enter the ATND command followed by a carriage return. All powered ROUTERS/END DEVICES that have joined the network will respond with their device information.

The second field returned from the ATND parameter is the 64-bit address of each particular ROUTER/END DEVICE. [Figure 2]

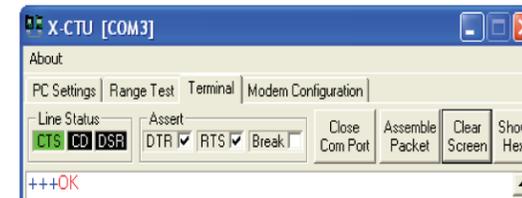


Figure 1

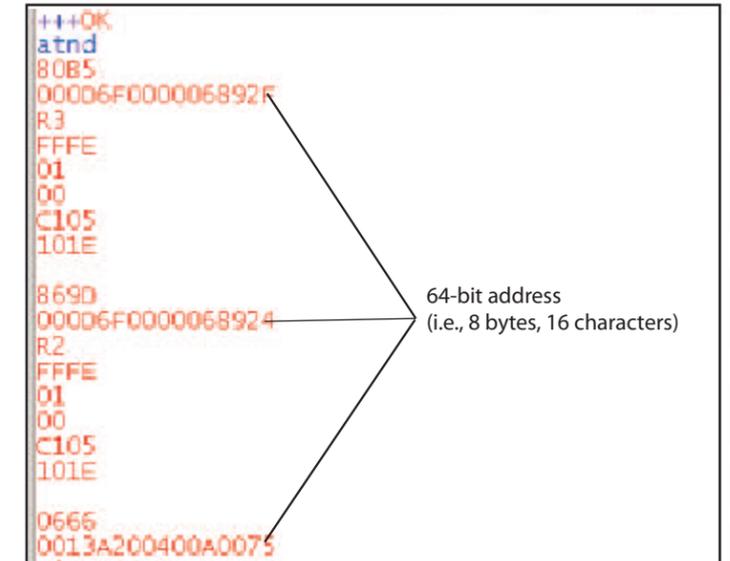


Figure 2

Range Test

Use the “Terminal” and “Range Test” tabs of the X-CTU Software to:

- Set parameters on the COORDINATOR module to communicate with a specific ROUTER/END DEVICE
- Determine the range capabilities of the XBee Modules

Run Range Test

1. Follow the directions in the previous example to perform a Node Discovery.
2. Use the ATDH and ATDL commands to set the destination address high and the destination address low of the COORDINATOR to match the 64-bit address of the particular ROUTER/END DEVICE with which you wish to communicate. Use ATDH for the upper 32 bits and ATDL for the lower 32 bits of the 64-bit address. [Figure 3] The “Modem Configuration” tab can be used to do this as well.

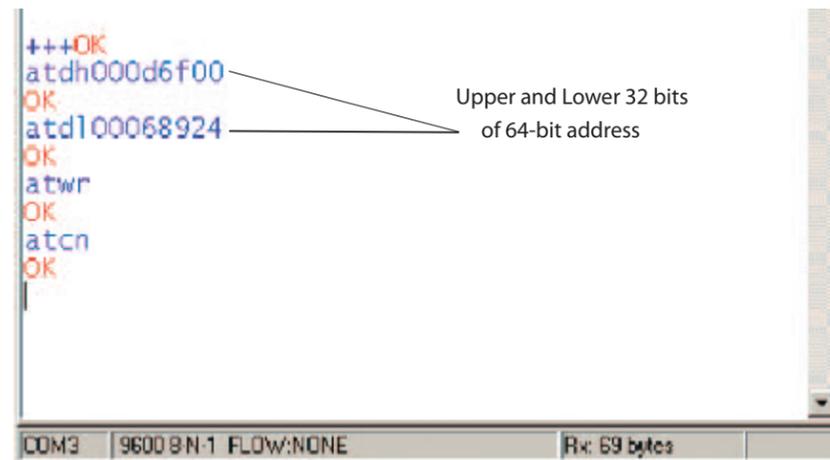


Figure 3