

Getting Started Guide



XBee[®] & XBee-PRO[®] 802.15.4 Development Kit

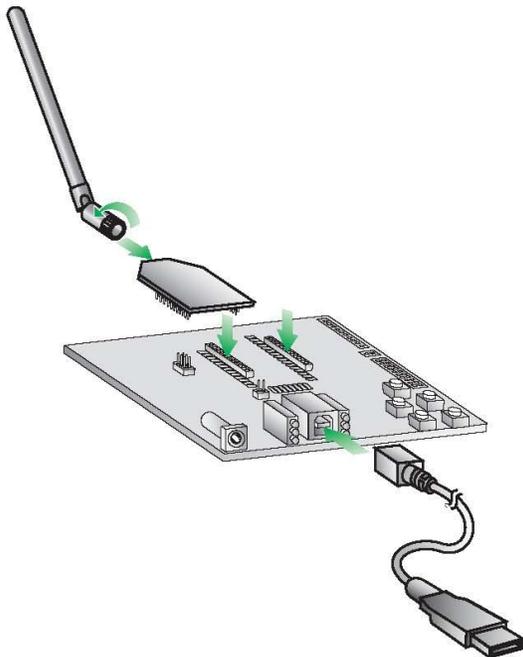
This guide provides instructions for setting up wireless links and testing the XBee module's ability to transport data over varying ranges and conditions. It covers these tasks:

- Connect the hardware
- Install the software and drivers
- Perform a range test
- Set up a point-to-multipoint network
- Explore advanced configurations

Create a long-range wireless link in minutes!

Connect the Hardware

Connect the hardware as shown in the following image:



XBee embedded module
XBee USB interface board
Antenna-RPSMA (male)
USB cable

Install the Software and Drivers

Install X-CTU Software

X-CTU is a stand-alone tool for configuring XBee modules. It can also be used to run a range test.

To install X-CTU:

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**.

Install USB Drivers

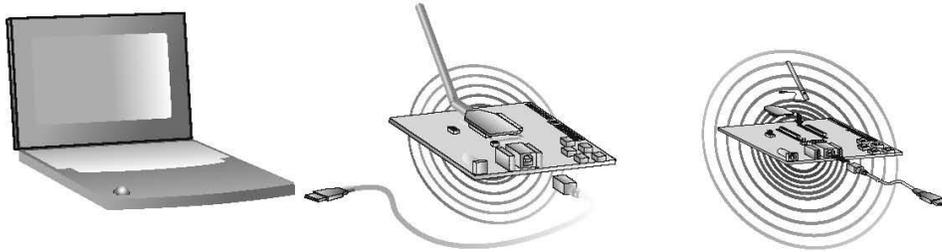
The XBee USB interface board is a "plug-and-play" device that should be detected by the PC automatically. If you are using Windows 7 or Vista, the USB drivers should automatically install and a notification will appear in the lower right portion of your screen indicating success or failure. If the USB 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. The USB interface board may now be connected to the computer.

Perform Range Test

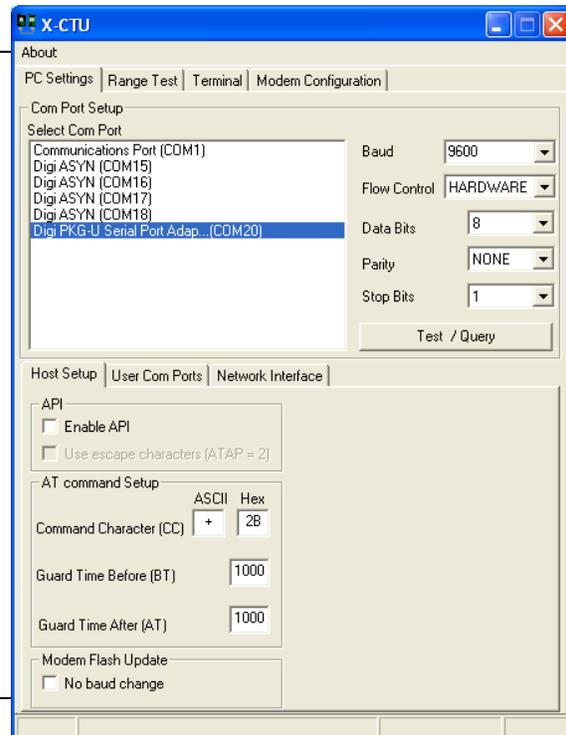


Run Range Test

1. Launch the X-CTU Software: **Start > Programs > Digi > X-CTU**
2. Under the **PC Settings** tab, select the PC serial COM port that will be used. The USB ports will be labeled as Digi PKG-U Serial Port Adapters and are assigned a number based on your PC's settings.

Figure 1. PC Settings Tab

The baud rate needs to match the BD parameter in the radios in order for X-CTU to communicate correctly with the radios. The default is 9600 baud.



3. Verify that the baud rate and data settings match the internal settings of the radios. The default settings for the radios are Baud Rate: 9600, Flow Control: HARDWARE, Data Bits: 8, Parity: NONE, and Stop Bits: 1.

4. Select the **Range Test** tab.

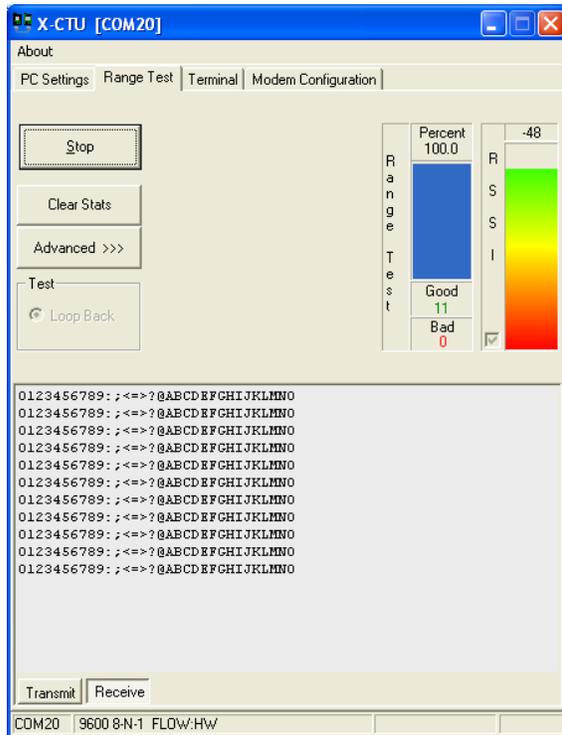


Figure 2. Range Test Tab

Clicking the **Advanced >>>** button displays several more test options. The RSSI box can also be checked as shown for an approximation of the radio's received signal strength.

5. (Optional) Check the **RSSI** checkbox to enable the Received Signal Strength Indicator. The RSSI value indicates the signal strength of the last packet that the radio received.
6. Click **Start** to begin the range test.
7. 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.
8. Click **Stop** to end the range test.

TIP: The range test works best if the user attaches a USB interface board to a mobile laptop and increases the distance between the base and the remote while monitoring the percentage of good packets on the laptop.

Set up a Point-to-Multipoint Network

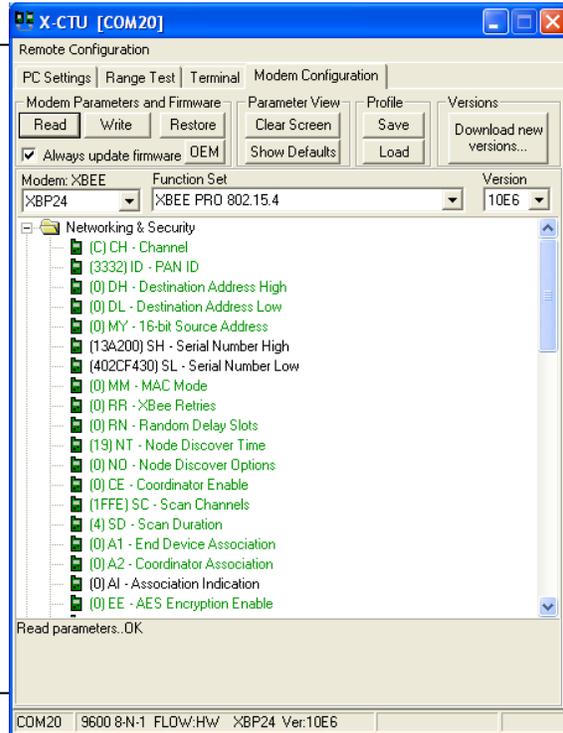
RF Module Configuration

This section requires changing some of the radio's internal settings. One simple method for configuration is as follows. In the X-CTU **Modem Configuration** tab, click **Read**. Select any of the module parameters you wish to change (e.g. Address, Encryption, etc.) and type in or select the desired value. Then click **Write** to save the changes to non-volatile memory.

This is one of several configuration methods. Refer to the product manual for more information. To restore the module back to defaults, click **Restore**.

Figure 3. Radio Configuration

Click Read to display a list of the RF module configuration parameters. Parameters shown in green are still set to default. Parameters in blue have been changed. Parameters in black are read-only with the exception of KY.

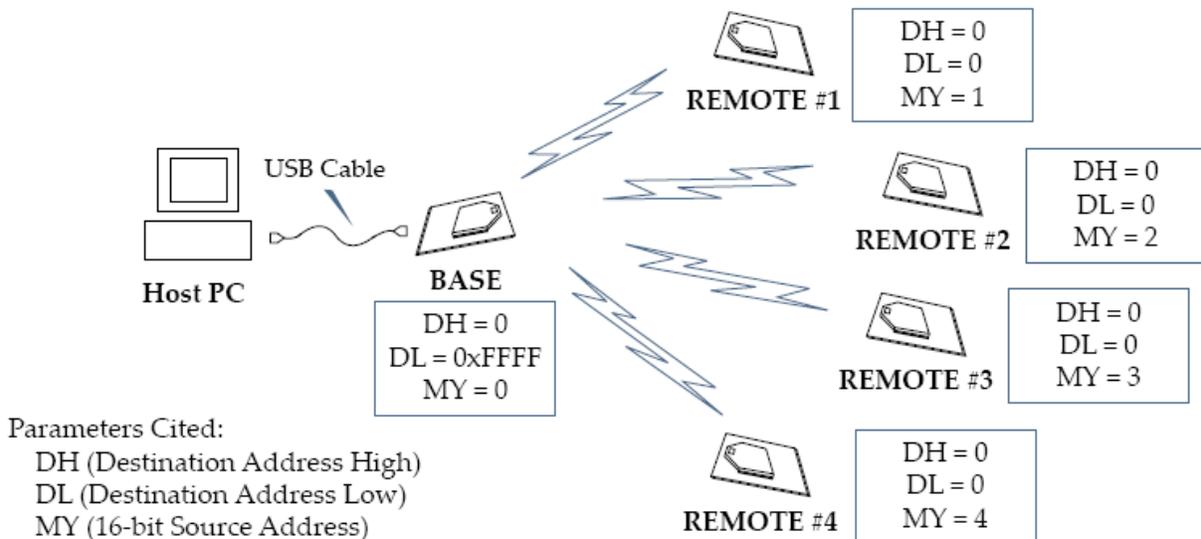


Point-to-Multipoint Addressing

Point-to-multipoint topologies require one base module to be configured to operate in Broadcast mode (DL= 0xFFFF). This allows the module to broadcast messages to all devices in the network.

Remote modules can operate either in Broadcast or Unicast mode. Unicast mode is used when you want to send a message directly from one module to another. To do so, you set the Destination Address High (DH) of the sender to zero and the Destination Address Low (DL) of the sender to match the 16-bit Source Address (MY) of the recipient. The figure below depicts a typical point-to-multipoint network that contains one base and four remotes and their associated settings.

Figure 4. Point-to-Multipoint Settings



Explore Advanced Configurations

Configure Remote Modules

The XBees can also be configured "over-the-air" using X-CTU. In order to use this feature, your base device must be configured for API mode.

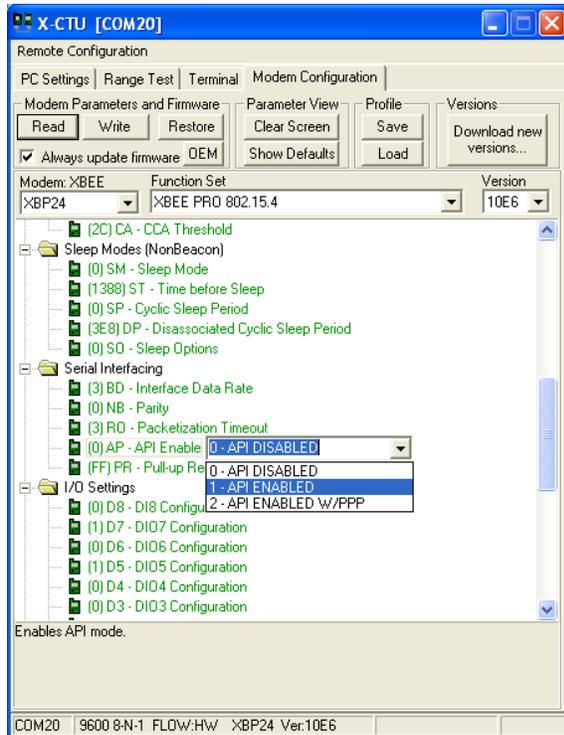
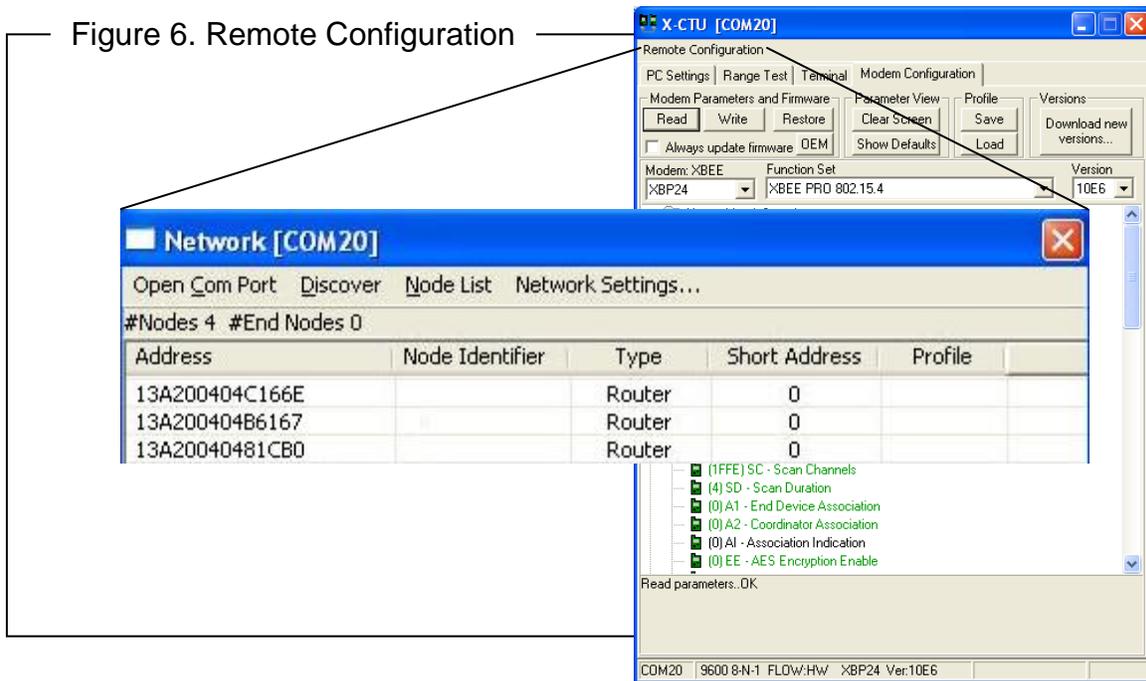


Figure 5. API Mode

To configure parameters on a remote radio, set AP = 1 on your base radio. For more information about the different AP settings, see the API section of the product manual.

To send "over-the-air" commands:

1. Go to the **Modem Configuration** tab and click the **Remote Configuration** option at the top of the window.
2. Click **Open Com Port** and **Discover** from the menu bar at the top of the Network window. A list of all of the nodes in the network will populate the screen.
3. Select a particular node from the list. You can interact with it as if it was connected to the PC directly.
4. Click **Read**, **Write**, or **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.
5. Close the Network window when you have finished with remote configuration.



Change Firmware Version

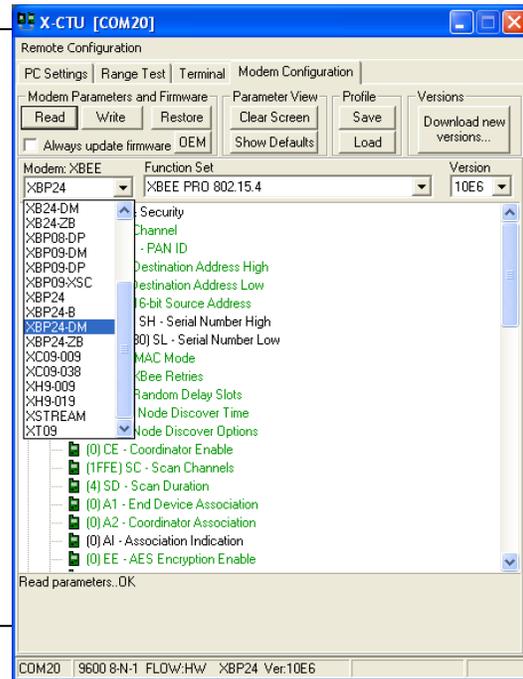
These modules can also be set up for mesh communications. In some cases, a mesh solution may be a better option. DigiMesh™ is better for networks needing routing capabilities. Also, DigiMesh provides the option for all the radios in the network to sleep synchronously. If you want to try mesh mode, you can simply load different firmware on your XBees.

These steps can also be used to update to the latest version of point-to-multipoint firmware. X-CTU is used to load different firmware on a locally connected radio.

1. Launch X-CTU and select the corresponding COM Port.
2. Set the PC settings back to default. (Baud Rate: 9600, Flow Control: HARDWARE, Data Bits: 8, Parity: NONE, Stop: Bits 1)
3. Click on the **Modem Configuration** tab.
4. Select the modem type. Choose **XB24-DM** or **XB24-DM** to convert an XBee or XBee-PRO 802.15.4 module into a DigiMesh XBee or XBee-PRO 2.4 module. Leave the modem type as **XB24** or **XB24** to just update the point to multipoint firmware.
5. Choose the **Function Set** and firmware **Version** desired.
6. Click the **Show Defaults** button. This helps to avoid out of range errors since some parameters have different limits based on the firmware type.
7. Check the **Always update firmware** box.
8. Click **Write**.

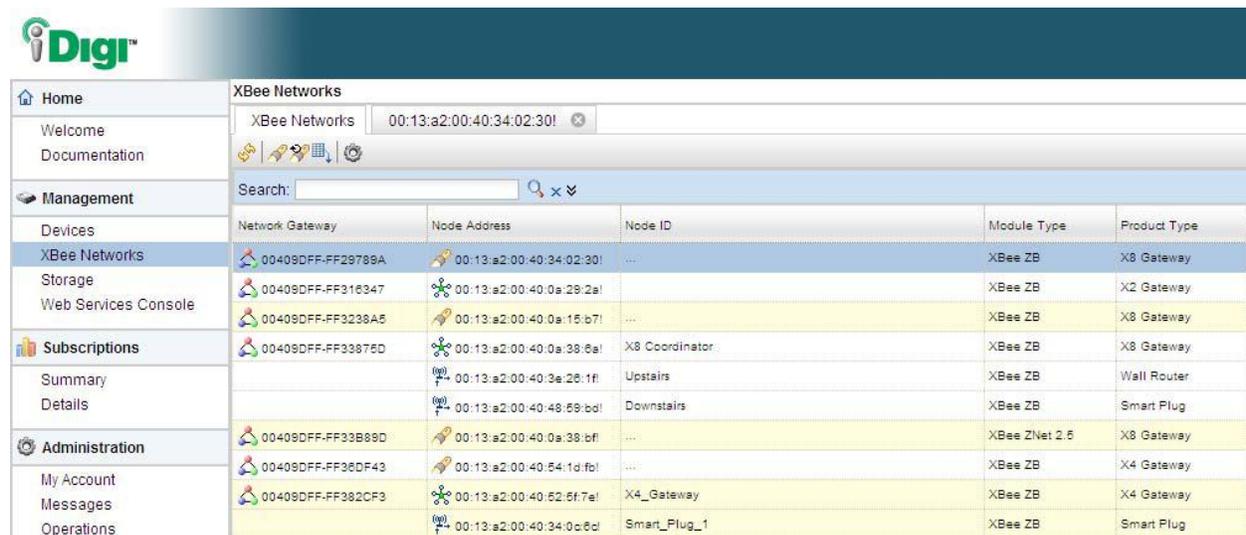
Figure 7. Point-to-Multipoint Firmware

When you select XBP24-DM, the Function Set that automatically loads is the standard DigiMesh one. The Version that automatically loads is the newest firmware in X-CTU's database. You can click **Download new versions...** then **Web** to download the latest firmware available from Digi's ftp site into X-CTU's database on your PC.



End-to-End Connectivity

These XBee modules are part of a family of cohesive devices. Digi's Drop-in Networking solutions are designed to provide end-to-end wireless connectivity to distributed electronic devices so those devices can be accessed and managed from anywhere. Specifically Digi offers RF-to-Internet gateways that allow remote monitoring and control of an RF network. For more information about Digi gateways, see <http://www.digi.com/products/wireless-routers-gateways>.



On a larger scale, multiple gateways controlling separate RF networks can be managed through our iDigi cloud services. The image above shows a secure connection to your devices through an iDigi account. Learn more about managing your remote devices at www.idigi.com.

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