

# Quick Start Guide

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## **XBee™/XBee-PRO™ OEM Development Kits**

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Create long range wireless links in minutes!

## **Introduction**

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This Quick Start Guide provides step-by-step instruction on how to setup wireless links and test the modules' ability to transport data over varying ranges and conditions. This guide illustrates how to setup and run a point-to-point range test; then how to expand into a point-to-multipoint topology.

## **Range Test Setup**

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### **Required Components**

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- (2) OEM RF Modules (any combination of XBee & XBee-PRO Modules)
  - (1) USB Interface Board\* (for interfacing between an RF module & host PC)
  - (1) RS-232 Interface Board (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 (Note: Drivers for LINUX and Mac OS X are provided on the CD, but the X-CTU Software will only run on Windows.)
- Accessories (1 USB Cable, 1 Serial Loopback Adapter [RED] & 1 power supply)
- \* *XBee Professional Developer Kits (XB24-PDK) contain four RS-232 boards. An RS-232 board (w/ RS-232 cable & power supply) can be used in lieu of the USB option.*

### **Software Installations**

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#### **Install X-CTU Software**

Double-click "setup\_X-CTU.exe" file and follow prompts of the installation screens. This file is located on the MaxStream CD and under the 'Software' section of the following web page: [www.maxstream.net/support/downloads.php](http://www.maxstream.net/support/downloads.php)

The X-CTU Software interface is divided into the four following tabs:

- PC Settings - Setup PC serial com ports to interface with the RF module
- Range Test - Test the range of wireless links under varying conditions
- Terminal - Read/Set RF module parameters and monitor data communications
- Modem Configuration - Read/Set RF module parameters



[www.maxstream.net](http://www.maxstream.net)

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## Software Installations (continued)

### Install USB Drivers (Hardware USB Bus & Virtual Com Port drivers)

The following steps were recorded while using the Windows XP operating system.

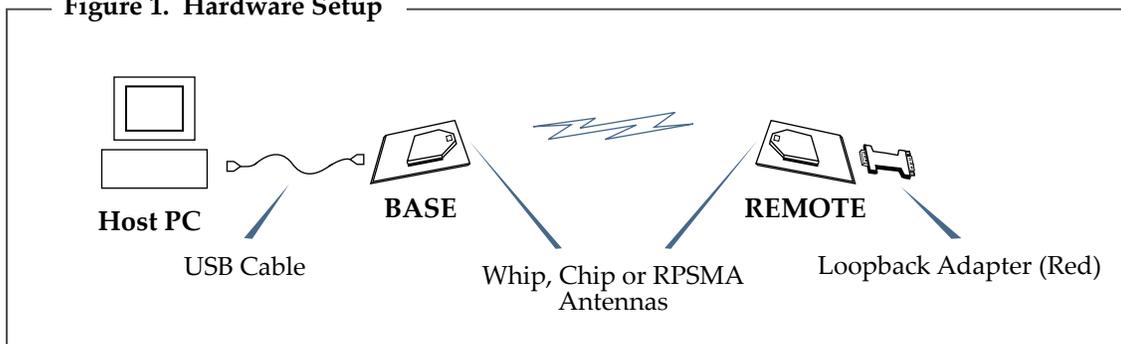
1. Verify the MaxStream CD is inserted into the CD drive.
2. Connect the USB development board to a PC using USB cable.
  - ▶After the module assembly is detected by the PC, a "Found New Hardware Wizard" dialog box should appear.
3. Select the 'No, not this time' option; then select the 'Next' button.
4. Select 'Install from a specific list or location (Advanced)' option; then select the 'Next' button.
5. a. Select the 'Search for the best driver in these locations' option.  
b. Check 'Search removable media (CD-ROM...)' box; then select 'Next'.
  - ▶The "Windows Logo Testing" alert box appears.
6. Select the 'Continue Anyway' button.
7. Select the 'Finish' button.
8. Repeat steps 2 through 6 to install the next driver.
9. Reboot the PC if prompted to do so.

## Hardware Setup

### Setup Point-to-point Wireless Data Link

1. Mount XBee/XBee-PRO Modules to the USB & RS-232 development boards.
  - ▶The module mounted to the USB board will be referred to as the "BASE".  
The module mounted to the RS-232 board will be referred to as the "REMOTE".
2. [Only if using modules that have the U.FL antenna connector]  
Connect the RF Cable Assembly to the U.FL antenna connector and RPSMA half-wave dipole antenna.
3. After installing the X-CTU Software and USB drivers, connect the BASE module assembly to the PC using a standard USB cable [Figure 1].
4. Attach the Serial Loopback Adapter [red] to the female DB-9 connector of the REMOTE module assembly.  
  
The Serial Loopback Adapter configures the REMOTE to function as a repeater by looping data back into the module for retransmission [Figure 1].
5. Power the REMOTE through the RS-232 development board's power connector using the power adapter included in the development kit.  
  
The BASE is powered through its USB connection.

Figure 1. Hardware Setup



# Point-to-point Range Test

Use the "PC Settings" and "Range Test" tabs of the X-CTU Software to to:

- Setup a PC Serial Com Port for communications with the BASE module assembly
- Determine the range capabilities of the XBee/XBee-PRO Modules

The out-of-box default configuration of the module is optimal for running this range test.

## Run Range Test

1. Launch the X-CTU Software: (Start --> Programs --> MaxStream --> X-CTU)
- ② Under the "PC Settings" tab [Figure 2], select the PC serial com port from the list that will be used to connect to the BASE module assembly. Before proceeding, verify the baud and data settings of the com port match those of the RF module.
3. Select the "Range Test" tab. [Figure 3]
- ④ (Optional) Check the "RSSI" checkbox to enable its display.
- ⑤ Click the 'Start' button to begin the range test.
6. Move the REMOTE (with red Serial Loopback Adapter) away from the BASE to find the maximum range of the wireless link.

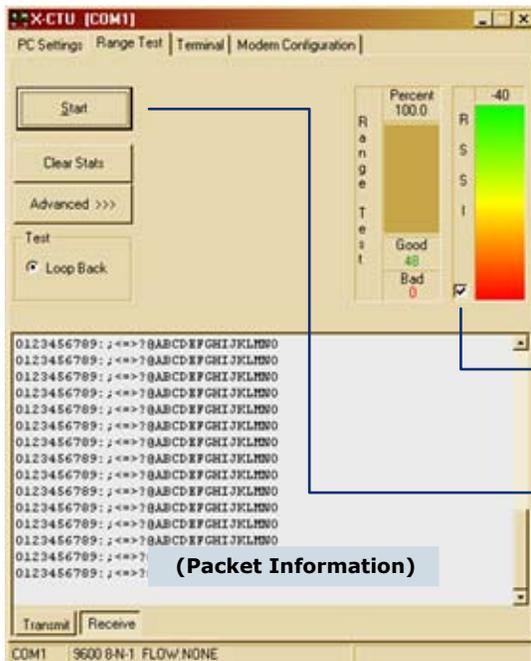
Figure 2. PC Settings tab

② PC Com Port

NOTE: Failure to enter AT Command Mode is most commonly due to baud rate mismatch. Ensure the 'Baud' setting on the "PC Settings" tab matches the interface data rate of the module [BD (Interface Data Rate) parameter = 9600 bps by default].



Figure 3. Range Test tab



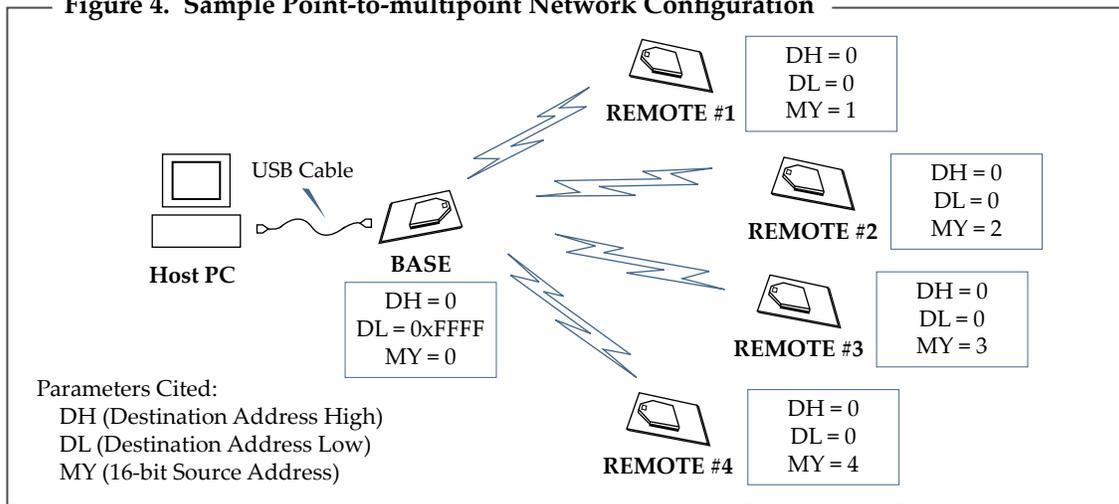
④ RSSI checkbox  
RSSI stands for "Received Signal Strength Indicator"

⑤ Start/(Stop) button

## Point-to-multipoint Networks

Point-to-multipoint topologies require that one BASE module be configured to operate in Broadcast Mode [see 'Addressing Considerations' section]. REMOTE modules can operate either in Broadcast or Unicast Mode. The figure below depicts a typical point-to-multipoint network that contains one BASE (Broadcast Mode) and four REMOTES (Unicast Mode).

Figure 4. Sample Point-to-multipoint Network Configuration



### RF Module Configuration

To configure RF module parameters:

- Install X-CTU Software (& USB drivers if connecting to the host via a USB port)
- Setup a USB or RS-232 connection between the module and host PC [page 2]
- On the X-CTU "PC Settings" tab [Figure 2]: Verify com port and module settings match; then select the PC com port that will be used to connect to the BASE
- On the X-CTU "Modem Configuration" tab: Select the 'Read' button, modify parameters, then select the 'Write' button.

This is one of several configuration methods. Refer to the manual for more information.

## Addressing Considerations

### Unicast Mode

By default, XBee/XBee-PRO Modules are configured to operate in Unicast Mode - retries are enabled and receiving modules send an ACK (acknowledgement) of RF packet reception to the transmitter. If the transmitting module does not receive an ACK, it re-sends the RF data packet up to three times or until the ACK is received.

Default addressing parameters:

MY (16-bit Source Address) = 0  
DL (Destination Address Low) = 0  
DH (Destination Address High) = 0

### Broadcast Mode

For one RF module to communicate to many modules, one module (BASE) must be configured to operate in Broadcast Mode. When in Broadcast Mode, retries and acknowledgements are disabled. Broadcast Mode is enabled by setting Destination Addresses as follows:

DL (Destination Address Low) = 0x00000000  
DH (Destination Address High) = 0x0000FFFF

Refer to the product manual for more information regarding addressing.

## Contact MaxStream (Office hours are 8am - 5pm U.S. Mountain standard time)

Phone: (801) 765-9885, Live Chat: [www.maxstream.net](http://www.maxstream.net), E-mail: [rf-xperts@maxstream.net](mailto:rf-xperts@maxstream.net)