



# XBee S2C DigiMesh 2.4 Kit

Radio Frequency (RF) Module

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## Getting Started Guide

## Revision history—90001526

Revision	Date	Description
A	August 2016	Initial release.
B	June 2017	Modified regulatory and certification information as required by RED (Radio Equipment Directive).
C	May 2018	Updated the SMT insertion picture. Added a warning to never insert or remove the XBee device while the power is on.

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## **XBee S2C DigiMesh 2.4 Kit Getting Started Guide**

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The XBee S2C DigiMesh 2.4 Kit modules support low-cost, low-power, peer-to-peer or wireless mesh networks. The XBee S2C DigiMesh 2.4 Kits provide reliable delivery of data between remote devices. This guide shows you how to set up an XBee mesh network using the DigiMesh protocol, send data between devices, and adjust device settings.

## Set up your XBee devices

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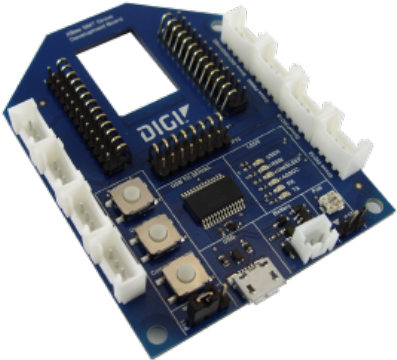

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Before you begin

To get started with your XBee RF module development kit, verify that your kit has all of the components and that you meet the system requirements.

Verify XBee RF module kit contents

Your XBee S2C DigiMesh 2.4 Kit module development kit contains the following components:

Qty.	Part	
1	XBee SMT Grove Development Board	
2	XBee TH Grove Development Boards	
1	XBee DigiMesh S2C SMT module (PCB Antenna)	

Qty.	Part	
2	XBee DigiMesh S2C Through-Hole module (Wire Antenna)	
3	Micro USB cables	
2	XBee stickers	

## Gather required materials

To complete the steps in this guide, you need the following items:

Item	Description
Computer	<p>One of the following operating systems:</p> <ul style="list-style-type: none"> <li>■ Windows Vista/7/8 (32-bit or 64-bit versions)</li> <li>■ Mac OS X v10.6 and higher versions (64-bit only)</li> <li>■ Linux with KDE or GNOME window managers (32-bit or 64-bit versions)</li> </ul> <p>System requirements:</p> <ul style="list-style-type: none"> <li>■ HDD space: 500 MB minimum, 1 GB recommended</li> <li>■ RAM memory: 2 GB minimum, 4 GB recommended</li> <li>■ CPU: Dual-core processor minimum, Quad-core processor recommended</li> </ul> <p>USB ports:</p> <ul style="list-style-type: none"> <li>■ Three available USB ports for the XBee/XBee-PRO DigiMesh 2.4 development kit</li> </ul> <p><b>Note</b> Only one computer is required to follow along with the steps in this guide. However, you can use two or more computers—one for each XBee module. For range testing, we recommend a laptop.</p>
XCTU software	Version 6.1.3 or later. See <a href="#">Download and install XCTU</a> .
USB drivers	Windows Vista and later: USB drivers automatically install through plug-and-play.



## Step 1: Assemble the hardware

This kit includes three XBee Grove Development Boards. For more information about this hardware, see the [XBee Grove Development Board](#) documentation.

To assemble the XBee module:

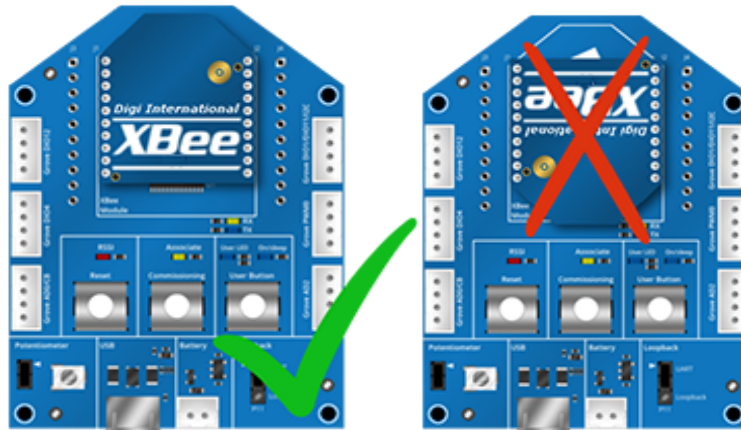
1. Attach the XBee modules to the XBee Grove Development Boards.
2. Connect the USB cables to the XBee Grove Development Boards.



Make sure the board is NOT powered by either the micro USB or a battery when you plug in the XBee module.

3. Plug the XBee S2C DigiMesh 2.4 Kit modules into the XBee Grove Development Board.

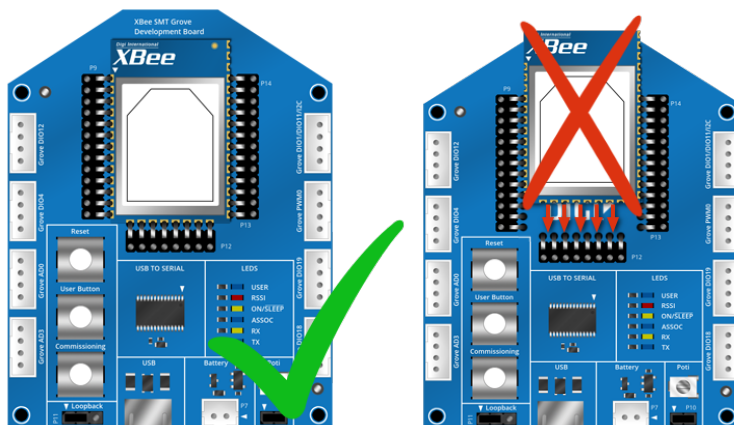
XBee TH modules have a flat edge and a more angular/diagonal edge. Match that footprint with the white lines on your board and carefully insert it, taking care not to bend any of the pins.



For XBee SMT modules, align all XBee pins with the spring header and carefully push the module until it is hooked to the board.



**WARNING!** Never insert or remove the XBee device while the power is on!



4. After you plug the XBee module into the board, connect the board to your computer using the micro USB cables provided.
5. Ensure the loopback jumper is in the UART position.



## How to unplug an XBee module

To disconnect your XBee module from the XBee Grove Development Board:

1. Disconnect the micro USB cable (or the battery) from the board so it is not powered.
2. Remove the XBee module from the board socket, taking care not to bend any of the pins.

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Make sure the board is **not** powered when you remove the XBee module.

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## Step 2: Download and install XCTU

This section contains download and install instructions based on operating system. XCTU is compatible with Linux, OSX, and Windows. It may be necessary to configure your system prior to installing XCTU for the first time.

If you get stuck, see [XCTU installation error](#).

## Install XCTU - Windows

Follow the steps below to download and install XCTU on your computer.

1. Go to [www.digi.com/xctu](http://www.digi.com/xctu).
2. Click **Download XCTU**.
3. Under **Utilities**, click the Windows installer link.
4. When the file has finished downloading, run the executable file and follow the steps in the XCTU Setup Wizard. A “What’s new” dialog appears when installation is complete.

## Install XCTU - Linux

By default, access to the serial and USB ports in Linux is restricted to root and dialout group users. To access your XBee devices and use XCTU to communicate with them, your Linux user must belong to this group.

To add your Linux user to the dialout group:

1. Open a terminal console.
2. Execute this following command, where **<user>** is the user you want to add to the dialout group.:

---

```
sudo usermod -a -G dialout <user>
```

---

3. Log out and log in again with your user in the system.

Then download and install XCTU:

1. Go to [www.digi.com/xctu](http://www.digi.com/xctu).
2. Click **Download XCTU**.
3. Under **Utilities**, click the Linux installer link.
4. When the file has finished downloading, run the executable file and follow the steps in the XCTU Setup Wizard. A “What’s new” dialog appears when installation is complete.

## Install XCTU - OSX

OSX version 10.8 (Mountain Lion) and greater only allows you to install applications downloaded from the Apple Store. To install XCTU, you must temporarily disable this setting.

Follow these steps to enable installation of "unsigned" software:

1. Click the **Apple** icon in the top-left corner of your screen and choose **System Preferences**.
2. Click the **Security & Privacy** icon.
3. To edit security settings, click the **padlock** icon in the bottom left of the window.
4. Enter your Mac credentials and click **Unlock**. The **Allow applications downloaded from** dialog appears.
5. Click the **Anywhere** radio button and, in the confirmation window, click **Allow From Anywhere**.

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**Note** We recommend you set this option back to **Mac App Store** or **Mac App Store and identified**

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**developers** once you have finished installing XCTU.

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Download and install XCTU:

1. Go to [www.digi.com/xctu](http://www.digi.com/xctu).
2. Click **Download XCTU**.
3. Under **Utilities**, click the OSX installer link.
4. When the file has finished downloading, unzip and run the executable file and follow the steps in the XCTU Setup Wizard. A “What’s new” dialog appears when installation is complete.

## Optional: Install XCTU updates

When you start XCTU, you may be notified about software updates. You should always run the latest version of XCTU.

1. When a new version is available, a popup window appears in the bottom-right corner of XCTU.
2. Click on that window and follow the prompts to install the XCTU update.

You can also do the following:

- Check for updates and manually update the tool by clicking **Help > Check for XCTU Updates**.
- Check the XCTU version by clicking **Help > About XCTU**.

For more information about XCTU, see the [XCTU walkthrough](#).

## Step 3: Set up your first wireless connection

This section shows you how to configure two XBee modules in AT (transparent) mode. The XBee module passes information along exactly as it receives it. All serial data received by the XBee module is sent wirelessly to a remote destination XBee module.

If you get stuck, see [Troubleshooting](#).

### Add XBee modules to XCTU



These instructions show you how to add two XBee modules to XCTU. However, you can use these instructions to add any number of XBee modules.

1. Connect two XBee modules to your computer using the USB cables.

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**Tip** Connect the two shorter range XBee modules instead of the longer range XBee-PRO modules. This makes it easier to set up a mesh network. See [Assemble the hardware](#).

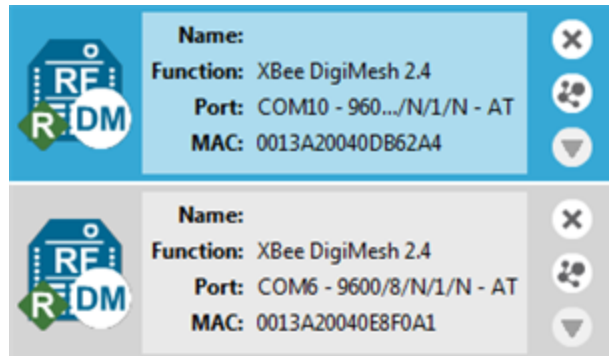
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2. Launch XCTU.
3. Click the **Configuration working modes** button .
4. Click the **Discover radio modules** button .
5. In the **Discover radio devices** dialog, select the serial ports where you want to look for XBee modules, and click **Next**.
6. In the **Set port parameters** window, maintain the default values and click **Finish**.

As XCTU locates radio modules, they appear in the Discovering radio modules dialog box.


- Click **Add selected devices** once the discovery process has finished.

You should see something similar to the following example in the **Radio Modules** section:

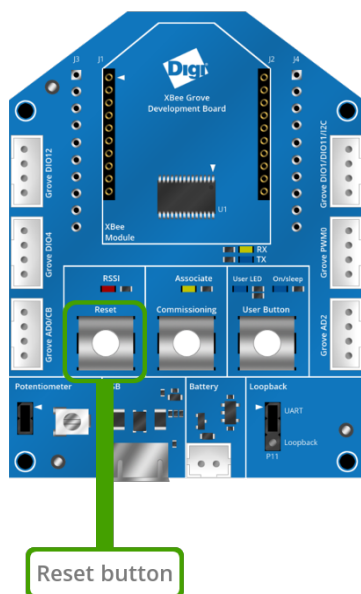
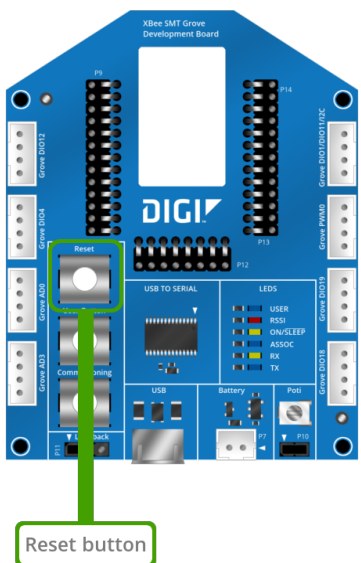


- Click **Finish**.

**Optional: Add a radio module**

1. Click the **Add a radio module specifying the port settings** button .
2. In the **Add radio device dialog**, select the COM port for the device you want to add.
3. Click **Finish**.


**Note** An **Action Required** pop-up may appear requesting you to reset the device. Press the **Reset** button on the Grove Development Board.

**XBee TH Grove Development Board****XBee SMT Grove Development Board**

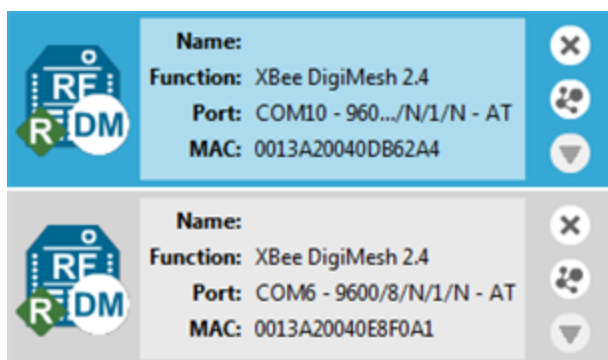
**Note** The function, port number and the MAC address that are displayed for your modules do not need to match those shown in the graphic.

## Configure the first two XBee modules in transparent mode


To transmit data wirelessly between your XBee modules, configure them to be in the same network.

**Tip** To locate an XBee module, select it in XCTU and click the **Read radio settings** button . The Rx and Tx LED lights on its development board blink green and yellow.

1. Set up the first XBee module (XBEE\_A):
  - a. Select the first XBee module.



- b. Click the **Load default firmware settings** button .

**Tip** In the following steps, type parameter initials in the Search box to quickly find a parameter, as shown in the following example: 


- c. Configure the following parameters:
 


**ID:** D161

**DH:** 0013A200

**DL:** **SL** of XBEE\_B (Enter the last eight characters of the MAC address for XBEE\_B. Or select XBEE\_B and find its **SL** value.)

**NI:** XBEE\_A

**PL:** 0
  - d. Click the **Write radio settings** button .


2. Set up the second XBee module (XBEE\_B):
  - a. Select the second XBee module.
  - b. Click the **Load default firmware settings** button .
  - c. Configure the following parameters:
 

**ID:** D161

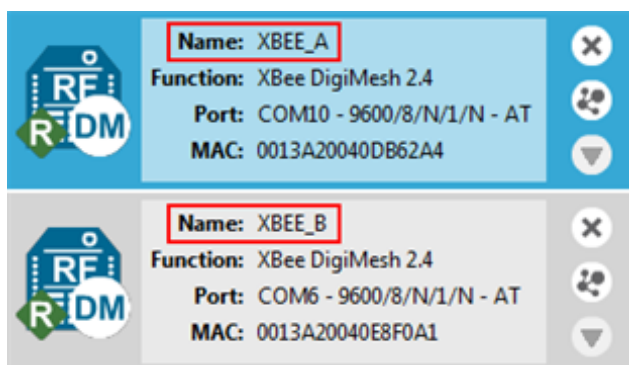
**DH:** 0013A200

**DL:** **SL** of XBEE\_A (Enter the last eight characters of the MAC address for XBEE\_A. Or select XBEE\_A and find its **SL** value.)

**NI:** XBEE\_B

**PL:** 0
  - d. Click the **Write radio settings** button .

After you write the radio settings for the XBee modules, their names appear in the Radio Modules area.



3. For more information about the parameters, see the following table:

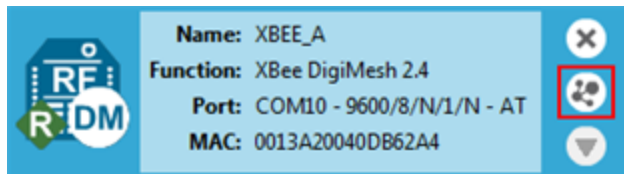
Parameter	XBEE_A	XBEE_B	Effect
<b>ID</b>	D161	D161	Defines the network that a radio will attach to. This must be the same for all devices in your network.
<b>DH</b>	0013A200	0013A200	Defines the destination address (high part) for the message.
<b>DL</b>	<b>SL</b> of XBEE_B	<b>SL</b> of XBEE_A	Defines the destination address (low part) for the message. The value of this setting is the <b>SL</b> (Serial Number Low) of the other module.
<b>NI</b>	XBEE_A	XBEE_B	Defines the node identifier.  <b>Note</b> The default <b>NI</b> value is a blank space. Delete the space when you change the value.
<b>PL</b>	0	0	Defines the transmitter output power level. When you are creating a mesh network, set this parameter to the lowest value (0) to help reduce the distance between the two devices.



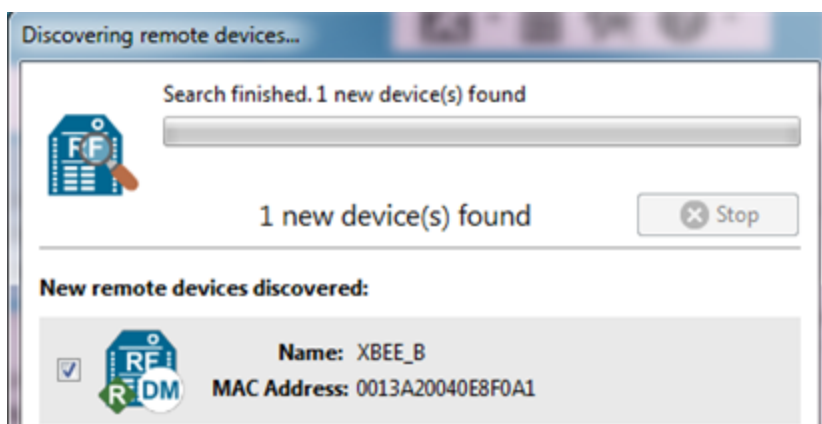
## Check the network

Once both XBee modules are configured, use XCTU to check that they are in the same network and can see each other.

1. Click the **Discover radio nodes in the same network** button  of XBEE\_A.



The device searches for devices in the same network.







When the discovery process is finished, XCTU lists discovered devices found within the network in the Discovering remote devices dialog.

2. Click **Cancel**. There is no need to add the remote device that has been discovered.

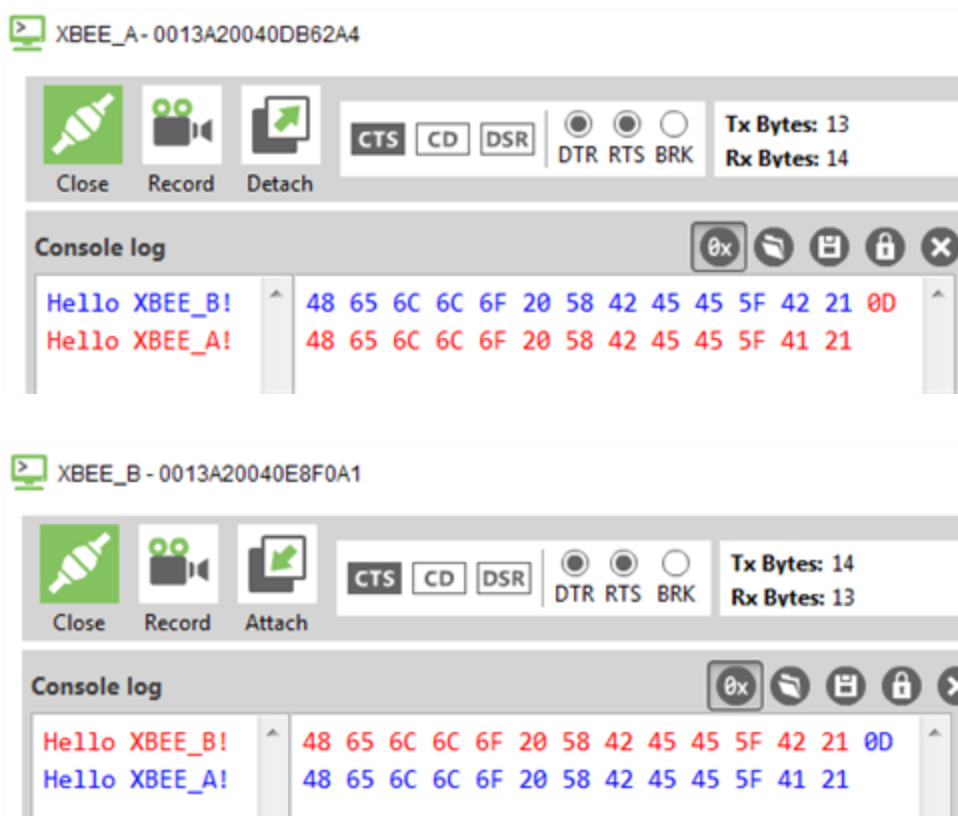
## Send messages through XCTU


Use the XCTU console to have your two XBee modules send messages to each other.

1. Switch both XBee modules to the consoles working mode .
2. Open a serial connection for each XBee.
  - a. Select **XBEE\_A** and click .
  - b. Select **XBEE\_B** and click .

3. Click the **Detach view** button  to see both consoles at the same time.
  - a. In the **Console log** area for XBEE\_A, type "Hello XBEE\_B!"
  - b. In the **Console log** area for XBEE\_B, type "Hello XBEE\_A!"

The message of the sender is in blue font, and the message of the receiver is in red font.



4. Close the window for XBEE\_B.
5. Keep the serial connections open  for both XBee modules.

**Tip** If the two XBee modules are unable to talk to each other:

- Verify that you accurately configured the parameters. See [Configure the first two XBee modules in transparent mode](#).
- Verify that the **CH** (Operating Channel) and **ID** (Network Identifier) are the same for both XBee modules.

## Step 4: Create a mesh network

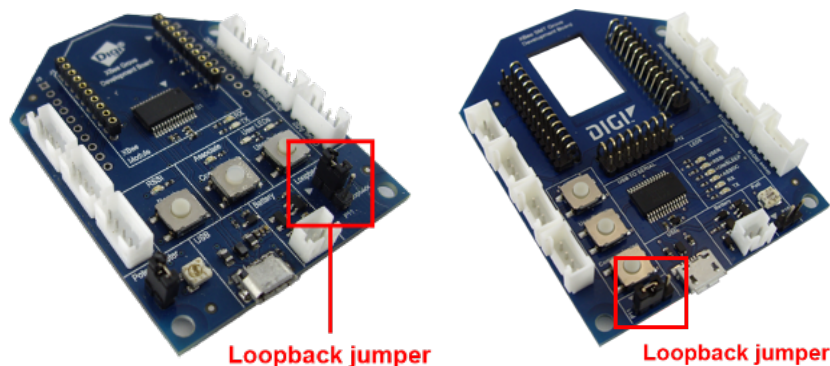
This section describes how to add a third XBee module to create a mesh network. Establish a mesh network any time you want to create a network that is larger than the range of each individual device. In these instructions, you first connect a loopback jumper to an XBee module in preparation for testing your network.


If you get stuck, see [Troubleshooting](#).

### Connect a loopback jumper to an XBee module

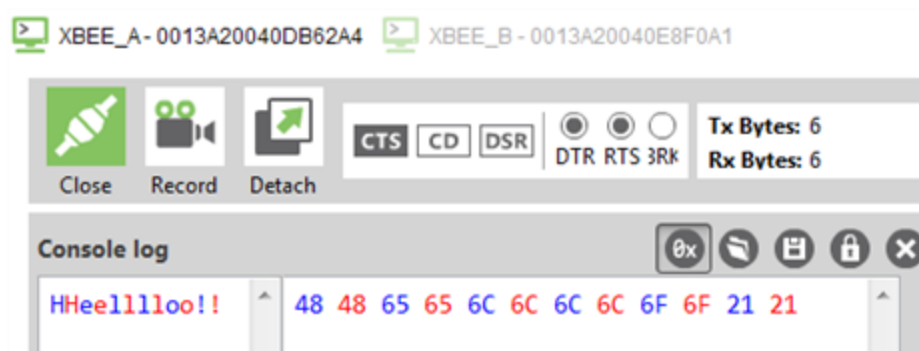
Connecting a loopback jumper to an XBee module lets you send a message to another XBee module and have the message loop back to the sender.

1. Connect the loopback jumper on XBEE\_B so it bridges the pin marked "loopback" and the middle pin on its development board.



2. In the XBEE\_A console, click the **Clear session** button  to clear your previous conversation.
3. Type "Hello!"



Each character loops back in the XBEE\_A console log, which indicates that XBEE\_A successfully sent the message to XBEE\_B.

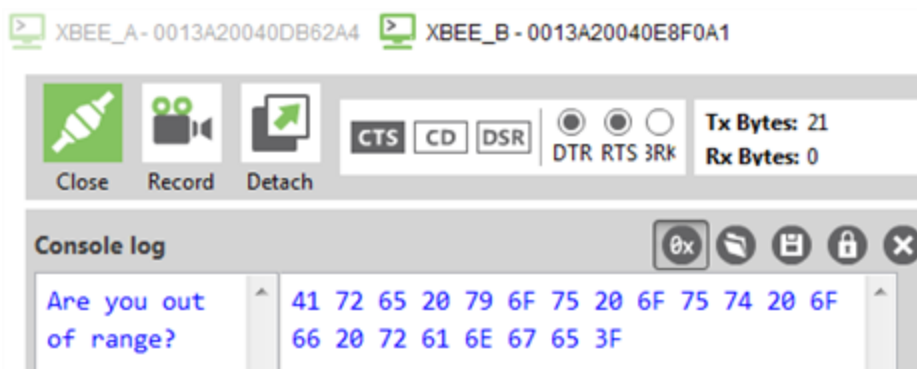





You are now ready to use the loopback jumper to help you test a mesh network consisting of three XBee modules.

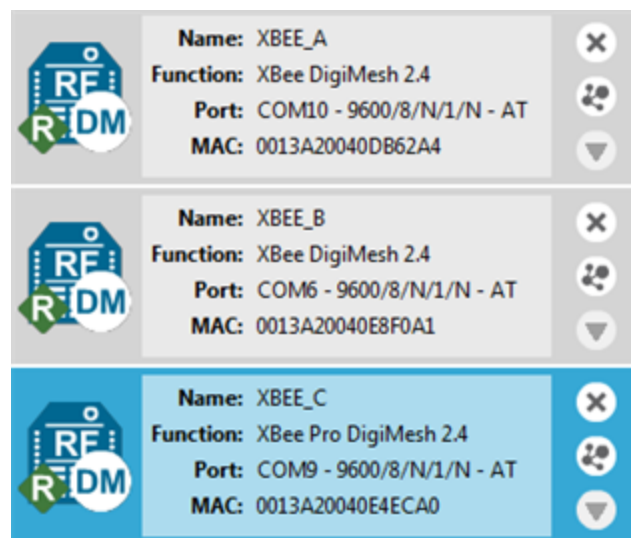
## Set up a third XBee module to create a mesh network



To create a mesh network, move XBEE\_B away from XBEE\_A until communication is lost. Then, add XBEE\_C to relay messages between XBEE\_A and XBEE\_B. The network automatically adjusts and redirects communications when a pathway becomes available.

1. Move XBEE\_B out of range of XBEE\_A:
  - a. Disconnect XBEE\_B from your computer and remove it from XCTU by clicking the **Remove the list of remote modules** button .
  - b. Connect XBEE\_B to a power supply (or laptop or portable battery) and move it away from XBEE\_A until it is out of range.  
  
The approximate indoor range is 100 ft (30 m), and the approximate outdoor range is 300 ft. (90 km).
  - c. Make sure the loopback jumper is connected to XBEE\_B. See [Connect the loopback jumper](#).
  - d. In the XBEE\_A console, click  to clear your previous conversation with XBEE\_B.
  - e. Type "Are you out of range?" In the illustration below, the message does not loop back, which means XBEE\_B did not receive it and it is out of range of XBEE\_A.
  - f. If the message loops back, move XBEE\_B farther away until it no longer loops back.

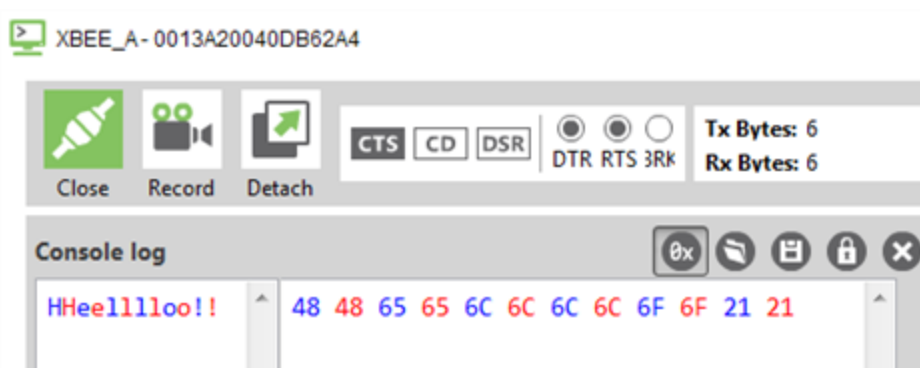



2. Add and configure another XBee module:
  - a. Connect another XBee module to your computer.
  - b. Click the **Configuration working modes** button .
  - c. Click the **Add a radio module** button .
  - d. In the **Add a radio module** dialog, select the USB Serial Port for this XBee module and click **Finish**.
  - e. Configure this XBee module as follows:  
**ID:** D161  
**NI:** XBEE\_C
  - f. Click the **Write radio settings** button .



3. Have XBEE\_C relay messages between XBEE\_A and XBEE\_B:
  - a. Switch back to the **Consoles working mode** .
  - b. Disconnect XBEE\_C from your computer and remove it from XCTU by clicking the **Remove the list of remote modules** button .
  - c. Connect XBEE\_C to a power supply (or laptop or portable battery) and place it between XBEE\_A and XBEE\_B.
  - d. Make sure the loopback jumper is still connected to XBEE\_B.
  - e. Have XBEE\_A send a message to XBEE\_B. In the XBEE\_A console, type "Hello!"

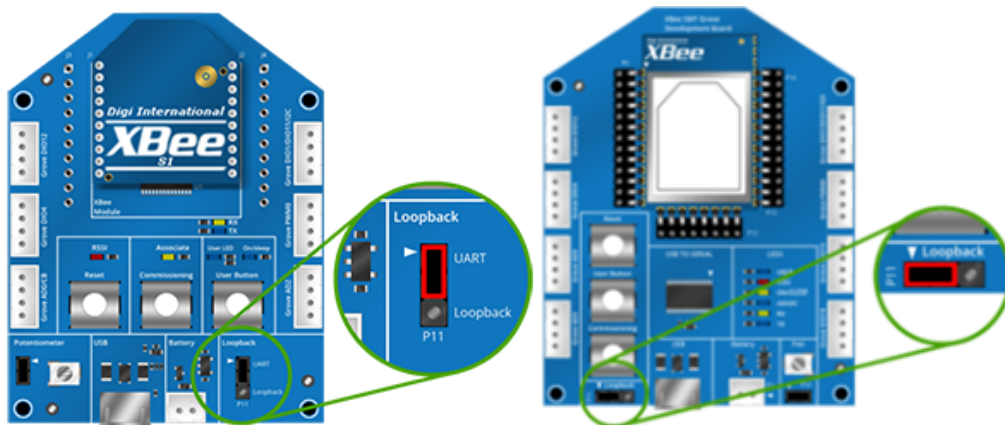
In the following illustration, the message loops back. XBEE\_C relayed your message to XBEE\_B, and you successfully established a mesh network.



**Tip** Use the **Send a single packet** command to send and have an entire message loop back, instead of having individual characters loop back. To do this, click the **Add new packet** button  to compose your message, and then click **Send selected packet** to send your message.



Before you perform other tasks, change the loopback jumper on XBEE\_B so it no longer bridges the two pins on its development board. It should look like this:



## Step 5: Use API mode to talk to XBee modules

This section shows you how to configure an XBee module in API mode, which gives you flexibility, speed, and reliability in your data transmissions.

If you get stuck, see [Troubleshooting](#).

For more information on API mode, see the [XBee S2C DigiMesh 2.4 User Guide](#).

### Configure an XBee module in API mode

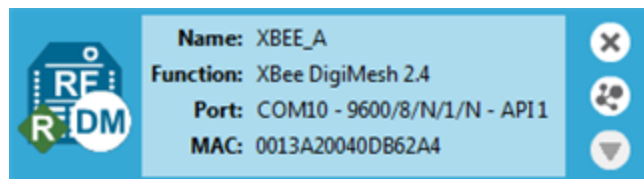
1. Select XBEE\_A and click the **Configuration working modes** button .
2. Add this configuration:

**AP:** API Mode 1



3. Click the **Write radio settings** button .

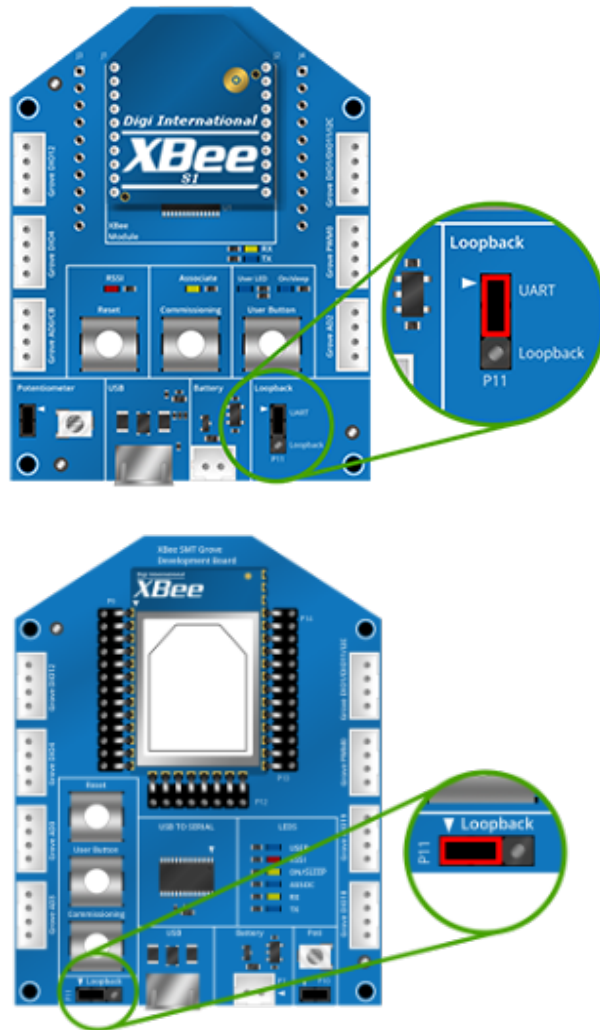
The Port indicates XBEE\_A is in API mode.



### Send an API Tx frame from an XBee module to another module


API Tx frames are the instructions that allow one XBee module to send data to another XBee module. In these instructions, XBEE\_A uses the API frame type "Transmit Request" to send some text data to XBEE\_B.

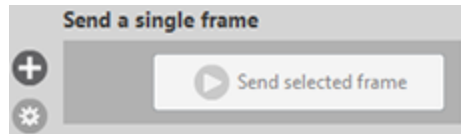
1. Reconnect XBEE\_B to your computer.
2. Make sure the loopback jumper on XBEE\_B no longer bridges the two pins on its development board.



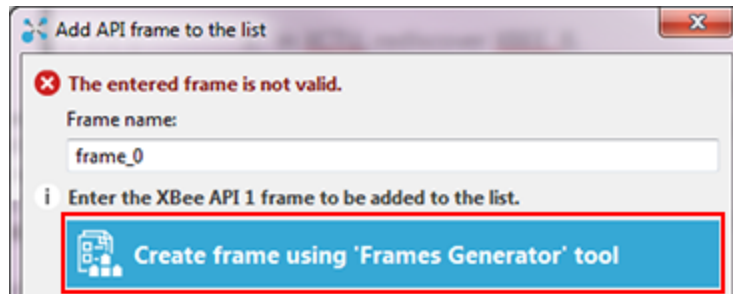
3. In XCTU, rediscover XBEE\_B.
4. Switch XBEE\_A and XBEE\_B to console mode:
  - a. Select **XBEE\_A** and click . Then click to open a serial connection.
  - b. Select **XBEE\_B** and click . Then click to open a serial connection.
5. Select **XBEE\_A**.



6. In the **Send a single frame** area, click the **Add new frame to the list** button .



7. In the **Add API frame to the list** dialog, click the **Create frame using 'Frames Generator' tool** button.



8. In the **XBee API Frame generator** dialog, configure the following parameters:

**Protocol:** DigiMesh

**Mode:** API 1

**Frame type:** 0x10 - Transmit Request

**64-bit dest. address:** MAC address of XBEE\_B

**RF data:** Type "Hello XBee\_B!" in the ASCII tab

**XBee API Frame generator**

This tool will help you to generate any kind of API frame and copy its value. Just fill in the required fields.

Protocol: **DigiMesh** Mode: **API 1 - API Mode Without Escapes**

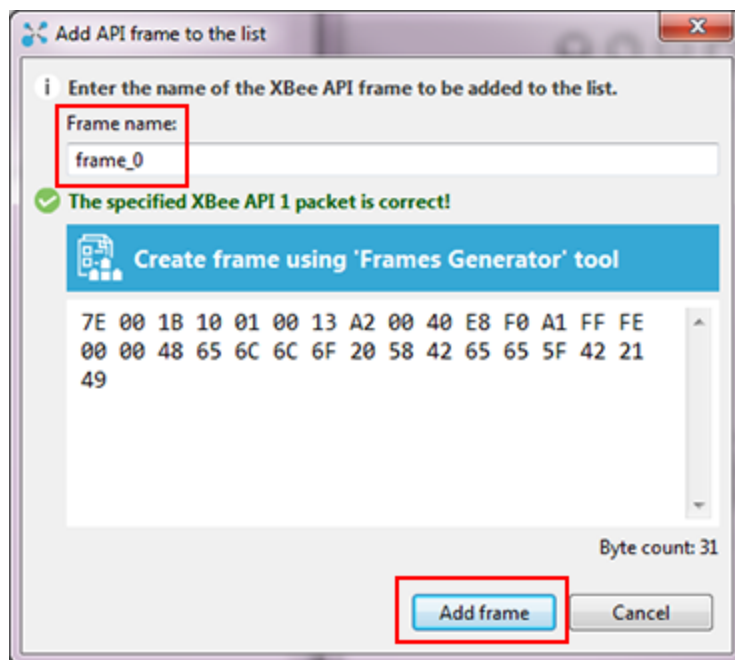
Frame type: **0x10 - Transmit Request**

Frame parameters:

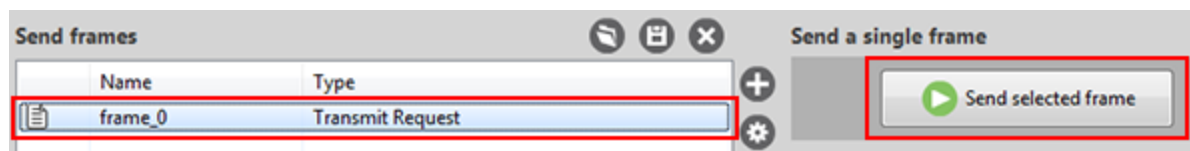
i Start delimiter	7E
i Length	00 18
i Frame type	10
i Frame ID	01
i 64-bit dest. address	00 13 A2 00 40 E8 F0 A1
i 16-bit dest. address	FF FE
i Broadcast radius	00
i Options	00
i RF data	ASCII HEX Hello XBee_B!

9. Click **OK**.
10. In the **Add API frame to the list** dialog, type a name for your frame.

11. Click **Add frame**.

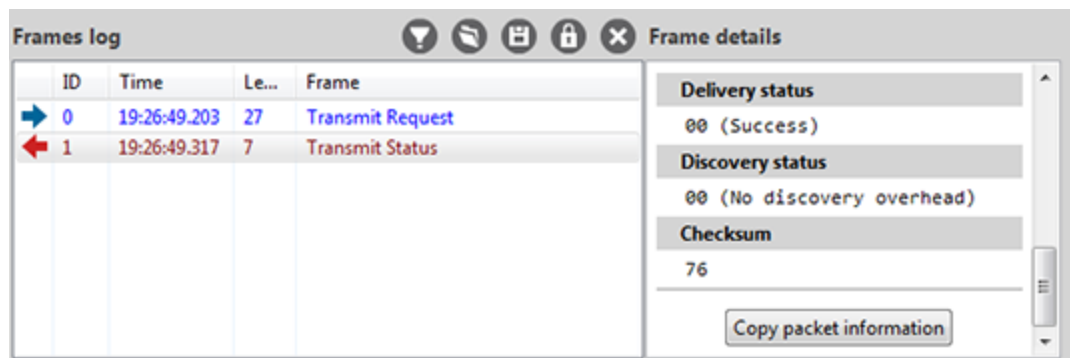


12. In the **Send frames** area, make sure your frame is selected.
13. In the **Send a single frame** area, click **Send selected frame**.

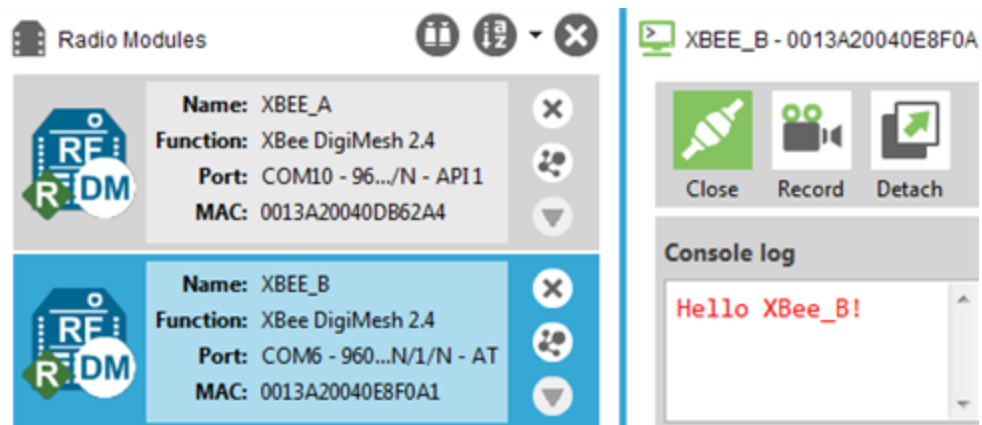


14. In the **Frames log** area, select **Transmit Request** and then **Transmit Status** to look at the Frame details for each.

For example, select **Transmit Status** and scroll down in the **Frame details** area to see that your Delivery status is a success.



15. In the **Radio Modules** area, select **XBEE\_B**. "Hello XBee\_B!" appears in the Console log.





# Do more with your XBee devices

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- Update the firmware of your XBee modules .....30
- Configure remote XBee modules .....30
- Set up and perform a range test .....32

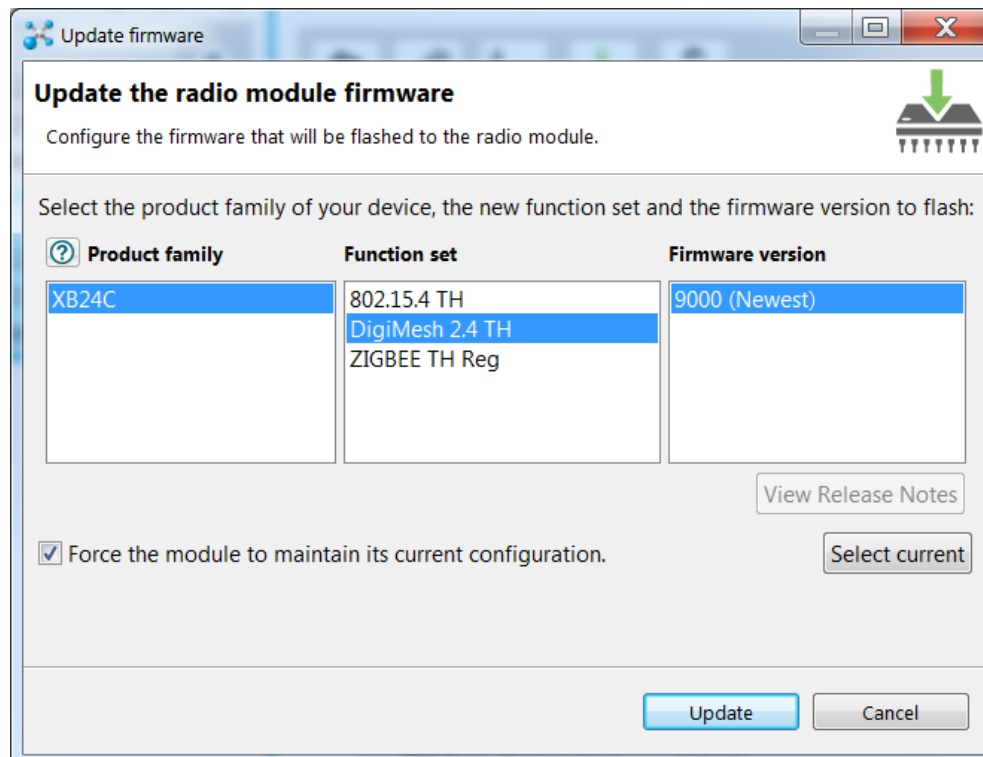
## Update the firmware of your XBee modules

Radio firmware is the program code stored in the device's persistent memory that provides the control program for the device. Use XCTU to update the firmware.

1. Click the **Configuration working modes** button .
2. Add local and remote XBee modules to your computer. See [Add XBee modules to XCTU](#) and [Configure remote XBee modules](#).
3. Select a local or remote XBee module from the Radio Modules list.
4. Click the **Update firmware** button .

The **Update firmware** dialog displays the available and compatible firmware for the selected XBee module.

5. Select the product family of the XBee module, the function set, and the latest firmware version.




6. Click **Update**. A dialog displays update progress.

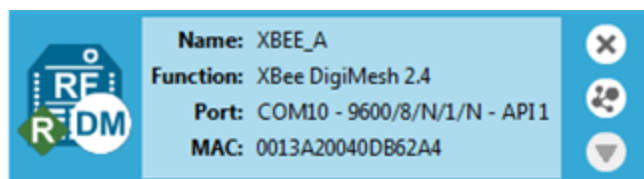
## Configure remote XBee modules


You can communicate with remote devices over the air through a corresponding local device. Configure the local device in API mode because remote commands work only in API mode. Configure remote radio modules in either API or transparent mode.

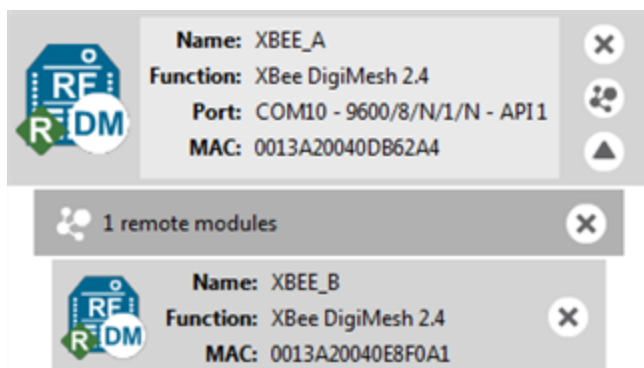
These instructions show you how to configure the LT (Associate LED blink times) parameter on a remote module.

1. Add two XBee modules to XCTU. See [Add XBee modules to XCTU](#).
2. Configure the first XBee module in API mode and name it **XBEE\_A**. See [Configure an XBee module in API mode](#).
3. Configure the second XBee module in either API or transparent mode, and name it **XBEE\_B**. See [Configure the first two XBee modules in transparent mode](#).
4. Disconnect XBEE\_B from your computer and remove it from XCTU by clicking the **Remove the list of remote modules** button .
5. Connect XBEE\_B to a power supply (or laptop or portable battery).

Your **Radio Modules** area should look something like this.




6. Select **XBEE\_A** and click the **Discover radio nodes in the same network** button .
7. Click **Add selected devices** in the **Discovering remote devices** dialog. The discovered remote device appears below XBEE\_A.



8. Select the remote device **XBEE\_B**, and configure the following parameter:  
**LT: FF** (hexidecimal representation for 2550 ms)



9. Click the **Write radio settings** button .
- The remote XBee module now has a different LED blink time.
10. To return to the default LED blink times, change the LT parameter back to 0 for XBEE\_B.

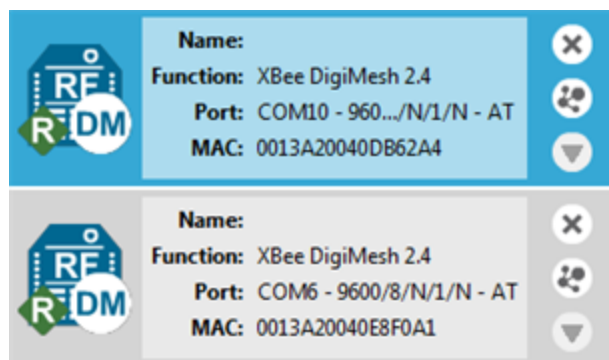
## Set up and perform a range test




This section shows you how to set up two XBee modules to perform a range test, which demonstrates the real-world RF range and link quality between two XBee modules in the same network. Performing a range test gives an initial indication of the expected communication performance of the kit components. When deploying an actual network, perform multiple range tests to analyze varying conditions in your application.

### Configure the XBee modules for a range test

For XBee modules to communicate with each other, you configure them so they are in the same network. You also set the local device to API mode to obtain all possible data of the remote XBee module.

1. Add two XBee modules to XCTU. See [Step 3: Add the XBee modules to XCTU](#).

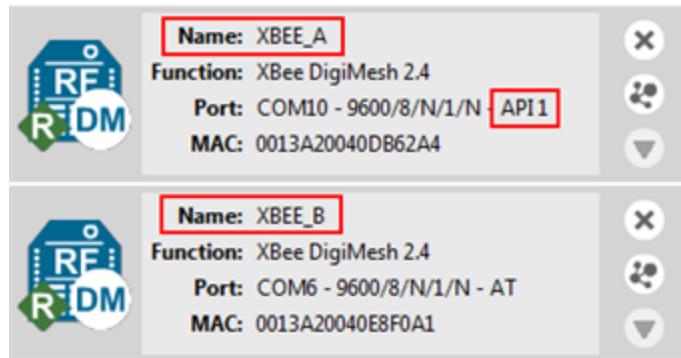



2. Select the first XBee module and click the **Load default firmware settings** button .
3. Configure the following parameters:
  - ID:** D161
  - NI:** XBEE\_A
  - AP:** API enabled [1]
4. Click the **Write radio settings** button .
5. Select the other XBee module and click .
6. Configure the following parameters:
  - ID:** D161
  - NI:** XBEE\_B
  - AP:** API disabled [0]



7. Click the **Write radio settings** button .

After you write the radio settings for each XBee module, their names appear in the **Radio Modules** area. The Port indicates XBEE\_A is in API mode.



8. Disconnect XBEE\_B from your computer and remove it from XCTU by clicking the **Remove the list of remote modules** button .
9. Connect XBEE\_B to a power supply (or laptop or portable battery) and move it away from XBEE\_A to the desired location for your range test.

The following table provides the approximate indoor and outdoor ranges.

XBee module	Indoor range (approximate)	Outdoor range (approximate)
XBee S2C DigiMesh 2.4	100 ft (30 m)	300 ft (90 m)

## Perform a range test

These instructions show you how to use the loopback cluster (0x12) when performing a range test. The benefit of using this type of range test is you do not have to close the loopback jumper of the remote module and the module can work in any operating mode.

1. In XCTU, open the **Tools** menu  and select the **Range Test** option.

The **Radio Range Test** window opens. Your local device appears on the left side of the **Device Selection** area.

2. Select **XBEE\_A** and click the **Discover remote devices** button .

#### Device Selection

Select the local radio device:

0013A20040DB62A4	XBEE_A	DigiMesh	API1

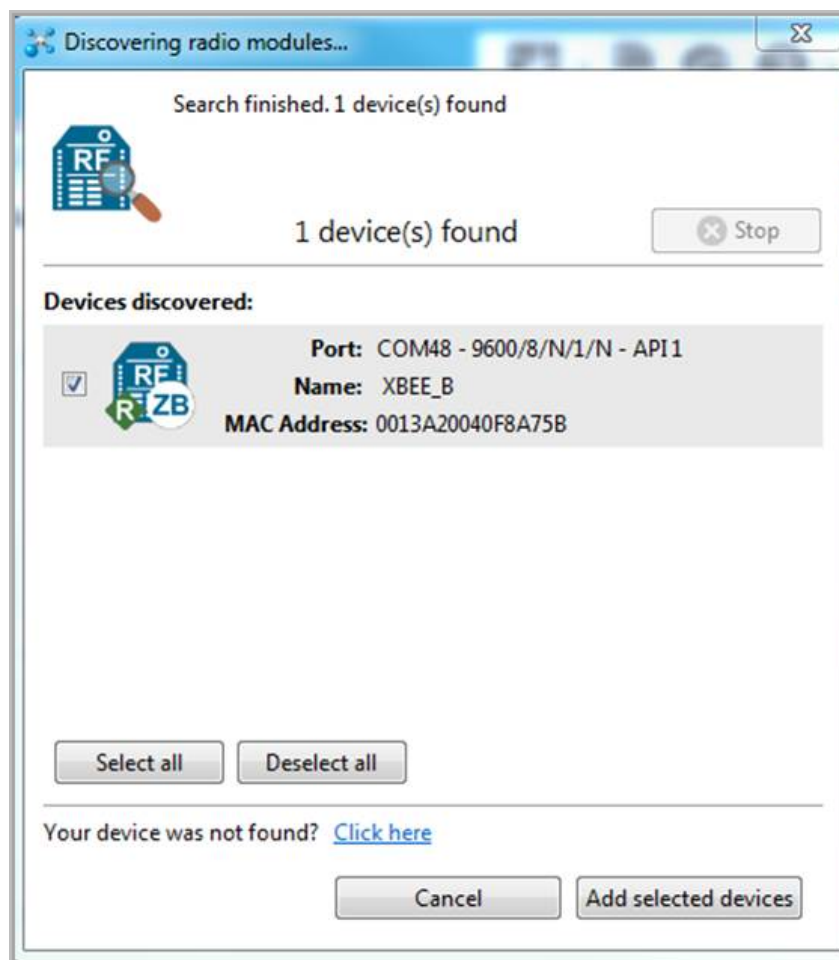
Select the remote radio device:

☒ Discovered device: No devices discovered

☐ Specify 64-bit address:

☐ Specify 16-bit address:

The discovery of remote devices starts. When the discovery process finishes, the other device (XBEE\_B) appears in the Discovering remote devices dialog.




3. Click **Add selected devices**.

4. Select **XBEE\_B** from the **Discovered device** drop-down menu in the **Device Selection** area.

**Device Selection**

Select the local radio device:

	0013A20040DB62A4	XBEE_A	DigiMesh	API1

Select the remote radio device:

☒ Discovered device: 0013A20040E8F0A1 - XBEE\_B

☐ Specify 64-bit address:


☐ Specify 16-bit address:

5. For Range Test type, select **Cluster ID 0x12**.

**Configuration**

Range Test type: Cluster ID 0x12

Packet payload: [Configure Payload...](#)

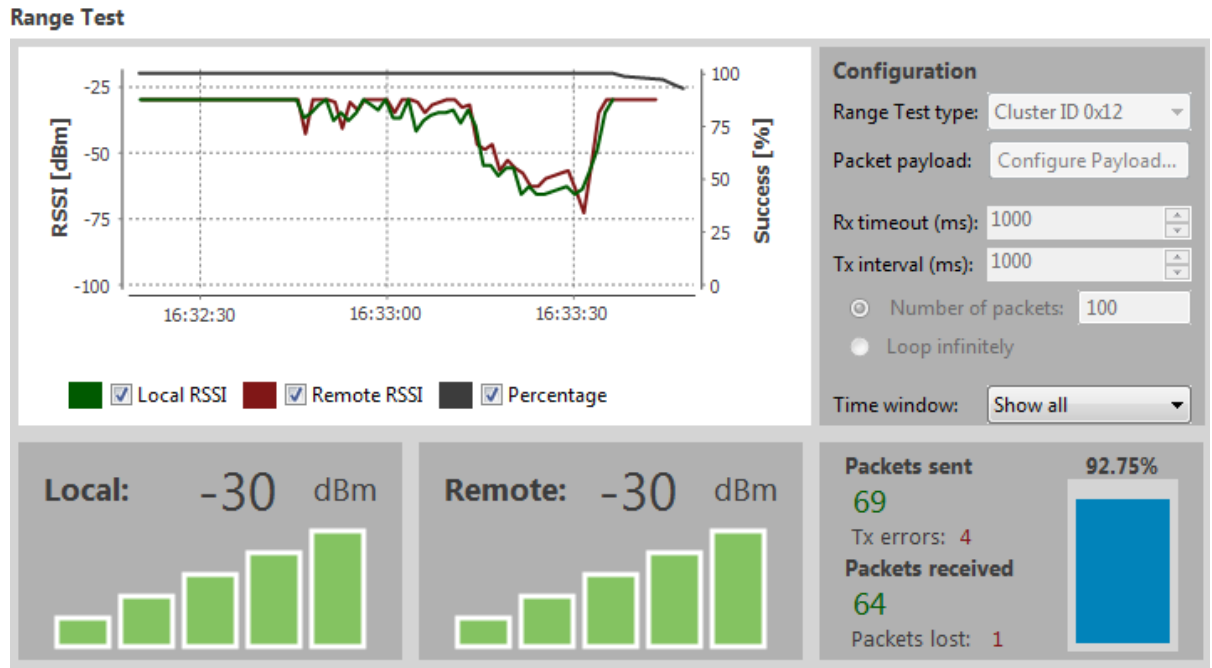
6. Click the **Start Range Test** button .
7. If a notification dialog asks you to close the loopback jumper in the remote device, click **OK**.
8. Test the signal interference by doing one of the following:
  - Place your hands over one of the XBee modules.
  - Block line-of-sight with your body.
  - Place a metal box over an XBee module.
  - Move the remote XBee module to a different room or floor of the building.



The Received Signal Strength Indicator (RSSI) value will decrease and some packets may even be lost.

9. Observe how XCTU represents the retrieved data:

- **Range Test** chart represents the RSSI values of the local and remote devices during the range test session. The chart also shows the percentage of total packets successfully sent.
- **Local** and **Remote** bar graphs represent the signal strengths of the local and remote XBee modules. These values are retrieved for the last packet sent/received. RSSI is measured in dBm. A greater negative value in dBm indicates a weaker signal. Therefore, -50 dBm is better than -60 dBm.
- **Packets sent** and **Packets received** area shows the total number of packets sent, packets received, transmission errors, and packets lost. The percentage bar graph indicates the percentage of packets that are successfully sent and received during a range test session.

In the following illustration, the percentage of packets successfully sent is 69% and received is 64%. The actual percentage of packets successfully sent or received may be higher.



10. Click the **Stop Range Test** button  to stop the process at any time.
11. When you have completed the range test, click the **Remove the list of remote modules** button  to remove the remote XBee modules from XCTU.

## Troubleshooting

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If you get stuck while performing any of the tasks in this guide, try one of these troubleshooting tips.

Cannot find the serial port for the module .....	38
Cannot identify XBee modules .....	38
Cannot install device driver .....	38
Use LEDs to identify XBee modules .....	39
No remote devices to select for a range test .....	39
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## Cannot find the serial port for the module

You can remove the XBee Grove Development Board from the USB port and view which port name no longer appears in your port list. The name that no longer appears is your XBee board.

To use XCTU to determine the correct serial port:

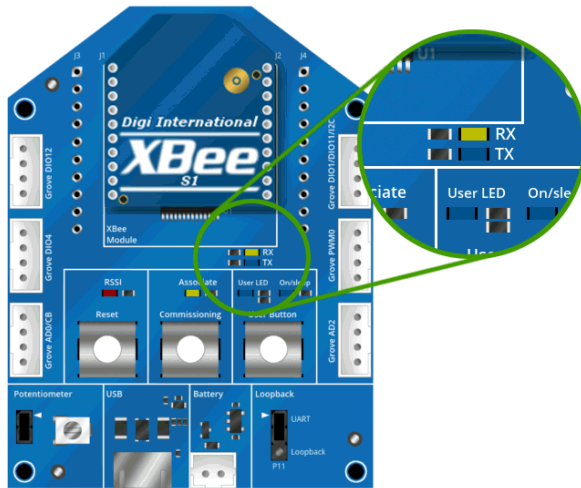
1. Open XCTU, Click the **Discover radio modules** button .
2. Select all ports to be scanned.
3. Click **Next** and then **Finish**.

Once the discovery process completes, a new window notifies you of the devices discovered and the details. The serial port and the baud rate appear in the **Port** label.

## Cannot identify XBee modules

To identify modules you have added to XCTU, read the device settings of each module and check the Rx and Tx LEDs of the XBee Grove Development Boards. The LEDs indicate that the XBee module is receiving (Rx) or transmitting (Tx) information through the serial port.

When you read or write the settings of a module, the Rx and Tx LEDs blink so you can identify which module is connected to each serial port. The following example shows the LED for a port already in use.



The serial port where the local XBee module is connected can only be in use by one application. Check to make sure the connection with the module in the XCTU console is closed and there are no other applications and no other instances of XCTU using the port.

## Cannot install device driver

The device driver software was not successfully installed.

### Potential cause

Sometimes when you connect an XBee Grove board to your computer, the operating system does not install the driver.

## Resolution

Try the following, in order. If one of the steps resolves the issue, you're done.


1. Remove and re-insert the XBee module into your computer.
2. If the OS is still unable to install the driver, remove and re-insert the XBee module into another USB port.
3. If your computer fails during the driver initialization problem and you are still unable to install the drivers, complete the following steps:
  - a. Open the Device Manager.
  - b. In the **Other Devices** section, right-click on the device **T232R USB UART** and click uninstall.
  - c. Plug in your device and allow your system to reinstall the drivers.

## Use LEDs to identify XBee modules

You want to force LEDs to blink so you can easily locate an XBee module.

### Resolution

To locate an XBee module using LEDs:

1. In XCTU, select one of your XBee modules and click the **Read radio settings** button .
2. Observe which XBee module has the Rx and Tx LED lights blinking green and yellow on its development board.

## No remote devices to select for a range test

If there are no remote XBee modules to select in the Radio Range Test dialog, try one of the following resolutions.

### Check cables

The USB cables should be firmly and fully attached to both the computer and the XBee development board. When attached correctly, the association LED on the adapter is lit.

### Check that the XBee module is fully seated in the XBee development board

When the XBee module is correctly installed, it is pushed fully into the board and no air or metal is visible between the plastic of the adapter socket and the XBee module headers. Also, check that all ten pins on each side of the XBee module are in a matching hole in the socket.

### Check the XBee module orientation

The angled "nose" of the XBee module should match the lines on the silk screening of the board and point away from the USB socket on the XBee development board.

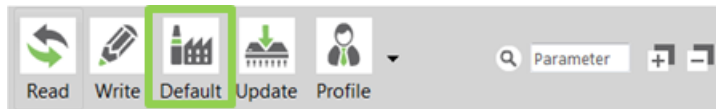
## Check that the XBee modules are in the same network

Check that the following parameters have the same value for all XBee modules on your network:

XBee module development kit	Parameters
XBee S2C DigiMesh 2.4	<b>ID</b> (Network ID) and <b>CH</b> (Operating Channel)

## Restore default settings

If the XBee modules are properly connected and in the same network, restore default settings and configure them again.



## Port in use

Message: "The port is already in use by other applications."

## Potential cause

The serial port where the local XBee module is connected can only be in use by one application.

## Resolution

Make sure the connection with the XBee module in the XCTU console is closed and there are no other applications using the port.



## XCTU cannot discover devices

If XCTU doesn't discover an XBee module or doesn't display any serial ports, try the following resolutions.

### Check the configuration of your USB serial converter

1. On the **Start** menu, click **Computer > System Properties > Device Manager**.
2. Under Serial Bus controllers, double-click the first USB Serial Converter to open the USB Serial Converter dialog.
3. Click the **Advanced** tab, make sure **Load VCP** is selected, and click **OK**.
4. Repeat steps 2 and 3 for each USB Serial Converter listed in the Device Manager.

### Check cables

Double-check all cables. The USB cable should be firmly and fully attached to both the computer and the XBee development board. When attached correctly, the association LED on the adapter will be lit.

### Check that the XBee module is fully seated in the XBee development board

When the XBee module is correctly installed, it should be pushed fully into the board and no air or metal should be visible between the plastic of the adapter socket and the XBee module headers. Also, double-check that all ten pins on each side of the XBee module made it into a matching hole in the socket.

### Check the XBee module orientation

The angled "nose" of the XBee module should match the lines on the silk screening of the board and point away from the USB socket on the XBee development board.

### Check that the XBee modules are in the same network

Check that the Network ID (**ID**) and the Channel (**CH**) settings have the same value for both XBee modules.

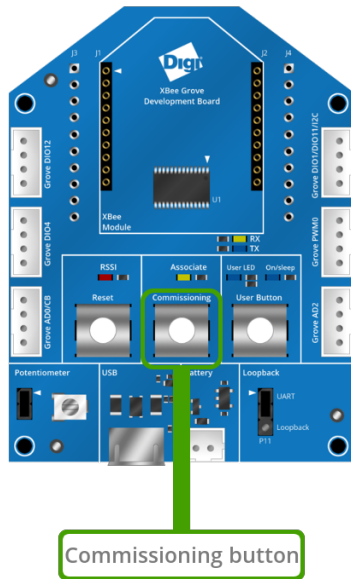
### Check driver installation

Drivers are installed the first time the XBee development board is plugged in. If this process is not complete or has failed, see [Cannot install device driver](#).

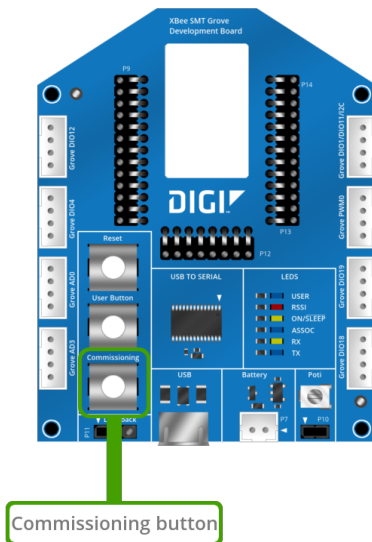
## Check if the modules are sleeping

The On/Sleep LED of the Grove Development Board indicates if the XBee module is awake (LED on) or asleep (LED off). When an XBee module is sleeping, XCTU cannot discover it, so press the Commissioning button to wake it up for 30 seconds.

### XBee TH Grove Development Board



### XBee SMT Grove Development Board



## Check the loopback jumper

The loopback jumper should not be connected when XCTU is trying to find the module. Make sure the loopback jumper is not connected to the loop-back pins.

## XCTU cannot discover remote devices


XCTU does not discover remote XBee module.

### Potential cause

The XBee modules do not have the appropriate values for the following parameters:

XBee module development kit	Parameters
XBee S2C DigiMesh 2.4	<b>ID</b> (Network ID) and <b>CH</b> (Operating Channel)

### Resolution

1. Ensure that all XBee modules on your network have the same value for each of the parameters listed in the table.
2. If this doesn't resolve the issue, try setting your modules back to their default settings. Select each XBee module and click the **Load default firmware settings** button .


## XCTU cannot discover remote devices for a range test

When setting up a range test in the Radio Range Test dialog, you receive the message "There are not remote devices discovered for the selected local device."

### Potential cause

In the Radio Range Test dialog, the local radio device you selected has not yet discovered any remote devices.

### Resolution

In the Device Selection area in the Radio Range Test dialog, click the **Discover remote devices** button  and XCTU will discover devices on the local device's network.

## XCTU installation error

An error is reported when installing XCTU.

### Potential cause

XCTU requires Administrator permissions.

### Resolution

Check that you have Administrator access on the computer where you are installing XCTU. On Windows systems, a User Account Control dialog may appear when you install XCTU or try to run the XCTU program. You must answer yes when prompted to allow the program to make changes to your computer, or XCTU will not work correctly. Note that you may also need to talk to your network manager to gain permission to install or run applications as administrator.

## Regulatory information

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Europe (CE) .....	45
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## Europe (CE)

The XBee S2C DigiMesh 2.4 Kits have been tested for European compliance and CE marked accordingly, refer to [www.digi.com/resources/certifications](http://www.digi.com/resources/certifications).

If the XBee S2C DigiMesh 2.4 Kits are incorporated into a product, the manufacturer must ensure compliance of the final product with articles 3.1a and 3.1b of the Radio Equipment Directive 2014/53/EU. An EU Declaration of Conformity must be issued in accordance with the Radio Equipment Directive 2014/53/EU and supplied with the product when it is placed on the European market. A copy of the EU Declaration of Conformity must also be kept on file as described in the Radio Equipment Directive.

Furthermore, the manufacturer must maintain a copy of the XBee S2C DigiMesh 2.4 Kit user manual documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user guide.

### Maximum power and frequency specifications

For the through-hole device:

- Maximum power: 9.82 mW (9.92 dBm) Equivalent Isotropically Radiated Power (EIRP) at normal condition.
- Frequencies: 5 MHz channel spacing, beginning at 2405 MHz and ending at 2480 MHz.

For the surface-mount device:

- Maximum power: 12.65 mW (11.02 dBm) EIRP.
- Frequencies: 5 MHz channel spacing, beginning at 2405 MHz and ending at 2480 MHz.