



XBee[®] Network Assistant

User Guide

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XBee® Network Assistant User Guide

The XBee Network Assistant is a tool designed to inspect and manage radio frequency (RF) networks created by Digi XBee devices.

The application features include the following:

- Join and inspect any nearby XBee network to get detailed information about all the nodes it contains.
- Update the configuration of all the nodes of the network, specific groups, or single devices based on configuration profiles.
- Geo-locate your network devices or place them in custom maps and get information about the connections between them.
- Export the network you are inspecting and import it later to continue working or work offline.
- Use automatic application updates to keep you up to date with the latest version of the tool.
- Access comprehensive online documentation directly from the application.

Download and install XBee Network Assistant

This section provides instructions for downloading and installing the XBee Network Assistant tool.

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Requirements

This section describes the requirements to run the Network Assistant application.

Operating systems

XBee Network Assistant is compatible with the Windows Vista/7/8/10 (32-bit or 64-bit versions) operating systems.

System requirements

Property	Minimum	Recommended
HDD space	300 MB	500 MB
RAM memory	2 GB	4 GB
CPU	Dual-core processor	Quad-core processor

Supported RF modules

- XBee SX (regular and PRO versions)
- XBee S1 (regular and PRO versions)
- XBee S2
- XBee S2B
- XBee S2C (regular and PRO versions)
- XBee 868LP
- XBee 868LP SX (regular and PRO versions)
- XBee3

Note XBee Network Assistant supports all of the above modules in all hardware variants, including surface-mount technology (SMT), through-hole technology (THT) and XBee3 micro-mount technology (MMT).

Install XBee Network Assistant

Complete the following steps to download and install the XBee Network Assistant application:

1. Navigate to www.digi.com/xbeetworkassistant.
2. Click **XBee Network Assistant**.
3. Under **Utilities**, click the **Windows installer** link.
4. When the file finishes downloading, run the executable file and follow the steps in the XBee Network Assistant Setup Wizard.

Install USB drivers

The required USB drivers are automatically installed the first time you connect an XBee board to your computer. If the board does not automatically install, use the following instructions to install the board drivers manually:

1. Find the appropriate USB drivers on the [Digi support site](#).
2. Select your operating system.
3. Download and run the executable file.
4. Follow the steps in the installation wizard.

RF concepts and terminology

This section contains concepts related to radio frequency modules and the XBee Network Assistant application. Understanding these concepts will help you in working with XBee Network Assistant.

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RF modules

A radio frequency (RF) module is a small electronic circuit used to transmit and receive radio signals on different frequencies. Digi produces a wide variety of [RF modules](#) to meet the requirements of almost any wireless solution, such as long-range, low-cost, and low-power modules. The most popular wireless products are the XBee RF modules.

XBee RF modules



XBee is the brand name of a family of RF modules produced by Digi. They are modular products that make deploying wireless technology easy and cost-effective. Digi has made multiple protocols and RF features available in the XBee footprint, giving you flexibility to choose the best technology for your needs.

XBee RF modules are available in three form factors: through-hole, surface-mount, and micro-mount, with various antenna options. Most modules are available in the through-hole form factor and share the same footprint.

Radio firmware

Radio firmware is program code stored in a radio module's persistent memory that provides the control program for the device. The main goal of the XBee Network Assistant application is the ability to manage an already deployed network and to update the firmware and settings of all its devices through the use of configuration profiles.

XBee Network Assistant takes the radio firmware to program from the configuration profile loaded in the application. For more information about configuration profiles, see the, [Configuration profile](#) topic.

Configuration profile

A configuration profile is a snapshot of a specific radio firmware configuration. The profile is useful in a production environment when you need to set the same radio firmware and parameters on multiple radios. A configuration profile is an XPRO file containing the following elements:

- Radio firmware to be programmed in the device.
- Firmware settings to configure with their respective values.
- Other configurations and metadata to identify the profile, such as the flash firmware policy, profile description, and so on.

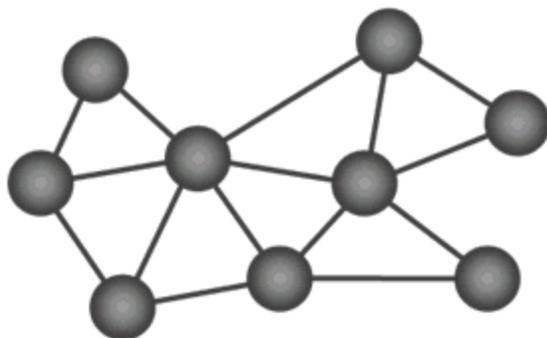
Before starting the programming process, you must load a configuration profile for data to be available.

Note XCTU is required to generate and save configuration profiles. See [How to create a profile using XCTU](#) for more information about generating profiles.

Mesh networking

A mesh network is a topology where each node in the network is connected to other nodes around it. Each node cooperates in the transmission of information. Mesh networking provides three important benefits:

- **Routing.** With this technique, the message propagates along a path by hopping from node to node until it reaches its final destination.
- **Ad-hoc network creation.** This is an automated process that creates an entire network of nodes on the fly, without any human intervention.
- **Self-healing.** This process automatically determines if one or more nodes on the network is missing and reconfigures the network to repair any broken routes.



With mesh networking, the distance between two nodes does not matter as long as there are enough nodes in between to pass the message along. When one node wants to communicate with another, the network automatically calculates the best path.

A mesh network is also reliable and offers redundancy. If a node can no longer operate, for example because it has been removed from the network or because a barrier blocks its ability to communicate, the rest of the nodes can still communicate with each other, either directly or through intermediate nodes.

Note Mesh networks use more bandwidth for administration, and therefore have less available for payloads. They can also be more complex to configure and debug in some instances.

Application layout

The XBee Network Assistant application is divided into five main sections:

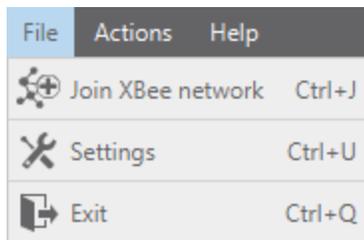
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The screenshot displays the XBee Network Assistant application interface. At the top is a menu bar with 'File', 'Actions', and 'Help'. Below it is a toolbar with icons for 'Join', 'Update', 'Import', 'Export', 'Settings', and 'Feedback'. The action bar shows 'ZigBee network (17 devices) - 1 Coordinators 8 Routers 8 End Devices' and a 'Scanning network' button with a 'Pause' icon. The working area features a 'Table' view showing a list of devices with columns for Role, Node ID, MAC address, NWK address, and FW Version. The status bar at the bottom indicates 'Scanning network constantly... (scan 1)' and a timer '00:00:09'.

Role	Node ID	MAC address	NWK address	FW Version
Router	RT-KYLO-REN	0013A20040913B75	9D79	4060
Coordinator	CO-YODA	0013A20040AA2B29	0000	405F
Router	INTRUDER-DROID	0013A20040A9E81B	4ADC	23A7
Router	RT3-ANAKIN	0013A20040A9E85D	7838	23A7
Router	RT4-LUKE	0013A20040A9E756	8915	23A7
Router	RT1-WINDU	0013A20040A9527D	AAF9	23A7
Router	RT2-OB1-WAN	0013A20040A9E883	EFDC	23A7
End device	ED-C3PO	0013A20040ADEA91	7058	29A7
End device	ED-JARJAR	0013A20040A9E740	A8C2	29A7
Router	RT5-PALPATINE	0013A20040A9E7ED	6632	23A7
Router	RT6-DOOKU	0013A20040A9E8AA	BDD0	23A7
End device	ED-DARTH MAUL	0013A20040A6A0DB	3CFC	29A7
End device	ED-CHEWBACCA	0013A20040A9E8AB	2F8F	29A7
End device	ED-PADME	0013A20040A9E7CC	5377	29A7
End device	ED-LEIA	0013A20040A9E843	D97F	29A7
End device	ED-HAN SOLO	0013A20040A9E921	8875	29A7
End device	ED-BOBA FETT	0013A20040A9E77E	A65C	29A7

Menu bar

The menu bar is located at the top of the application. You can use the menu bar to access all XBee Network Assistant features.



Toolbar

The toolbar is located below the menu bar near the top of the page. You can use the toolbar to access the main XBee Network Assistant features.



Action bar

The action bar is located below the toolbar near the top of the page. The left pane displays information about the XBee network (type and number of devices), while the right pane displays the current action, Pause or Resume.



Working area

The working area is the main control of the application and is located in the center of the tool. It displays the XBee devices in the network, provided they are discovered either in a table or in maps.

Table view

The default view displays the network devices in a table and gives you the following information:

- **Role.** Device type of the XBee module. Depending on the protocol (Zigbee, DigiMesh, 802.15.4), it can be a coordinator, router or end device.
- **Node ID.** Node identifier of the XBee module.
- **MAC address.** Unique MAC address of the XBee module.
- **NET address.** Network address of the XBee module.
- **Firmware version.** Firmware version of the XBee module.

You can re-order the columns by dragging them to another location on the screen, or you can show or hide them using the + icon located on the right side.

The XBee module you are using to access the network and is connected to your computer is denoted with a serial port icon (🔌).

Role	Node ID	MAC address	NWK address	FW Version
Router	RT-KYLO-REN	0013A20040913B75	9D79	4060
Coordinator	CO-YODA	0013A20040AA2B29	0000	405F
Router	INTRUDER-DROID	0013A20040A9E81B	4ADC	23A7
Router	RT3-ANAKIN	0013A20040A9E85D	7838	23A7
Router	RT4-LUKE	0013A20040A9E756	8915	23A7
Router	RT1-WINDU	0013A20040A9527D	AAF9	23A7
Router	RT2-OBI-WAN	0013A20040A9E883	EFDC	23A7
End device	ED-C3PO	0013A20040ADEA91	7058	29A7
End device	ED-JARJAR	0013A20040A9E740	A8C2	29A7
Router	RT5-PALPATINE	0013A20040A9E7ED	6632	23A7
Router	RT6-DOOKU	0013A20040A9E8AA	BDD0	23A7
End device	ED-DARTH MAUL	0013A20040A6A0DB	3CFC	29A7
End device	ED-CHEWBACCA	0013A20040A9E8AB	2F8F	29A7
End device	ED-PADME	0013A20040A9E7CC	5377	29A7
End device	ED-HAN SOLO	0013A20040A9E921	8875	29A7
End device	ED-BOBA FETT	0013A20040A9E77E	21ED	29A7
End device	ED-LEIA	0013A20040A9E843	5F07	29A7

Map view

The map view allows you to place the devices where they are geographically located, either in a dynamic map or in a custom map for indoor networks.

In addition, to see the location of your devices, you can also inspect and analyze the connections and link qualities between them.

The screenshot displays the 'Map view' of the application. On the left, a table lists the devices with their roles, Node IDs, MAC addresses, and NWK addresses. The main area shows a Google Map of Lincoln Square with various devices placed at their geographic locations. Lines connect the devices, representing network links. The interface includes a top navigation bar with 'Table' and 'Map' tabs, and a left sidebar with a list of devices. The map shows streets like W 6th St, W 7th St, and W 8th St, and landmarks like Lincoln Square and Heckscher Playground.

Status bar

The status bar is located at the bottom of the screen and displays the current action. When the application is searching new updates or installing updates, the status bar also displays the status of the process.



Inspect your network

One of the primary features of the application is to inspect an XBee network. This feature lists all the devices connected to the network and provides general information such as address, ID, role, and so on. You can also place the XBee devices in a map and see the connections between each node as well as the quality of the connections.

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Join a network

The first step to visualize a network is to join the network. The only requirement for joining a network is having an XBee device attached to your computer through a USB port. This device acts as a bridge between the computer and the XBee network so the application can obtain network information and communicate with any device in the network. It is not necessary for the XBee device to be connected to the network from the beginning, as the application can configure the device to connect.

Follow these steps to join a network:

1. Attach an XBee device to a USB port of your computer.
2. Click the **Join** button on the toolbar. A message displays indicating that you must have an XBee device attached to your computer to inspect a network.
3. Click **OK**. The wizard is displayed.

Step 1 - Select the XBee device

Select the XBee device that is attached to your computer.

Select the XBee device
Select the XBee device connected to your computer or configure the serial port manually.



Configure the serial port manually

Select a device from the list



Node ID: Local Device

Protocol: ZigBee (API Mode Without Escapes) 

MAC address: 0013A20040A9526F

Port: COM17 - 115200/8/N/1/N

< Back
Next >
Finish
Cancel

When your XBee device appears, select it, and click **Next** to access [Step 2 - Select the network source](#). If the wizard cannot locate any device automatically, it prompts you to provide the serial configuration manually.

Select the XBee device
Select the XBee device connected to your computer or configure the serial port manually.



Configure the serial port manually

Serial port: COM1 - Communications Port

Baud rate: 9600

Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

Refresh ports Default

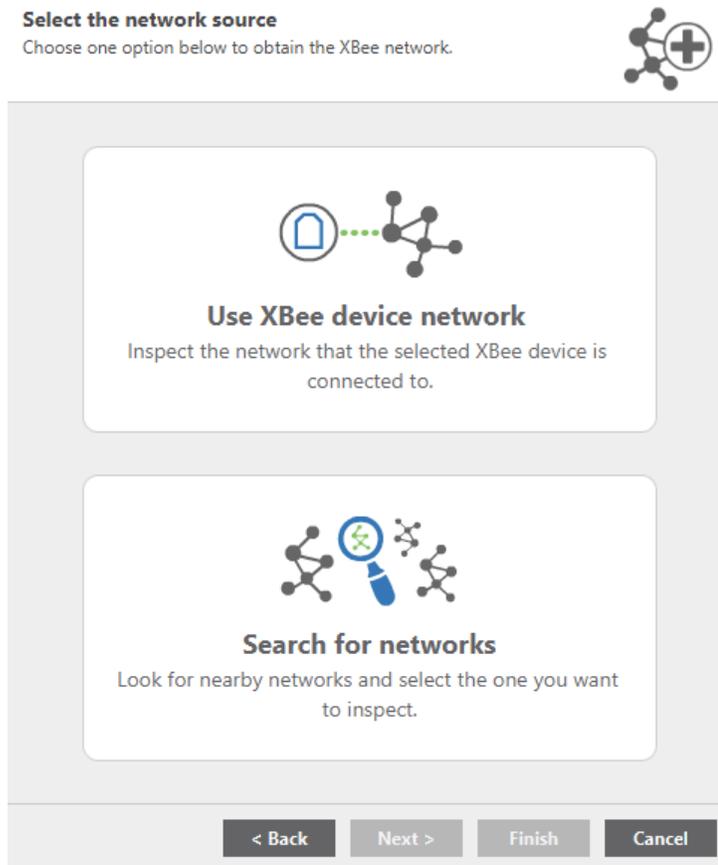
Select a device from the list

< Back Next > Finish Cancel

Configure the port parameters and click **Next** to open the **Select the network source** dialog.

Step 2 - Select the network source

If your XBee device is a Zigbee or 802.15.4 (S2C), the wizard allows you to choose between using the network where the XBee device is connected or searching for nearby networks. Otherwise, the application automatically selects and opens the **Use XBee device network** option.



Use XBee device network

This option means that the application inspects the network where the device joins.

Configure the network settings
Use the network configuration of your XBee module or change its settings.



Use current network configuration
 Change network configuration

ID PAN ID:

SC Scan channels:

Network requires authentication

KY Encryption key:

EO Encryption options:

? You can configure additional network parameters with [XCTU](#)

< Back Next > Finish Cancel

Select one of the following options:

- **Use current network configuration.** Select this option if the device has already joined a network and is the network you want to inspect.

Note You cannot edit these parameters unless you select the following **Change network configuration** option.

- **Change network configuration.** Select this option if your device is not joined to a network or you want to join to a different network. Configure the following network parameters:
 - **PAN ID:** The unique identifier value of the network.
 - **Scan Channels/Channel mask/Channel:** Option to change Scan channels. Complete this option according the the protocol of your XBee device:

Protocol	Setting name	Description
Zigbee	Scan channels	Mask of the list of channels to scan. See the user guide for your XBee device for more information.
DigiMesh 2.4	Channel	Operating channel number of the network.
DigiMesh 868/900	Channel mask	Mask of the list of channels to enable or disable. See the user guide of your XBee device for more information.
802.15.4	Channel	Operating channel number of the network.

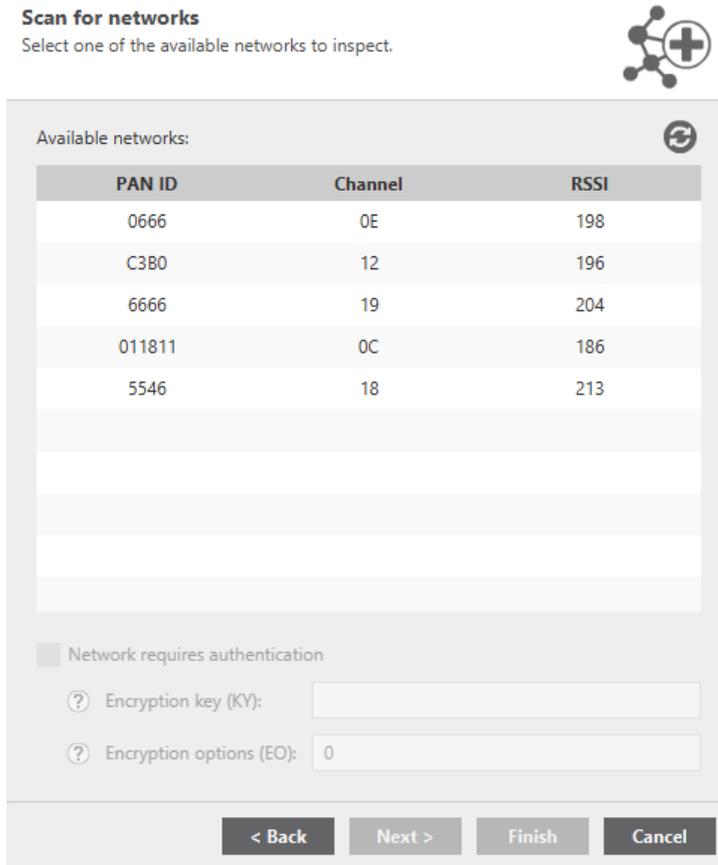
- **Network requires authentication.** Option indicating the network requires authentication. Select this option, and complete the authentication parameters:
 - **Encryption key.** Key used for encryption and decryption (that is, Zigbee trust center link key).
 - **Encryption options.** Numeric value based on the following configuration. Starting with a value of 0:
 - Bit0 - Acquire / Transmit network security key unencrypted during joining: +1 to the numeric value.
 - Bit1 - Use Trust Center: +2 to the numeric value.
 - Bit2 - Use hash link key: +4 to the numeric value.
 - Bit3 - Use Authentication (for trust center only): +8 to the numeric value.

When you are done with the configuration, click **Next** to join the network and open [Step 3 - Load existing network](#). If there are problems joining the network, an error message is displayed.

If you do not want to load an existing network, click **Finish** to start inspecting the network.

Search for networks

The wizard allows you to select the network you want to join from a list of nearby networks.



The available networks are displayed in a table with the following information for each network:

- **PAN ID.** Personal Area Network (PAN) ID the device should join
- **Channel.** Operating channel of the network.
- **RSSI.** Received Signal Strength Indicator of the network.

If the network you want to join requires authentication, check the **Network requires authentication** option and complete the authentication parameters:

- **Encryption key (KY).** Key used for encryption and decryption (that is, the Zigbee trust center link key).
- **Encryption options (EO).** Numeric value based on the following configuration. Starting with a value of 0:
 - Bit0 - Acquire / Transmit network security key unencrypted during joining: +1 to the numeric value.
 - Bit1 - Use Trust Center: +2 to the numeric value.
 - Bit2 - Use hash link key: +4 to the numeric value.
 - Bit3 - Use Authentication (for trust center only): +8 to the numeric value.

Step 3 - Load existing network

Optionally, you can specify the wizard you want to start inspecting a network, based on networks you have already exported. With this option, the Table and Map views are populated with the devices in the exported file, and new devices are added as they are discovered.

Import existing network (optional)

Import and use a network that you previously exported. This allows you to compare the imported and actual networks.



Select the network to import:

Click **Browse** to search for the exported network file you want to load.

Note See [Export the current network](#) topic for more information about exporting networks.

Click **Finish** to start inspecting the network.

Once your XBee device joins a network, the application starts collecting data and displaying the discovered devices with detailed information in both the table and map views.

Note After a device joins a network, it maintains a running discovery process to notify you when new devices are added or lost.

Table view

The table view lists all the devices of the network with detailed information the application discovers new devices.

Role	Node ID	MAC address	NET address	Firmware
Router	Local Device	0013A20040A9526F	F825	23A7
Coordinator	CO-YODA	0013A20040AA2B29	0000	405F
Router	INTRUDER-DROID	0013A20040A9E81B	4ADC	23A7
Router		0013A2004174C9F6	8910	1001
Router	RT4-LUKE	0013A20040A9E756	8915	23A7
Router	RT-KYLO-REN	0013A20040913B75	9D79	4060
Router	RT1-WINDU	0013A20040A9527D	AAF9	23A7
Router	RT2-Obi-Wan	0013A20040A9E883	EFDC	23A7
Router	RT3-ANAKIN	0013A20040A9E85D	7838	23A7
Router		0013A2004174C9F3	CA0B	1001
End device	ED-C3PO	0013A20040ADEA91	7058	29A7
End device	ED-JARJAR	0013A20040A9E740	E313	29A7
End device	ED-DARTH MAUL	0013A20040A6A0DB	3CFC	29A7
End device	ED-CHEWBACCA	0013A20040A9E8AB	2F8F	29A7
End device	ED-PADME	0013A20040A9E7CC	5377	29A7
End device	ED-BOBA FETT	0013A20040A9E77E	873E	29A7

The following columns can be displayed in the table:

■ **Columns shown by default:**

- **Device info.** Displays an icon with additional information about the device.

Icon	Description
	Standard XBee device.
	Indicates the XBee device attached to your computer and used to inspect the network.
	Indicates the XBee device is not reachable. It has been in the network at some point, but now it cannot be found.

- **Role.** One of the following device types:

Icon	Description
	Coordinator
	Router
	End device

- **Node ID.** Node identifier of the XBee device.
- **MAC address.** Physical address of the XBee device; this is unique for each XBee device.
- **NET address.** Address of the device within the network (short address).
- **Firmware version.** Firmware version of the XBee device.

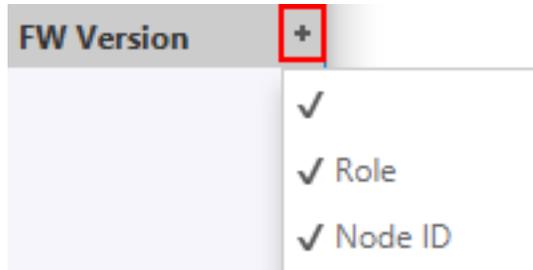
■ **Other available columns:**

- **Hardware version.** Hardware version of the XBee device.
- **Elapsed.** Total time (in minutes and seconds) elapsed since the update process for the XBee device started until finished.
- **Status.** Status of the update process. Available statuses are:

Icon	Description
	Waiting. XBee device waiting for the update process to be executed.
	In progress. Update process in progress.
	Success. Update process finished successfully.
	Error. Update process failed.

- **Progress.** Total percentage of the update process for the XBee device.
- **Details.** Information about the actions taking place in the update process. If the update process failed, this column displays the reason.

Note You can display additional columns or hide columns by clicking the table menu button.



You can also sort the columns by dragging and dropping the corresponding column headers.

When the application detects an XBee device in the network, it displays it in the table. If the application is unable to communicate with the XBee device, some of the properties appear empty and are grayed out.

Role	Node ID	MAC address	NET address	Firmware	
 Router		0013A20040A9E756	8915		+

When the application is able to communicate with the XBee device, the properties are displayed, and you can operate the device. For more information, see [Update your network](#).

Role	Node ID	MAC address	NET address	Firmware	
 Router	RT4-LUKE	0013A20040A9E756	8915	23A7	+

Table toolbar

The network table contains a toolbar that allows you to perform the following actions.



Name	Description	Image
Filter button	Toggle to Show only the programming devices .	
Lock scroll button	Toggle to Lock scroll and unlock .	
Clear devices button	Clear the list of devices .	
Search box	Search for XBee devices in the table.	

Show only the programming devices

When you are performing an update network operation, you may want to display only those devices that are being updated. Click the **Show only the programming devices** button on the toolbar to display only the XBee devices that are being updated. Click the button again to display all the XBee devices.

Lock scroll

Whenever a new XBee device is added to the table, the view automatically scrolls to the bottom of the table. You can click the **Lock scroll** button on the toolbar to disable this feature and maintain the view at its current position. Press the **Lock scroll** button a second time to unlock the view.

Clear the network devices

Click the **Clear the network devices** button to remove the devices from the table.

This operation does not remove, or disconnect, devices from the network; it removes them from the table. If the devices are found again while inspecting the network, they are added to the table.

Search for XBee devices

You can use the search box of the network table toolbar to find XBee devices by search prefix. Type the search expression in the search box.

You can use the following search prefixes:

Search prefix	Colon	Search by
ROLE	:	Device type (Coordinator, Router or End device).
ID	:	Node identifier of the XBee device.
MAC	:	MAC address of the XBee device.
NET	:	Network address of the XBee device.
FW	:	Firmware version of the XBee device.
HW	:	Hardware version of the XBee device (starts with '0x').
STATUS	:	Status of the XBee device update operation.

Note By default, if no prefix is specified, the search box filters by MAC address. To search by MAC, type a part of the address using some wild cards.

For example: `*4F*` shows only the XBee devices with a MAC address that contains 4F.

You can also use a wild card if you do not want to specify the entire parameter, or if you want to find more than one programming task.

Wildcard	Equals
*	any string
?	any character
\	escape for literals (i.e. *, ?, or \)

The following table lists some examples of wild card usage:

Description	Search box text
Get all the XBee devices whose MAC is of this range: 0013A20040F2XXXX	MAC:0013A20040F2* or 0013A20040F2*
Get all the XBee devices whose MAC is of this range: 0013A20040F213XE	MAC:0013A20040F213?E or 0013A20040F213?E
Get all the XBee devices whose firmware version is 23A7	FW:23A7

You must always include the complete MAC address in the search box or a partial MAC address with wild cards.

For STATUS, you can also start typing a valid status value in the search box; for example, **STATUS:Su** without using wild cards. Only successfully updated XBee devices will appear.

Note Blank spaces are taken into account. Be careful introducing spaces after the colon that separates the prefix and the search expression.

'STATUS:Error' (correct).

'STATUS: Error' (incorrect) - There is a space between the colon and the expression).

Map view

The map view allows you to locate XBee devices in a map and get information about the connections between the different nodes of the network. This view is divided in two areas:

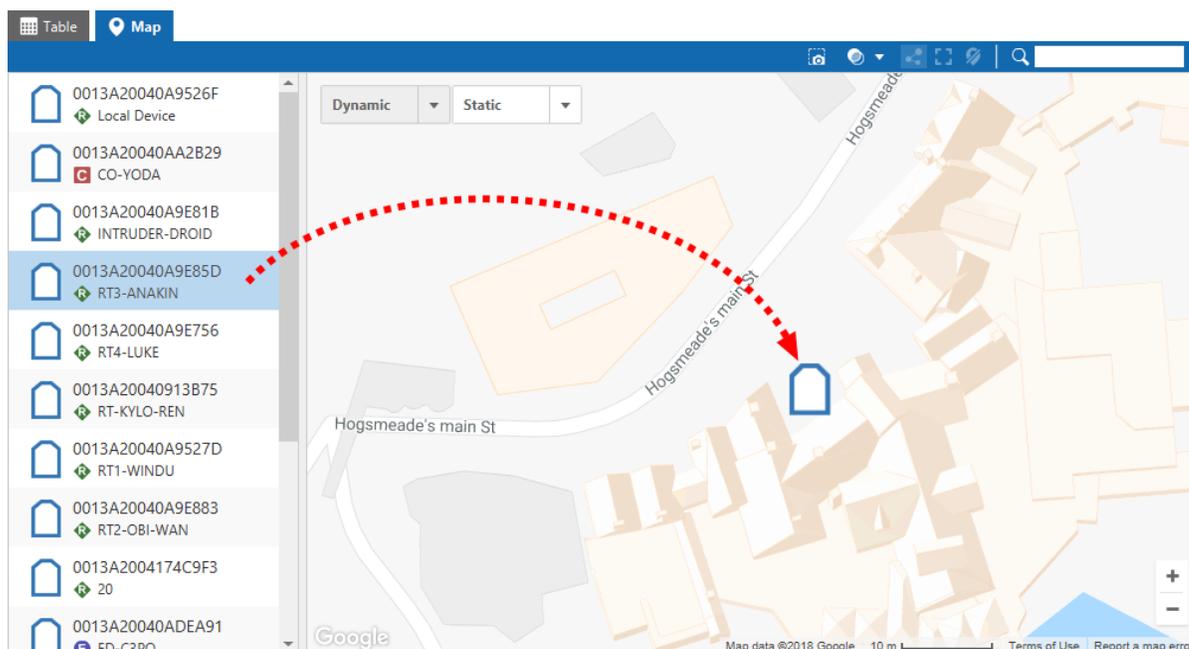
- **XBee devices list.** This list is located on the left side pane and displays all the XBee devices contained in the network. Each device is represented by its MAC address, role (coordinator, router, or end device) icon and node identifier.
 - **Map.** The map is located on the right side pane, and there are two types of maps that can be used to locate XBee devices:
 - **Dynamic map.** Geo-locate XBee devices around the world.
 - **Static map.** Load a map image and place XBee modules. This works well with indoor spaces and buildings.

The first time you join a network, the map view requests the map type (dynamic or static) to locate the XBee devices on the network. Select the appropriate device.

If your first selection was incorrect, you can switch between dynamic and static maps at any time using the [Maps navigation control](#).

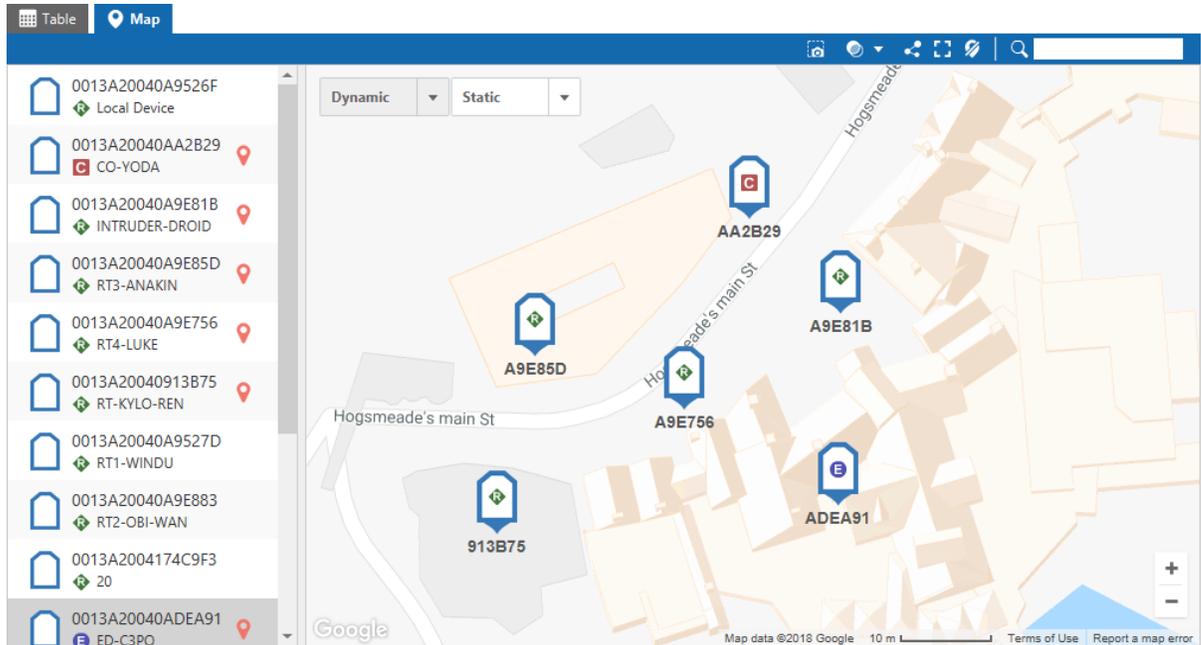
Place devices in the map

When you have selected the map to work with, you can start placing XBee devices. Drag and drop the device from the XBee devices list to the appropriate position in the map .



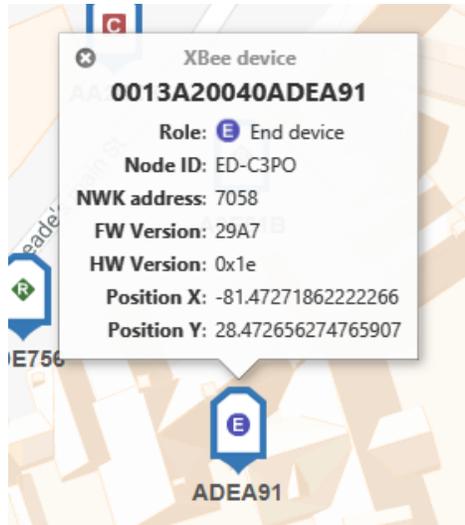
When you place the device, it appears in the map with an XBee-shaped marker that contains the role (that is, coordinator, router, or end device) and is labeled with its MAC address so it can be easily identified. You can drag and drop the marker anywhere on the map.

Note If the device is not ready for communication, the marker is grayed out.



When you select a marker, a pop-over dialog appears above it with details about the Xbee device. The following information is included for each device:

- **MAC address.**
- **Role.**
- **Node identifier.**
- **Network address.**
- **Firmware version.**
- **Hardware version.**
- **Position X.** For dynamic maps, this equal the **longitude** coordinate. For static maps, this is the X relative position of the marker in the image (in pixels).
- **Position Y.** For dynamic maps, this equals the **latitude** coordinate. For static maps, this is the Y relative position of the marker in the image (in pixels).



To remove a marker, right click the marker and select **Remove**. You can also remove markers from the list of devices using the same steps.

Map toolbar

The map toolbar allows you to perform some common operations that you can perform in the map view regardless of the chosen map type (dynamic or static). The map toolbar contains the following options:

Name	Description	Image
Snapshot button	Take a snapshot.	
Opacity control	Change the map opacity.	
Toggle connections	Show the connection lines.	
Center button	Center the map view.	
Clear markers button	Clear the map markers.	
Search box	Search for places on the map.	

Take a snapshot

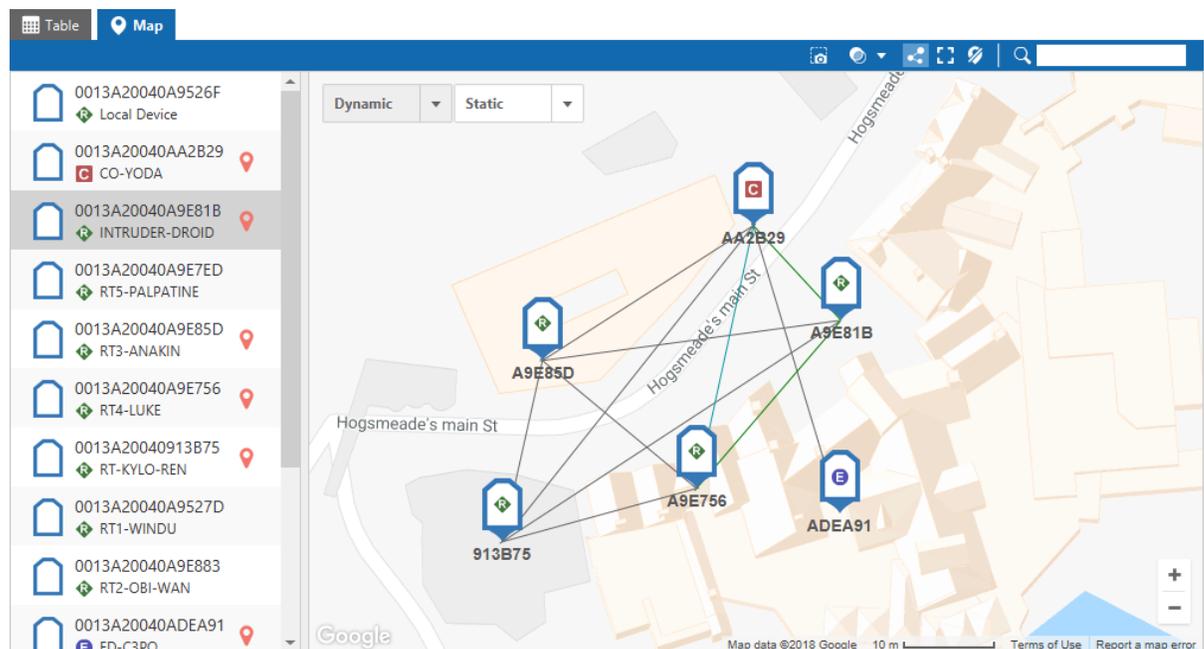
You can take a snapshot of the currently displayed map at any time, including the XBee markers. Click the **Snapshot** button on the toolbar and specify the name of the image to save.

Change the map opacity

Depending on the map being displayed, it may be difficult to distinguish the XBee markers or their labels. The opacity control allows you to change the opacity of the map, so markers can be seen more clearly. Click the **Opacity control** icon on the toolbar and specify the desired opacity with the slider.

Show the connection lines

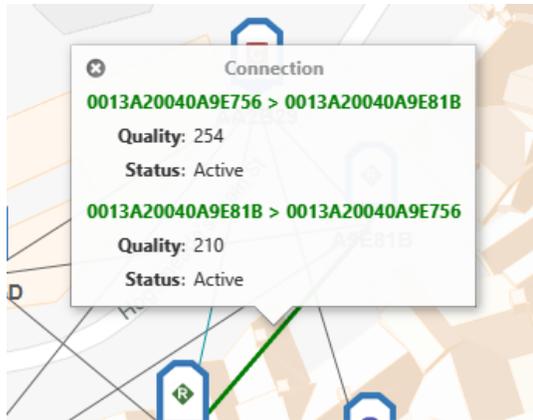
Apart from the devices contained in a network, the XBee Network Assistant application retrieves information for all the connections between the listed nodes. These connections are hidden by default, but you can show them by clicking the **Toggle connections** button on the toolbar.



Each line represents the connection between the two XBee devices. The color of the line changes depending on the quality of the connection. For more information about connection quality ranges and colors, see [Map settings](#).

If any of the devices that are part of the connection are not ready for communication, the connection appears as a dotted line.

Select a connection to view details. When you select a connection, it displays a pop-over dialog with specific information about bidirectional quality and status of the connection.



There are some protocol related considerations that you should note when checking the connections between nodes:

Protocol	Description
802.15.4	The quality of the connection between two XBee devices is not displayed. The devices are in the RF range of the XBee device attached to the computer.
DigiMesh	The quality of the connection between two XBee devices is displayed in dB.
Zigbee	The link quality is represented by Link Quality Indication, or LQI, a number between 0 and 255, where 0 is the weakest and 255 is the strongest.

Center the map view

Depending on the map type, this control has different behaviors:

- Dynamic maps.** Centers and zooms in or out the map until all the XBee device markers are displayed on the map view. The view is centered and focused on the displayed devices.
- Static maps.** Zooms in or out the image of the map until it fits the size of the map view. The view displays the full map image.

Clear the map markers

To clear all the markers from the current map, click the **Clear the map markers** button on the toolbar.

Search for places in the map

In dynamic maps, you can use the **Search box** on the tailboard to look for specific places or directions. Type the direction you want to access and press **Enter**. The map automatically moves to that direction or place.

Note This feature is disabled in static maps.

Maps navigation control

The map view includes a navigation control that allows you to change between dynamic and static maps or add new static maps. It is located at the top left corner of the view.



- [Dynamic map](#)
- [Static map](#)

Dynamic map

Dynamic maps allow you to geo-locate your XBee devices around the globe.

To access the dynamic map click the Dynamic option on the maps navigation control.

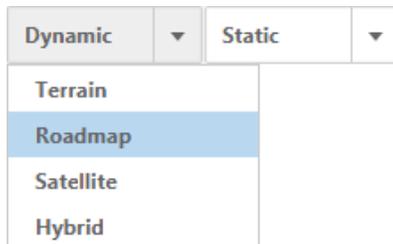


Dynamic map types

With Dynamic maps, there is only one dynamic map to place XBee devices. However, you can configure the dynamic map type to display in different ways. You can use the following supported dynamic map types:

- **Terrain.** Shows the terrain and vegetation.
- **Roadmap.** Shows the street view of a region. Default type.
- **Satellite.** Shows the satellite images of a region.
- **Hybrid.** Shows the major streets and important places on satellite images.

To configure the dynamic map type, click the arrow next to the **Dynamic** option of the maps navigation control to display all the available types and select the appropriate map type.



Static map

Static maps allow you to locate your XBee devices in custom maps (images) such as interiors or buildings. You can add an unlimited number of static maps.

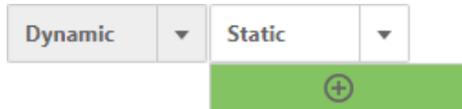
To access the static maps, click the **Static** option of the maps navigation control.



Add a static map

To work with static maps, you need to add at least one map. You can add more maps and navigate between them at a later time.

To add a static map, click the arrow next to the **Static** option of the maps navigation control and select the **+** option. The **Add static map** dialog is displayed.



If you click the Static option on the maps navigation control and there are no static maps, you are prompted with the **Add static map** dialog. Otherwise, the view changes to the last static map selected.

Add static map dialog

Use the **Add static map** dialog to add and configure a static map.

Add static map
Specify the name of the map and the different layers that compose it. Optionally, give this map a real world location.



Name:

Map layers: + -

Name	Image
No map layers in the list	

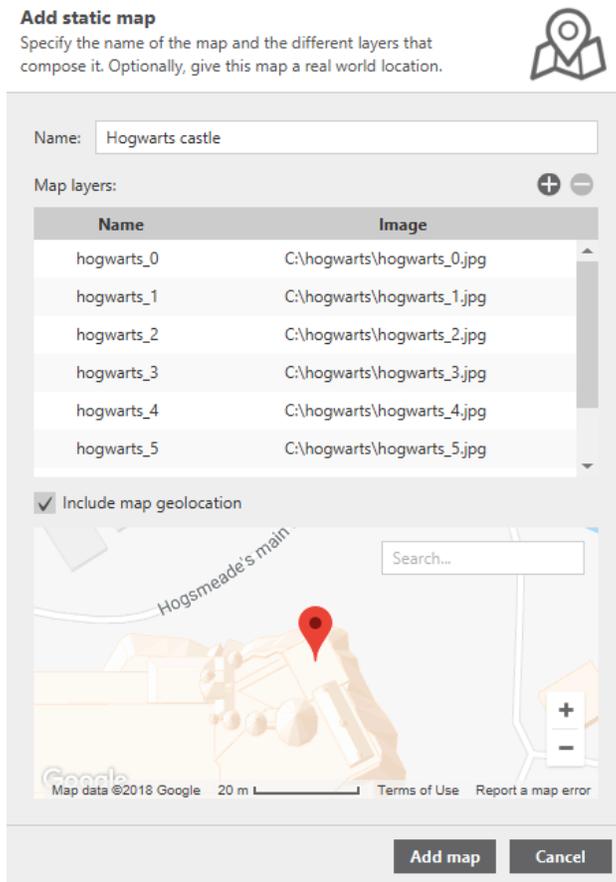
Include map geolocation

Set the following properties of the dialog to create a new static map:

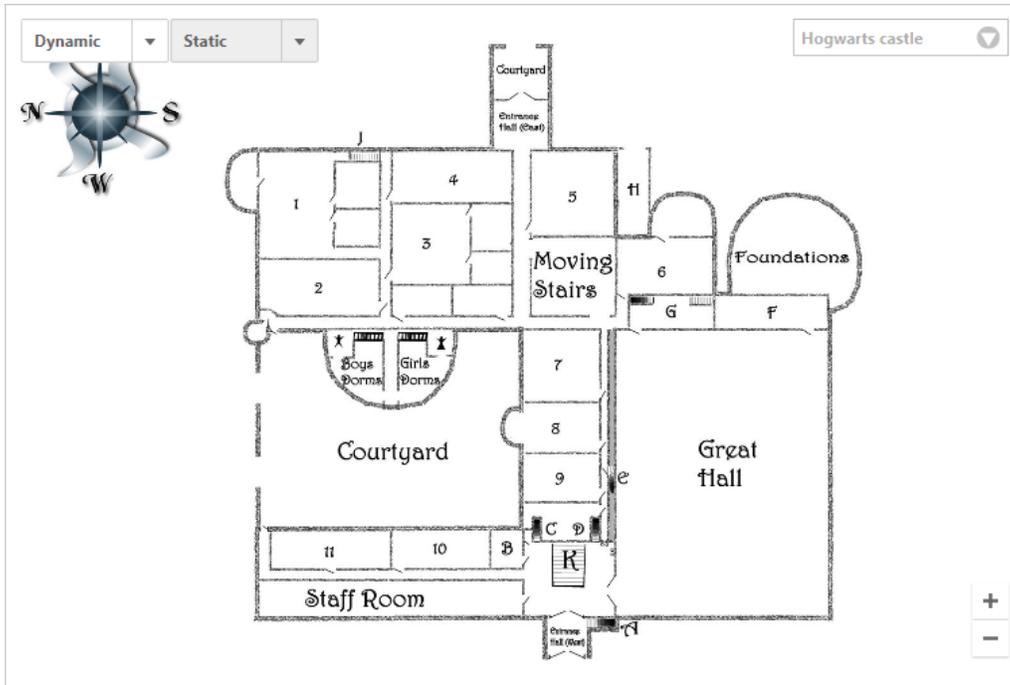
- **Name.** Type the name of the static map; this is the map identifier and it must be unique. There cannot be more than one static map with the same name.
- **Map layers.** Each static map needs to contain at least one layer. A layer can represent a floor or a specific section of a building.
 - To add a layer, click the + button of the **Map layers** section, select all the images you want to add as layers from the **File selection** dialog and click **OK**. The images you select are added as layers and each layer is named automatically with the name of the image file.
 - To remove a layer, select it and click the - button of the Map layers section.

Note Double-click the name of the layer to change the name. The label control changes to a text box where you can enter the new name. When you are finished, press **Enter** to rename the layer.

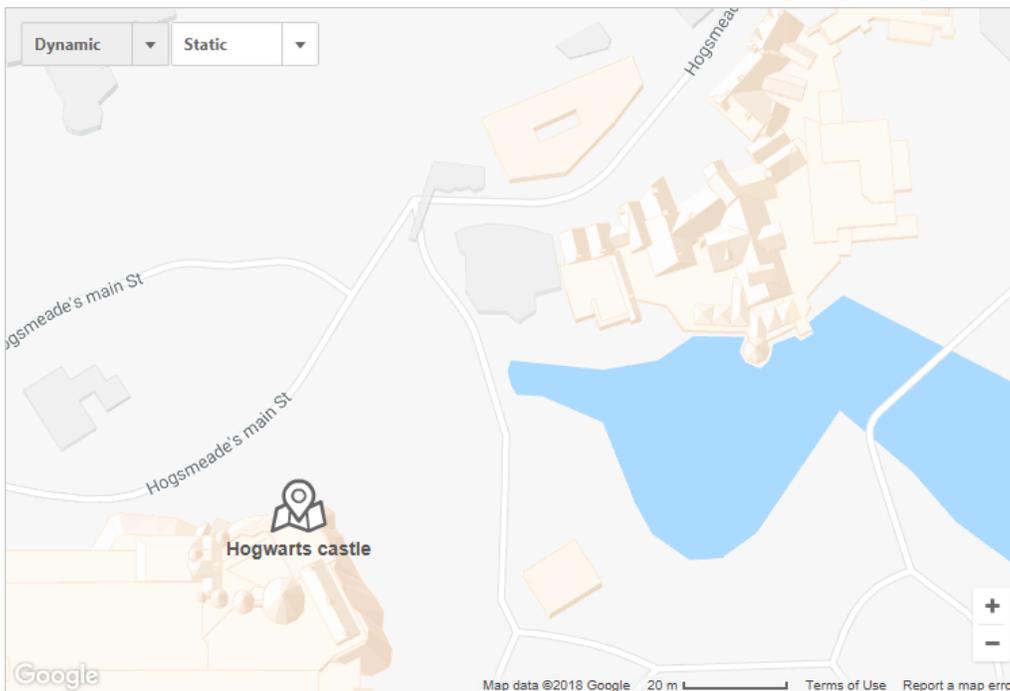
- **Include geolocation.** Optionally, you can provide a geo-location to the map. Select the **Include geolocation** option of the dialog, and then click the location on the dynamic map where you want it placed.



When you are finished, click the **Add map** button to add the static map to the list. The view changes automatically to the first layer of the static map you just added.



Note If the static map was configured with geo-location, a new marker is displayed in that position within the dynamic map. You can double-click the marker to access the static map.

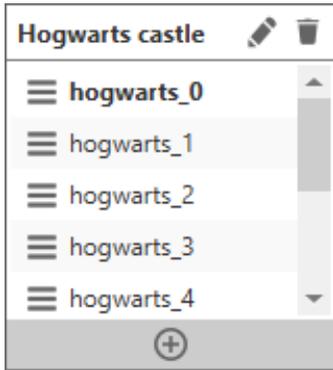


Static map quick menu

When you are working with static maps, the static map quick menu appears in the top-right corner of the map view with the name of the map that is currently displayed.



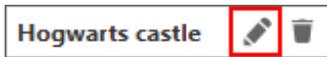
Hover over the control to highlight and expand the options. You can edit or remove static maps, and you can work with static map layers.

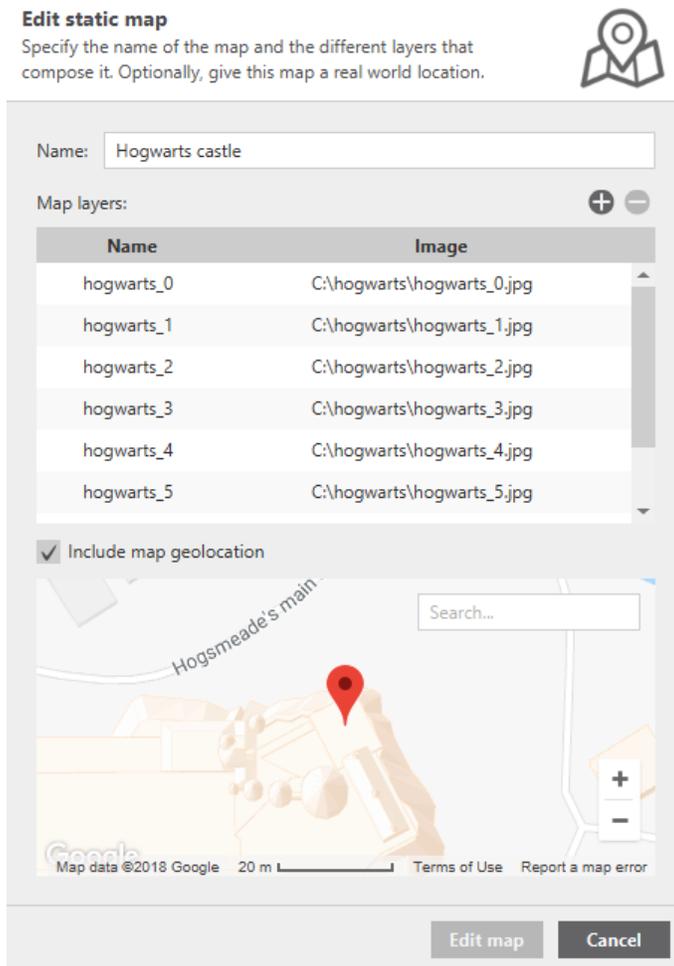


Edit static map

The static map quick menu allows you to edit the current map to change its name, layers, or location. The **Edit static map** dialog is similar to the **Add static map** dialog where you can add, remove, and configure map layers. For more information, see [Add a static map](#).

To edit a map, click the **Edit map** button on the menu. The **Edit static map** dialog appears.

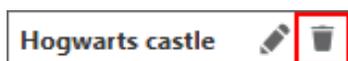




Complete the appropriate changes, and click the **Edit map** button to apply the new map settings.

Remove static map

To remove a static map, click the **Remove map** button on the menu.



Click **OK** to confirm that you want to remove the map.

When you remove a static map, all the XBee device markers within it are also removed, and the map view changes to the next static map in the list. If the map was the only static map, the view automatically displays the dynamic map.

Work with static map layers

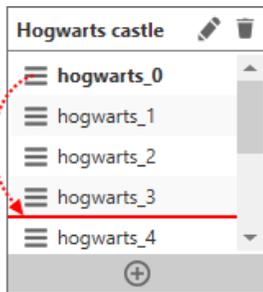
The layers list on the static map quick menu displays all of the layers contained in the static map. The layer that is currently selected and displayed is highlighted in bold. From this list you can change the current layer, reorder layers, or add layers.

Change the current layer

To display a different layer of a static map, click the layer you want to view from the list.

Reorder layers

You can reorder the map layers from the static map quick menu. Set the mouse pointer over the move icon (≡) for the layer, and drag the layer to the desired position in the list.



Add a new layer

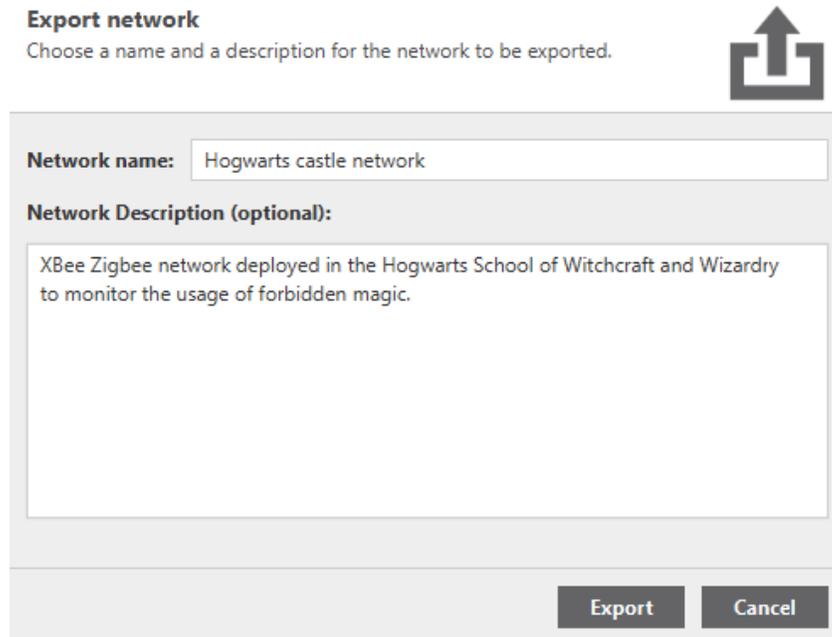
To add a new layer, click the + button located at the bottom of the layers list. Select the images you want to add as layers from the **File selection** dialog and click **OK**.

Export the current network

When all the XBee devices in your network have been located and they are placed in a map, you can export the network to save its current state and import it in future sessions to work offline.

Complete the following steps to export an XBee network:

1. Click the **Export** button on the toolbar. The **Export network** dialog appears.
2. Type the name of the network and a brief description.



3. Click **Export** and select the destination file for the network.

Update your network

The XBee Network Assistant application allows you to configure and update single or multiple XBee devices on your network simultaneously. You can change the settings of your modules, update the firmware, or both.

The update process is based on configuration profiles. A configuration profile is a snapshot of a specific radio firmware configuration that contains information about the radio firmware, its settings, and other metadata.

Note To learn more about configuration profiles and how to create them, see the [Configuration profile](#) topic.

Once you have discovered your network and created a configuration profile, complete the following steps to begin the update process:

1. Click the **Update** button on the toolbar. If there is a network scan in progress, the scan automatically pauses. A dialog appears with information about the configuration profiles.
2. Click **OK** to continue. You can optionally select the **Do not show again** check box if you do not want this dialog to appear again. The **Add configuration profile** wizard appears.
3. Using this wizard, select the configuration profile and the XBee devices you want to update with this profile.
 - [Select the profile](#)
 - [Select the target devices](#)
 - [Add more profiles](#)
 - [Start the update](#)

Update network considerations

Normal network updates only require some minor changes to improve remote node performance; for example, updating some IOs. However, there may be times when you need to change the parameters that define your network, such as the Pan ID. Errors in changing these parameters may cause part of the network to become unreachable.

For this reason, the XBee Network Assistant application uses a secure configuration algorithm whenever any of these network parameters need to be updated. The goal of this algorithm is for the network to remain in a consistent state and be reachable.

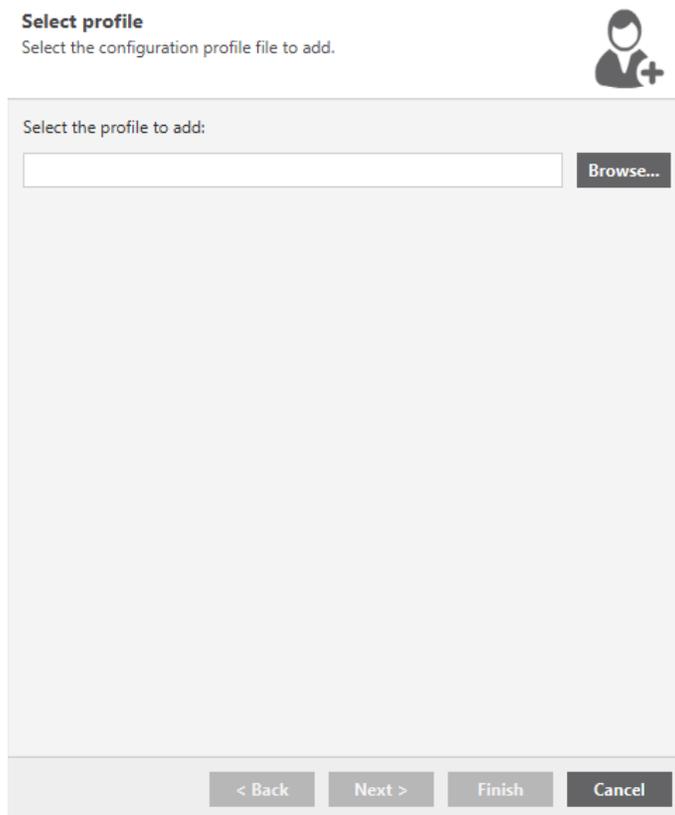
The algorithm works as follows:

1. Verify the list of profiles to configure the network, and check if any of the network parameters need to be applied. The list of network parameters includes:

- **ID:** Pan ID
 - **HP:** Preamble ID
 - **CH:** Channel number
 - **SC:** Scan Channels
 - **CM:** Channel mask
 - **EE:** Encryption enable
 - **KY:** Encryption Key
 - **EO:** Encryption options
2. If the algorithm is needed, the tool verifies that all of the nodes will update the required network settings. If all devices are not selected, a dialog appears indicating that the network could remain inconsistent and asks you if you want to continue.
 3. To verify that the network remains reliable, the update process starts from the farthest to the closest nodes in the network, and finishes on the local device.

Select the profile

To select the profile, load the desired configuration profile to configure the network.



1. Click **Browse....**
2. Locate and select the configuration profile you want to use.
3. Click **Next >**.

Select the target devices

After you have loaded the configuration profile, select the XBee devices from the network to which this profile applies. You may want to update all the XBee devices; for example, if you are upgrading the firmware or changing some settings. Other times, you may only want to configure specific groups or single devices; for example, if the routers have a different configuration than the end devices.

This step allows you to select which targets to apply targets to the profile:

- **All.** The profile applies to all the XBee devices of the network.
- **Specific groups.** The profile applies to the selected groups: coordinator, routers, or end devices. You can include multiple groups.
- **Specific devices.** The profile applies to the selected devices on the list.

Select the target devices
Select the XBee target devices to apply the profile configuration to.



Select the apply targets for the profile:

All
 Specific groups
 Coordinator Routers End devices
 Specific XBee devices

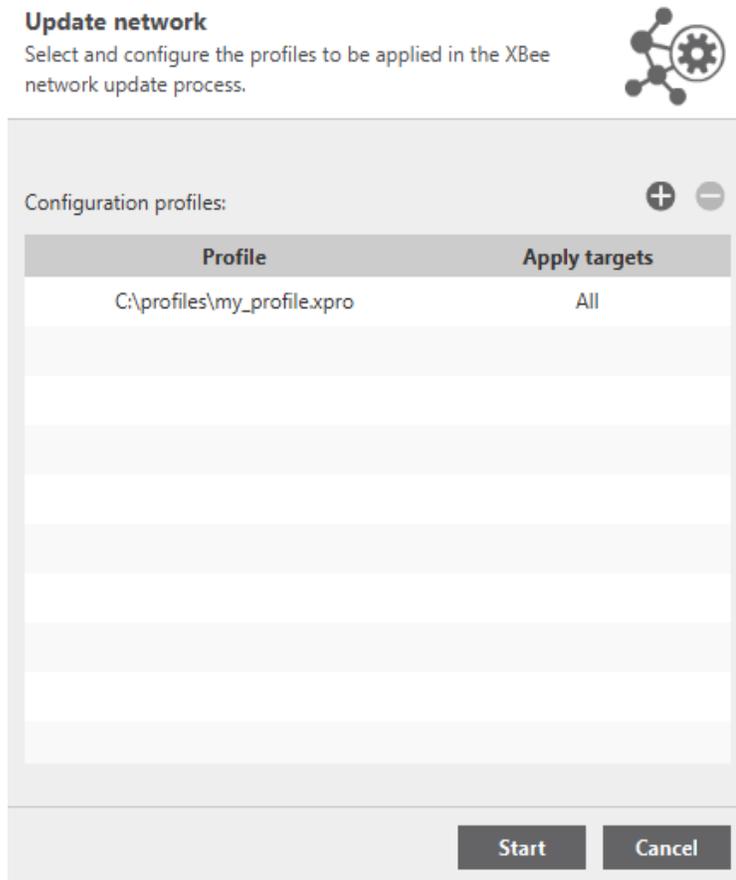
	MAC address	Node ID	Role	FW Version	+
<input checked="" type="checkbox"/>	0013A20040913B75	RT-KYLO-REN	R	4060	
<input checked="" type="checkbox"/>	0013A20040AA2B29	CO-YODA	C	405F	
<input checked="" type="checkbox"/>	0013A20040A9E81B	INTRUDER-DRO...	R	23A7	
<input checked="" type="checkbox"/>	0013A20040A9E883	RT2-OBI-WAN	R	23A7	
<input checked="" type="checkbox"/>	0013A20040A9527D	RT1-WINDU	R	23A7	
<input checked="" type="checkbox"/>	0013A20040ADEA91	ED-C3PO	E	29A7	
<input checked="" type="checkbox"/>	0013A20040A9E740	ED-JARJAR	E	29A7	
<input checked="" type="checkbox"/>	0013A20040A9E7ED	RT5-PALPATINE	R	23A7	
<input checked="" type="checkbox"/>	0013A20040A9E85D	RT3-ANAKIN	R	23A7	
<input checked="" type="checkbox"/>	0013A20040A9E8AA	RT6-DOOKU	R	23A7	

When you have selected the devices you want to update with the profile, click **Finish**.

Add more profiles

To start the update process, you need at least one profile, but you can add more. This is useful if the configuration you want to apply is different between modules. For example, if you have different types of XBee modules in your network, the firmware may not be the same in all of them. In this case, you can create a different profile for each type of XBee device.

To add a new profile, click the **+** button; the **Add configuration profile** wizard appears. If you want to remove a profile from the list, select it and click the **-** button.



Start the update

Once you have added the profiles to update your network, click **Start** to begin the process.

Before starting the update, you may see a progress dialog. This means the application is verifying the configuration profiles and establishing the order of the update.

The tool displays the following columns in the table:

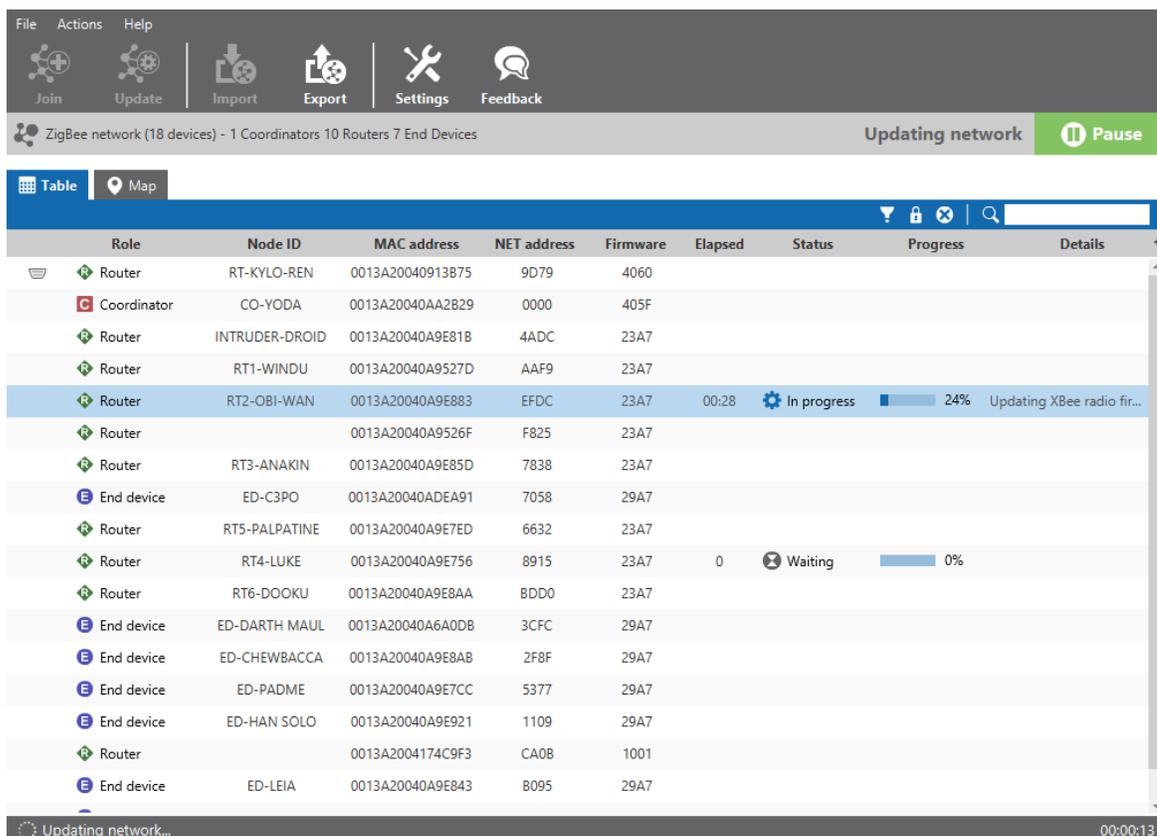
- **Elapsed.** Total elapsed time of the update process in minutes and seconds from beginning to end.

- Status.** Status of the update process. The statuses are as follows:

Icon	Description
	Waiting. XBee device waiting for the update process to be executed.
	In progress. Update process in progress.
	Success. Update process finished successfully.
	Error. Update process failed.

- Progress.** Total percentage of the update process.
- Details.** Information about the actions taking place in the update process. If it fails, this field displays the reason.

Note When network parameters change, the order of the update is not sequential from the first XBee device to the last one in the table. The application calculates the routes and connections between the devices, and, based on this calculation, updates them from the furthest to the nearest devices.



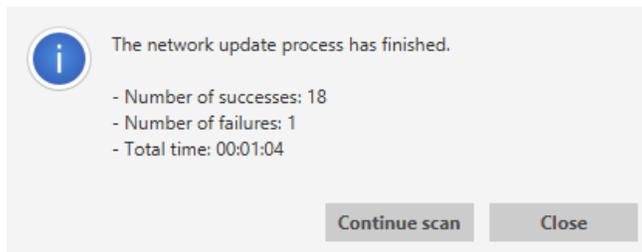
The screenshot shows the software interface for managing a ZigBee network. At the top, there is a menu bar with 'File', 'Actions', and 'Help'. Below it are icons for 'Join', 'Update', 'Import', 'Export', 'Settings', and 'Feedback'. A status bar indicates 'ZigBee network (18 devices) - 1 Coordinators 10 Routers 7 End Devices' and 'Updating network' with a 'Pause' button.

The main area features a table with columns: Role, Node ID, MAC address, NET address, Firmware, Elapsed, Status, Progress, and Details. The table lists 18 devices. One device, 'RT2-OBI-WAN', is highlighted in blue and is in the 'In progress' state with a 24% progress bar. Another device, 'RT4-LUKE', is in the 'Waiting' state with a 0% progress bar.

Role	Node ID	MAC address	NET address	Firmware	Elapsed	Status	Progress	Details
Router	RT-KYLO-REN	0013A20040913B75	9D79	4060				
Coordinator	CO-YODA	0013A20040AA2B29	0000	405F				
Router	INTRUDER-DROID	0013A20040A9E818	4ADC	23A7				
Router	RT1-WINDU	0013A20040A9527D	AAF9	23A7				
Router	RT2-OBI-WAN	0013A20040A9E883	EFDC	23A7	00:28	In progress	24%	Updating XBee radio fir...
Router		0013A20040A9526F	F825	23A7				
Router	RT3-ANAKIN	0013A20040A9E85D	7838	23A7				
End device	ED-C3PO	0013A20040ADEA91	7058	29A7				
Router	RT5-PALPATINE	0013A20040A9E7ED	6632	23A7				
Router	RT4-LUKE	0013A20040A9E756	8915	23A7	0	Waiting	0%	
Router	RT6-DOOKU	0013A20040A9E8AA	BDD0	23A7				
End device	ED-DARTH MAUL	0013A20040A6A0DB	3CFC	29A7				
End device	ED-CHEWBACCA	0013A20040A9E8AB	2F8F	29A7				
End device	ED-PADME	0013A20040A9E7CC	5377	29A7				
End device	ED-HAN SOLO	0013A20040A9E921	1109	29A7				
Router		0013A2004174C9F3	CA0B	1001				
End device	ED-LEIA	0013A20040A9E843	B095	29A7				

At the bottom of the interface, there is a progress indicator for 'Updating network...' and a timer showing '00:00:13'.

When all the devices you selected have been updated, the application displays a dialog with the summary of the process. You can continue the network scan or close it.



Work offline with your network

The XBee Network Assistant application is designed to work with live XBee networks. However, there is some functionality that can be used without having an XBee device connected to your computer or access to the network.

To work offline with the application, you must import an XBee network that was previously exported (see [Export the current network](#) for more information).

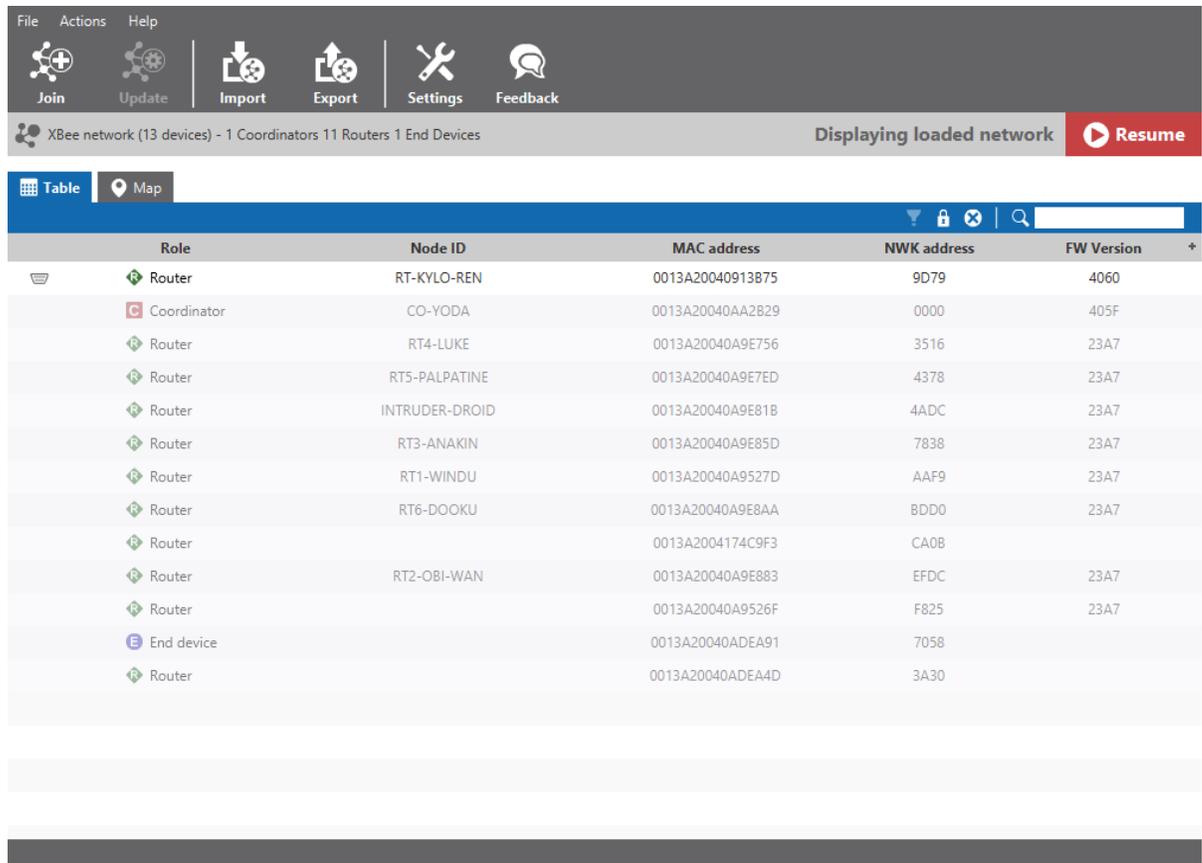
- [Import an XBee network](#)
- [Available features while working offline](#)

Import an XBee network

To import an XBee network, complete the following steps:

1. Click the **Import** button from the toolbar. A dialog appears for you to select the XBee network file (.xnet).
2. Select your network and click **Open**.

The application adds the XBee devices that form the network to the table; this includes the exported maps and the locations of the devices. By default, all the XBee devices appear disabled and grayed out, unless you still have the XBee device that you used to access the network connected to the computer.



Available features while working offline

When you import an XBee network, you only see a snapshot of how the network appeared when it was exported. This means the network you have imported may not be completely accurate, because it may have been altered since it was exported.

For this reason, the functionality of the application is limited to the following tasks when working offline.

Resume the network scan

When you import a network, you can resume the scan by clicking the **Resume** button from the action bar if you still have access to the network. This is useful if you want to compare the status of the network when you exported it versus the online version.

If the XBee device you exported is still connected to the computer, the application resumes the scan automatically. Otherwise, it prompts you to select a new XBee device that is connected to your computer. If network devices are discovered, they appear available in the table and map views.

Update some devices

Because you are working offline, you can only update XBee devices that are connected to your computer (if any). However, if you resume the network scan and the devices become available, you can update them as well.

Work with the maps

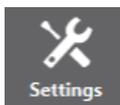
You can visualize the XBee devices on the network in the table view and in the maps. In addition, you can change the device locations, analyze device connections, and add, edit or remove any static map.

Export the network

Use this feature if you made any modification in the device locations or in the maps and you want to preserve those changes. The export process is the same as if you were working online with the application.

Applications settings

This section provides information on how to configure multiple XBee Network Assistant settings. To open the **Settings** dialog, click the **Settings** button on the toolbar or select the **File > Settings**.



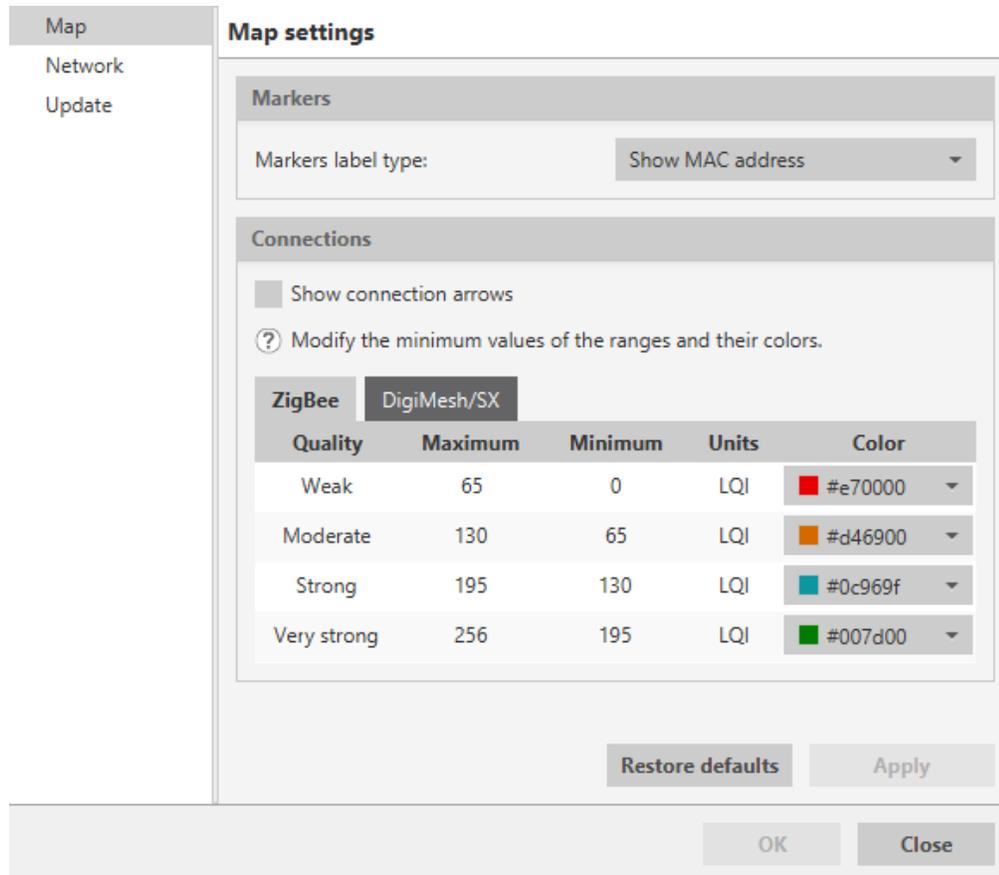
The setting categories are listed on the left side of the **Settings** dialog. You can configure settings for the following categories:

Map settings	51
Network settings	51
Update settings	53

Map settings

To configure settings related to the maps, complete the following steps:

1. Click the **Settings** button on the toolbar or select **File > Settings** from the menu. The **Settings** dialog appears.

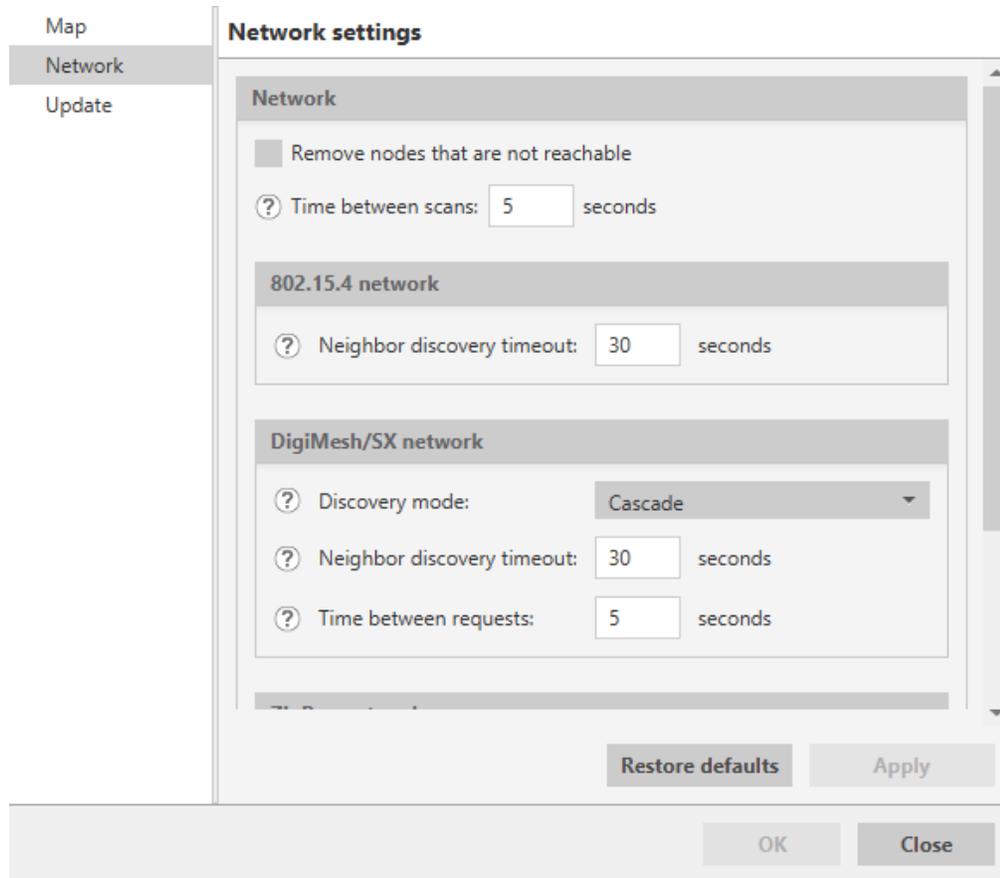


2. On the left side of the Settings dialog, select **Map**.
3. Configure the appropriate settings and click **Apply**.

Network settings

To configure settings related to XBee networks, complete the following steps:

1. Click the **Settings** button of the toolbar or select **File > Settings** from the menu. The **Settings** dialog appears.



2. On the left side of the Settings dialog, select **Storage**.
3. Configure the appropriate settings and click **Apply**.

Setting	Description
Remove nodes that are not reachable	Enables or disables the removal of XBee devices that are not reachable on the network. A node is not reachable if it was part of the network but can not be discovered anymore. If you select this setting, the unreachable devices are removed from the table and map; otherwise, the application shows a warning icon for those devices.
Time between scans	Specifies the time to wait before starting a new scan during the constant network scan process. The value must be between 0 and 300 seconds (5 minutes).

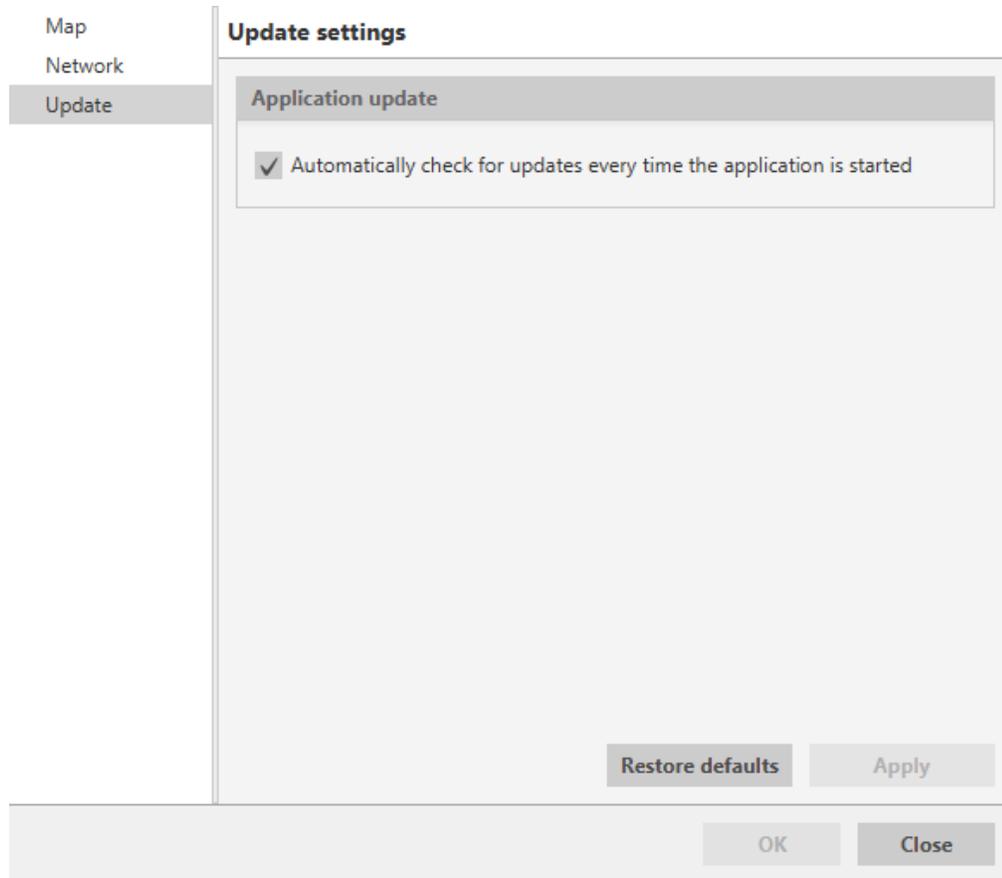
The remainder of the options are specific to 802.15.4, DigiMesh, and Zigbee network types:

Setting	Description
Discovery mode	<p>Sets the method used by the network discovery process.</p> <ul style="list-style-type: none"> ■ Flood: The neighbor discovery process is performed for every node at the moment the node is found. Several discovery processes may be running at the same time. This method may be faster, but it may also generate high traffic and saturate the network. ■ Cascade: The neighbor discovery process is performed for every node as soon as the discovery process completes. Only one discovery process runs at a time. This method may be slower, but it is likely to generate less traffic. This method is the most reliable.
Neighbor discovery timeout	<p>Sets the maximum duration, in seconds, the discovery process should spend finding neighbors of a module. The values must be between 5 and 1800 seconds (30 minutes). This timeout is highly dependent on the nature of the network. For DigiMesh, the value should be greater than the highest NT (Node Discover Timeout) and include enough time to let the message propagate, depending on the sleep cycle of your devices.</p>
Time between requests	<p>Sets the wait time between node neighbor requests. The value must be between 0 and 300 seconds (5 minutes).</p> <p>For the Cascade method, this is the number of seconds to wait after completion of the neighbor discovery process of the previous node.</p> <p>For the Flood method, this is the minimum time to wait between each radio module's neighbor requests.</p>

Update settings

You can configure the application to automatically check for new application updates when the application starts.

1. Click the **Settings** button of the toolbar or select **File > Settings** from the menu. The **Settings** dialog appears.



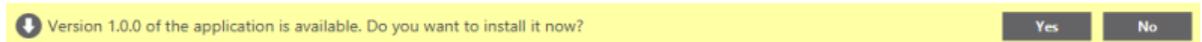
2. On the left side of the Settings dialog, select **Update**.
3. Select or clear the **Automatically check for updates every time the application is started** checkbox to enable or disable the automatic updates feature.
4. Click **Apply**.

Update the tool

The XBee Network Assistant allows you to automatically update the application without downloading any extra files. This process can be configured to execute automatically, but you can also execute it manually at any time. For more information about configuring automatic updates, see [Update settings](#).

If you have enabled the automatic updates, you may be notified about software updates when you open the XBee Network Assistant. You should always run the latest version of the tool.

1. When a new version is available, a notification window appears asking you if you want to update the application.



2. Click **Yes** to start the update process.
3. When the installation process is complete, you must restart XBee Network Assistant for new changes to be applied. When prompted, click **Yes** to restart the tool.

You can also check for updates and manually update the tool by clicking **Help > Check for updates**.

Note Click the **Run in background** button of the progress dialog to execute this process in the background. The status bar displays the update progress.

How-to articles

The following pages contain how-to articles describing some of the most common procedures to work with the XBee Network Assistant tool.

How to create a profile using XCTU

XCTU is required to generate and save configuration profiles. This section provides the steps to create a profile using XCTU.

For more information about configuration profiles, see [Configuration profile](#).

Step 1: Configure the profile

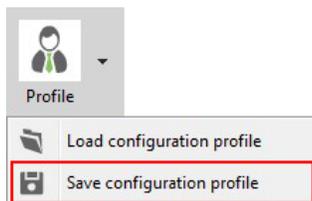
XCTU offers two methods for configuring a profile:

- Configuration working mode
- Firmware explorer

Configuration working mode

Configuration working mode allows you to quickly generate profiles for modules attached to your computer.

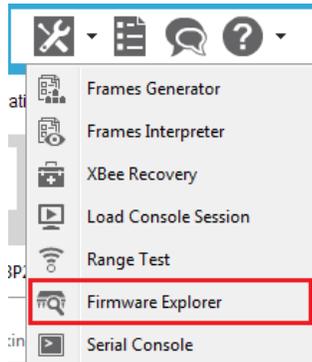
1. In the main window of XCTU, switch to **Configuration working mode** .
2. Select a radio module from the device list.
3. Configure the radio module with the appropriate values. You only need to change the values; they don't need to be written to the specific module.
4. Click the **Configuration profiles** drop-down menu on the configuration toolbar and select **Save configuration profile**.



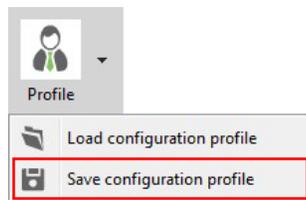
Firmware Explorer

The Firmware Explorer is useful for generating profiles for modules that you may not have.

1. In the main window of XCTU, select the **Firmware explorer** tool in the tools menu.

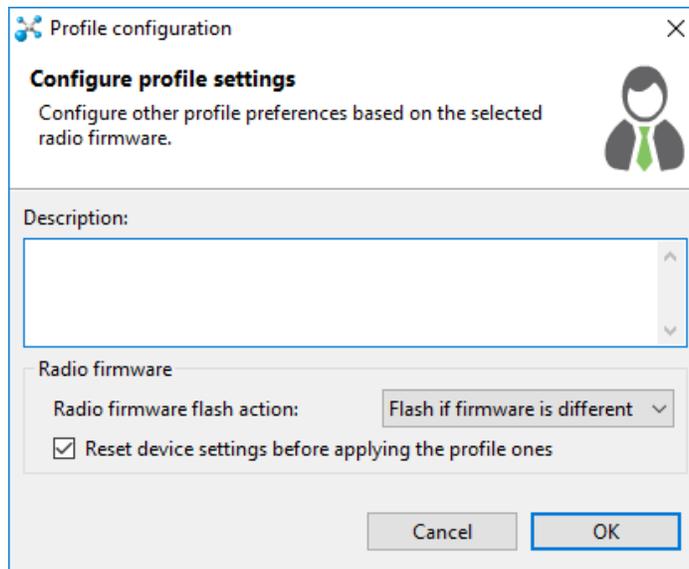


2. Create a representative model upon which to base the configuration profile by selecting the specific firmware (that is, Product family, Function set and Firmware version) and modifying the appropriate settings.
3. Click the **Configuration profiles** drop-down menu on the configuration toolbar and select **Save configuration profile**.



Step 2: Set the profile preferences

1. Select **Save configuration profile**. A window appears that allows you to set some extra configurations:



You can use this window to:

- Include a short description of the profile to be generated (optional).
- Select the Radio firmware flash action from the drop-down list:
 - **Flash always:** The firmware image is always programmed into the module. Then, if there are non-default settings, they are applied and written to the XBee, as well.
 - **Flash if firmware is different:** If the target device has the same firmware version as the one selected in the profile, only the settings are written to that device. If the target device does not have the same firmware version as the one selected in the profile, both the firmware and the settings are flashed into the module.
 - **Do not flash firmware:** Only the non-default settings are written to the device.
- Select whether you want to reset the XBee module settings to their default values prior to applying the profile settings.

Note A profile should only be configured in compatible modules. For example, do not configure a profile for an S2C module in an SX.

This is particularly important with the **Do not flash firmware** option. It should only be used when the firmware version of the target device matches that of the profile.

2. Once you are finished, click **OK** in the **Profile configuration** window. A **Save file** dialog box appears.
3. Choose a name and path and click **Save**.

Known issues

The XBee Network Assistant application currently has the following known issues and limitations.

The XBee device must follow these requirements to access the network:

- The device must operate in API or API escape mode. If you attempt to add a device configured in transparent mode (AT), the application displays an error message but allows you to change the mode.
- The device must not be an end device. The discovery process is not supported for this type of device.
- The device must not be a coordinator if you are working with Zigbee networks. Management of routes and connections is limited with this device type.