User Manual

Allen-Bradley

Configurable NAT Router

Catalog Number 1783-NATR

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Network Implementation

The 1783-NATR is a network device with Embedded Switch Technology capable of doing Network Address Translation (NAT) for applications using Device Level Ring (DLR) or linear topologies. The 1783-NATR device can be used to connect a small private network (for example, a machine network) to a larger plant-wide network without changing IP addresses on the private network.

The 1783-NATR device serves as a default gateway for the private network. It translates private IP addresses to unique public IP addresses (1:1 NAT). If a device on the private network must be accessible from the public network, a translation is created on the 1783-NATR device.

Figure 1 shows an example network implementation of the 1783-NATR device. In this example, two small machines with private networks are integrated into an overall plant network for remote access and monitoring purposes.

Figure 1 - Network Implementation Example with 1783-NATR Device

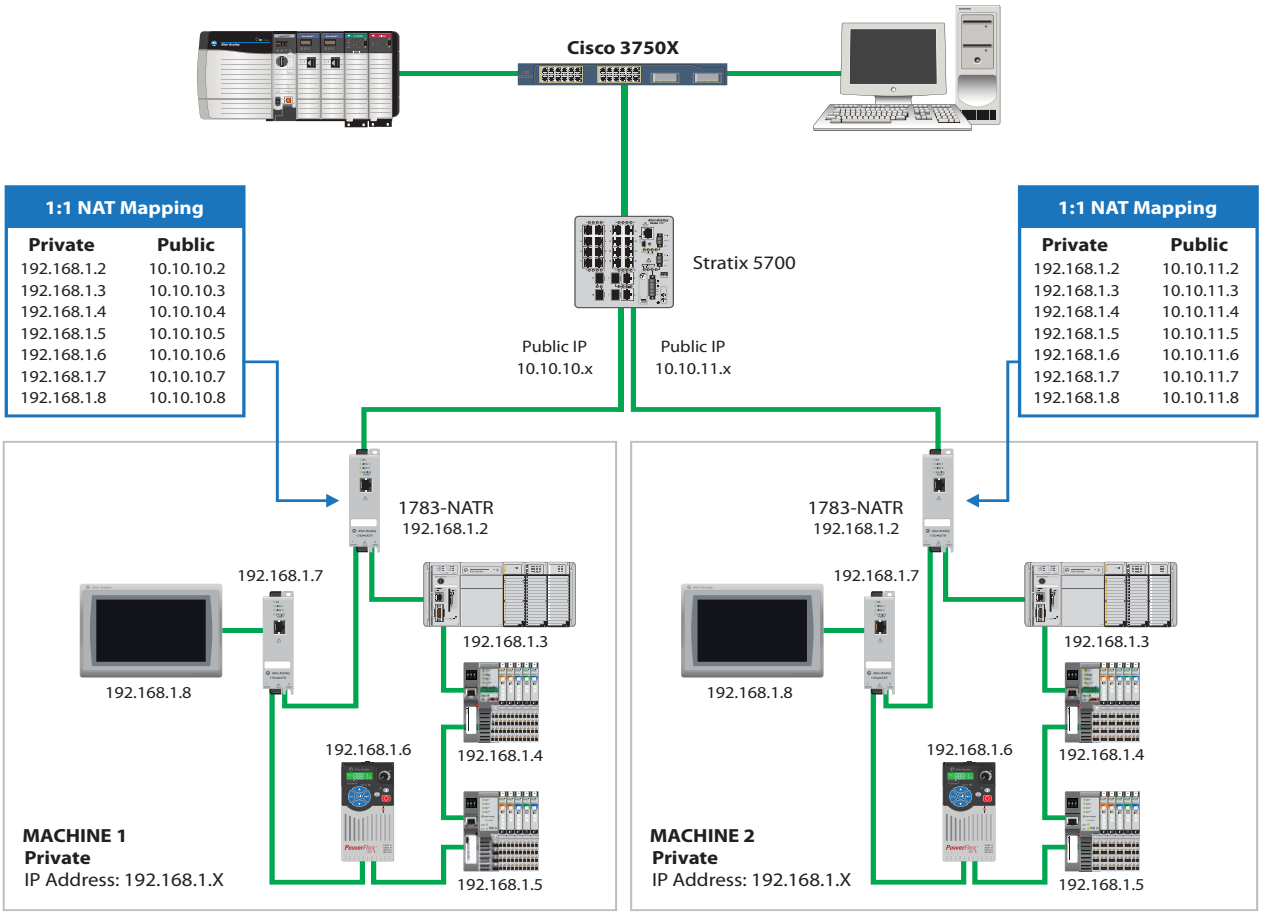
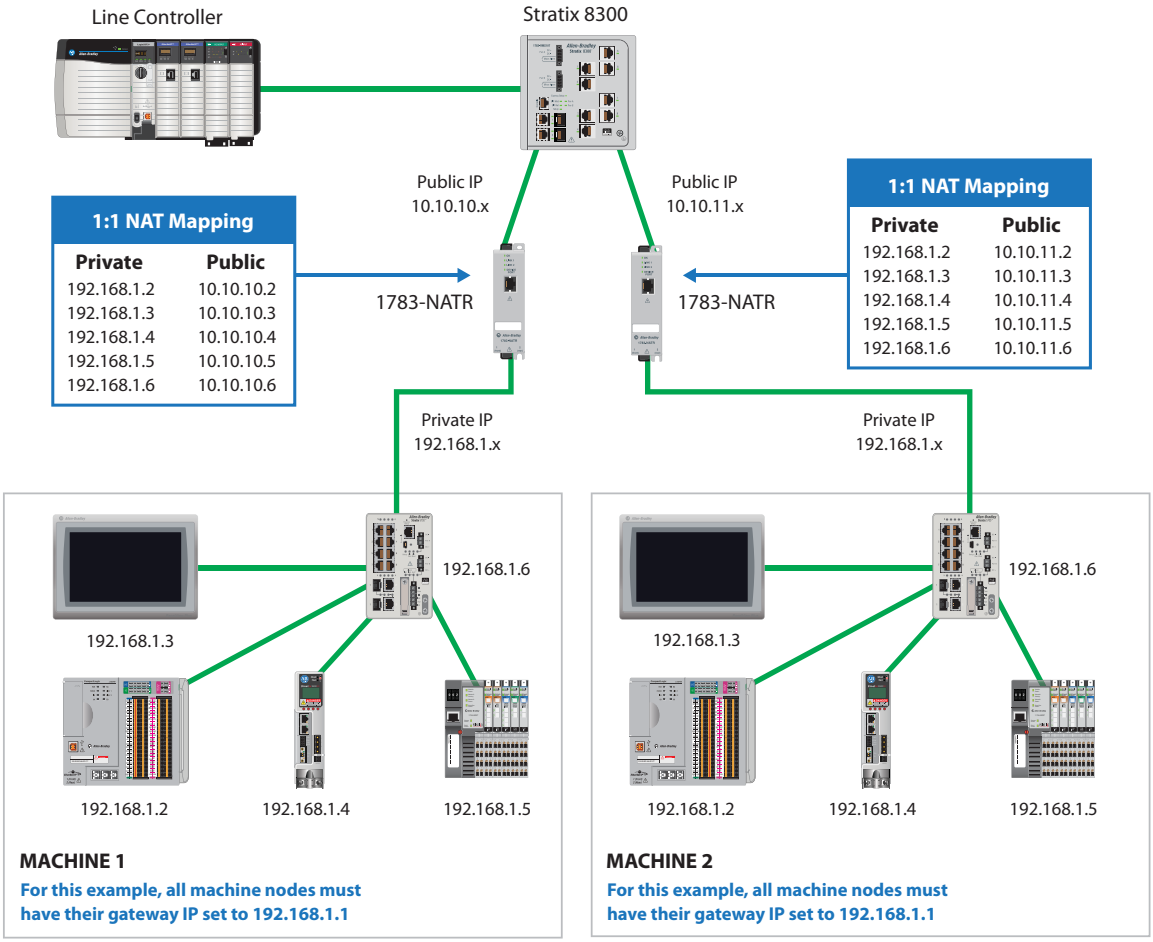


Figure 2 shows an example network implementation of the 1783-NATR device with a Stratix 8300 switch.

Figure 2 - Network Implementation Example with 1783-NATR Device and Stratix 8300



Because there are Public and Private ports on the 1783-NATR device, the ports are used for different purposes.

Public Port

The Public port is used to connect the device to the Public (Outside) network. The public network can be a plant-wide network with unique IP addressing scheme. The MAC address of the Public port differs from the MAC address of the Private ports. The IP address of the Public port also differs from the IP address of the Private ports. The Public port is in standard Ethernet configuration in the Star topology.

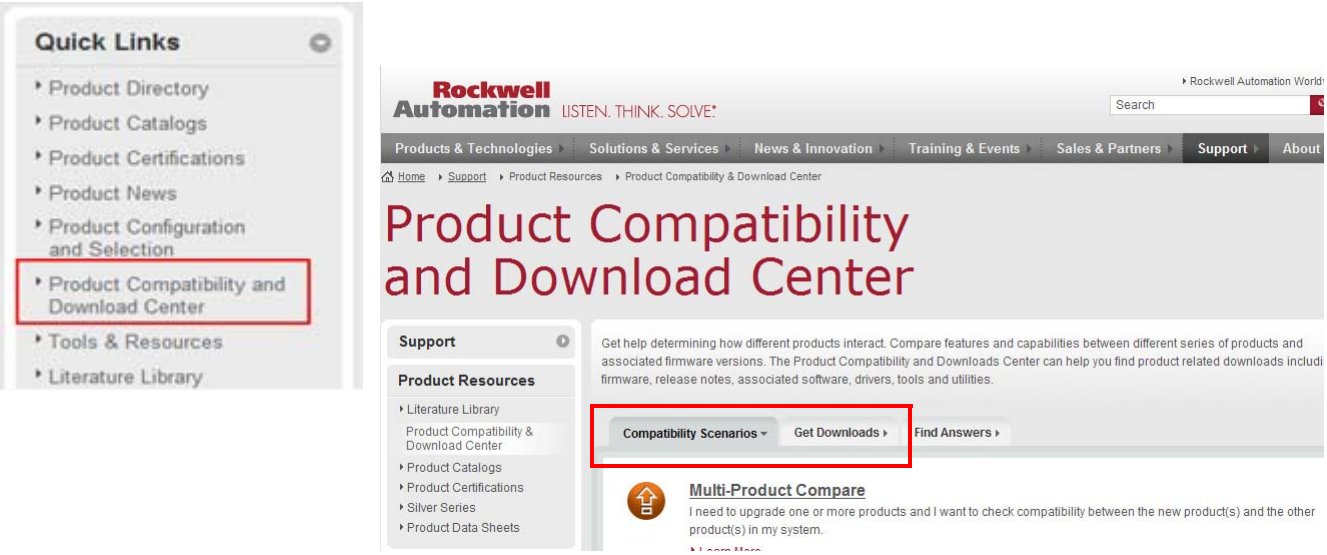
Private Ports

The Private ports are used to connect the device to the Private (Inside) network. The private network can be a small network for a machine or process area where IP addresses can be reused throughout the plant. The Private ports share MAC addresses, which differ from the MAC address of the Public port. The Private ports share IP addresses, which differ from the IP address of the Public port. The Private ports can be used in the Linear or Ring topology. In Ring topology, the ports comply with the ODVA DLR specification. In Linear topology, the ports operate as standard Ethernet in daisy-chain or star topology.

Access Release Notes

Product release notes are available online within the Product Compatibility and Download Center.

1. From the Quick Links list on http://www.ab.com, choose Product Compatibility and Download Center.



2. From the Compatibility Scenarios tab or the Get Downloads tab, search for and choose your product.

3. Click the download icon  to access product release notes.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Stratix Ethernet Device Specifications Technical Data, publication 1783-TD001	Provides specifications for Stratix ethernet devices.
Ethernet Embedded NAT Device Product Information, publication 1783-PC017	Provides information for ethernet embedded NAT devices.
Ethernet Tap Product Information, publication 1783-PC011	Provides information for Ethernet tap devices.
Network Address Translation Application Technique, publication ENET-AT005	Provides information for application techniques for Network Address Translation.
EtherNet/IP Network Configuration User Manual, publication ENET-UM001	Describes how you can use EtherNet/IP communication modules with your Logix5000™ controller and communicate with various devices on the Ethernet network.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website http://www.rockwellautomation.com/rockwellautomation/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Chapter 1

Install the 1783-NATR Device

Chapter 2

Configure the 1783-NATR Device

Chapter 3

1783-NATR Device Diagnostics

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Install the 1783-NATR Device

Install the Device

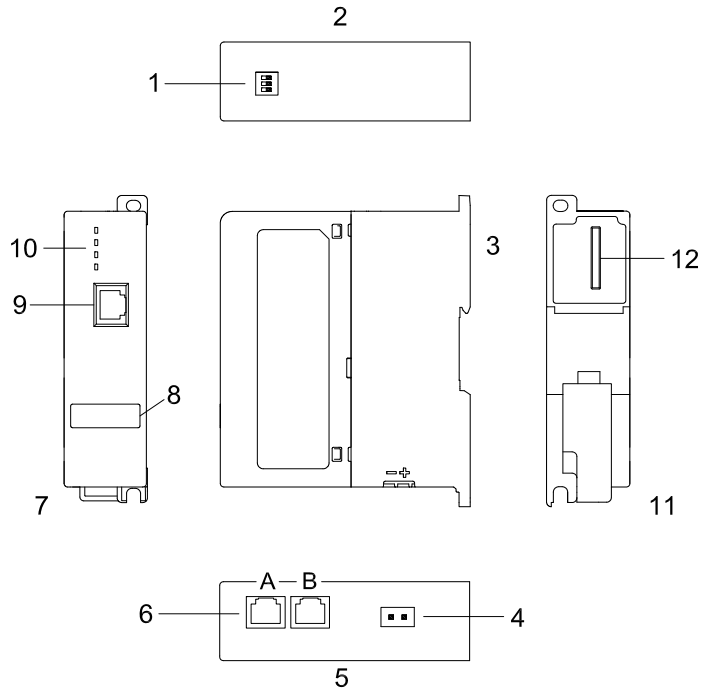
WARNING: For hazardous location applications, use the supplied Weidmuller 1317570000 power terminal block.

Follow these procedures to install the 1783-NATR device.

1. Install the Secure Digital (SD) card (optional).
2. Verify that you have the correct software versions.
3. Mount the 1783-NATR device in one of these configurations:
   - Panel mount
   - DIN rail mount
4. Wire the 1783-NATR device.
5. Connect the Ethernet ports.
6. Download the EDS file for the 1783-NATR device.
7. Configure Internet Protocol settings.
8. Set the DIP switches.

This publication describes these steps in detail.

The 1783-NATR device components are shown in the following figure and table.



Item	Description	Item	Description
1	DIP switches	7	Front view
2	Top view	8	User label
3	Side view	9	Public port on front panel
4	DC connector	10	Status indicators
5	Bottom view	11	Rear view
6	Private ports for connection to linear or ring network A: Port 1 B: Port 2	12	SD card slot

Install the SD Card

The SD card installation is optional. The purpose of the SD card is to back up and restore the configuration of the 1783-NATR device.

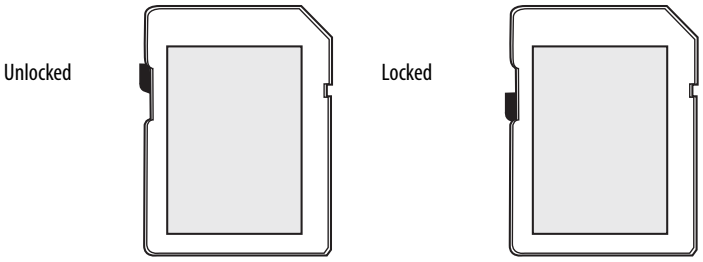
Complete these steps to reinstall an SD card that has been removed from the 1783-NATR device back into the device or to install a new SD card into the device.

It is recommended that you leave the SD card in the 1783-NATR device, even when it is not used. The SD card can be used to restore the configuration of the 1783-NATR device.

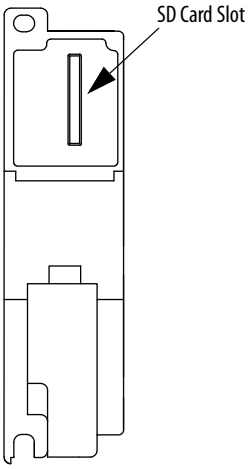
WARNING: When you insert or remove the SD card while power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

1. Verify that the SD card is locked or unlocked according to your preference. Consider the following when deciding to lock the card before installation:
   - If the card is unlocked, the 1783-NATR device can write data to it or read data from it.



2. Locate the SD card slot on the rear of the 1783-NATR device.



3. Insert the SD card into the SD card slot.

   You can install the SD card in only one orientation. The notch on the SD card points toward the top of the device.

   If you feel resistance when inserting the SD card, pull it out and change the orientation.

4. Gently press the card until it clicks into place.

Software Requirements

You must have these versions of software to configure your 1783-NATR device.

Software	Version
RSLinx® Classic	2.7 or later
Studio 5000 Logix Designer™	20 or later

Mount the NATR Device

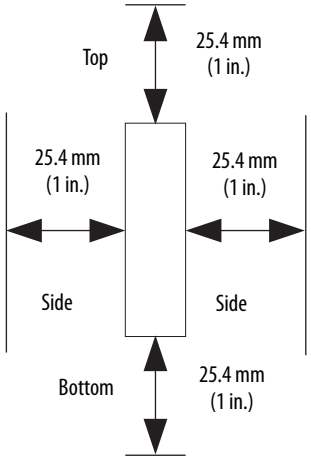
You can mount the 1783-NATR device on a DIN rail or on a panel.

WARNING: When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method that complies with the governing electrical codes.

IMPORTANT The 1783-NATR device is intended to be mounted only vertically. Do not mount the 1783-NATR device horizontally.

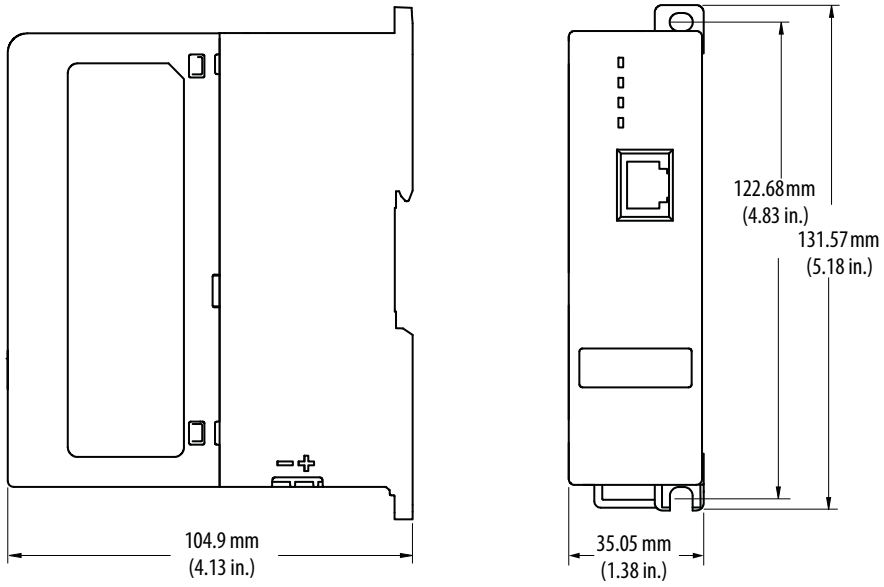
Minimum Spacing

Maintain spacing from enclosure walls, wireways, and adjacent equipment. Allow 25.4 mm(1 in.) of space on all sides. This spacing provides ventilation and electrical isolation. The spacing also accommodates the bend radius of the cables that are connected to the bottom of the 1783-NATR device..



Device Dimensions

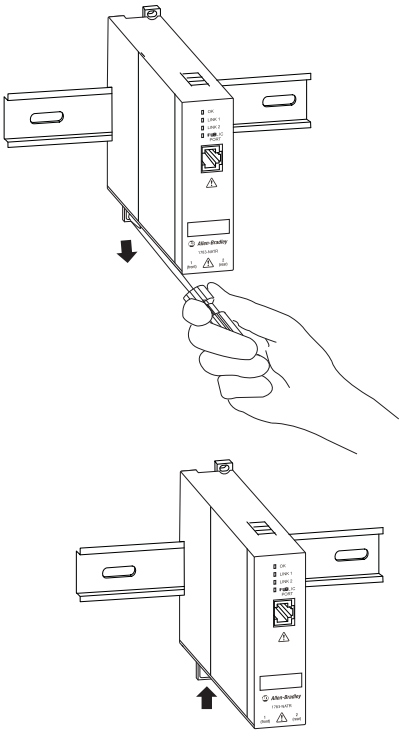
This graphic shows the device dimensions.



DIN Rail Mounting

To install the 1783-NATR device on a DIN rail, by using these steps.

1. Mount your DIN rail.
2. Use a screwdriver to open the latch at the bottom of the 1783-NATR device.
3. Hook the latch over the DIN rail while holding the latch open with your screwdriver.
4. Remove the screwdriver and push the latch to close.



Panel Mounting

Panel mount a 1783-NATR device by using these steps.

1. Use the 1783-NATR device as a template and mark pilot holes on your panel.
2. Drill the pilot holes for M4 or #8 screws.
3. Secure the 1783-NATR device to the panel by using two M4 or #8 screws.

Ground the 1783-NATR Device

The metal panel or DIN rail provides grounding for the 1783-NATR device.

WARNING: This product is grounded through the DIN rail to chassis ground. Use zinc-plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure the DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.

See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for more information.

Wire the NATR Device

WARNING: An electrical arc can occur if you connect or disconnect the following:

- Communication cable with power applied to this module or any device on the network
- Wiring while the field-side power is on

This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

For hazardous location applications, use the supplied Weidmuller 1317570000 power terminal block.

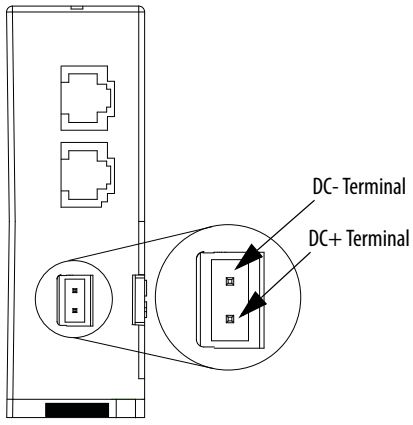
ATTENTION: To comply with the CE Low Voltage Directive (LVD), this equipment must be powered from a source compliant with safety extra low voltage (SELV) or protected extra low voltage (PELV).

To comply with UL restrictions, power to this equipment must be provided through a listed supply compliant with the following:

- IEC 60950-1 ed. 2.1 clause 2.2 – SELV Circuits clause and clause 2.5 LIMITED POWER SOURCES
- IEC 61010-2-201 ed. 1 clause 9.4 - Limited-energy circuit and either clause 3.109 – PELV Circuit or clause 3.110 - SELV Circuit

Provide DC power to the 1783-NATR device by using the DC connector at the bottom of the 1783-NATR device.

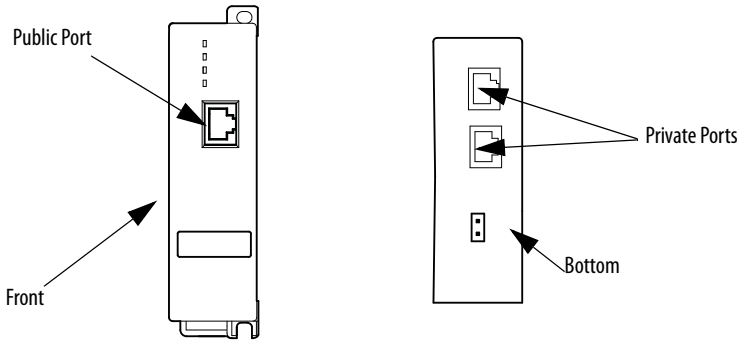
ATTENTION: Do not wire more than two conductors on any single terminal.



Connect the RJ45 Ports

Follow these steps to connect the RJ45 ports on the 1783-NATR device.

1. Locate the RJ45 ports on the front and bottom of the 1783-NATR device, as shown in the figure.



2. Connect one end of an Ethernet cable to the front panel port used as a device port.
3. Connect the other end of the Ethernet cable to the device in your control network.
4. Connect one end of a second Ethernet cable to a port at the bottom of the 1783-NATR device.

IMPORTANT Make sure that a ring supervisor is present in the ring before physically connecting the Private ports in a ring.

5. Connect the other end of the Ethernet cable to the linear or ring network.
6. If your network uses the other port at the bottom of the 1783-NATR device, repeat this process for the other port.

When using the 1783-NATR device in a DLR network, consider whether the 1783-NATR device is a ring supervisor. By default, the 1783-NATR device is configured to be a non-supervisor ring node. Use one of these methods for controlling supervisor functionality:

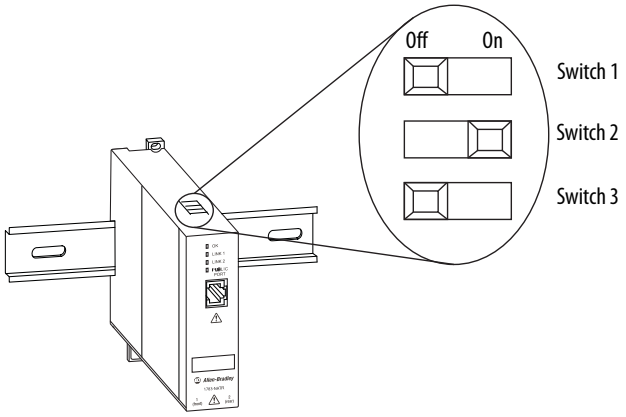
- Use RSLinx Classic communication software or Studio 5000 Logix Designer programming software to set the Ring Supervisor mode and other supervisor-related parameters. This is the default method. If you choose this option, follow the procedures that are outlined in the online help that accompanies the software to enable Ring Supervisor mode.
- Use the DIP switches to enable Ring Supervisor mode with the current supervisor-related parameters stored in the memory of the 1783-NATR device. See DIP Switch Settings on page 16 for more information.

DIP Switch Settings

You can use the DIP switches on your 1783-NATR device to do the following:

- Specify the method for configuring Internet Protocol (IP) settings, such as the IP address.
- Enable the Ring Supervisor mode with its current parameters.
- Restore the factory default settings.
- Restore the configuration from the SD card

See the following figure to understand DIP switch On and Off positions.



Follow these steps to set the DIP switches.

1. Move the switches to the desired position, and cycle power to the 1783-NATR device.

IMPORTANT The switch settings take effect only at powerup. Switch changes do not modify the behavior of the 1783-NATR device until the 1783-NATR device is power cycled.

Powerup Behavior		Switch 1	Switch 2	Switch 3
Internet Protocol settings	Use DHCP for Private port IP address by default, changeable by software. The Public port configured by software (Factory default settings for the Public port are 169.254.1.1, subnet mask 255.255.255.0, Gateway 0.0.0.0.)	Off - factory default	Off - factory default	The position of switch 3 does not affect IP settings.
	Uses the IP settings configured by software. (Factory default settings for Public port are 169.254.1.1, subnet mask 255.255.255.0, Gateway 0.0.0.0. Factory default setting for the Private ports is IP address 192.168.1.1, subnet mask 255.255.255.0, Gateway 0.0.0.0)	Off	On	
	Loads device configuration from SD card suspends operation	On	Off	

Powerup Behavior		Switch 1	Switch 2	Switch 3
Ring Supervisor mode	Enables Ring Supervisor mode	The positions of switches 1 and 2 do not affect Ring Supervisor mode.		On
	Lets Ring Supervisor mode to be enabled via software			Off - factory default
Restores the factory default settings and then suspends operation		On	On	On or Off

2. Observe these guidelines for use of the DIP switches:
   - Out of the box, all three switches are in the Off position. In this state, the 1783-NATR device is configured to be a non-supervisor ring node and responds to the default IP address of 169.254.1.1 for the Public port and DHCP for the Private ports.
   - The 169.254.1.1 address is used only during the initial configuration. When configuring 1783-NATR for translations, change the Public port IP address to the assigned address in the plant-wide network. Choose alternate DIP switch settings or configure the 1783-NATR device by using RSLinx Classic communication software, Studio 5000 Logix Designer programming software, or the Device Manager Web-interface.
   - When a switch is pushed to the left when viewing the front of the device, it is in the Off position.
   - When a switch is pushed to the right when viewing the front of the device, it is in the On position.
   - To configure the ports with a static address, move switch 1 to the Off position and switch 2 to the On position.
   - To enable Ring Supervisor mode with the current supervisor-related parameters, move switch 3 to the On position.
   - To restore the factory default settings and suspend operation, move switch 1 and 2 to the On position. When switch 1 and 2 are in the On position, the position of switch 3 is ignored.

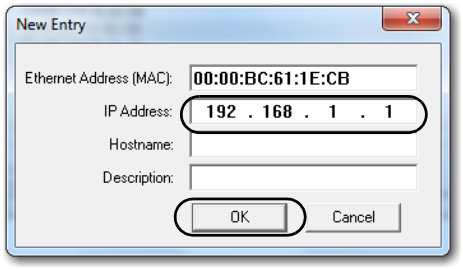
When operation is suspended, the OK status indicator blinks red. To resume normal operation, move the switches to the desired positions and cycle power to the 1783-NATR device.

Initial 1783-NATR Device Setup

1. Set all DIP switches to the OFF position.
2. Apply power to the device.
3. At the bottom of the device, connect an Ethernet cable to the front port.
4. Connect the other end of the cable to your computer.
5. Go to Start\All Programs\Rockwell Software\BOOTP-DHCP Server and open the utility.

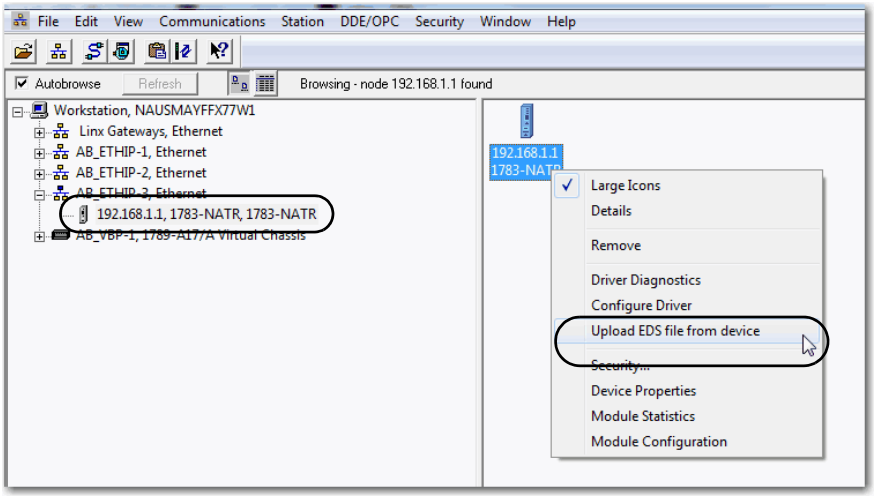
   It can take a minute or two for the MAC address to display in the BOOTP/DHCP Request History listing.

6. Under Request History in the BOOTP/DHCP window, double-click the MAC address.
7. At the New Entry window, enter the value for the private IP address of the 1783-NATR device (for example, 192.168.1.1), enter the Hostname and Description as necessary, and click OK.



   The IP address appears in the Relation List in the BOOTP/DHCP window.

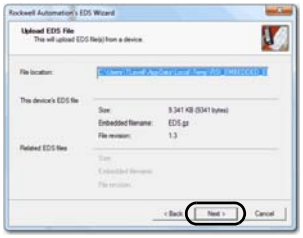
8. Open RSLinx Classic.
9. Navigate to your 1783-NATR device.
10. Right-click the device and select Upload EDS file from device.



11. Click Next at each EDS window.

1

2



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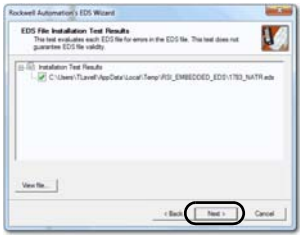

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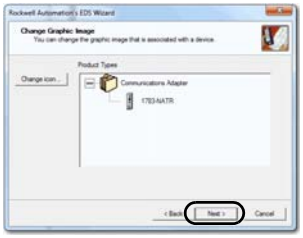

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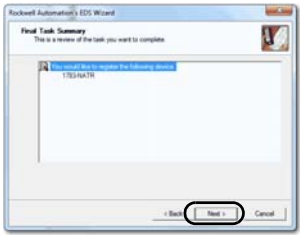
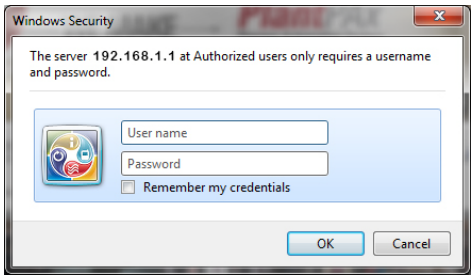


12. At the successful completion window, click Finish.

13. Open a web browser and navigate to 192.168.1.1.

14. Click Configuration and then click one of the links, for example Device Services.

15. You are prompted to enter a user name and password.

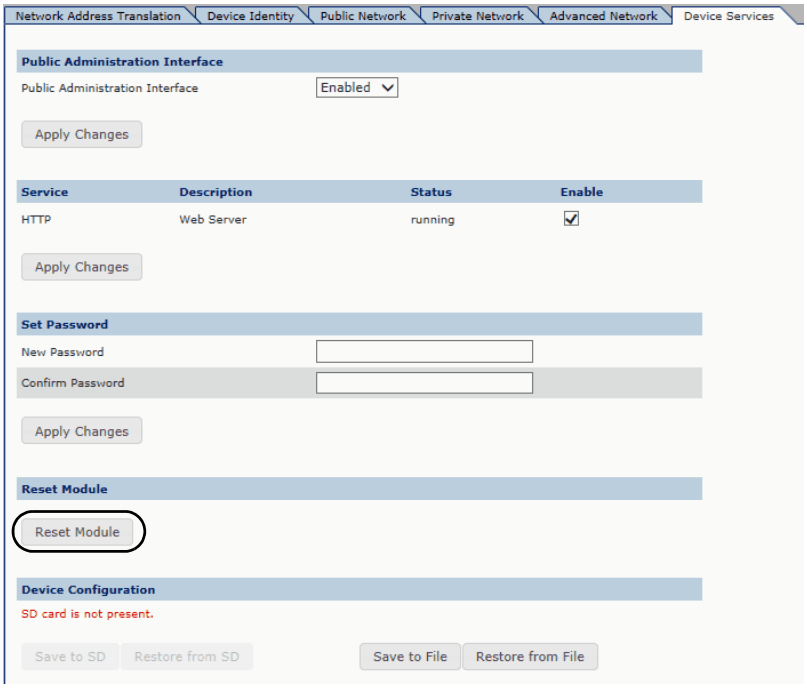


16. Enter **admin** for the user name and the serial number of the device for the password. Locate the serial number on the label on the right side of the device. The serial number is the default password.
17. You are prompted to enter a new password.
18. Choose your own password for the 1783-NATR device.

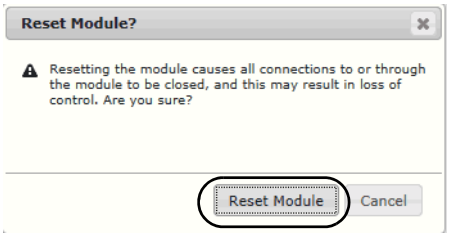
    Now you can access the Configuration menu items.

IMPORTANT If Public port or Private port configuration changes were made, the device must be reset for the changes to take effect.

19. Navigate to Device Services and under Reset Module click Reset Module.



20. At the device reset warning window, click Reset Module.



21. Wait until the device reboots.
22. Save the configuration of the device to the SD card. See Save to the SD Card with the Web User-interface on page 22 for further information.

Save to the SD Card with the Web User-interface

The following steps provide instruction to save the configuration of the device to the SD Card.

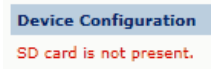
1. Under Device Configuration, click Save to SD.

   The Configuration successfully saved to SD card dialog box appears.

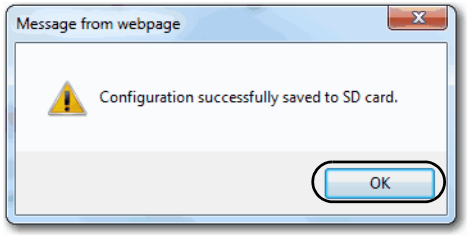
TIP If Restore is dimmed (unavailable), make sure that the SD card is installed.

- The memory card is installed.

If the SD card is not installed, the following message appears under Device Configuration in the Device Services tab..



2. At the dialog box, click OK.



Restore from the SD Card with the Web User-interface

The following steps provide information to load the configuration of the device from the SD Card.

TIP SD card configuration can also be loaded via DIP switch settings. See DIP Switch Settings on page 16.

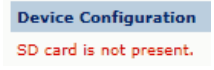
1. Under Device Configuration, click Restore from SD.

   The Successful SD configuration dialog box appears.

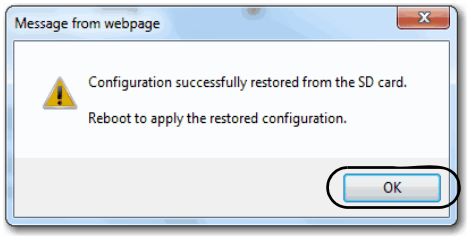
TIP If Restore is dimmed (unavailable), make sure that the SD card is installed.

- The memory card is installed.

If the SD card is not installed, the following message appears under Device Configuration in the Device Services tab..



2. At the dialog box, click OK.



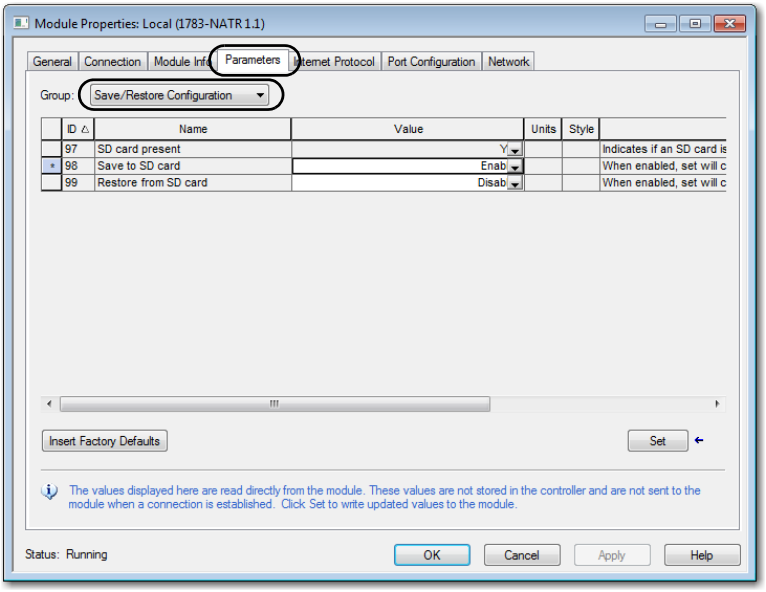
3. Reboot the device.
4. At the device reset warning window, click Reset Module.

TIP The new configuration can change the IP addresses of the device.

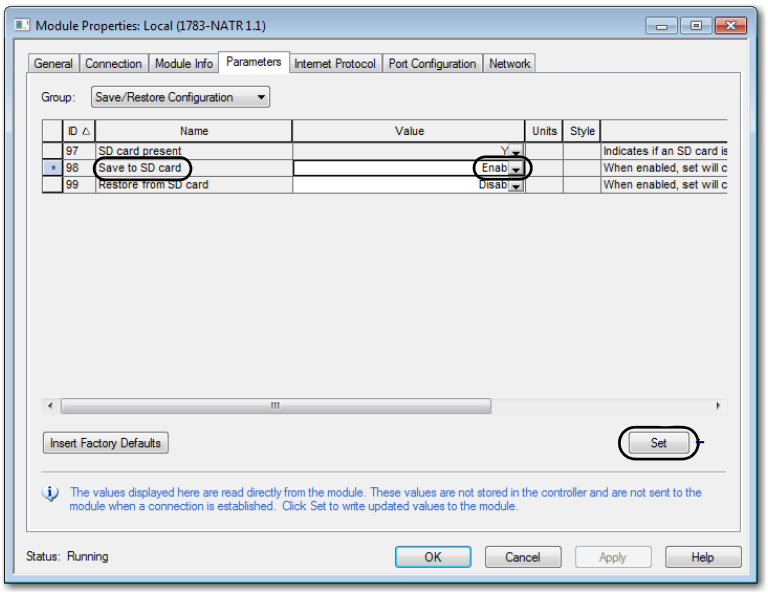
Save to the SD Card with Logix Designer Application

After you are online with the 1783-NATR device, complete these steps to save to the memory card.

1. Open the Module Properties dialog box and click the Parameters tab.
2. Select Save/Restore Configuration from the Group pull-down menu.



3. Select Enabled from the Save to SD card pull-down menu and click Set.



TIP If Set is dimmed (unavailable), verify the following:

- You have specified the correct communication path and are online with the device in Program mode.
- The memory card is installed.

If the memory card is not installed, the SD card present ID does not have a value..

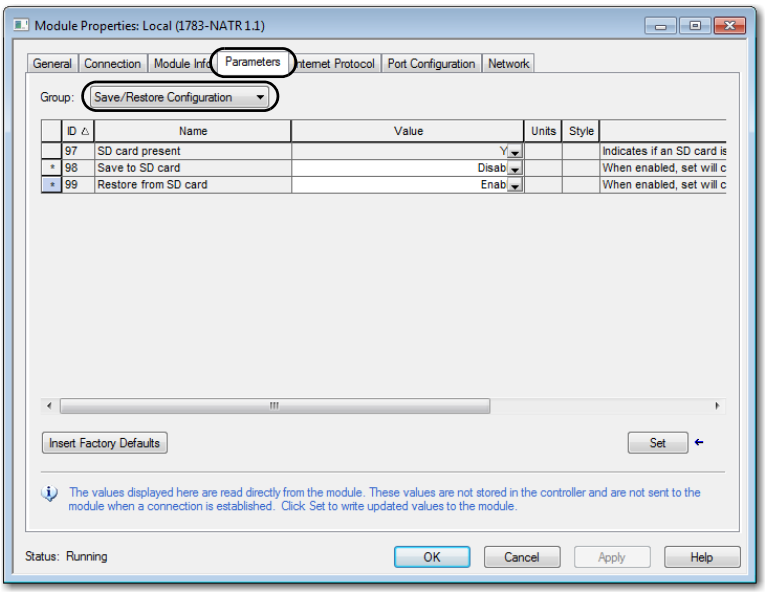
If the factory defaults must be restored, click Insert Factory Defaults and click Set to restore the factory defaults.

Restore from the SD Card with Logix Designer Application

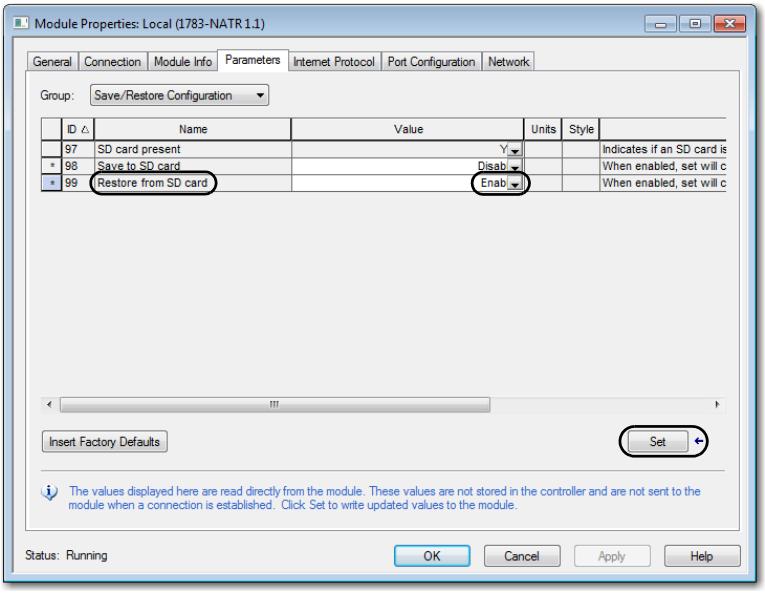
After you are online with the 1783-NATR device, complete these steps to restore the configuration from the memory card.

1. Open the Module Properties dialog box and click the Parameters tab.

2. Select Save/Restore Configuration from the Group pull-down menu.



3. Select Enabled from the Restore from SD card pull-down menu and click Set.



TIP If Set is dimmed (unavailable), verify the following:

- You have specified the correct communication path and are online with the device.
- The memory card is installed.

If the memory card is not installed, the SD card present ID does not have a value..

Set the Network IP Address

Set the Network IP Address with the DIP Switches

Use the DIP switches on the 1783-NATR device to choose the configuration method to use for IP settings. See DIP Switch Settings on page 16

Configure Internet Protocol (IP) settings, such as the IP address, as follows:

- Use the default IP address of the 1783-NATR device, 192.168.1.1 for the Private ports and 169.254.1.1 for the Public port, by connecting the 1783-NATR device directly to a computer and setting DIP switch 1 to Off and DIP switch 2 to On. To establish communication between a computer and the default IP address of the 1783-NATR device, enter a unique IP address in the local area connection properties for your computer. The IP address of the computer must be on the same subnet as the default IP address of the 1783-NATR device, such as 169.254.1.2 for the Public port or 192.168.1.2 for the Private ports.

IMPORTANT At least one of the Private ports must be connected with an assigned IP address to another device before the Public port communicates. For this reason, it is suggested that you use the Private ports for initial configuration.

Set the Network IP Address with the BOOTP/DHCP Server

The BOOTP/DHCP server is a standalone server that you can use to set an IP address. When used, the BOOTP/DHCP server sets an IP address and other Internet Protocol (IP) parameters.

You can use the BOOTP/DHCP server to set the IP address of the device if DIP switch 1 and 2 are off and no static IP address has been saved.

Access the BOOTP/DHCP server from one of these locations:

- Programs > Rockwell Software > BOOTP-DHCP Server

  If you have not installed the server, you can download and install it from http://www.ab.com/networks/ethernet/bootp.html.

- Tools directory on the Studio 5000® environment installation CD

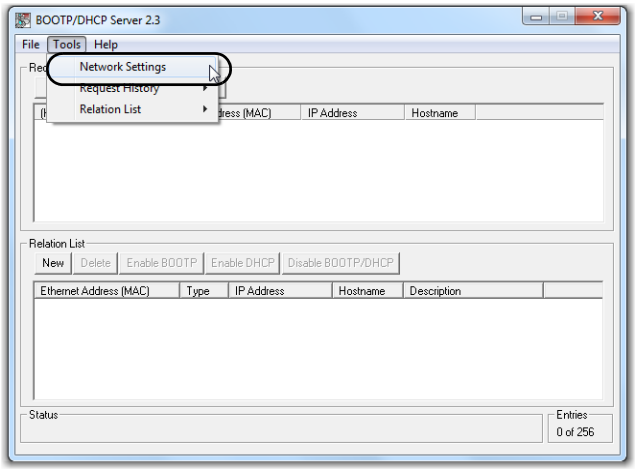
IMPORTANT Before you start the BOOTP/DHCP server, make sure that you have the hardware (MAC) address of the device. The hardware address is on a sticker on the side of the communication device and uses an address in a format similar to the following:

00-00-BC-14-55-35

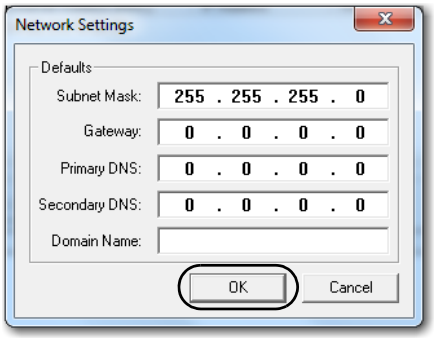
Follow these steps to set the IP address of the device with a BOOTP/DHCP server.

1. Start the BOOTP/DHCP software.

2. From the Tools menu, choose Network Settings.



3. Type the Subnet Mask of the network.

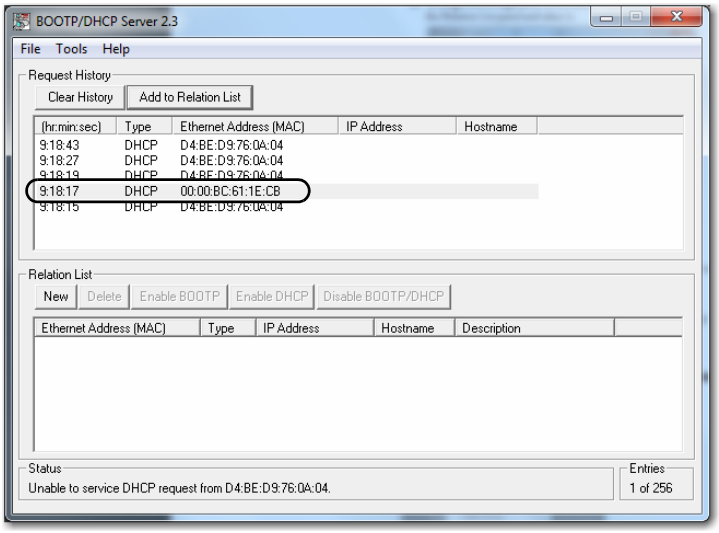


The Gateway address, Primary and Secondary DNS addresses, and Domain Name fields are optional.

4. Click OK.

The Request History panel appears with the hardware addresses of all devices issuing BOOTP requests.

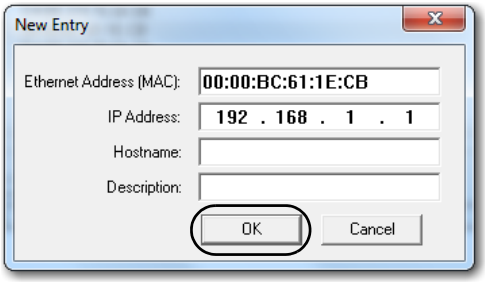
5. Select the appropriate device.



6. Click Add to Relation list.

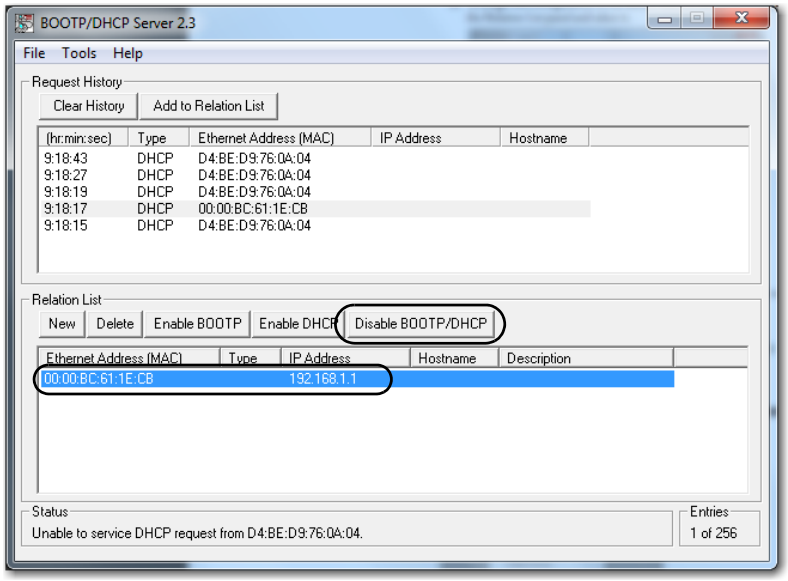
   The New Entry dialog box appears.

7. Type an IP address, Hostname, and Description for the device, as necessary for your application.



8. Click OK.

9. To assign this configuration to the device, wait for the device to appear in the Relation List panel and select it.



10. Click Disable BOOTP/DHCP.

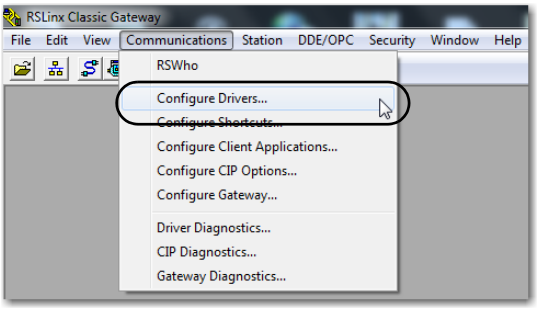
    When power is recycled, the device uses the assigned configuration and does not issue a BOOTP request.

If you do not click Disable BOOTP/DHCP, on a power cycle, the host controller clears the current IP configuration and begins sending BOOTP requests again.

Configure the Ethernet Communication Driver in RSLinx Software

To configure the EtherNet/IP driver, follow these steps.

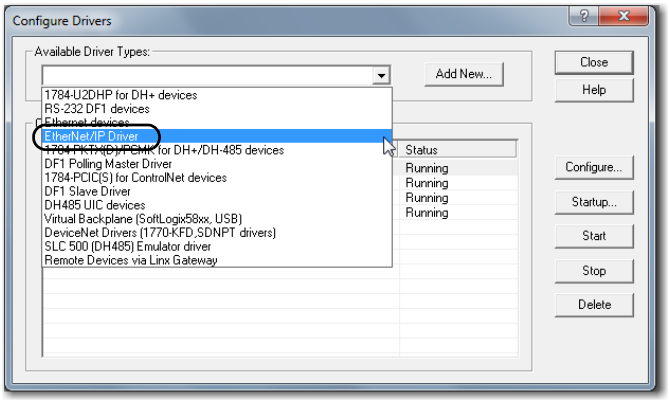
1. From the Communications menu, choose Configure Drivers.



   The Configure Drivers dialog box appears.

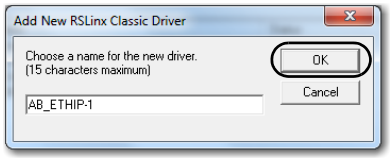
2. From the Available Driver Types pull-down menu, choose EtherNet/IP Driver or Ethernet devices and click Add New.

IMPORTANT The EtherNet/IP driver is not supported on the Public port. Use the Ethernet devices driver instead.



   The Add New RSLinx Driver dialog box appears.

3. Type a name for the new driver and click OK.

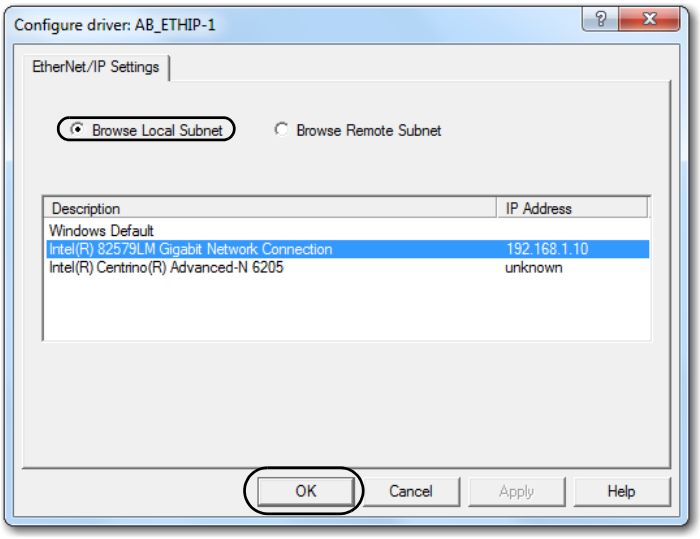


   The Configure driver dialog box appears.

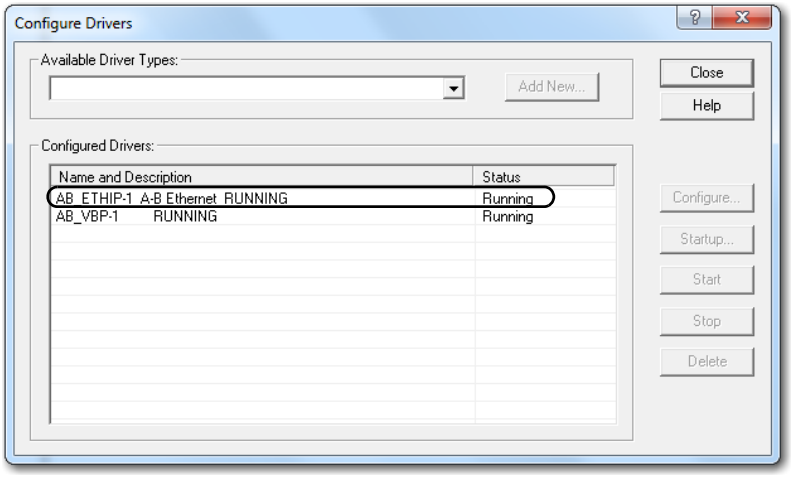
4. Click Browse Local Subnet.

TIP To view devices on another subnet or VLAN from the workstation running RSLinx software, click Browse Remote Subnet.

5. Click OK to close the dialog box.



The new driver is available.



Set the IP Address with RSLinx Software

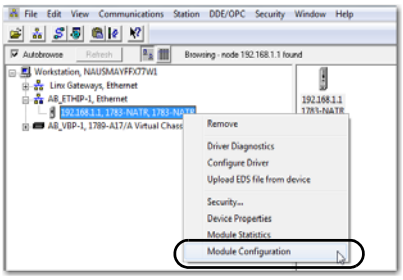
To use RSLinx software to set the IP address of the communication device, follow these steps.

1. From the Communications menu, choose RSWho.

   The RSWho dialog box appears.

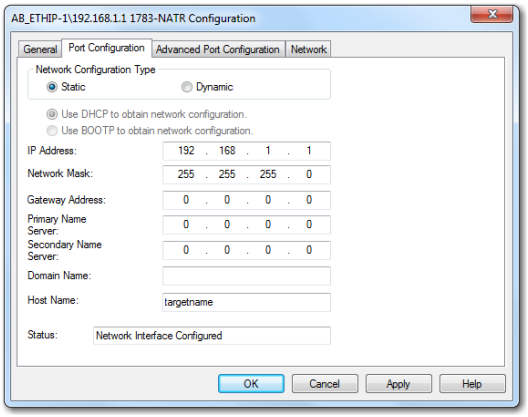
2. Navigate to the Ethernet network.
3. Right-click the EtherNet/IP device and choose Module Configuration.

IMPORTANT	The EtherNet/IP driver is not supported on the Public port. Use the Ethernet devices driver instead.



The Module Configuration dialog box appears.

4. Click the Port Configuration tab.



5. For Network Configuration Type, click Static to assign this configuration to the port.

IMPORTANT If you click Dynamic, the 1783-NATR device clears the current IP configuration and begins sending DHCP requests.

A power cycle is not required for the changes to take effect.

6. Type the information necessary for your application in the appropriate fields.
7. Configure the port settings.

To	Then
Use the default port speed and duplex settings	Leave Auto-negotiate port speed and duplex checked. This setting determines the actual speed and duplex setting.
Manually configure the speed and duplex settings of your port	Follow these steps. 1. Clear the Auto-negotiate port speed and duplex checkbox. 2. From the Current Port Speed pull-down menu, choose a port speed. 3. From the Current Duplex pull-down menu, choose the appropriate Duplex value, that is, Half Duplex or Full Duplex.

IMPORTANT Consider the following when you configure the port settings of the device:

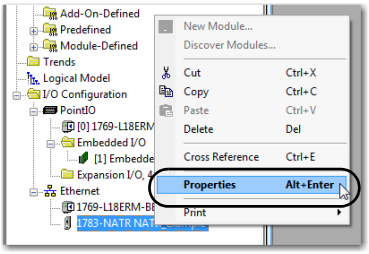
- The speed and duplex settings for the ports that are connected by an Ethernet Cable must match or communication can be impaired.
- Fixed speed and full duplex settings can be required for legacy devices that do not support autonegotiation or do not operate reliably when autonegotiation is enabled.
- If the device is connected to an unmanaged switch, leave Autonegotiate port speed and duplex checked or communication can be impaired.
- If you force the port speed and duplex of a device and it is connected to a managed switch, the corresponding port of the managed switch must be forced to the same settings to avoid communication errors.
- If you connect a manually configured device to an autonegotiate device (duplex mismatch), a high rate of transmission errors can occur.
- Always verify configuration on both ends of the connection to make sure that it matches.

8. Click Apply then click OK.

Set the IP Address with Logix Designer Application

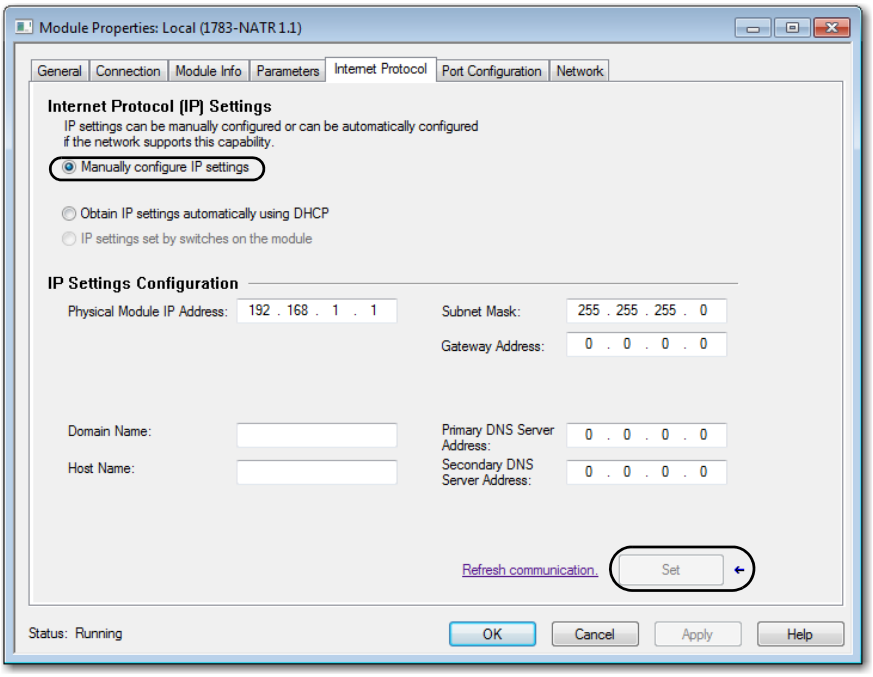
To use the Logix Designer application to set the IP address of the communication device, follow these steps.

1. Go Online with the controller.
2. In the Controller Organizer, right-click the EtherNet/IP device and choose properties.



The Module Properties dialog box appears.

3. Click the Internet Protocol tab.



4. Select Manually configure IP settings.

   The IP address is 192.168.1.1 for this example.

5. Click Set.

TIP It is normal for an error message to appear after the IP address is set because Logix Designer application is looking for the module at the previous address.

6. In the other fields, type the other network parameters, if necessary.

IMPORTANT The fields that appear vary from one EtherNet/IP device to another.

7. Click Apply.
8. Click OK.

Use DHCP Software

Dynamic Host Configuration Protocol (DHCP) software automatically assigns IP addresses to client stations logging on to a TCP/IP network. DHCP is based on BOOTP and maintains some backward compatibility. The main difference is that BOOTP allows for manual configuration (static), while DHCP allows for both static and dynamic allocation of network addresses and configurations to newly attached devices.

Be cautious when using DHCP software to configure a device. A BOOTP client, such as the EtherNet/IP communication devices, can start from a DHCP server only if the DHCP server is written to handle BOOTP queries. This is specific to

the DHCP software package used. Consult your system administrator to see if a DHCP package supports BOOTP commands and manual IP allocation.

ATTENTION: The EtherNet/IP communication device must be assigned a fixed network address. The IP address of this device must not be dynamically provided.

Failure to observe this precaution can result in unintended machine motion or loss of process control.

Configure the 1783-NATR Device

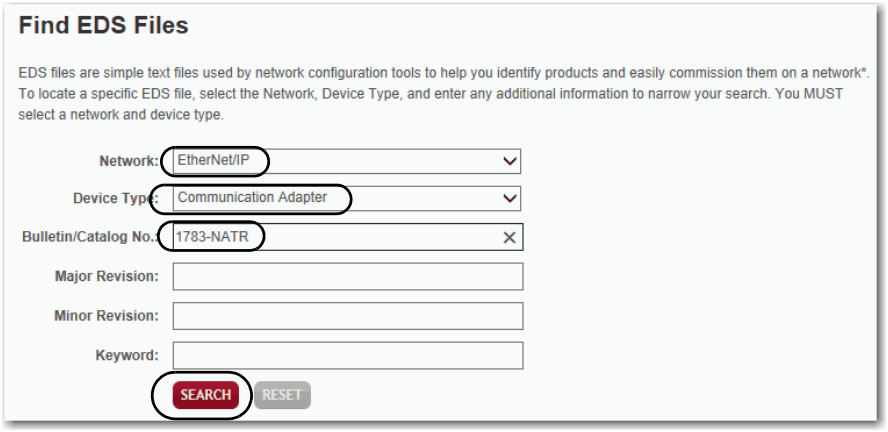
Configure via the Studio 5000 Logix Designer Application

Download the EDS File

IMPORTANT At least one of the Private ports must be connected with an assigned IP address to another device before the Public port communicates. For this reason, it is suggested that you use the Private ports for initial configuration.

To use RSLinx Classic communication software to configure the 1783-NATR device, follow these steps to download the EDS file for the 1783-NATR device. If the EDS file was not uploaded and installed from the 1783-NATR device, see Initial 1783-NATR Device Setup on page 18 for instructions.

1. Obtain the EDS file from http://www.rockwellautomation.com/resources/eds/.
2. From the Network pull-down menu, choose the EtherNet/IP network.
3. From the Device Type pull-down menu, choose Communication Adapter.
4. In the Bulletin/catalog number field, type 1783-NATR.
5. Click Search.

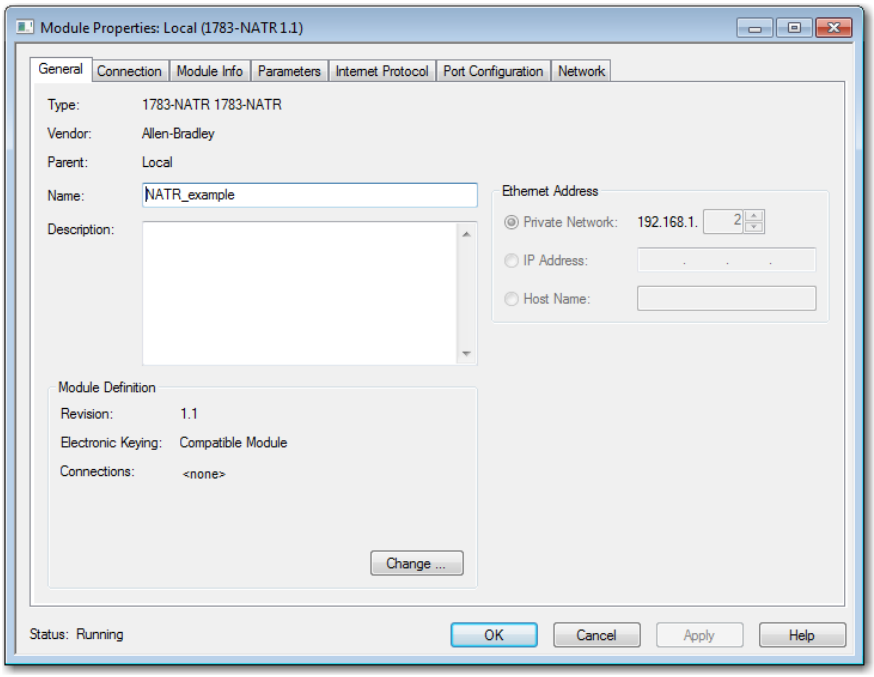


6. Click Download to download the EDS file for the 1783-NATR device.
7. Save the file to a location on your computer.
8. Use your configuration software to register the downloaded file.
   a. If you are using RSLinx Classic communication software, use the EDS Hardware Installation Tool.
   b. Choose Start>All Programs>Rockwell Software>RSLinx>Tools.

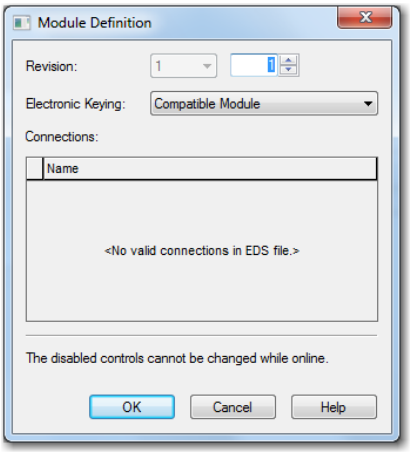
You can also upload the EDS file from the 1783-NATR device per the instructions in Initial 1783-NATR Device Setup on page 18.

General

The General tab lets you name the device, configure the IP address, and select module definition options.



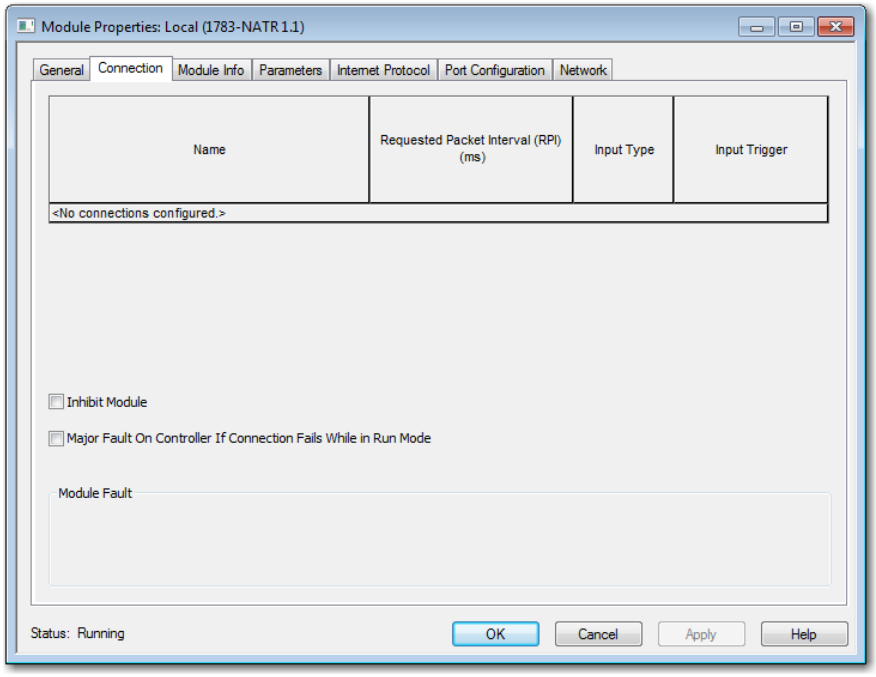
Click Change to access the Module Definition dialog box.



You can configure the firmware revision and Electronic Keying options from this dialog box. See Electronic Keying on page 54 for more information about Electronic Keying.

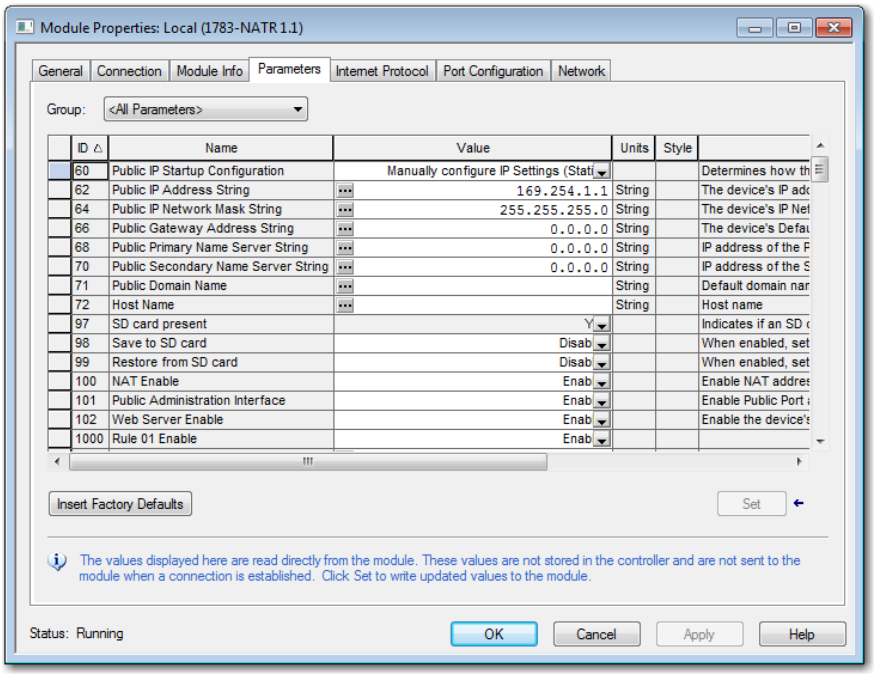
Connection

The Connection tab shows configured connections and provides options to inhibit the module and show major faults on the device.



Parameters

The Parameters tab lets you configure device parameters dependent upon the selection from the Group pull-down menu. Selecting All Parameters lists all available parameters for the device. Select individual parameters from the Group pull-down menu, as necessary for your application.



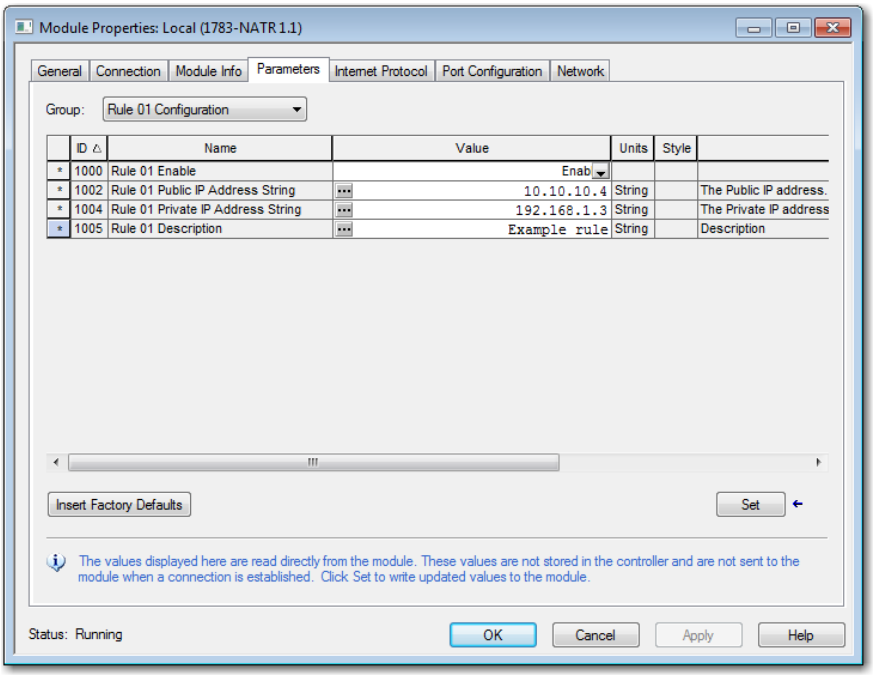
IP Address Translation Rule Configuration

You can configure up to 32 rules with the Parameters tab of the Module Properties dialog box in the Logix Designer application. Each rule must be configured separately. Select the Rule number from the Group pull-down menu to configure the Rule. The private IP address is the IP address that is configured on the device on the private network. The public IP address is the translated address that devices on the public network use to communicate with the device on the private network.

IMPORTANT The private IP address of the rule must differ from the IP address of the Private ports for the 1783-NATR device. The public IP address of the rule must differ from the IP address of the Public port for the 1783-NATR device.

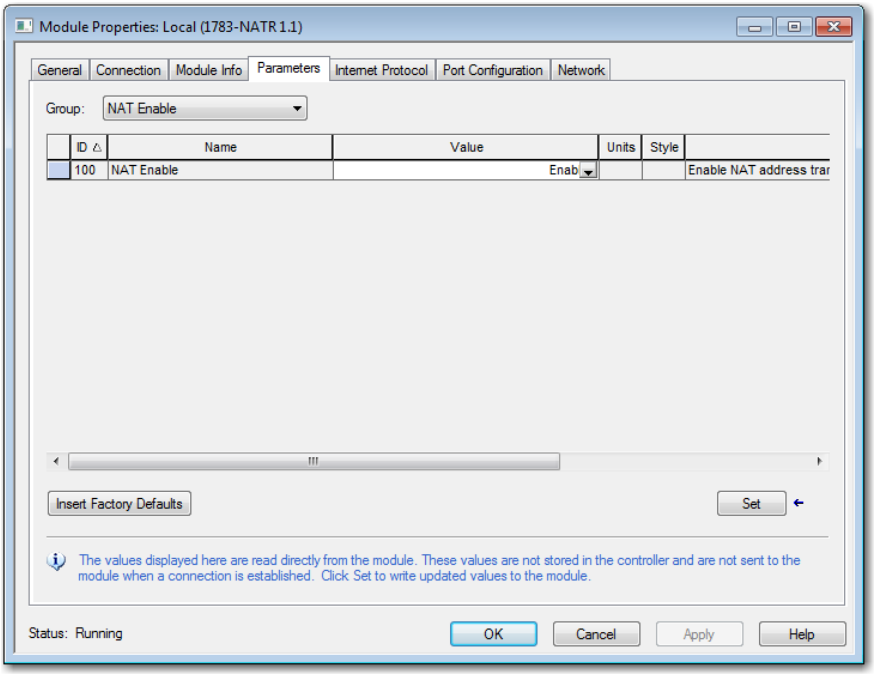
The gateway address for any device on the private (machine) network that is translated must be set to the 1783-NATR Private port address.

Rule 01 Configuration is shown in the following figure as an example. Configure the parameters as necessary for your application. Click set to apply any changes.



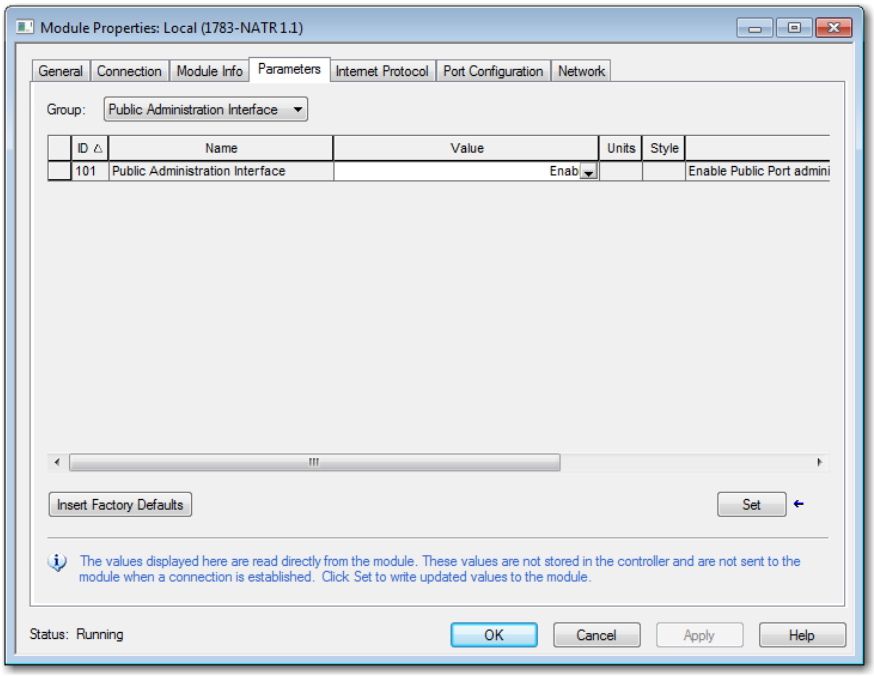
NAT Enable

Select NAT Enable from the Group pull-down menu to enable or disable NAT.



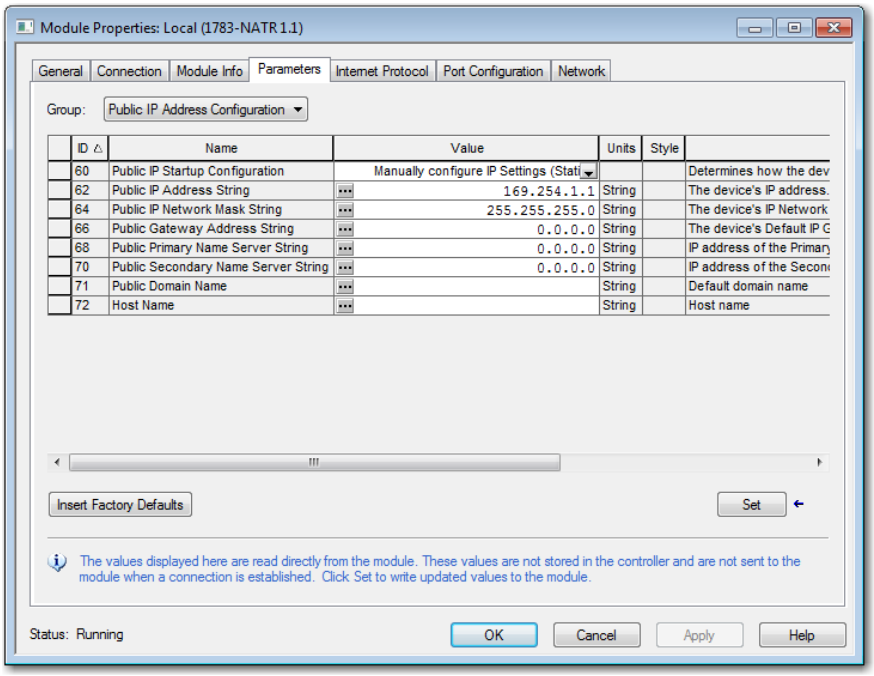
Public Administration Interface

Select Public Administration Interface from the Group pull-down menu to enable or disable Public Administration Interface.



Public IP Address Configuration

Select Public IP Address Configuration from the Group pull-down menu to configure the Public IP address.

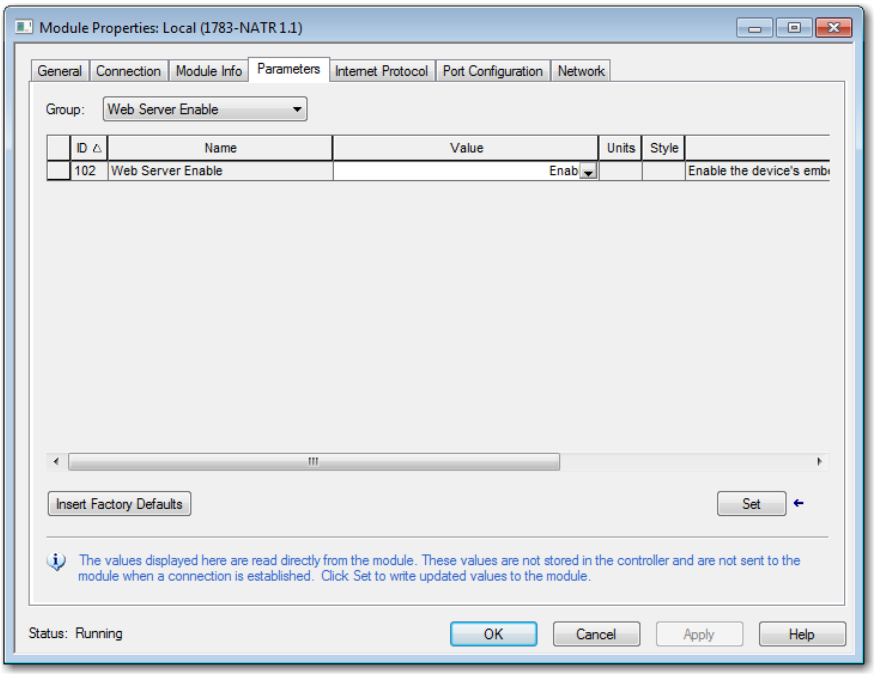


You can configure the following parameters:

- Public IP Startup Configuration
- Public IP Address String
- Public IP Network Mask String
- Public Gateway Address String
- Public Primary Name Server String
- Public Secondary Name Server String
- Public Domain Name
- Host Name

Web Server Enable

Select Web Server Enable from the Group pull-down menu to enable or disable the Web Server.

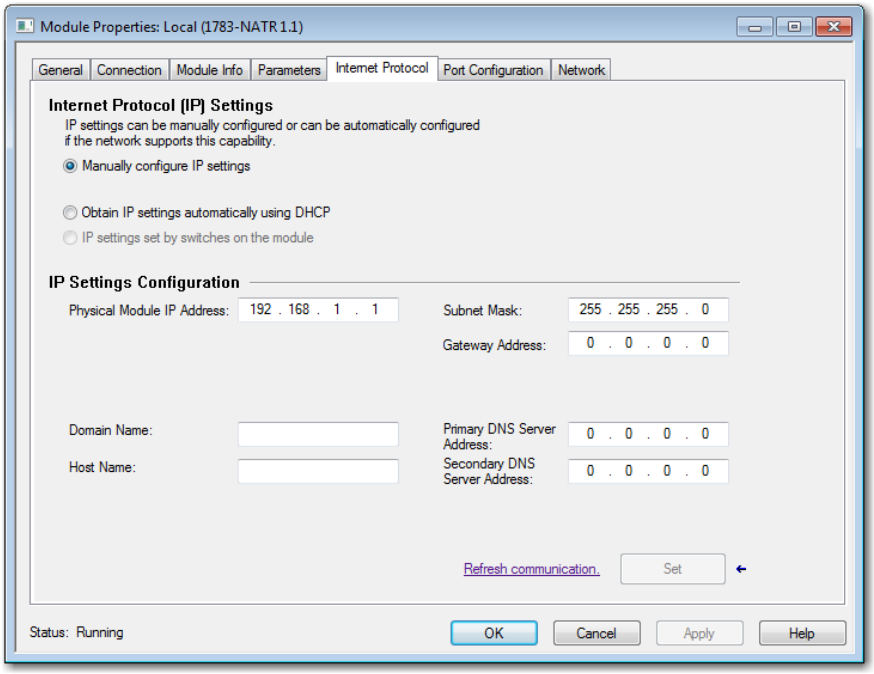


Save/Restore Configuration

See Save to the SD Card with Logix Designer Application on page 23 and Restore from the SD Card with Logix Designer Application on page 24 for more information on the Save/Restore Configuration parameters.

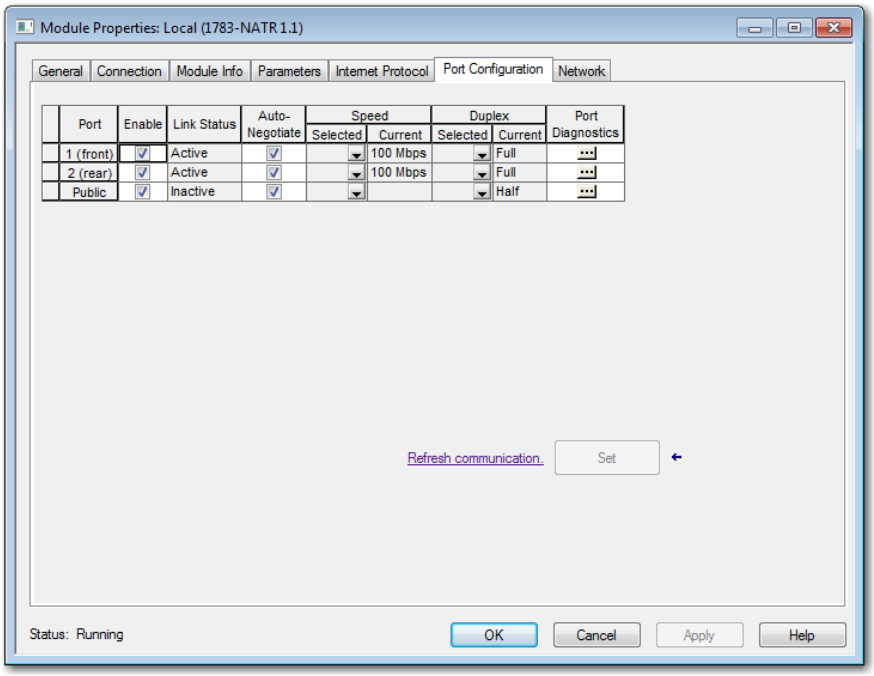
Internet Protocol

The Internet Protocol tab lets you configure IP settings for the device.



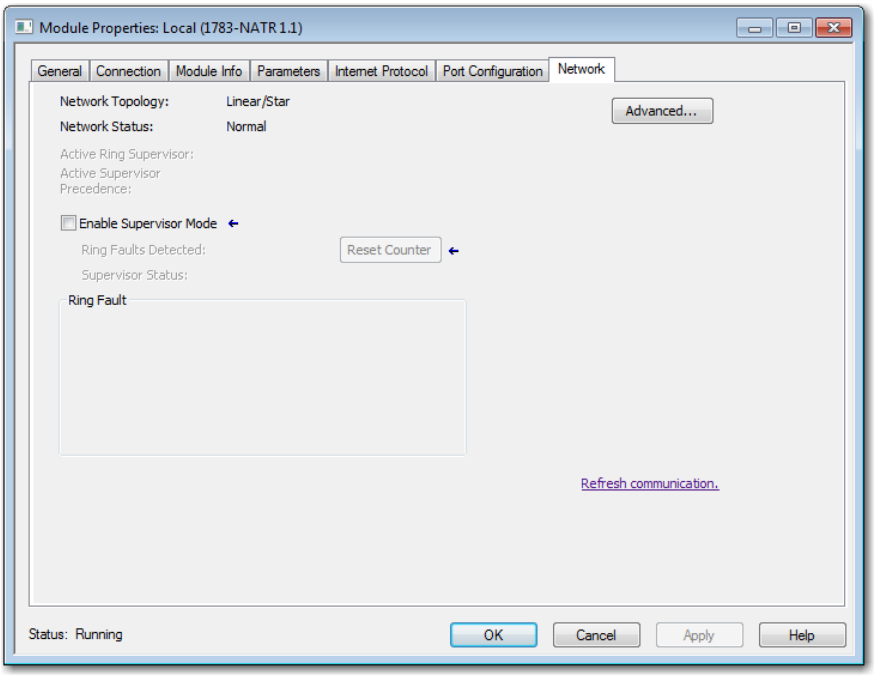
Port Configuration

The Port Configuration tab lets you configure the ports for the device and see port diagnostic information.

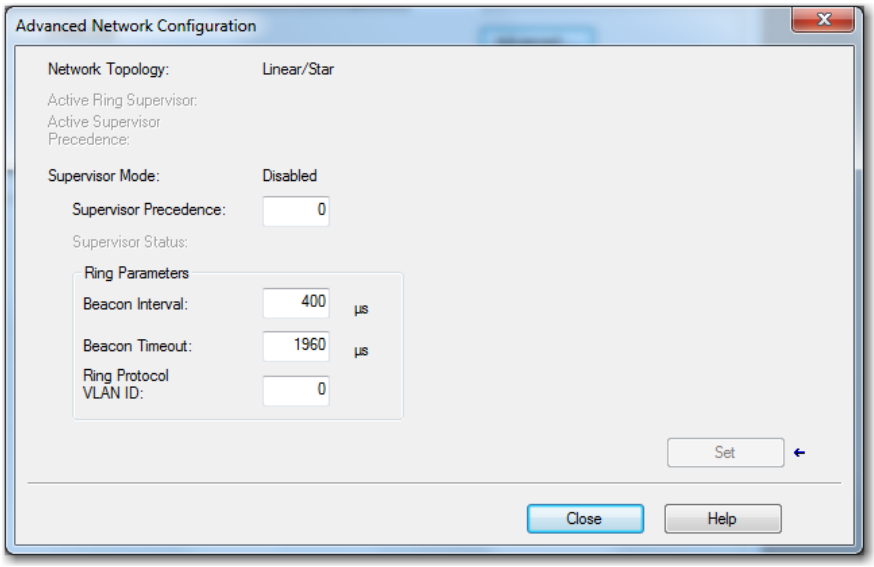


Network

The Network tab lets you enable supervisor mode, reset counters, and refresh communication.

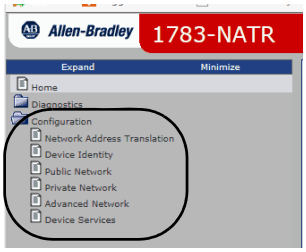


Click Advanced to display the Advanced Network Configuration dialog box. You can configure supervisor mode and ring parameters in the dialog box. Click Set to apply any changes.



Configure via the Device Manager Web-interface

You can configure the 1783-NATR device with the Device Manager web-interface by navigating through the links under the Configuration folder. The different tabs can also be accessed by clicking the individual tabs.

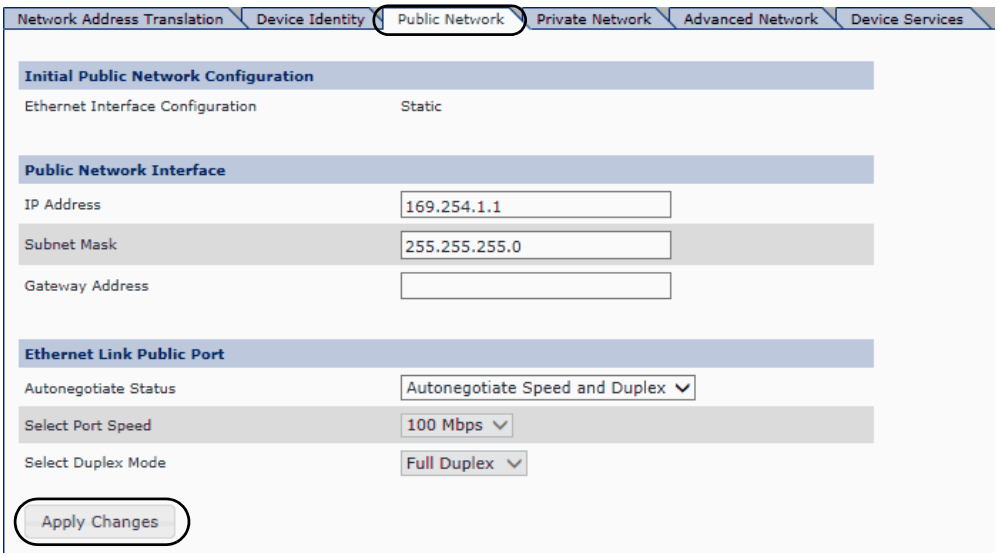


Follow these steps to configure NAT on the 1783-NATR device in the Device Manager web-interface.

1. Under the Configuration folder, click any of the links. For this example, click Public Network.

2. Enter the user name and password that is selected in step 17 on page 21 in the dialog box and click OK.
3. Complete the fields in the Public Network tab with the correct information.

The information that is shown in the figure is for example purposes only.

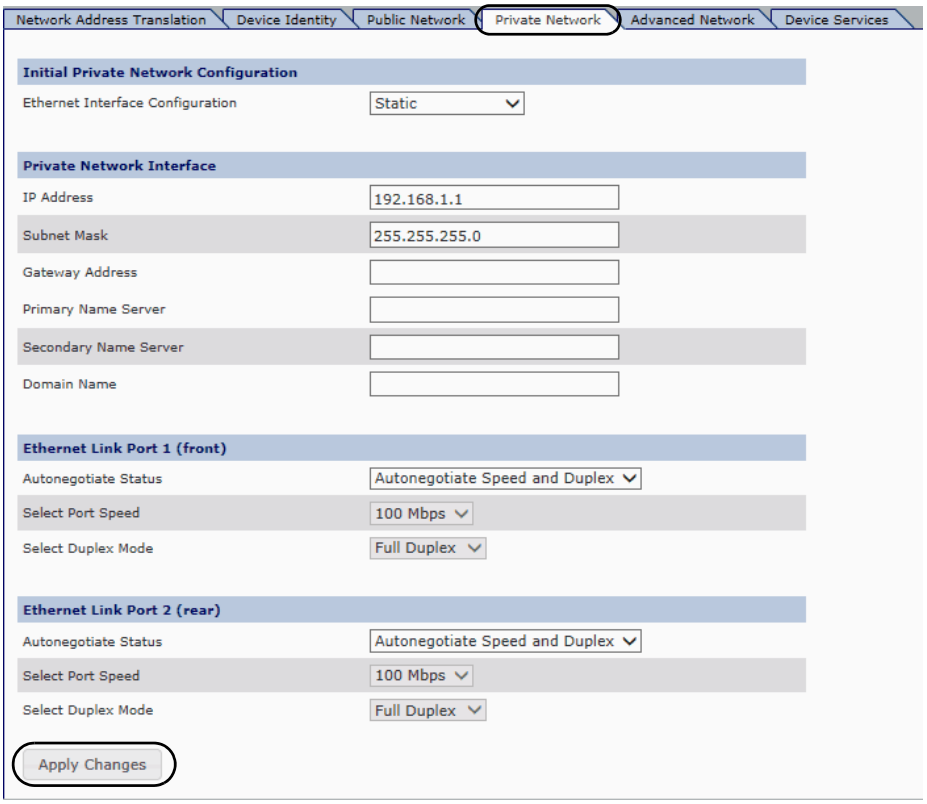


4. Click Apply Changes when finished.

   Changes do not take effect until the 1783-NATR device is reset.

5. Navigate to the Device Services tab and reset the 1783-NATR device.
6. Click the Private Network tab.
7. Complete the fields in the Private Network tab with the correct information.

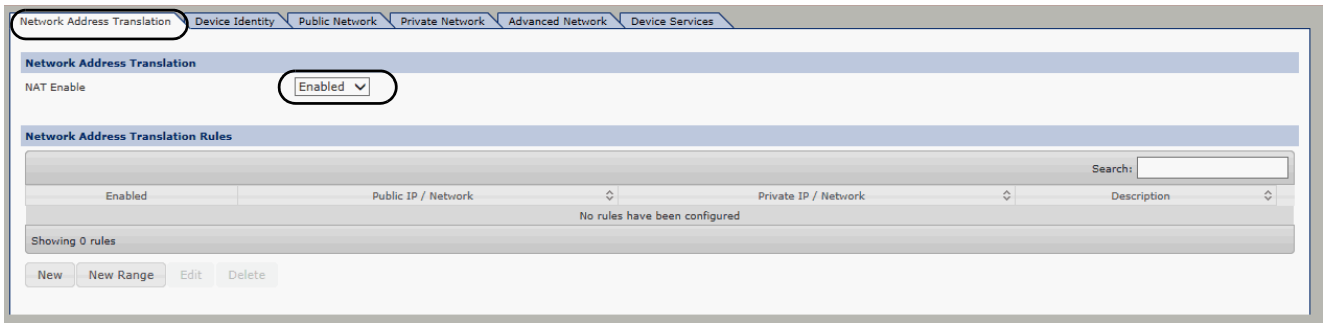
   The information that is shown in the figure is for example purposes only.



8. Click Apply Changes when finished.

   Changes do not take effect until the 1783-NATR device is reset.

9. Reset the 1783-NATR device.
10. Click the Network Address Translation tab.
11. Choose Enabled from the NAT Enable pull-down menu.



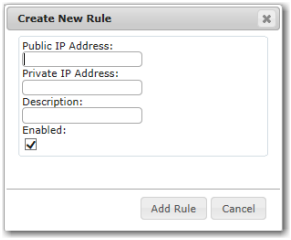
Create Rules with the Device Manager Web-interface

Complete the following steps to create one rule.

TIP Rules take effect immediately and do not require a reset.

1. In the Network Address Translation tab, click New.

   The Create New Rule dialog box appears.



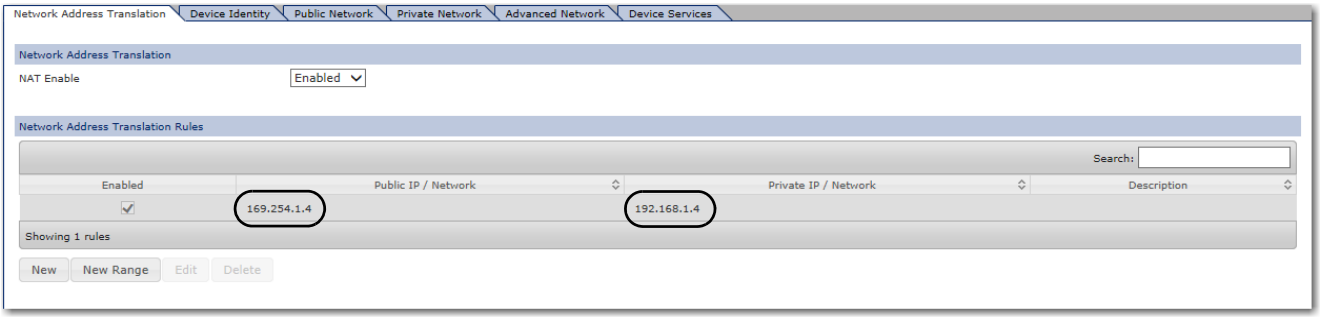
2. Configure the dialog box as necessary for your application and click Add Rule. The private IP address is the IP address that is configured on the device on the private network. The public IP address is the translated address that devices on the public network use to communicate with the device on the private network.

   The IP addresses must be different than the assigned addresses of the Public and Private ports.

IMPORTANT The private IP address of the rule must differ from the IP address of the Private ports for the 1783-NATR device. The public IP address of the rule must differ from the IP address of the Public port for the 1783-NATR device.

The gateway address for any device on the private (machine) network that is translated must be set to the 1783-NATR Private port address.

The new rule displays in the Network Address Translation tab.



Complete the following steps to create multiple rules with sequential IP addresses.

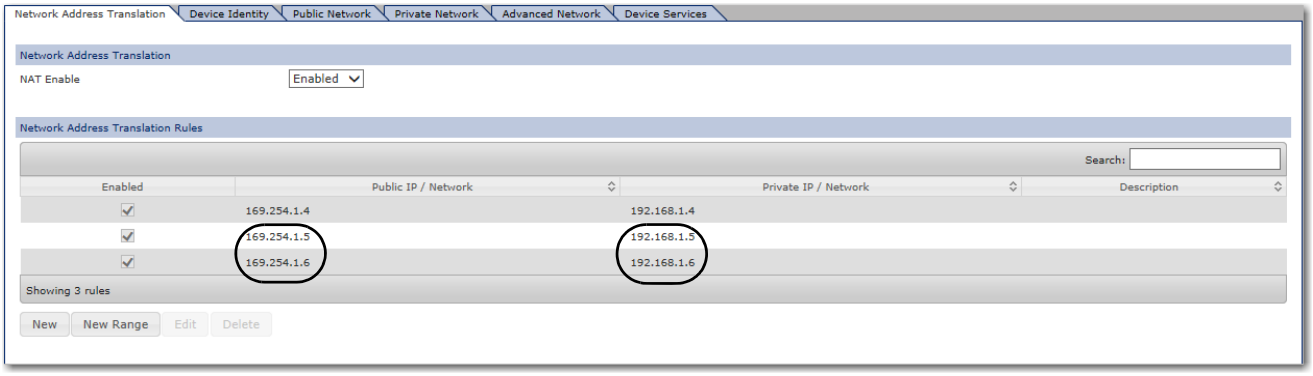
1. In the Network Address Translation tab, click New Range.

   The Create New Rules dialog box appears.

2. Configure the dialog box as necessary for your application and click Add Rules. Each additional IP address automatically increments by one.

   The IP addresses must be different than the assigned addresses of the Public and Private ports.

The new rules display in the Network Address Translation tab. The rule that is created in step 2 on page 46 is also shown in the following figure.

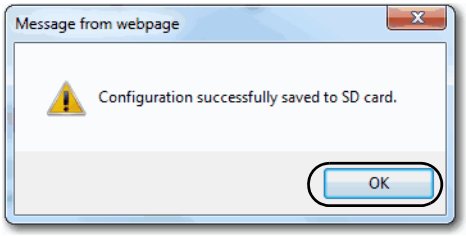


You can save the new rules to the SD card if necessary for your application.

1. Navigate to Device Configuration and click Save to SD.

   The Configuration successfully saved to SD card window appears.

2. At the window, click OK.



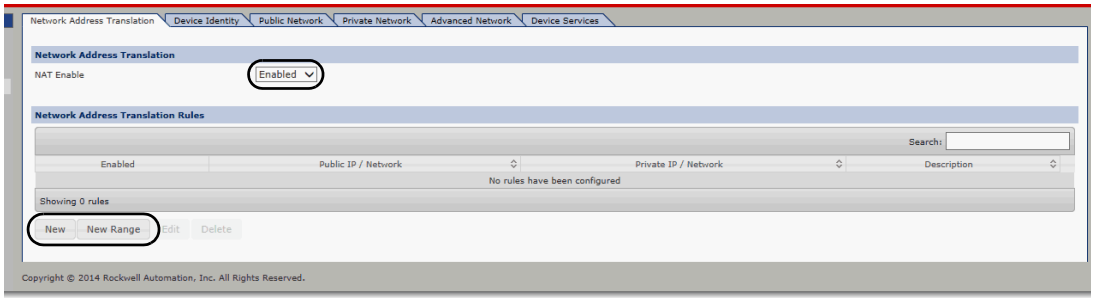
3. Your configuration is now saved to the SD card.

Network Address Translation

The Network Address Translation tab contains information on the following:

- NAT Enable/Disable
- Create New rule
- Create New Range of rules

See Create Rules with the Device Manager Web-interface on page 46 for more information on rule creation.

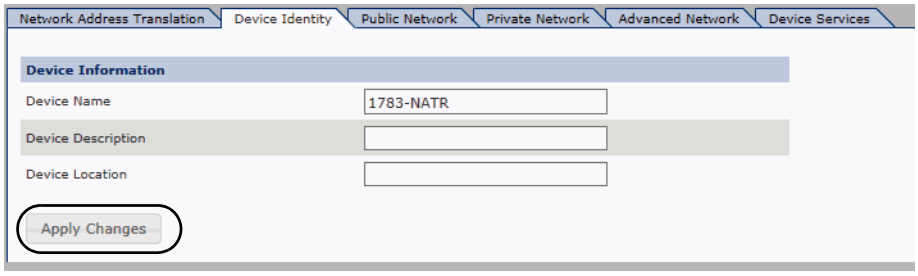


Device Identity

The Device Identity tab lets you configure the following:

- Device Name
- Device Description
- Device Location

Configure the fields as required for your application. Click Apply Changes to save the configuration.

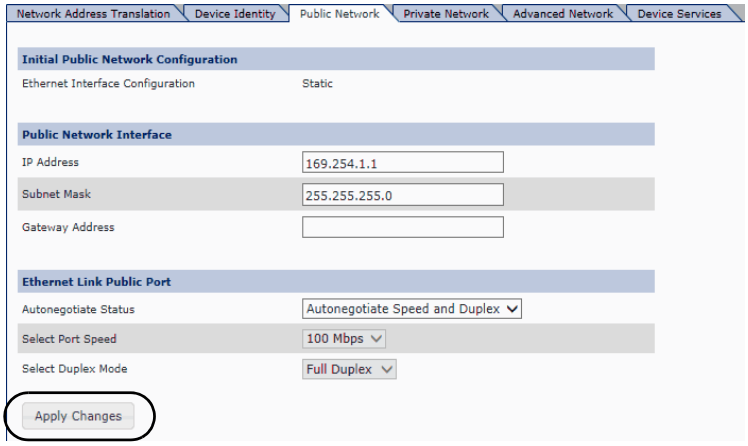


Public Network

The Public Network tab lets you configure the following:

- IP Address
- Subnet Mask
- Gateway Address
- Autonegotiate Status
- Select Port Speed
- Select Duplex Mode

Configure the fields as required for your application. Click Apply Changes to save the configuration.



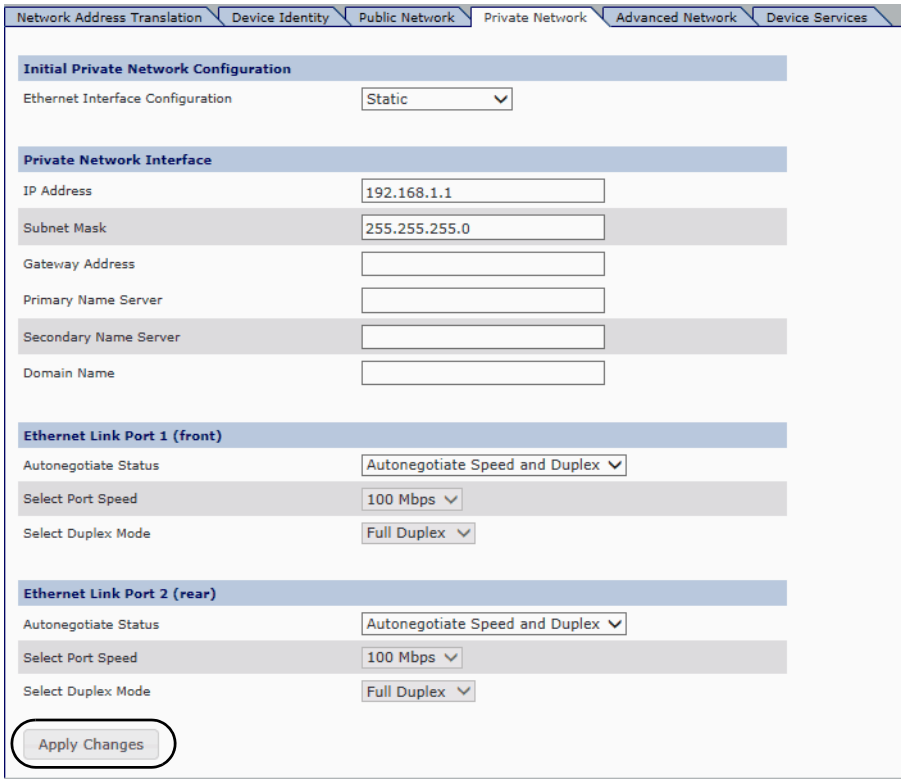
Private Network

The Private Network tab lets you configure the following:

- Ethernet Interface Configuration
- IP Address
- Subnet Mask
- Gateway Address
- Primary Name Server
- Secondary Name Server
- Domain Name

- Autonegotiate Status - Ethernet Link Port 1 (front)
- Select Port Speed - Ethernet Link Port 1 (front)
- Select Duplex Modes - Ethernet Link Port 1 (front)
- Autonegotiate Status - Ethernet Link Port 2 (rear)
- Select Port Speed - Ethernet Link Port 2 (rear)
- Select Duplex Modes - Ethernet Link Port 2 (rear)

Configure the fields as required for your application. Click Apply Changes to save the configuration.



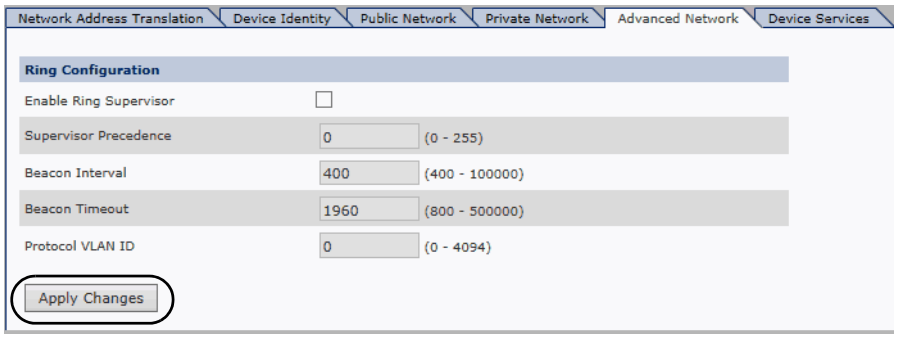
Advanced Network

The Advanced Network tab lets you configure the following:

- Enable Ring Supervisor
- Supervisor Precedence
- Beacon Interval
- Beacon Timeout
- Protocol VLAN ID

Configure the fields as required for your application. Click Apply Changes to save the configuration.

IMPORTANT For Beacon Interval, Beacon Timeout and Ring Protocol VLAN ID, we recommend that you use the default values.

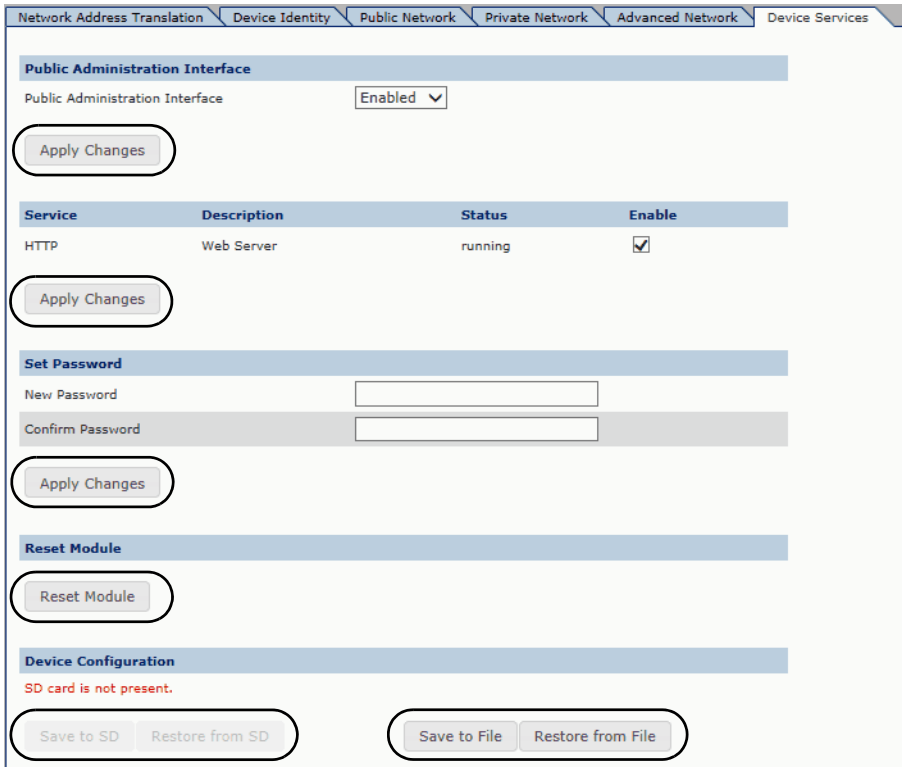


Device Services

The Device Services tab lets you configure the following:

- Public Administration Interface
- HTTP Web Server
- Password
- Module Reset
- Save and Restore

Configure the fields as required for your application. Click Apply Changes to save the configuration. Click Reset Module to reset the device.



Save and Restore Device Configuration

The Device Configuration can be saved and restored to an SD card or a file. Click Save to File to save the configuration and click Restore from File to restore the device configuration from a file. See the SD card sections in Chapter 1 for SD card configuration information.

Electronic Keying

Electronic Keying reduces the possibility that you use the wrong device in a control system. It compares the device that is defined in your project to the installed device. If keying fails, a fault occurs. These attributes are compared.

Attribute	Description
Vendor	The device manufacturer.
Device Type	The general type of the product, for example, digital I/O module.
Product Code	The specific type of the product. The Product Code maps to a catalog number.
Major Revision	A number that represents the functional capabilities of a device.
Minor Revision	A number that represents behavior changes in the device.

The following Electronic Keying options are available.

Keying Option	Description
Compatible Module	Lets the installed device accept the key of the device that is defined in the project when the installed device can emulate the defined device. With Compatible Module, you can typically replace a device with another device that has the following characteristics: • Same catalog number • Same or higher Major Revision • Minor Revision as follows: – If the Major Revision is the same, the Minor Revision must be the same or higher. – If the Major Revision is higher, the Minor Revision can be any number.
Disable Keying	Indicates that the keying attributes are not considered when attempting to communicate with a device. With Disable Keying, communication can occur with a device other than the type specified in the project. **ATTENTION**: Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We **strongly recommend** that you **do not use** Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Exact Match	Indicates that all keying attributes must match to establish communication. If any attribute does not match precisely, communication with the device does not occur.

Carefully consider the implications of each keying option when selecting one.

IMPORTANT Changing Electronic Keying parameters online interrupts connections to the device and any devices that are connected through the device. Connections from other controllers can also be broken.

If an I/O connection to a device is interrupted, the result can be a loss of data.

More Information

For more detailed information on Electronic Keying, see Electronic Keying in Logix5000 Control Systems Application Technique, publication LOGIX-AT001.

1783-NATR Device Diagnostics

Status Indicators

The 1783-NATR device status indicators are shown in the following figure.

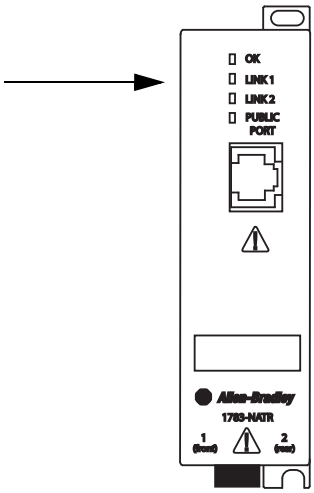


Table 1 provides descriptions of the status indicators.

Table 1 - 1783-NATR Device Status Indicators

Indicator	Status	Description
OK	Off	Device does not have 24V DC power.
	Green	Device is operating correctly.
	Flashing red(1)	Recoverable fault or duplicate IP address has been detected.(2)
	Red	An unrecoverable fault has been detected.
	Flashing red/ yellow	The configuration was unable to be restored from the SD card.
	Flashing red/ green	Device is performing a power-up self-test.

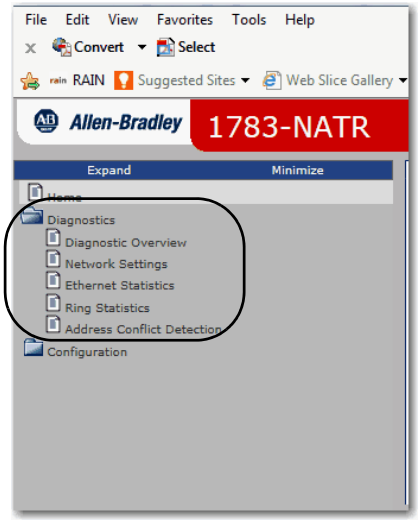
Table 1 - 1783-NATR Device Status Indicators

Indicator	Status	Description
LINK1, LINK2	Off	No data is being transmitted.
	Green	Private port link that is established at 100 Mbps. Device is ready to communicate.
	Flashing green	Data transmission in progress at 100 Mbps
	Yellow	Private port link that is established at 10 Mbps. Device is ready to communicate.
	Flashing yellow	Data transmission in progress at 10 Mbps.
PUBLIC PORT	Off	No data is being transmitted.
	Green	Public port link established at 100 Mbps. Device is ready to communicate.
	Flashing green	Data transmission in progress at 100 Mbps.
	Yellow	Public port link established at 10 Mbps. Device is ready to communicate.
	Flashing yellow	Data transmission in progress at 10 Mbps.

(1) The 1783-NATR device requires a reset to clear the fault.
(2) SD card errors, including missing and unresponsive cards, are considered recoverable faults.

Diagnostic s in the Web User-interface

The 1783-NATR device diagnostics are accessed through the web user-interface by navigating through the links under the Diagnostics folder. The different tabs can also be accessed by clicking the individual tabs.



The tab headings for the Diagnostics are as follows:

- Diagnostic Overview
- Network Settings
- Ethernet Statistics
- Ring Statistics
- Address Conflict Detection

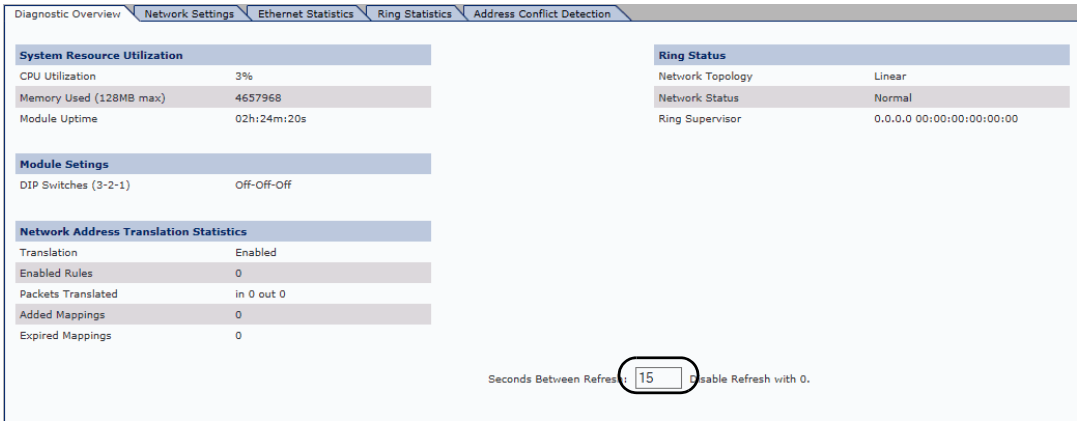
The tabs are described in more detail within this section.

Diagnostic Overview

The Diagnostic Overview tab contains information on the following:

- System Resource Utilization
- Module Settings
- Network Address Translation Statistics
- Ring Status

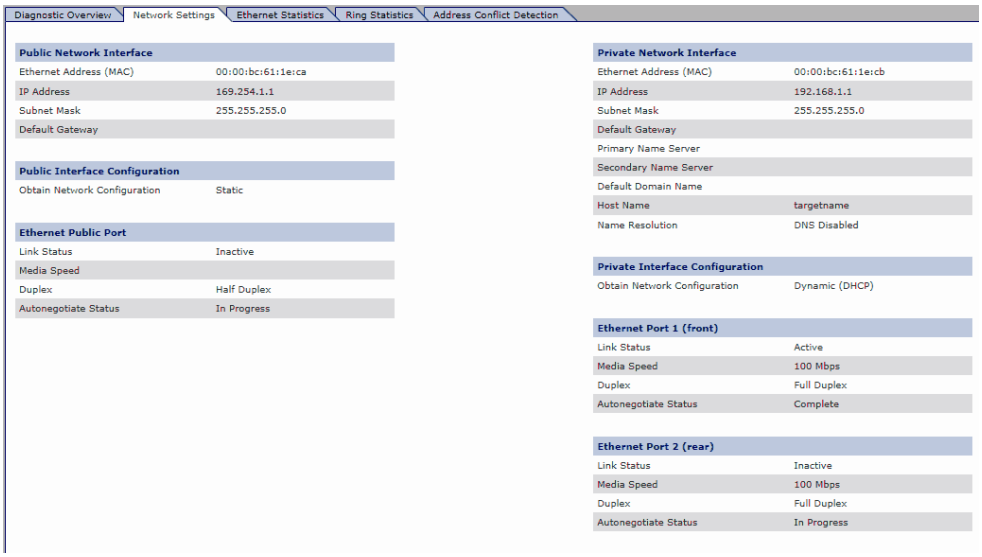
The refresh rate can be configured on the Diagnostic Overview tab. The default refresh rate is 15 seconds.



Network Settings

The Network Settings tab contains information on the following:

- Public Network Interface
- Public Interface Configuration
- Ethernet Public Port
- Private Network Interface
- Private Interface Configuration
- Ethernet Port 1 (front)
- Ethernet Port 2 (rear)



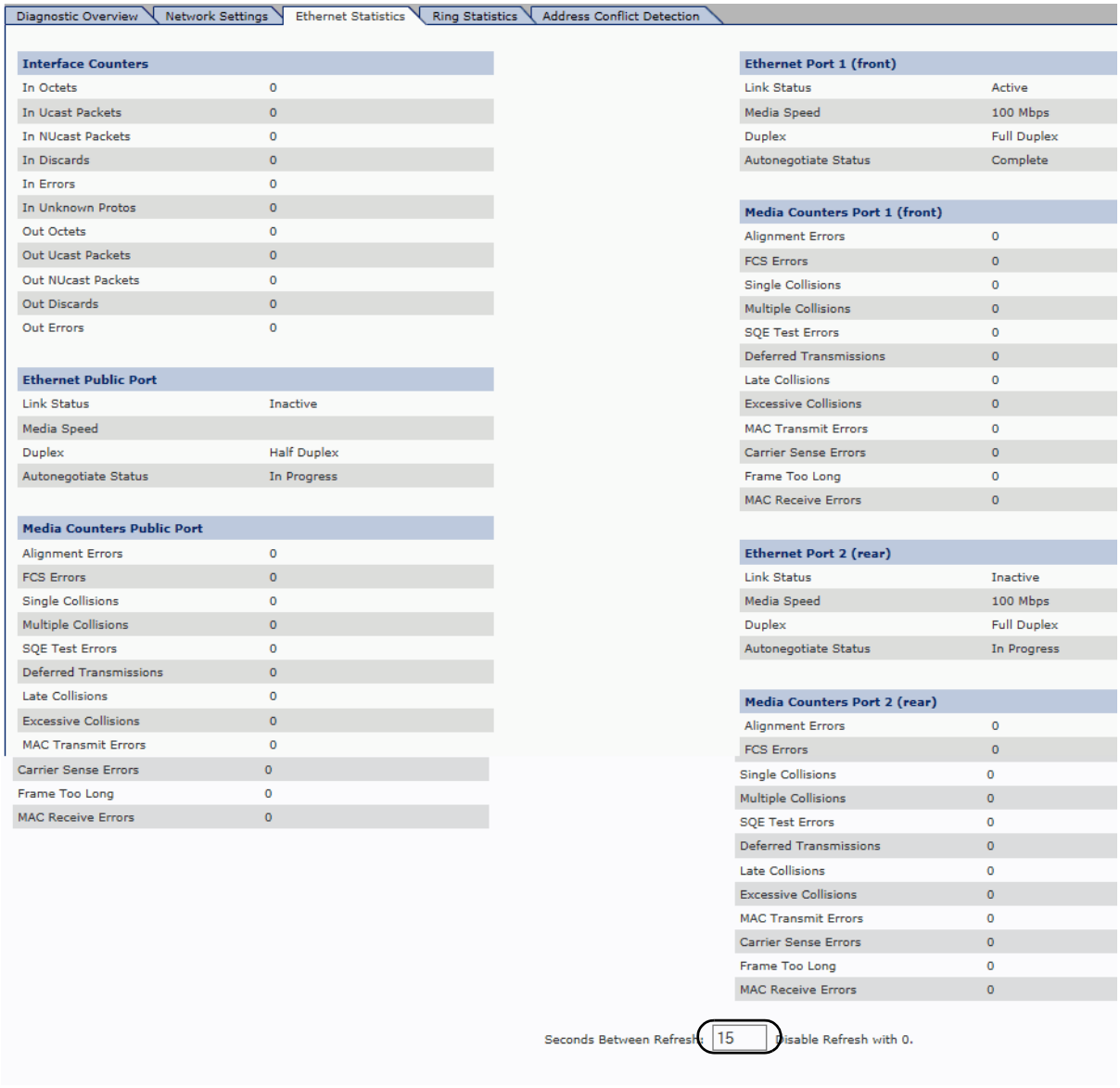
Ethernet Statistics

The Ethernet Statistics tab contains information on the following:

- Interface Counters
- Ethernet Public Port
- Media Counters Public Port
- Ethernet Port 1 (front)
- Media Counters Port 1 (front)

- Ethernet Port 2 (rear)
- Media Counters Port 2 (rear)

The refresh rate can be configured on the Ethernet Statistics tab. The default refresh rate is 15 seconds.

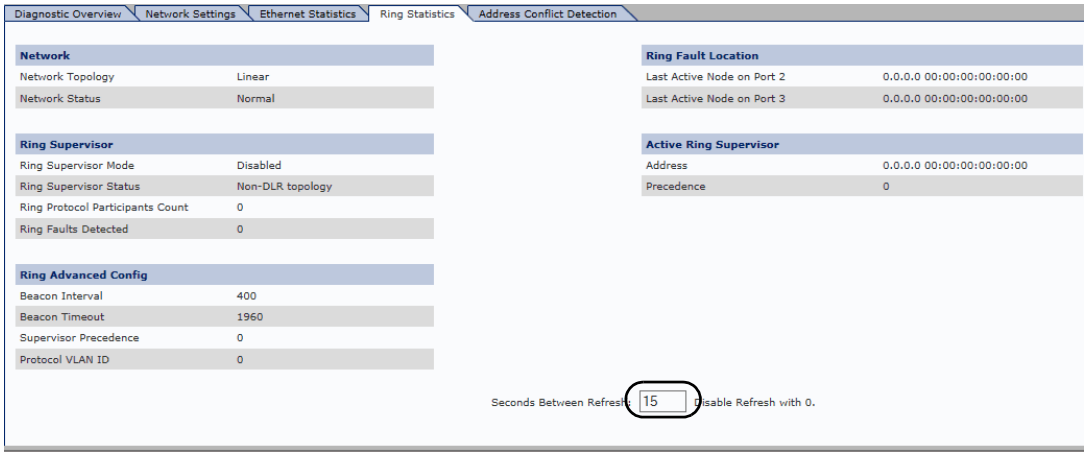


Ring Statistics

The Ring Statistics tab contains information on the following:

- Network
- Ring Supervisor
- Ring Advanced Config
- Ring Fault Location
- Active Ring Supervisor

The refresh rate can be configured on the Ring Statistics tab. The default refresh rate is 15 seconds.

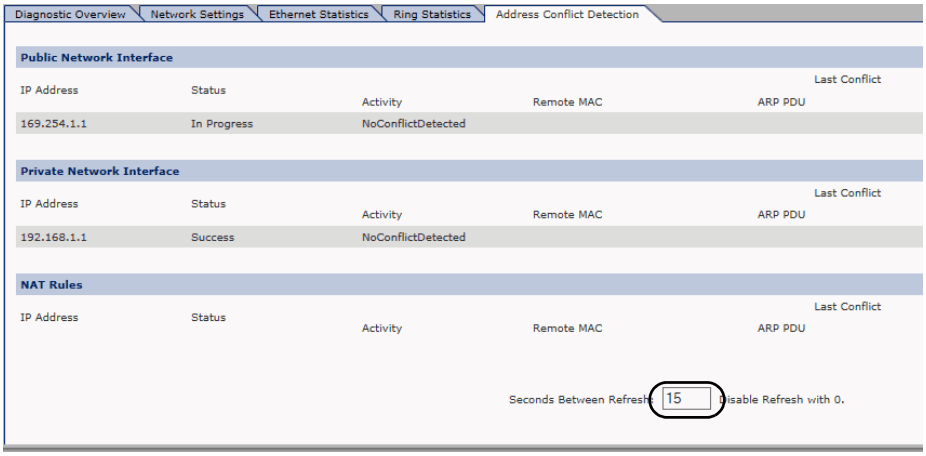


Address Conflict Detection

The Address Conflict Detection tab contains information on the following:

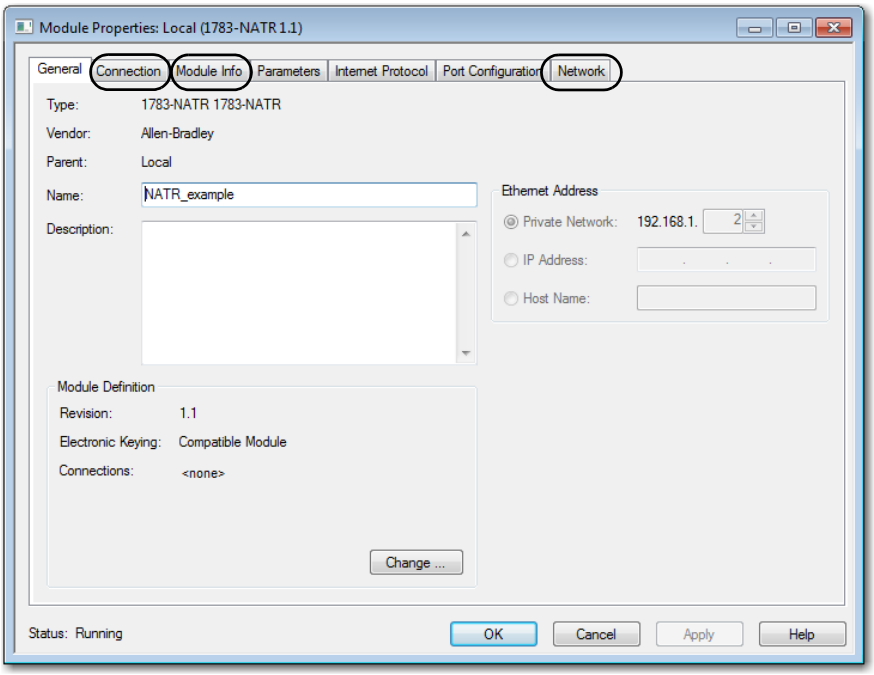
- Public Network Interface
- Private Network Interface
- NAT Rules

The refresh rate can be configured on the Address Conflict Detection tab. The default refresh rate is 15 seconds.



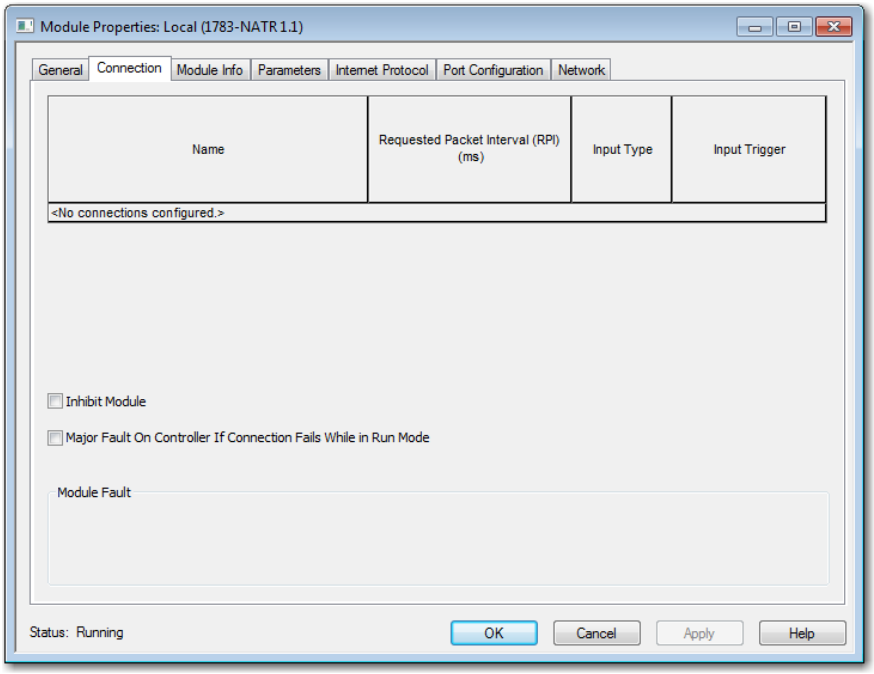
Diagnostics in Logix Designer Application

The 1783-NATR device diagnostics are accessed through the tabs in the Module Properties window in Logix Designer Application.

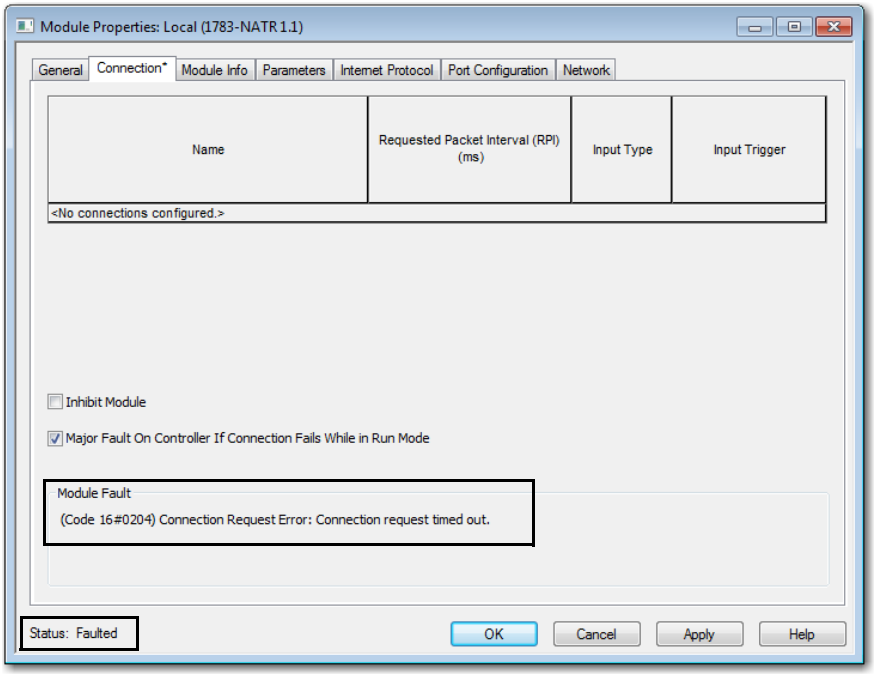


Connection

The Connection tab shows configured connections and module faults.

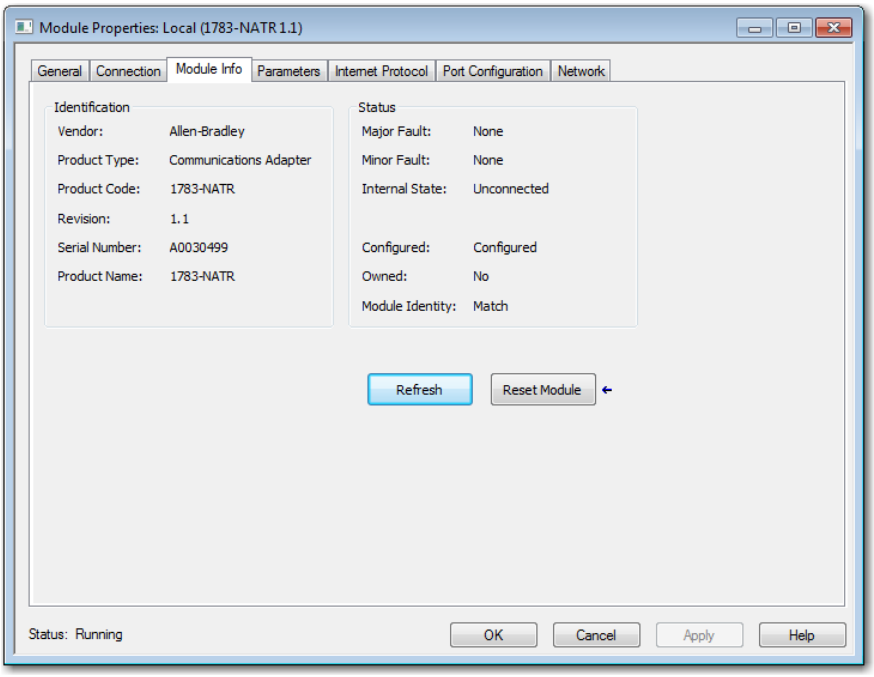


Module faults display in the Module Fault area of the Connection tab. The tab also indicates "Status: Faulted" in the lower left corner.

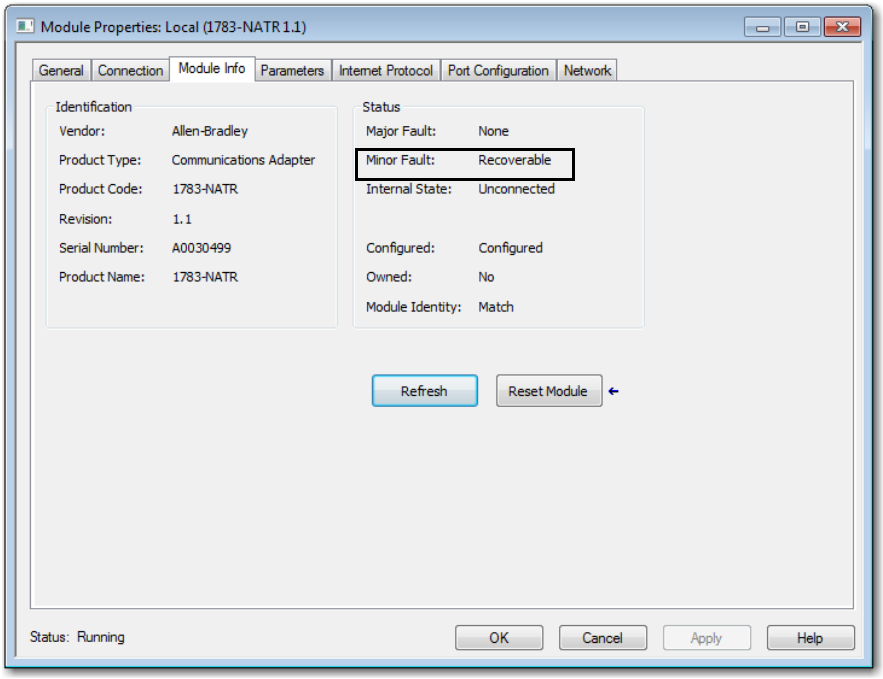


Module Info

The Module Info tab shows identification and status information for the device. You can also refresh and reset the device from this tab.

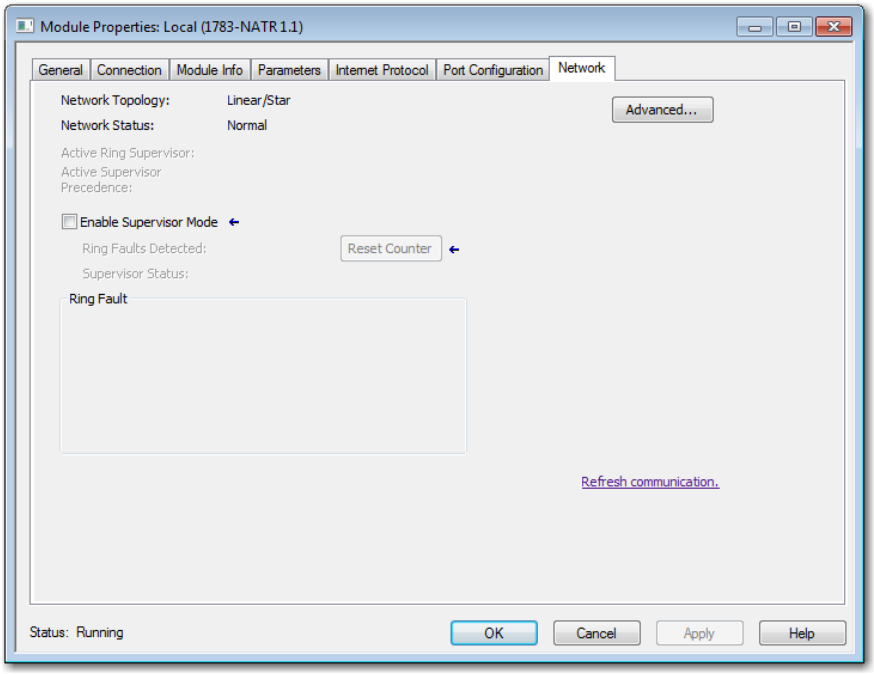


Module faults display in the Status area of the Module Info tab. Minor faults are recoverable and major faults are nonrecoverable. The module becomes uncommunicative with a major fault. In the following figure, a change in DIP switch configuration after powerup caused the minor fault. The minor fault can be recovered by returning the DIP switches to the correct configuration.

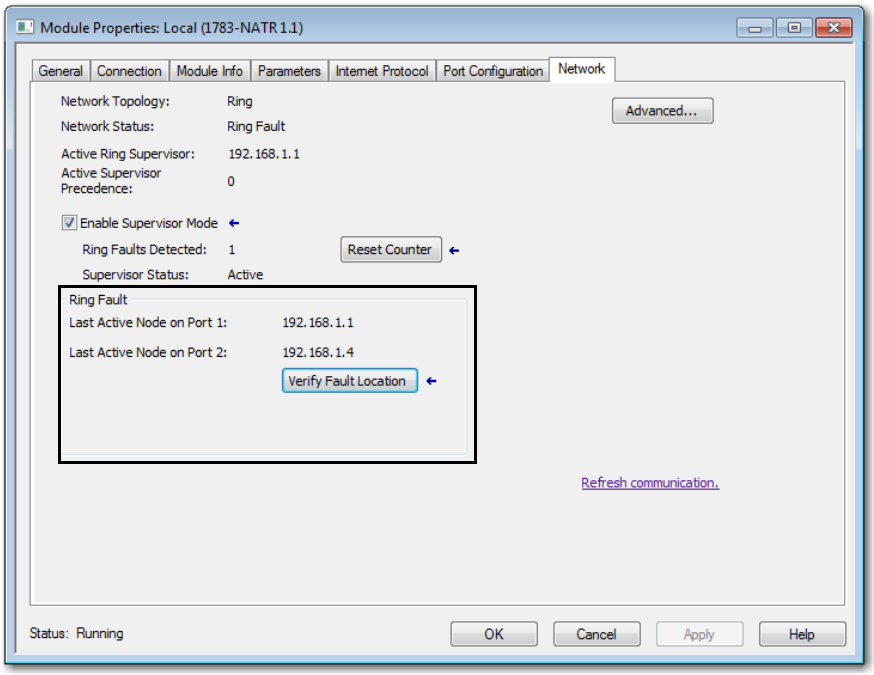


Network

The Network tab lets you view ring faults when DLR supervisor mode is enabled.



When Enable Supervisor Mode is selected, ring faults display in the Ring Fault area of the Network tab.



Numerics

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Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support you can find technical and application notes, sample code, and links to software service packs. You can also visit our Support Center at https://rockwellautomation.custhelp.com/ for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/services/online-phone.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

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Rockwell Automation tests all of its products to help ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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