

Configuring IP

6

The NMC-RX application enables you to configure IP interfaces and IP addresses on your E-series device.

Topic	Page
Overview	6-1
Before Configuring IP Interfaces	6-2
Creating IP Interfaces	6-2
Creating IP Addresses	6-8
Associating a Customer with an IP Interface	6-9
Viewing Policy List Statistics on IP Interfaces	6-11

Overview

TCP/IP is a suite of data communications protocols. Two of the more important protocols in the suite are the Transmission Control Protocol (TCP) and the Internet Protocol (IP).

IP provides the basic packet delivery service for all TCP/IP networks. It is a *connectionless* protocol, which means that it does not exchange control information to establish an end-to-end connection before transmitting data. A *connection-oriented* protocol exchanges control information with the remote computer to verify that it is ready to receive data before sending it.

IP relies on protocols in other layers to establish the connection if connection-oriented services are required and to provide error detection and error recovery. IP is sometimes called an *unreliable* protocol, because it contains no error detection or recovery code.

Before Configuring IP Interfaces

Before you attempt to configure an IP interface, you must configure a module. See the following chapters in the *NMC-RX User Guide, Vol. 1*:

- *Chapter 10, Configuring Channelized OC Modules*
- *Chapter 11, Configuring Unchannelized OC Modules*
- *Chapter 13, Configuring Ethernet Modules*
- *Chapter 14, Configuring T3/E3 and T1/E1 Modules*

You must also configure the lower-layer interfaces over which IP traffic flows. See the following chapters in the *NMC-RX User Guide, Vol. 1*:

- *Chapter 16, Configuring ATM*
- *Chapter 18, Configuring Bridged IP*
- *Chapter 21, Configuring Cisco HDLC*
- *Chapter 22, Configuring Frame Relay*
- *Chapter 23, Configuring MLPPP Bundles*
- *Chapter 25, Configuring PPP*
- *Chapter 26, Configuring PPP over Ethernet*

Creating IP Interfaces

Using the NMC-RX application, you can create an IP interface and its IP address(es) at the same time. You can create an IP interface with a(n):

- Numbered IP address and multiple secondary addresses
- Unnumbered IP address
- Loopback address

To create a numbered or unnumbered IP address, you need to navigate to the appropriate level (interface, subinterface). There are two ways to navigate to the interface or subinterface level.

- If you navigate via the Instance Explorer, you can display interfaces or subinterfaces that belong to a line interface of the module you select.
- If you navigate via the Device-wide Explorer, you can display all the interfaces or subinterfaces configured on a device.

Loopback interfaces are created from the system level of the Instance Explorer.

Creating an IP Interface with a Numbered or Unnumbered IP Address

To create an IP interface with a numbered or unnumbered IP address:

- 1 In the Instance Explorer, navigate to the appropriate link layer interface or subinterface level.
- 2 Click the interface or subinterface.
- 3 Right-click, select Create, and click IP Address.

The Create IP Address dialog box appears.

Lab01 - Create IP Address

Location:

Physical: Module: T3 ATM-4 port, Slot: 6, Port: 0

Logical: ATMINTF: ATM6/0
ATMSUBINTF: ATM6/0.2

IP Major Interface:

Name:

Alias:

Ifindex:

Status: Operational:

Administrative: Up

Category: pointToPoint Virtual Router: default

Interface Number:

Policy Information:

Type	Policy Name	Statistics Enabled
Input	-- None --	<input type="checkbox"/>
Output	-- None --	<input type="checkbox"/>
Local Input	-- None --	<input type="checkbox"/>

Address Information:

IP Address: Address Type: Numbered

Net Mask: 255.255.255.0

MTU: 0

Secondary Address


UnNumbered Loop Interface Index:

Interface Index:

Status Setting	Enabled
Administrative	<input checked="" type="checkbox"/>
ICMP Redirect	<input type="checkbox"/>


4 In the IP Major Interface group box, set parameters (see Table 6-1).

Table 6-1 IP Major Interface group box parameters

Parameter	Description
Name	Identifies the interface; generated automatically
Alias	Description of the interface; 0–256 characters; default blank
IfIndex	Identifies the interface on the particular line interface; generated automatically
Operational	Current operational status of the interface
Administrative	Desired status of the interface: Up/Down; default Up
Category	<ul style="list-style-type: none"> • other • broadcast – data is sent to all hosts on a particular physical network • pointToPoint – data is sent to directly connected hosts • nbma – nonbroadcast multiaccess; data is sent to interconnected hosts but is not broadcast to all hosts on the network
Virtual Router	<ul style="list-style-type: none"> • Select the virtual router with which you are associating the IP address and IP interface • Display a list of all the available virtual routers by clicking . Then select the virtual router with which you want to associate the IP interface you are creating.
Interface Number	Number associated with the interface; selectable only when creating a loopback address

5 In the Policy Information group box, select policy names (see Table 6-2). See *Chapter 2, Configuring Policy Management* for more information.

Table 6-2 Policy Information group box parameters

Parameter	Description
Policy Information	<ul style="list-style-type: none"> • Input - apply policy to data arriving at this interface • Output - apply policy to data leaving this interface • Local Input - apply policy to local data arriving at this interface Click  and select a policy name from the dialog box. To enable statistics logging, select the Statistics Enabled check box after selecting a policy name.

- 6 In the Address Information group box, select an address type, and do one of the following:
 - If you selected Numbered, enter the IP address, net mask, and MTU values (see Table 6-3).
 - If you selected UnNumbered, enter an MTU value, click the Select Interface Index button, and make a selection (see Table 6-3).

Table 6-3 Address Information group box parameters

Parameter	Description
IP Address	32-bit number consisting of a network number and a host number; available only when Numbered address type is selected.
Address Type	<ul style="list-style-type: none"> • Numbered (default): You can create multiple secondary IP addresses for a single IP interface (except on bridged IP) • UnNumbered: There can be only one UnNumbered address on an IP interface <ul style="list-style-type: none"> › If you select UnNumbered, the Select Interface Index button becomes active. Click this button to display the Select IP Interface dialog box, which allows you to select an Interface Index for the UnNumbered IP address. › Unnumbered interfaces are often used in point-to-point connections.
Net Mask	<ul style="list-style-type: none"> • You can set a nondefault value only when you create the IP address; default value is 255.255.255.0; you cannot modify this parameter later • For an unnumbered IP address, the value for the mask is 255.255.255.255; you cannot edit this value • Within a virtual router, the subnet part of the IP address has to be unique in relation to the other addresses on the router
MTU	Maximum transmission unit; range 0–65535; default is 0, which means the size is limited by the underlying layer
UnNumbered Loop Interface Index	<ul style="list-style-type: none"> • Takes the ifindex value of another IP loopback interface with Category set as a loopback • Available only when UnNumbered is selected as address type
Secondary Address	Select to make the address the secondary IP address Note: You must create a primary IP address before creating a secondary IP address.

- 7 Complete the status settings in the lower portion of the Create IP Address dialog box by clicking the desired setting’s checkbox. See Table 6-4 for descriptions.

Table 6-4 IP status settings

Status Setting	Meaning
Administrative	The IP interface is enabled or disabled by the administrator
ICMP Redirect	Enables the sending of redirect messages if the software is forced to resend a packet through the same interface on which it was received
Direct BCAST	Enables directed broadcast forwarding to physical broadcasts
Proxy ARP	<ul style="list-style-type: none"> Proxy Address Resolution Protocol; can be enabled only for addresses on top of bridged IP or Ethernet interfaces Variation of the ARP protocol in which an intermediate device (a router, for example) sends an ARP response on behalf of an end node to the requesting host Can lessen bandwidth use on slow-speed WAN links ARP is used to map an IP address to a MAC address
IRDP	Enable to use ICMP Router Discover Protocol (IRDP) processing on an interface
Access Route	Enable to use an access route

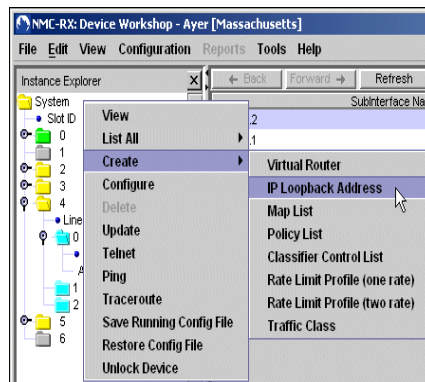
- Click OK to create the IP interface. You have established an IP interface and IP address over the lower-layer interface.

To create additional IP addresses, see page 6-8.

Creating an IP Loopback Address

To create an IP loopback address:

- In the Instance Explorer, click the System folder.
- Right-click, select Create, and click IP Loopback Address.



The Create IP Address dialog box appears.

Lab01 - Create IP Address

Location:

Physical: Module: T3 ATM-4 port, Slot: 6, Port: 0

Logical: ATMINTF: ATM6/0
 ATMSUBINTF: ATM6/0.2

IP Major Interface:

Name:

Alias:

IIndex:

Status: Operational:
 Administrative: Up

Category: pointToPoint Virtual Router: default

Interface Number:

Policy Information:

Type	Policy Name	Statistics Enabled
Input	-- None --	<input type="checkbox"/>
Output	-- None --	<input type="checkbox"/>
Local Input	-- None --	<input type="checkbox"/>

Address Information:

IP Address:

Net Mask: 255.255.255.0

MTU: 0

Address Type: Numbered

UnNumbered Loop Interface Index:

Secondary Address

Select Interface Index...

Status Setting	Enabled
Administrative	<input checked="" type="checkbox"/>
ICMP Redirect	<input type="checkbox"/>

OK Cancel

- 3 Perform steps 4–8 in the previous section.

Creating IP Addresses

You can create numbered and unnumbered IP addresses for IP interfaces. Numbered addresses can be either primary or secondary addresses.



Note: You must create a primary IP address before creating a secondary IP address.

To create an IP address:

- 1 In the Device-wide Explorer, select IP Interfaces, right-click, and click List All.

A list of IP interfaces appears in the list area.

- 2 Select the interface for which you want to create an IP address, right-click, select Create, and click IP Address.

The Create IP Address dialog box appears. Note that previously configured settings in the IP Major Interface group box, such as logical name, are displayed and uneditable.

Lab01 - Create IP Address

Location:

Physical: Module: T3 ATM-4 port, Slot: 6, Port: 0

Logical: ATMINTF: ATM6/0
ATMSUBINTF: ATM6/0.2

IP Major Interface:

Name:

Alias:

Ifindex:

Category: pointToPoint Virtual Router: default

Interface Number:

Status:

Operational:

Administrative: Up

Policy Information:

Type	Policy Name	Statistics Enabled
Input	-- None --	<input type="checkbox"/>
Output	-- None --	<input type="checkbox"/>
Local Input	-- None --	<input type="checkbox"/>

Address Information:

IP Address:

Net Mask: 255.255.255.0

MTU:

Address Type: Numbered

UnNumbered Loop Interface Index:

Interface Index:

Secondary Address

Status Setting	Enabled
Administrative	<input checked="" type="checkbox"/>
ICMP Redirect	<input type="checkbox"/>

- 3 Set the Address Information parameters (see steps 5-6, starting on page 6-5.)



Note: Be sure to click the Secondary Address checkbox.

- 4 Click OK.

Associating a Customer with an IP Interface

When you configure an IP interface, you can associate a customer with the interface.

To associate a customer with an IP interface:

- 1 Select the IP interface that you want to associate with a customer.
- 2 Right-click, and click Configure.

The IP Intf Configuration tab appears in the work area.

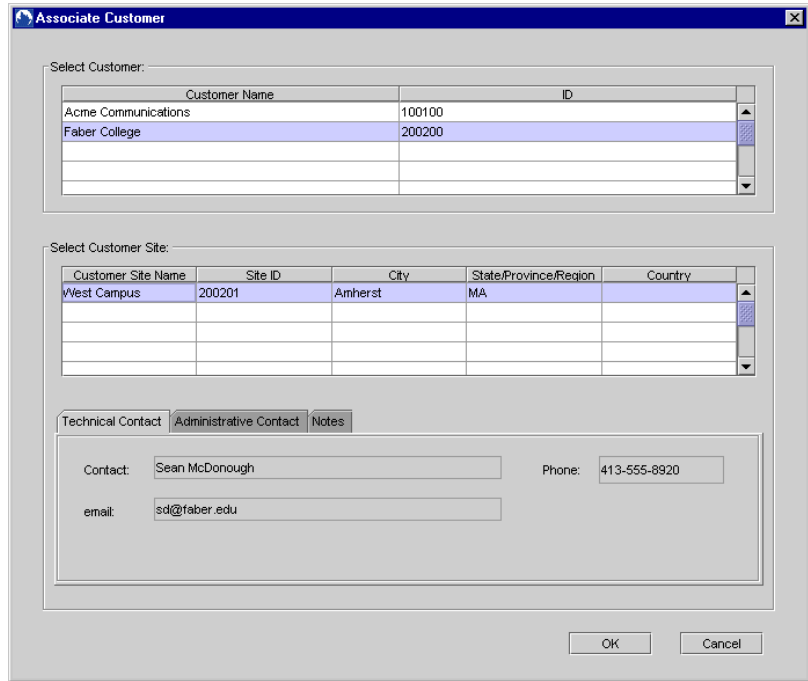
- 3 Click the Customer Information tab.

The screenshot shows a dialog box titled "IP Intf Configuration" with a sub-tab "Customer Information". The dialog contains the following fields and controls:

- Customer Information:**
 - Customer Name:
 - Customer ID:
 - Site:
 - Site ID:
- Contact Information:** (Accessed via tabs: Technical Contact, Administrative Contact, Notes)
 - Contact:
 - Phone:
 - email:
- Buttons:**
 - Clear Customer
 - Associate Customer...

- 4 Click Associate Customer.

The Associate Customer dialog box appears.



- 5 Select a customer and customer site, and click OK.

The customer is associated with the interface.



Note: See *NMC-RX User Guide, Vol. 1, Chapter 7, Configuring Customers*, for instructions on configuring customers and customer sites.

To clear a customer's configuration settings, click the *Clear Customer* button on the *Customer Information* tab.

Viewing Policy List Statistics on IP Interfaces

You can display policy statistics on a device for policies associated with IP interfaces. To obtain policy statistics, you must identify a specific policy list rule and one of its associated classifier control list entries (if any).

See *Chapter 2, Configuring Policy Management* for more information on creating policy lists and rules.

To view policy list statistics on an IP interface:



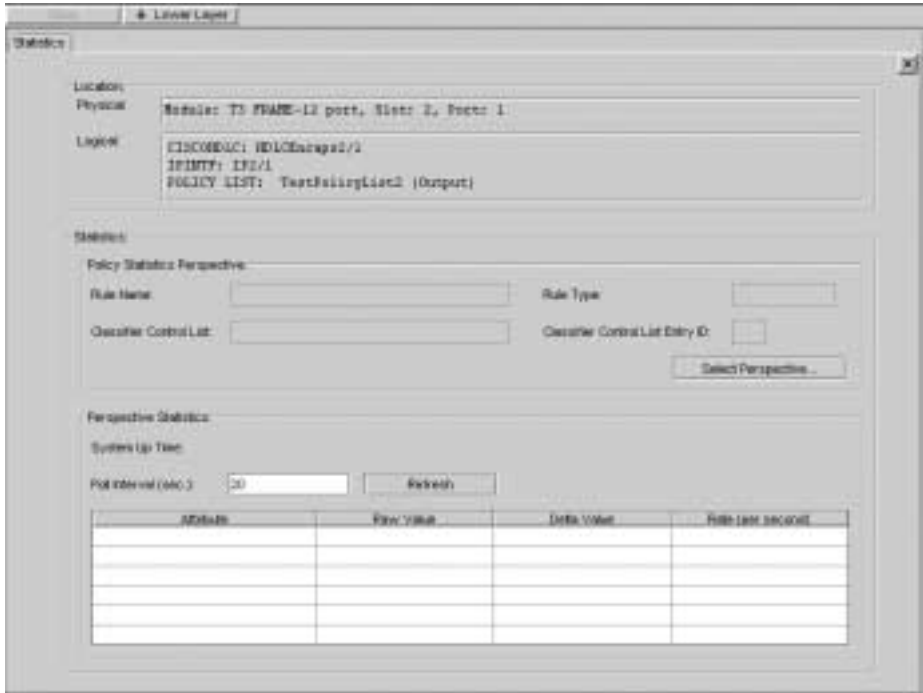
Note: These steps assume that you have created a policy list, associated it with an IP interface, and have enabled statistics for the policy type. See *Chapter 2, Associating a Policy List with an IP Interface* for more information.

- 1 In the Device-wide Explorer, select IP Interfaces, right-click, and click List All.

All IP interfaces on the device are displayed in the list area.

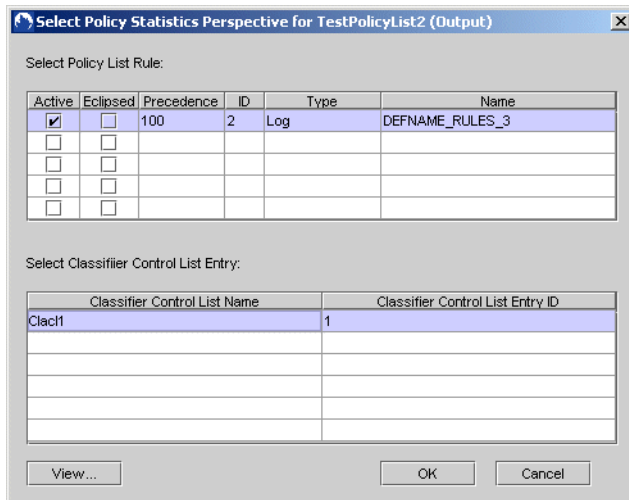
- 2 Select an IP interface, right-click, and select the statistics you want to display:
 - Policy Statistics (Input)
 - Policy Statistics (Output)
 - Policy Statistics (Local Input)

The Statistics tab appears in the work area.



- 3 Click the Select Perspective button.

The Select Policy Statistics Perspective for <policy name> dialog box appears. The Policy List Rule table lists all rules contained in the policy list.



- 4 Click a policy list rule.
 - If a policy list rule has classifier control list entries associated with it, you must also select a classifier control list entry.
 - To view a selected classifier control list entry, click View.
- 5 Click OK.

Information is entered in the Statistics group box and statistics appear for the perspective you just chose.

Depending on the perspective (rule type/classifier control list entry) selected, different attributes are displayed. See Table 6-5 for a complete list of attributes.

Save Lower Layer

Statistics

Location:

Physical: Module: T3 FRAME-12 port, Slot: 2, Port: 1

Logical: CISCOHDLC: HDLCEncaps2/1
IPINTF: IP2/1
POLICY LIST: TestPolicyList2 (Output)

Statistics:

Policy Statistics Perspective:

Rule Name: DEFNAME_RULES_3 Rule Type: Log

Classifier Control List: Clac1 Classifier Control List Entry ID: 1

Select Perspective...

Perspective Statistics:

System Up Time: 21 hours, 21 minutes, 7 seconds.

Poll Interval (sec.): 20 Refresh

Attribute	Raw Value	Delta Value	Rate (per second)
Logged Packets	0	0	0
Logged Bytes	0	0	0

- 6 To select a different perspective, repeat steps 3 through 5.

Table 6-5 Policy list statistics attributes

Attribute	Description
Rule Name	Logical identifier of the selected rule from all rules contained by the policy list.; uneditable
Classifier Control List	Identifier of the classifier control list associated to the selected rule. If “None” is displayed, then there is no classifier control list associated to the selected rule; uneditable
Rule Type	Rule type for the selected rule; uneditable <ul style="list-style-type: none"> See below for rule attribute descriptions
Classifier Control List Entry ID	Identifier of the entry associated with the selected classifier control list. This field will be blank when there is no classifier control list associated to the selected rule; uneditable

Color Rule	
Transmitted Packets	Number of packets transmitted by the color rule
Transmitted Bytes	Number of bytes transmitted by the color rule

Filter Rule	
Dropped Packets	Number of packets dropped by the filter rule
Dropped Bytes	Number of bytes dropped by the filter rule

Forward Rule	
Forwarded Packets	Number of packets forwarded by the forward rule
Forwarded Bytes	Number of bytes forwarded by the forward rule

Log Rule	
Logged Packets	Number of packets logged by the log rule
Logged Bytes	Number of bytes logged by the log rule

Mark Rule	
Marked Packets	Number of packets marked by the mark rule
Marked Bytes	Number of bytes marked by the mark rule

Next Hop Rule	
Routed Packets	Number of packets routed to the next-hop IP address
Routed Bytes	Number of bytes routed to the next-hop IP address

Table 6-5 Policy list statistics attributes (continued)

Attribute	Description
Next Interface Rule	
Routed Packets	Number of packets routed to the next-interface interface
Routed Bytes	Number of bytes routed to the next-interface interface
Rate Limit Profile Rule	
Committed Packets	Number of packets policed by the rate limit rule committed action
Committed Bytes	Number of bytes policed by the rate limit rule committed action
Conformed Packets	Number of packets policed by the rate limit rule conformed action
Conformed Bytes	Number of bytes policed by the rate limit rule conformed action
Exceeded Packets	Number of packets policed by the rate limit rule exceeded action
Exceeded Bytes	Number of bytes policed by the rate limit rule exceeded action
Traffic Rule	
Transmitted Packets	Number of packets transmitted by the traffic class rule
Transmitted Bytes	Number of bytes transmitted by the traffic class rule

