Reference Manual for the ProSafe Network Management System NMS100

NETGEAR

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Customer Support

Refer to the Support Information Card that shipped with your ProSafe Network Management System. ProSafe NMS includes free installation support for the first 30 days. Customer support after the initial 30 day period is offered as a fee-based per-incident service. Please go to the Sales page at *http://www.netgear.com* for more information.

World Wide Web

NETGEAR maintains a World Wide Web home page that you can access at the URL*http://www.netgear.com*. A direct connection to the Internet and a Web browser such as Internet Explorer or Netscape are required.

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Chapter 1
Introduction

Audience, Scope, Conventions, and Formats

This reference manual assumes that the reader has basic to intermediate computer and Internet skills. This guide uses the following typographical conventions:

Table 1-1. Typographical Conventions

italics	Emphasis, books, CDs, URL names
bold	User input
SMALL CAPS	Screen text, file and server names, extensions, commands, IP addresses

This guide uses the following format to highlight special messages:

> **Note:** This format is used to highlight information of importance or special interest.

This manual is written for the ProSafe NMS according to these specifications.

Table 1-2. Manual Scope

Product Version	ProSafe Network Management System
Manual Publication Date	September 2004

> **Note:** Product information and updates are available on the NETGEAR Web site at *http://kbserver.netgear.com.*

Overview

ProSafe NMS uses the popular SNMP management protocol to poll and configure devices, workstations, and servers over IP networks. Along with all the features expected in any SNMP management station, ProSafe NMS also includes the following advanced features:

- Scalable to 1,000 devices.
- SNMPv1, SNMPv2c and secure SNMPv3 support.
- Event forwarding, and email and pager notifications.
- Audit events for user actions (login and editing).
- Application Service (TCP) polling.
- Long-term trend reports.
- Custom MIB tables with derived MIB expressions.
- RMON-I user interface application.
- GUI device support development tools.
- Application programming interfaces with samples.

Other ProSafe NMS Features

This document has only described some of the most commonly used ProSafe NMS features. ProSafe NMS is a full-featured distributed network management system that will meet your most demanding needs. These are some of the other features that you will find described in the Online Help system.

- Running tasks as Windows Services
- Windows Task Bar Control Icon
- Private MIB Import
- User audit events (login and map edit)
- Custom MIB Tables
- Custom MIB Expressions
- Custom menus
- Graphical device views
- MIB variable browser
- RMON user interface

- Alarm box event action
- Event forwarding
- Running external programs
- Automatic Icon and Program selection
- Programming interfaces

ProSafe Network Management System

This is a single user version for managing small to medium sized networks. ProSafe NMS can be used on Windows 2000, 2003, NT, XP, ME, and 98 systems. All components run on a single system and support one user. The map database size is limited to 1,000 objects.

System Requirements

The following table lists the minimum recommended system requirements.

Table 1-3. Recommended system requirements

Parameter	ProSafe NMS
CPU	Pentium II 600 MHz
Memory	128 MB
Disk Free	500 MB
Screen	800 x 600
Mouse Required	Yes
Console Operating System	Win XP/2K/2K3/NT/ME/98

Device Access Modes

ProSafe NMS supports various device access modes including TCP only, ICMP (Ping), SNMP V1, SNMP V2c and SNMP V3. Each mode is briefly described below.

None (TCP Only)

Null access is used for polling TCP services only, where ICMP (Ping) and SNMP access is restricted by a firewall.

ICMP (Ping)

ICMP (Ping) mode is used for devices that do not support SNMP but can still be pinged to see if they are responding. This may include servers and workstations.

SNMP V1 and V2c

SNMP V1 and SNMP V2c are very similar SNMP agent protocols that are used by most currently deployed network devices. Any device that supports V2c will generally also support V1. ProSafe NMS uses automatic intelligence to switch from one mode to the other as needed. So in most cases select SNMP V1 as the device access mode for any SNMP device.

Since SNMP V1 and V2c are the most common and simplest SNMP protocols, this guide will only show you how to use these protocols.

SNMP V3

SNMP V3 is a secure SNMP agent protocol that supports authentication and privacy (encryption). The use of SNMP V3 is considered an advanced topic. As such, this guide does not describe V3 in any detail. For more information about using V3, please use the Help/Help Topics menu and search for *Setting Device Access Modes* in the Index.

Package Contents

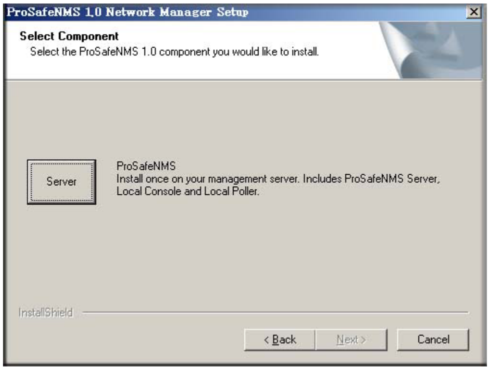
The product package should contain the following items:

- Software CD, including:
  - ProSafe NMS Software
  - This guide
- Software license key
- Customer support card

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Please remember to keep your software CD and license key in a secure location.

Chapter 2
Installation and Startup

Installing the ProSafe NMS Server and Local Console



ProSafeNMS 1.0 Network Manager Setup

Select Component

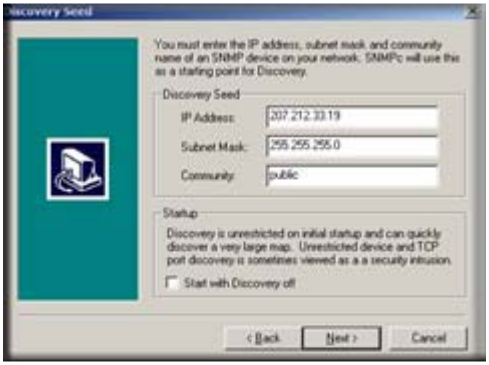
Select the ProSafeNMS 1.0 component you would like to install.

ProSafeNMS

Install once on your management server. Includes ProSafeNMS Server, Local Console and Local Poller.

1. Log on to Windows with administrator permission.
2. Insert the ProSafe NMS CD into the computer CD drive.
3. Use the Windows Start/Run menu and enter **d:\NMSsetup**, where d: is the CD drive.

   The install program shows a dialog with three buttons for the installable ProSafe NMS options. On your main ProSafe NMS system, you only need to install the Server component, as this includes a local console and polling agent.



iscovery Seed

You must enter the IP address, subnet mask and community name of an SNMP device on your network. SNMPc will use this as a starting point for Discovery.

Discovery Seed

IP Address: 207.212.33.19

Subnet Mask: 255.255.255.0

Community: public

Startup

Discovery is unrestricted on initial startup and can quickly discover a very large map. Unrestricted device and TCP port discovery is sometimes viewed as a a security intrusion.

☐ Start with Discovery off

4. Click the Server button.

   You are prompted for the installation directory. Then the Discovery Seed dialog is displayed. You must enter valid information at this dialog or network discovery will not work properly.
5. Enter the IP Address of an SNMP Seed Device on your network, preferably a router.
6. Enter the Subnet Mask for the Seed Device.
7. Enter the SNMP V1 Read Community for the seed device.

   The install program installs ProSafe NMS on your hard drive.
8. After the installation is complete, log off Windows and restart your computer.

Installing the Air Messenger Pro Paging Software

ProSafe NMS includes a copy of the Air Messenger Pro paging application. This software is required if you want ProSafe NMS to page you when an event occurs. Air Messenger Pro is not installed as part of the regular ProSafe NMS installation.

To install Air Messenger Pro, use the Windows Start/Programs/NETGEAR ProSafe NMS/Install Air Messenger Pro menu. Follow the installation instructions.

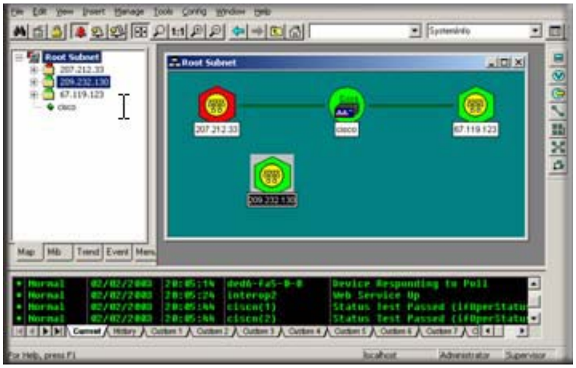
After you have installed Air Messenger Pro you can configure ProSafe NMS to notify your pager when an event occurs. Please refer to “Emailing or Paging the Administrator on an Event” for further instructions.

Starting the ProSafe NMS Server and Local Console

To control ProSafe NMS tasks, you must be logged on to Windows with administrator permission.

After installation of the ProSafe NMS Server component, you are prompted to reboot the Windows system.

When the system has rebooted and you log on to Windows, the ProSafe NMS Server and Console applications automatically start and you are automatically logged on.

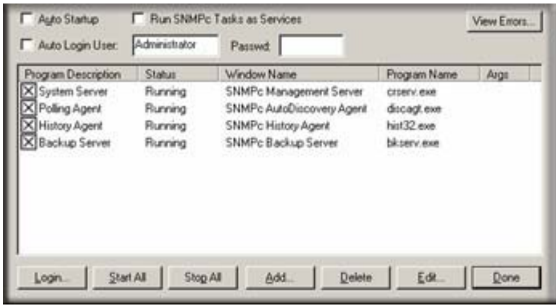


```
• Normal   02/02/2003  20:05:14  ded6-Fa5-0-0   Device Responding to Poll
• Normal   02/02/2003  20:05:24  interop2       Web Service Up
• Normal   02/02/2003  20:05:44  cisco(1)       Status Test Passed (ifOperStatu
• Normal   02/02/2003  20:05:44  cisco(2)       Status Test Passed (ifOperStatu
```

Disabling Automatic Console Login

To disable automatic console startup and login, go to the Windows Start menu and use the Programs/NETGEAR ProSafe NMS/Configure Tasks menu.

Disable the Auto Login User check box and click the Done button.



☐ Auto Startup ☐ Run SNMPc Tasks as Services

☐ Auto Login User: Administrator Passwd:

Program Description	Status	Window Name	Program Name	Args
☒ System Server	Running	SNMPc Management Server	crserv.exe	
☒ Polling Agent	Running	SNMPc AutoDiscovery Agent	discagt.exe	
☒ History Agent	Running	SNMPc History Agent	hist32.exe	
☒ Backup Server	Running	SNMPc Backup Server	bkserv.exe	

Starting a Local Console Session

1. Go to the Windows Start menu and use the Programs/NETGEAR ProSafe NMS/Login Console menu.
2. At the login prompt, enter **localhost** as the Server Address.
3. Enter the username and password and click OK.

   Initially there is only one user named Administrator with no password.

Stopping and Starting the Server

1. Go to the Windows Start menu and use the Programs/NETGEAR ProSafe NMS/Shutdown System menu to stop the ProSafe NMS Server system tasks.
2. Use the Windows Start Programs/NETGEAR ProSafe NMS/Startup System menu to restart the ProSafe NMS Server system tasks.

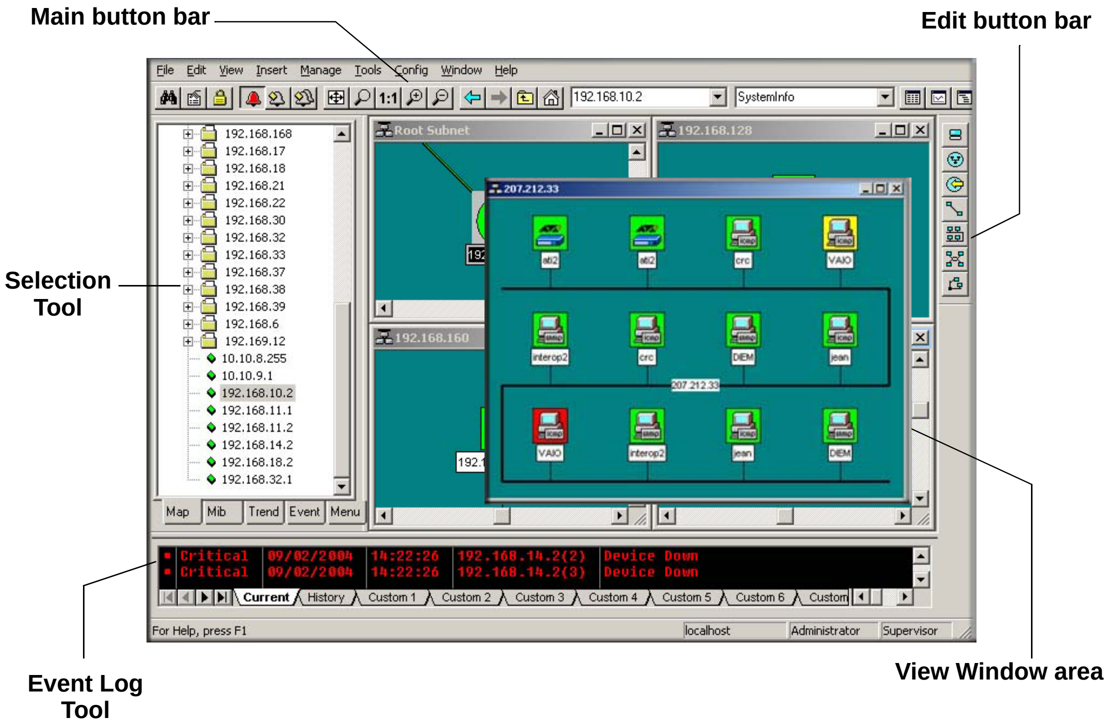
   Note that any running console sessions will be logged off and you will need to exit the console applications separately.

Disabling Automatic Start up of ProSafe NMS Server System Tasks

1. Go to the Windows Start menu and use the Programs/NETGEAR ProSafe NMS/Configure Tasks menu.
2. Disable the Auto Startup check box and click Done.

Console Elements

The following figure and table show the main elements of the ProSafe NMS console.



```
Critical 09/02/2004 14:22:26 192.168.14.2(2) Device Down
Critical 09/02/2004 14:22:26 192.168.14.2(3) Device Down
```

Figure 2-1: Console elements

Element	Function
Main Button Bar	Buttons and controls to execute common commands quickly.
Edit Button Bar	Buttons to quickly insert Map elements.
Selection Tool	Tabbed control to select objects within different ProSafe NMS functional modules.
Event Log Tool	Display filtered Event Log entries.
View Window Area	Map View, MIB Tables, and MIB Graph windows are shown here.

Console Button Commands

The following diagrams show the function of each button in the Main button bar and Edit button bar. Each of these buttons has a corresponding main menu item.

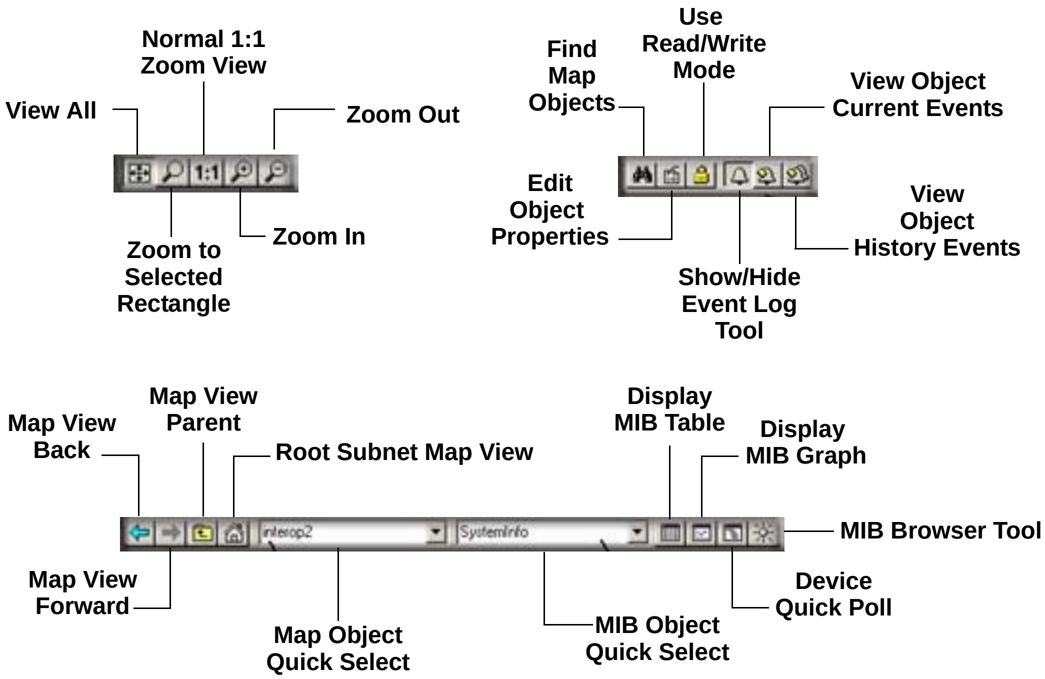


Figure 2-2: Main button bar

Edit Button Bar

Use the Edit button bar to add the objects shown below.

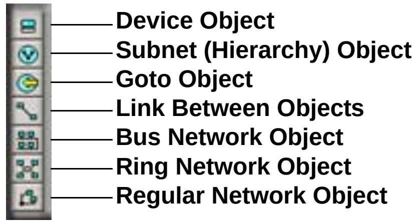


Figure 2-3: Edit button bar

Selection Tool

If you do not see the selection tool, use the View/Selection Tool menu to show it. Use the Selection Tool to manipulate objects from one of several databases. Use the drag control at the right of the Selection Tool to change its size. Select one of the Selection Tool tabs to display a tree control for the database. Use the right-click menu inside a selection tree for database-specific commands.

Table 2-1. Selection Tool tabs

Selection Tab	Description
Map	Map Object database, including devices and subnets.
MIB	Compiled SNMP MIBs, Custom Tables and Custom MIB Expressions.
Trend	Report profiles that define long term polling procedures and scheduled reports.
Event	Event filters used to determine what happens when an event is received.
Menu	Custom menus that appear in the Manage, Tools, and Help ProSafe NMS menus.

Event Log Tool

The Event Log Tool displays different filtered views of the ProSafe NMS event log. If you do not see the Event Log Tool, use the View/Event Log Tool menu to show it.

- Select the Current tab to show unacknowledged (current) events. These events have a colored box at the left side of the log entry. The color of map objects is determined by the highest priority unacknowledged event for that object.
- Select the History tab to show all events, including acknowledged and unacknowledged events.
- Select one of the Custom tabs and use the right-click Filter View menu to specify which events should be displayed for that tab.
- Double-click an event entry to display a Map View window with the corresponding device icon visible.
- To quickly view events for a particular device, first select the device and then use one of the View Events buttons (or the View/Active Events and View/History Events menus). This will show the device events in a separate window in the View Windows area.

- To remove one or more events, select the event and press the Delete key.
- To acknowledge (remove current status of) an event, select the event and use the right-click Acknowledge menu.
- To completely clear the event log, use the File/Clear Events menu.

View Window Area

The View Window Area is the main way to view the ProSafe NMS map and command results. This area uses the Multi-Document-Interface (MDI) specification to display multiple windows at the same time.

Use the Window/Cascade and Windows/Tile menus to rearrange the windows in the View Window area in a way that makes them all visible.

Windows in this area can be in one of several states:

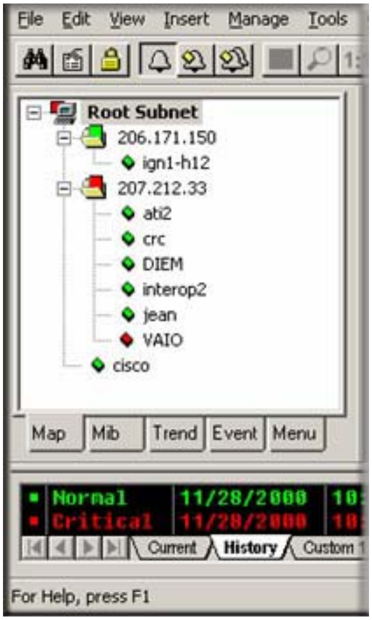
- A *maximized* window uses the entire area and hides any other windows behind it. If you close a maximized window, the next top-most window will still be displayed in the maximized state. You need to be careful when using maximized windows because it is easy to lose track of how many windows you have opened and there is an upper limit. Use the Windows menu to see a list of windows. Use the Windows/Cascade menu to view all windows at the same time.
- An *overlapped* window does not take up the entire area. One window will be completely visible and other windows are partially hidden behind it. This is the most common situation for the View Window area because it lets you view maps, tables and graphs at the same time and quickly move between them.
- A *minimized* window is displayed as a small title bar with window Open and Close buttons. Windows are not typically minimized within the View Window area because, as with the maximized case, they can easily be lost behind other windows.

Chapter 3
Data and Statistics

Working with the Map Database

The Map Selection Tree

Locate the Selection Tool on the right side of the console. If you do not see the Selection Tool, use the View/Selection Tool menu to show it. Select the first tab marked Map. The displayed Map Selection Tree shows all icon objects in the map. This includes subnets (which contain lower map levels), devices, and Goto icons. Networks and links are not shown in the Map Selection Tree.



```
Normal    11/28/2000  10:
Critical  11/28/2000  10:
```

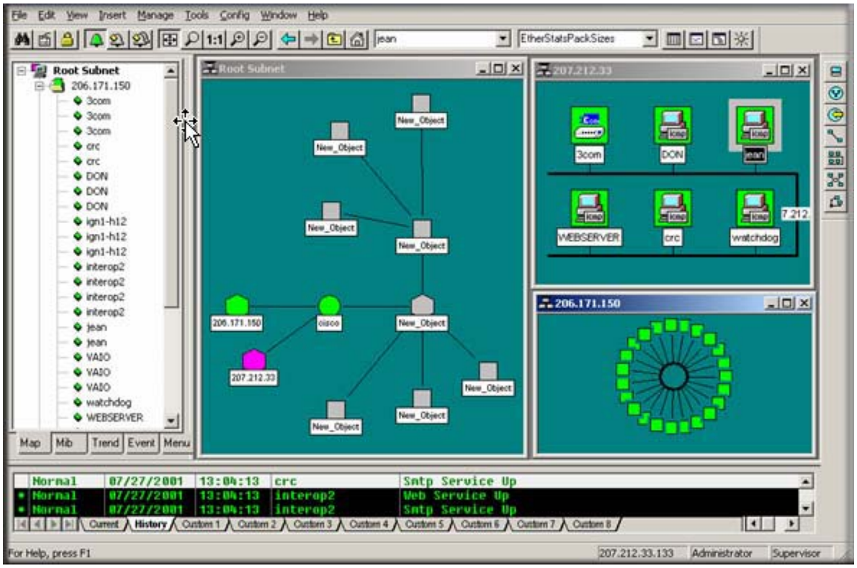
For Help, press F1

- *Single-click* the small box to the left of a subnet icon (folder icon) to open or close that sublevel in the selection tree.
- *Double-click* on a subnet name (right of folder icon) to open that subnet level as a Map View window (see below).
- *Left-click* on any object name to select that object. Use the Shift and Ctrl keys to select multiple objects.
- Use the Delete key to remove selected objects.
- After opening two subnet levels, select multiple device names and drag the mouse to move them from one subnet to another. Note that any attached links and networks are not moved, and links will be deleted during the move (you can re-add them manually later).
- Right-click on a device icon (colored rectangle) or name to see the available right-click menus. Use these menus to edit the selected object properties, display tables, and run other custom menus.
- Open a subnet tree and use the Insert/Map Object menus, or the Edit button bar to add icon objects to the subnet tree.

Each icon in the Map Selection Tree is colored according to the status of the represented object. Subnet icons (and the top level Root Subnet icon) show the highest priority color of all underlying objects.

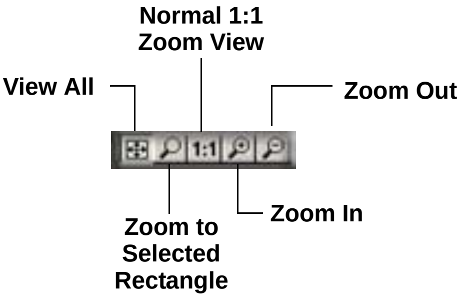
Using Map View Windows

Map View windows are overlapping windows that are displayed in the View Window area of ProSafe NMS. This is where you can see the map topology as a diagram and easily manipulate the map objects (add, delete, move). Note that the View Window area shows multiple windows and if the topmost window is *maximized* (takes up the entire area) then any other windows will be hidden. Use the Windows/Cascade menu to show all windows within the View Window area.



```
Normal   07/27/2001  13:04:13  crc        Smtp Service Up
Normal   07/27/2001  13:04:13  interop2   Web Service Up
Normal   07/27/2001  13:04:13  interop2   Smtp Service Up
```

- Use the View/Map View/Root Submap menu to show the top level of the ProSafe NMS map.
- Double-click on any subnet name in the Map Selection Tree or subnet icon in a map view to show a map view for that subnet.
- To easily move the map view, right-click anywhere on the view and drag the mouse to move the view contents. You can also use the scroll bars, but this is not as easy.
- Use the Zoom buttons to see more or less of the Map view.
  - — Use the Pan/Zoom button to zoom into a selected rectangle (left click and drag the rectangle).
  - — Use the 1:1 button to set the normal zoom mode (icon and name visible).
  - — Use the Zoom +/- buttons to manually zoom.



- Use the View All button to toggle the View All state for a selected map view. In this state, the view contents are automatically zoomed so that all icons are visible. As you change the size of the View window, the contents will change size. As the icon sizes get smaller, the icon image is hidden and then the name is hidden. If your top-level map is large and the View All state is enabled (default) you may only see small icons. Use the manual Zoom buttons to zoom in to an area of the map view.
- Use the Previous View and Next View buttons to move back and forth between different zoom levels you have selected.

Moving Map Objects

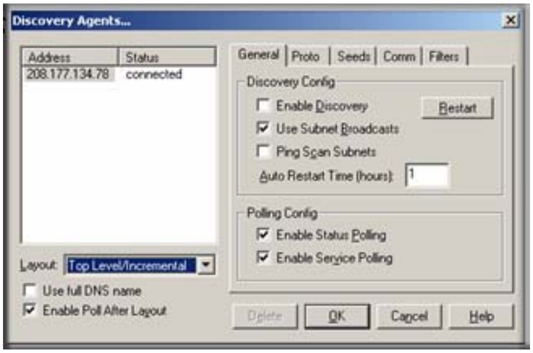
ProSafe NMS normally uses a discovery process to add subnets, devices, links, and networks in a logical topology that represents a two-level IP Subnet hierarchy. The top level includes all router devices and subnet icons. The second layer includes single-port devices linked to Bus Networks under the appropriate subnet icons. The top-level map is automatically arranged as a star network.

Map objects are placed on the nearest Map Grid Point when you move them. Use the Config/Console Options menu and select the Show Grid check box to show map grid points. Set the grid size in the Grid Spacing edit box.

Moving Objects at the Root Level

Since the discovery agent continually arranges the top map level, before changing the root level manually you need to change the way discovery works. Use the Config/Discovery-Polling menu and then do one of the following:

- Clear the Enable Discovery check box so that discovery is completely disabled.
- Select Discovered Objects from the Layout pull-down so that any newly discovered objects are added to a separate subnet icon named Discovered Objects.
- Select Top Level/Incremental from the Layout pull-down so that any newly discovered objects are added using an incremental layout algorithm that does not disturb the existing layout.



Discovery Agents...

Address	Status
208.177.134.78	connected

Layout: Top Level/Incremental

☐ Use full DNS name

☑ Enable Poll After Layout

Discovery Config

☐ Enable Discovery

☑ Use Subnet Broadcasts

☐ Ping Scan Subnets

Auto Restart Time (hours): 1

Polling Config

☑ Enable Status Polling

☑ Enable Service Polling

To move objects at the top level, select one or more objects in a Map view and drag the mouse. The selected objects are moved to the new mouse location. The following illustration shows an automatically (left) and manually (right) arranged Root Submap level.

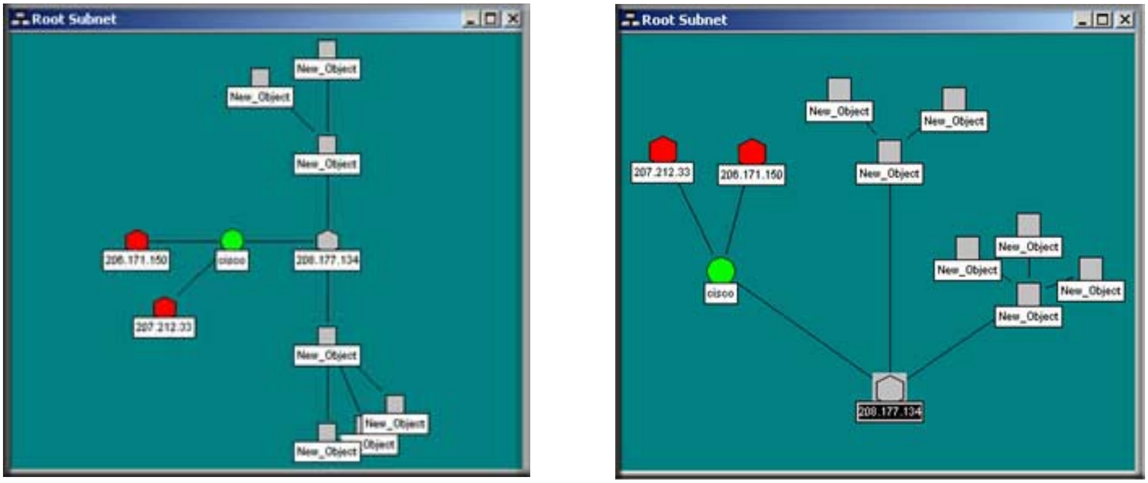


Figure 3-1: Automatically arranged and manually arranged submap levels

Moving Objects Inside Subnet Levels

Single port devices are added to the second map layer, below top-level subnet icons. Each subnet layer also includes a Bus Network that all devices are attached to. You can move devices around the Bus Network by selecting them and dragging them to the new position. However, the Bus Network is automatically arranged and the object will only be approximately placed where you drag it.

If you need to positively rearrange the lower levels then it is best to change the network from a Bus to a regular *Network*. This network will not be automatically arranged and you can move icons anywhere in the view, as well as change the network shape with *junction points*. You can click and drag any junction point or network segment. To add or remove junction points, double-click on the network.

You can also disconnect objects from the Bus Network by deleting the attaching link. Then the detached object can be moved anywhere in the view. The following figure shows a Map view of an automatically arranged subnet level on the left, and a manually arranged (regular network) subnet level on the right.

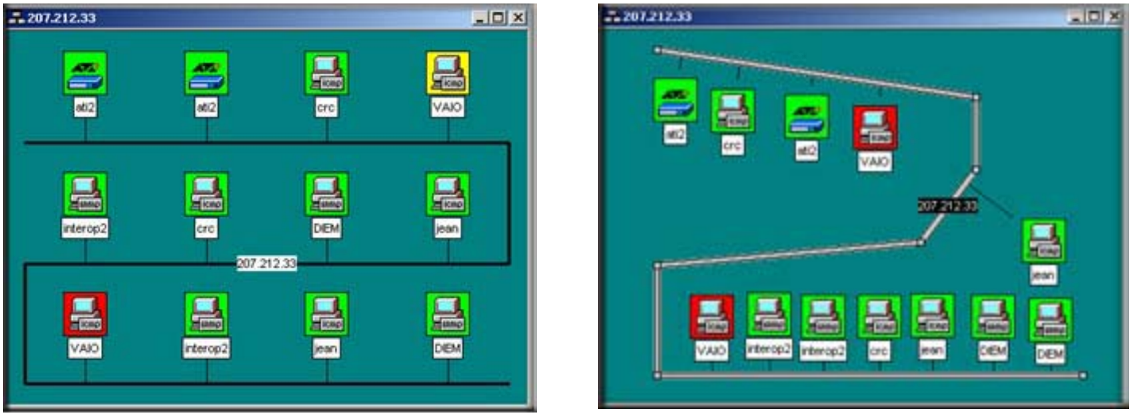


Figure 3-2: Automatically arranged and manually arranged (regular network) subnet levels

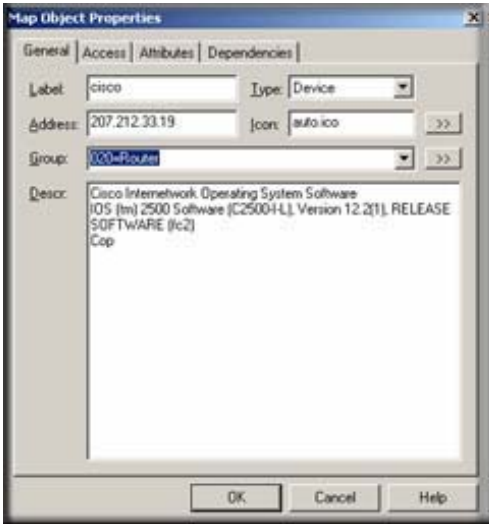
Moving Objects from One Subnet to Another

1. Use the Window/Close All menu to remove all View windows.
2. Open a Map view for each of the source and target map subnets.
3. Use the Windows/Tile Horizontal menu to make both windows fully visible.
4. Scroll and zoom the source Map view so the objects you want to move are visible.
5. Scroll and zoom the target Map view so the location where the objects will be placed is visible.
6. Select the objects (click the Off icon+drag or Shift-click on icons) in the source Map view.
7. Drag the selected objects from the source to the target Map view.

Note that any links will be deleted if you only move the attached objects. To move a network and all attached links and objects you must select all the items. You can also use the Edit/Copy or Cut menus along with the Edit/Paste menu to move objects (or create copies) but these menus will not move link or network objects and the moved objects will not retain their relative positions.

Changing Object Properties

Attributes

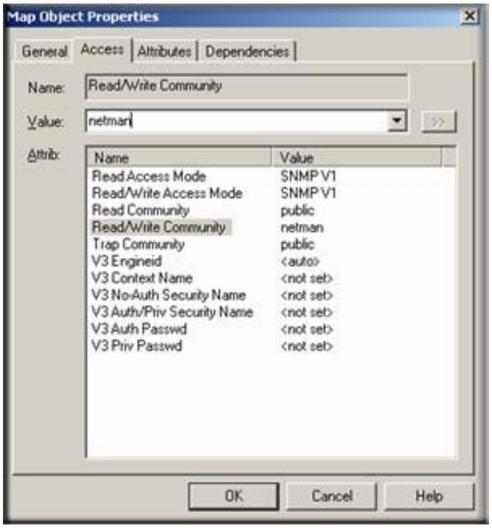


Label: cisco
Type: Device
Address: 207.212.33.19
Icon: auto.ico
Group: 020=Router
Descr: Cisco Internetwork Operating System Software
IOS (tm) 2500 Software (C2500-I-L), Version 12.2(1), RELEASE
SOFTWARE (fc2)
Cop

1. Use the Edit/Properties menu to change the attributes of one or more selected objects. To edit multiple objects, all selected objects must be of the same type such as subnet or device.
2. Set the object name in the Label edit box.
3. Set the object type in the Type pull-down. The object type can only be changed for network type objects (Ring, Bus, Network).
4. For device objects, set the object IP Address in the Address edit box. This can be in dot format or a DNS name. You can also append a UDP port number to a dot-notation IP address (for example, 198.22.11.22.168).
5. For Goto objects, set the name of the subnet that the Goto jumps to in the Address edit box.
6. Set an alias name for a group of similar device objects in the Group edit box.
7. For icon type objects (Subnet, Device, Goto), set the icon in the Icon edit box. This is normally set to AUTO.ICO so that an icon is selected automatically based on the device SNMP Object Identifier.

Access Parameters

1. Select the Access tab to set access parameters for a Device, Link, or Network object. For a description of access parameters, please see Table 3-1 Object Properties Access tab.



Name: Read/Write Community

Value: netman

Attrib:

Name	Value
Read Access Mode	SNMP V1
Read/Write Access Mode	SNMP V1
Read Community	public
Read/Write Community	netman
Trap Community	public
V3 Engineid	<auto>
V3 Context Name	<not set>
V3 No-Auth Security Name	<not set>
V3 Auth/Priv Security Name	<not set>
V3 Auth Passwd	<not set>
V3 Priv Passwd	<not set>

2. To change an access parameter, first select the parameter name in the Attrib table.

   The selected parameter name is displayed in the Name box and the current value is in the Value pull-down control.

3. In the Value pull-down, select one of the pull-down values or type in a new value.
   - Note that the Value pull-down does not necessarily show all possible values for the attribute.
   - When editing multiple objects, any access parameter that has a different value for different objects is shown as #####. Changing these attributes will set the new value for all selected objects.

The following table describes the access parameters available in the Object Properties Access tab for Device, Link, and Network objects. Access parameters are not valid for Subnet and Goto object types.

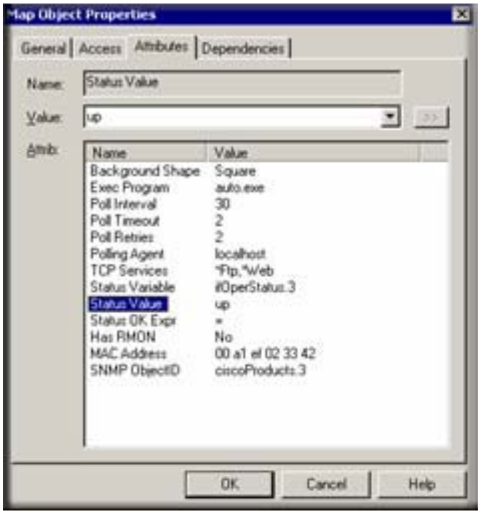
Table 3-1. Object Properties Access tab

Attribute Name	Description
Read Access Mode	The mode used for polling and SNMP Read operations. Select ICMP (Ping) for non-SNMP devices. Select SNMP V1 for standard SNMP devices. Select NONE (TCP Only) for devices that will only have TCP services polled.
Read/Write Access Mode	The mode used for SNMP Write operations. Select SNMP V1 for standard SNMP devices. You can also force this mode to be used for both Read and Write operations from your console (not polling operations) by using the Read/Write button on the ProSafe NMS frame button bar (third button from left).
Read Community	The Community name used for SNMP V1/V2c operations when the Read Access Mode is used.

Table 3-1. Object Properties Access tab

Attribute Name	Description
Read/Write Community	The Community name used for SNMP V1/V2c operations when the Read/Write Access Mode is used.
Trap Community	The Community name expected in a received SNMP V1/V2c Trap frame. This is used to match an incoming trap to a map object.
V3 Engineid	SNMP V3 Engine Identifier (detected automatically).
V3 Context Name	VSNMP V3 Context Name (normally blank).
V3 No Auth Security Name	SNMP V3 Security Name to use with the noAuth access mode (no authentication, no privacy).
V3 Auth/Priv Security Name	SNMP V3 Security Name to use with authenticated or private (encrypted) access modes.
V3 Auth Password	SNMP V3 password to use for authentication.
V3 Priv Password	SNMP V3 password to use for privacy (encryption).

Type-Dependent Attributes



Name: Status Value

Value: up

Attrib:

Name	Value
Background Shape	Square
Exec Program	auto.exe
Poll Interval	30
Poll Timeout	2
Poll Retries	2
Polling Agent	localhost
TCP Services	*Ftp,*Web
Status Variable	ifOperStatus.3
Status Value	up
Status OK Expr	=
Has RMON	No
MAC Address	00 a1 ef 02 33 42
SNMP ObjectID	ciscoProducts.3

1. Select the Attribute tab to set type-dependent attributes. For a complete description of all type-dependent object attributes, please see Table 3-2 Object Properties Attribute tab.
2. To change an attribute, first select the attribute name in the Attrib table. The selected attribute name is displayed in the Name box and the current value in the Value pull-down control.
3. In the Value pull-down, select one of the pull-down values or type in a new value.
   - Note that the Value pull-down does not necessarily show all possible values for the attribute. *Use the >> button to show an expanded selection mechanism for the selected attribute value.*
   - When editing multiple objects, any attribute that has a different value for different objects is shown as #####. Changing these attributes will set the new value for all selected objects.

The following table lists each available attribute in the Object Properties Attributes tab, the object types it is valid for, and a description of the attribute.

Table 3-2. Object Properties Attribute tab

Object Type[a]	Attribute Name	Description
S, G, D	Background Shape	Icon background, one of Square, Circle, Hexagon, Octagon, or Diamond.
S	Bitmap	Background bitmap image.
S	Bitmap Scale	Background bitmap image scaling factor (bigger number expands).
L	Show Link Name	Link names normally hidden.
D	Exec Program	Double-click program for devices. Include any of the following special program arguments: $a – IP Address, $n –‘ node name, $g – Read Community; $s – Set community, $w – console window number.
D, L, N	Poll Interval	Seconds between poll sequences.
D, L, N	Poll Timeout	Seconds to wait for a response after a poll is sent.
D, L, N	Poll Retries	Number of times to retry a failed poll during a single poll sequence.
D, L, N	Polling Agent	IP Address of the Polling Agent system that performs regular and trend statistics polling for this object. Unless you are using Remote Polling Agents, this is set to localhost.
D, L, N	TCP Services	List of TCP service names to poll.
D, L, N	Status Variable	An SNMP variable with instance that is polled to determine device status (as opposed to just polling for device response). For example, ifOperStatus.3.
D, L, N	Status Value	The number to be compared to the returned Status Variable value.
D, L, N	Status OK Expr	The expression to use when comparing the Status Value to the returned Status Variable to determine if the status is OK (<, >, <=, >=, =, !=).
D, L, N	HasRMON	Set to TRUE to enable the RMON tool.
D, L,N	MAC Address	Primary device MAC address or link MAC address, if known.
D, L, N	SNMP ObjectID	Read-Only. The System Object Identifier of an SNMP object.

[a] D = Device, L = Link, N = Ring, Bus, Network, S = Subnet, G = Goto

Adding Map Objects

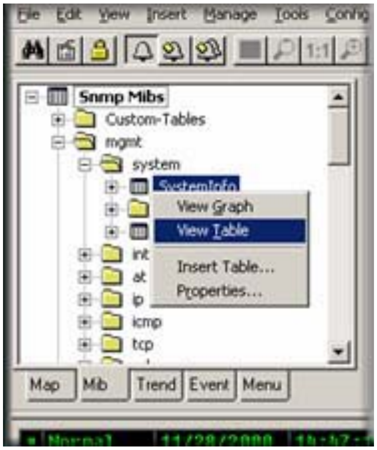
ProSafe NMS supports several object types, including subnets, devices, links, and networks. To add objects, first open a Map view window and then use one of the Insert/Map Object menus or the Edit button bar. After adding icon objects, you need to move them to the desired location. If you do not see the new object, use the View All button. The following table describes the different object types.

Table 3-3. Object Types

Type	Description
Subnet	A Subnet icon contains other map layers, possibly including other subnets. • Double-click on a subnet icon to open a view window for the next layer down. • Use the Parent Window button to go up one layer to the parent subnet view. • Use the Root Subnet button to open the top map level view.
Device	A Device icon represents a polled device, including SNMP and Ping polled devices. 1. When adding a device object, set the device Address in the displayed Properties dialog box. You can append an optional UDP port to the address as x.x.x.Port. 2. Then select the Access tab and set the Read Access Mode and Read/Write Access Mode parameters. Use ICMP (Ping) for non-SNMP devices (or NONE where you only want to poll TCP services), and use SNMP V1 for regular SNMP devices. For SNMP V1 devices, you must also set the Read Community and Read/Write Community parameters to valid community names. 3. Finally, select the Attributes tab and set appropriate values for the Poll Interval, Poll Timeout, and Poll Retries attributes.
Link	A Link object is a line between two icon objects (Subnet, Device, Goto). Link objects can be polled so you can optionally set an IP Address and Access/Polling attributes as with the Device object. However, by default the poll Interval for links is set to zero so it is not polled. To add one or more Link objects, first select two or more Device objects and optionally a single Subnet or Network object, then click the Add Link button from the Edit button bar.
Network	There are several types of Network objects, which have different layout styles. • A Bus Network automatically arranges the network and attached links and icons in a bus configuration. • A Ring Network automatically arranges the attached objects in a ring. • A regular Network object can be manually shaped. Double-click on a Regular Network object to create a junction point. Double-click on an existing junction point to remove it. Click on a Junction object or network segment and drag it to move it in the Map view. • Network objects can also be polled but the Poll Interval is set to zero (non-polled) by default. • Use one of the Add Network buttons from the Edit button bar to add a network. If you first select several icon objects, ProSafe NMS will also add links between the icons and the new network.
Goto	A Goto object is like a Subnet in that you can double-click on it to open a new Map view window. However, a Goto object displays the map subnet that is named in the Address field. To make a Goto that opens the Root Submap, leave the Address field blank.

Viewing Device MIB Data

The MIB Selection Tree



1. Select one or more SNMP Device objects.
2. Locate the Selection Tool at the left of the console window. If you do not see it, use the View/Selection Tool menu to show it.
3. Click the MIB tab to activate the MIB Selection Tree. This tree shows all compiled standard and private MIBs.
4. Open the Mgmt subtree to show standard MIB elements. Open the Private subtree to show vendor-specific MIB elements.

   Note that each device supports a subset of the standard and private MIBs. It is up to you to determine if a device supports a particular MIB table.
5. Open subtree elements until you see one or more table grid icons listed. These are the MIB table definitions that you will be working with.
6. Right-click on one of the table names and use the View Table or View Graph menu to display the contents of the table for the selected devices as a form or graph.

Manage Menus

Select one or more SNMP Device objects and use the Manage or right-click menus to display common SNMP MIB tables in several formats. Note that not all devices implement all tables in these menus, so in some cases the menus will fail to show a result. It is up to you to determine if the table specified in the menu is supported.

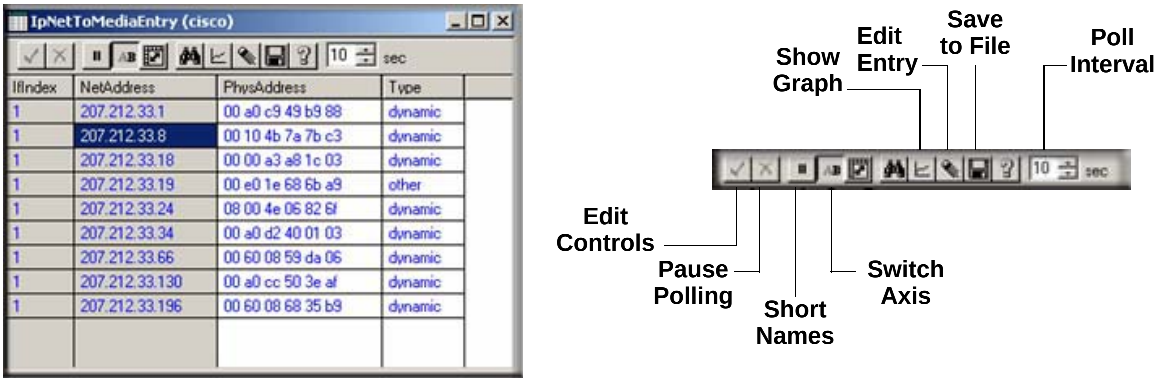
- Use the List <tablename> menus to display a single entry table.
- Use the Edit <tablename> menus to show an edit dialog for a single entry table.
- Use the Display <tablename> menus to display a multi-entry table.
- Use the Graph <tablename> menus to display a graph for all instances in the table. You can also start a graph after selecting some elements in a displayed table.

Custom Menus

The Manage menus are actually built-in custom menus from an external configuration file. You can also add custom menus to display particular tables. For example, if you have only a few device types in your network you probably should add custom menus to display the vendor specific tables for those devices. You can then display MIB information using the right-click menus instead of searching for MIB tables in the MIB Selection Tree. For more information about custom menus, select the Menu tab of the Selection Tool and press the F1 key.

Table Display Elements

The following figure shows a sample table display and describes the function of table controls.



IpNetToMediaEntry (cisco)

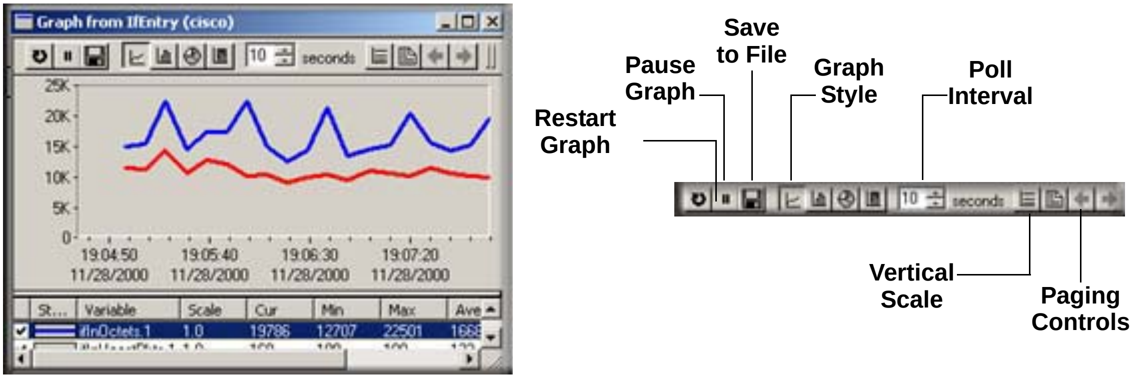
IfIndex	NetAddress	PhysAddress	Type
1	207.212.33.1	00 a0 c9 49 b9 88	dynamic
1	207.212.33.8	00 10 4b 7a 7b c3	dynamic
1	207.212.33.18	00 00 a3 a8 1c 03	dynamic
1	207.212.33.19	00 e0 1e 68 6b a9	other
1	207.212.33.24	08 00 4e 06 82 6f	dynamic
1	207.212.33.34	00 a0 d2 40 01 03	dynamic
1	207.212.33.66	00 60 08 59 da 06	dynamic
1	207.212.33.130	00 a0 cc 50 3e af	dynamic
1	207.212.33.196	00 60 08 68 35 b9	dynamic

Figure 3-3: Table display and table controls

- To start a graph display, first select one or more cells (rows, columns, or individual cells), then use the Show Graph button.
- To change a table cell and do a Set Operation to the device, first locate settable cells (those displayed in blue). Double-click the cell to move into Edit Mode. Enter the new value directly into the cell (or select from the pull-down if it is displayed). Then click the Check Edit Control button. To cancel a Set operation in progress, click the Cross Edit Control button.

Graph Display Elements

The following figure shows a sample graph display and the function of graph controls.

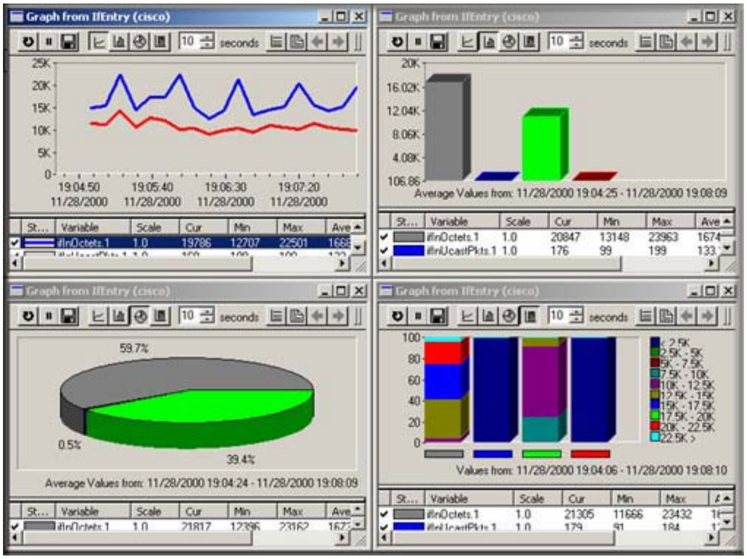


St...	Variable	Scale	Cur	Min	Max	Ave
✓	ifInOctets.1	1.0	19786	12707	22501	1668

Figure 3-4: Graph display and graph controls

Graph Styles

In the following figure there are four graph styles: Line, Bar, Distribution, and Pie. Note that the Bar and Pie show Average values.



St...	Variable	Scale	Cur	Min	Max	Ave
✓	ifInOctets.1	1.0	19786	12707	22501	166

St...	Variable	Scale	Cur	Min	Max	Ave
✓	ifInOctets.1	1.0	20847	13148	23963	1674
✓	ifInUcastPkts.1	1.0	176	99	199	133

St...	Variable	Scale	Cur	Min	Max	Ave
✓	ifInOctets.1	1.0	21817	12396	23162	1672

St...	Variable	Scale	Cur	Min	Max
✓	ifInOctets.1	1.0	21305	11666	23432
✓	ifInUcastPkts.1	1.0	179	91	184

Graph Page Controls

The graph is difficult to view with many variables at the same time. Use the Page Controls to enable blocks of variables. Use the Paginate button (paper sheet icon) to enable all variables or just the first page (eight variables). Use the Prev Page and Next Page buttons to enable the previous or next page of variables.

Graph Legend Control

The Legend Control displays all variable names and a data summary, including the Current, Minimum, Maximum, and Average values.

- Drag the bar at the top of the Legend Control to make the control bigger or smaller.
- Double-click the check mark at the left to enable or disable a variable.
- Use the right-click Properties menu to set line properties and scaling for a variable.
- Double-click on the Graph View area to show or hide the Legend Control.

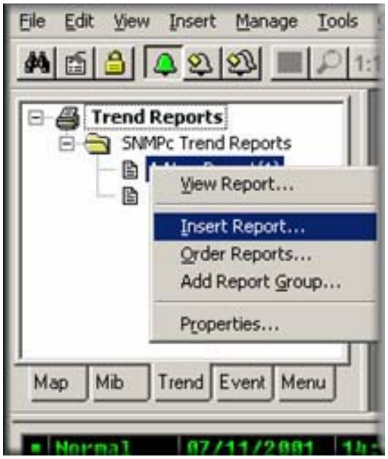
Saving Long-term Statistics

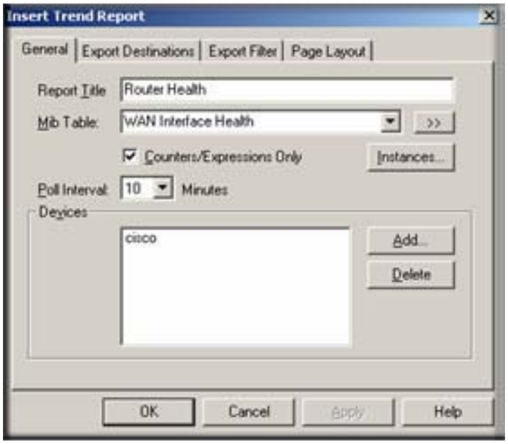
ProSafe NMS Trend Reports save long term statistics for any SNMP table and also ProSafe NMS Service Polling pseudo-tables. Each report saves data for one table and up to 10 devices. You can set manual threshold alarms for any variable instance to generate an event when a variable reaches a specific value. Data is saved in a private format database at one or more polling agent systems. Data can be downloaded and viewed in a regular graph window for a specified date period.

Creating a New Report

1. Select one or more device objects using the Map Selection Tree or a Map View window.
2. Locate the Selection Tool at the left of the console. If you do not see the Selection Tool, use the View/Selection Tool menu to show it.

3. Select the Trend tab and open the Trend Reports Group name.





Report Title: Router Health

Mib Table: WAN Interface Health

☑ Counters/Expressions Only

Poll Interval: 10 Minutes

Devices: cisco

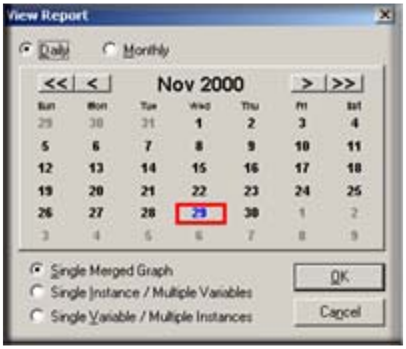
4. Use the right-click Insert Report menu to add a new report.
5. Enter a name for the new report.
6. Select one of the built-in table names from the MIB Table pull-down. You can also click the >> button to select any standard or private MIB table.

Note: For initial test purposes, set the Poll Interval to one minute. We recommend that you use a 10 minute poll interval if you have several reports.

7. Click OK to save the report using standard settings.

Viewing Trend Data in a Graph Window

1. Assuming you set a one minute poll interval, wait about 10 minutes to save some data.
2. Right-click on the new report name in the Trend Report Selection Tree and use the Properties menu.
3. Use the View Report menu.
4. Select the current day and Single Merged Graph to see all data on one graph.
5. Click OK. Some progress dialogs are displayed and then the report data is displayed in a regular ProSafe NMS graph window.



● Daily ○ Monthly

Nov 2000

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2
3	4	5	6	7	8	9

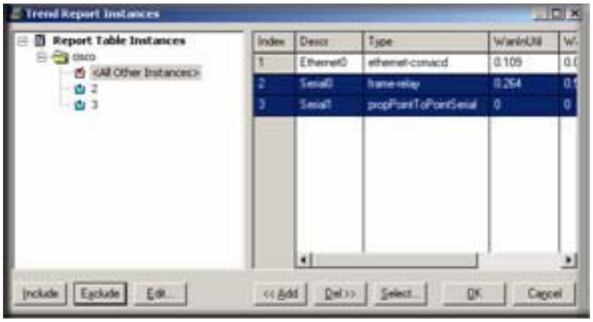
● Single Merged Graph
○ Single Instance / Multiple Variables
○ Single Variable / Multiple Instances

Irrespective of the report poll interval, all Counter variables shown in a trend report graph window are *normalized to per-second values*.

Limiting Saved Instances

The polling agent normally polls all available instances for each variable in a trend report table.

1. To limit polled instances, select the report name in the Trend Selection Tree and use the right-click Properties menu, then use the Instances button.
2. Select one or more rows in the displayed table and click the Add button to add them to the Instances Tree at left.
3. In the Instances Tree, select one or more labels (including <All Other Instances>) and click the Include or Exclude button.
4. For each included instance, use the Edit button to set textual instance names and manual threshold alarms.



Trend Report Instances

- Report Table Instances
  - cisco
    - <All Other Instances>
    - 2
    - 3

Index	Descr	Type	WanInUtil	W.
1	Ethernet0	ethernet-csmacd	0.109	0.0
2	Serial0	frame-relay	0.264	0.
3	Serial1	propPointToPointSerial	0	0

Chapter 4
Polling and Emailing

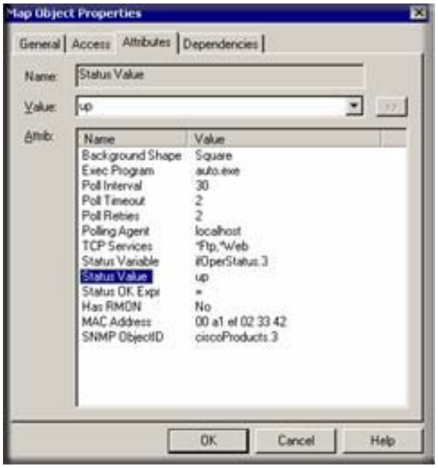
Setting Threshold Alarms

You can generate a Threshold Alarm when a polled SNMP variable value meets certain criteria. ProSafe NMS supports three distinct mechanisms for generating Threshold Alarms as described in the following table.

Table 4-1. Threshold Alarms

Alarm Type	Description
Status Variable Polling	Use the Object Properties dialog to set a single SNMP variable plus instance that is polled in real time (Poll Interval attribute seconds). Use this for Emergency Status Polling. For example, poll for UPS battery failure, disk full, or link down conditions.
Automatic Trend Baseline	ProSafe NMS automatically determines a baseline value for all variables in any trend reports that you add. The baseline is set after a learning period and periodically adjusted. The polling agent will generate alarms if a polled value exceeds the baseline by a preset percentage.
Manual Trend Threshold	Use manual threshold alarms in trend reports to specify a particular condition to test. This is commonly used to monitor line utilization variables. In this case the alarm condition is well known to the user and involves a longer polling period (for example, 80% over 10 minutes).

Setting Status Variable Polling



Name: Status Value

Value: up

Attrib:

Name	Value
Background Shape	Square
Exec Program	auto.exe
Poll Interval	30
Poll Timeout	2
Poll Retries	2
Polling Agent	localhost
TCP Services	*Ftp,*Web
Status Variable	ifOperStatus.3
Status Value	up
Status OK Expr	=
Has RMON	No
MAC Address	00 a1 ef 02 33 42
SNMP ObjectID	ciscoProducts.3

- Using the Map Selection Tree or a Map View window, right-click on an SNMP Device, Link, or Network object and use the Properties menu.
- Make sure the Address field is set to a valid IP address. You can optionally append a UDP port number to the address as x.x.x.x.Port.
- Select the Access tab.
- For a regular SNMP V1 device, set Read Access Mode to SNMP V1 and set Read Community to a valid community name.
- Select the Attributes tab.
- Set Poll Interval to the number of seconds between successive polls.
- Set the Status Variable to the name of an *Integer* SNMP variable including an instance (e.g., ifOperStatus.3). *Make sure you enter a full variable instance.*
- Set the Status Value to the Numeric value for your comparison (or one of the pull-down aliases).
- Set the Status OK Expr to the test performed to determine if the status test passes. Use the Value pull-down list for possible tests.

Note: For variables that have a textual instance part, you can use the form statusVar.”text instance” rather than full SNMP dot notation.

Configuring Automatic Alarms

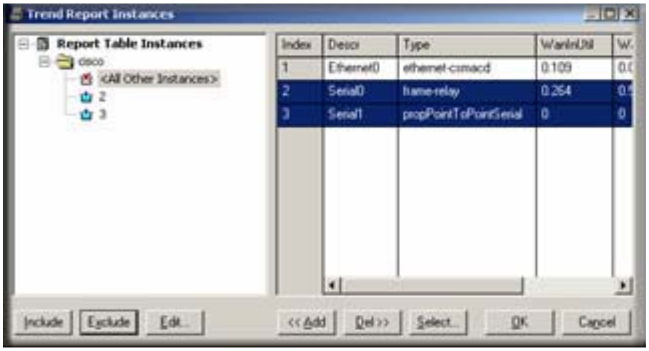
Use the Config/Trend Reports menu and select the Automatic Alarms tab. You can set various parameters of the automatic alarm algorithm in this dialog. Generally the default settings are adequate and the main thing you might want to do is disable automatic alarms by clearing the Enable Automatic Alarms check box.

Setting Manual Threshold Alarms

You must first create a trend report for a set of devices and an SNMP MIB Table. Please refer to Saving Long-term Statistics for a description of creating trend reports.

Select the report name in the Trend Selection Tree and use the right-click Properties menu, then use the Instances button.

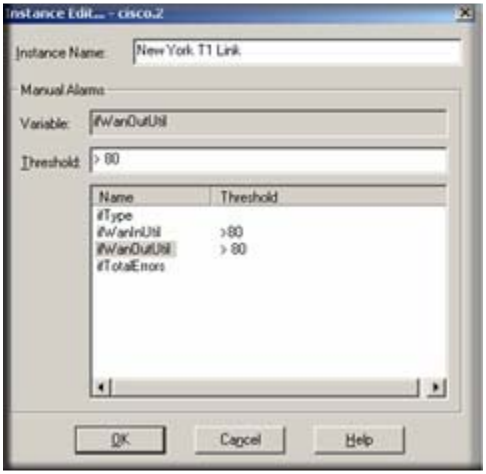
1. Select one or more rows in the displayed table and click the Add button to add them to the Instances Tree at the left.
2. In the Instances Tree, select one or more labels (including <All Other Instances>) and click the Include or Exclude button.
3. For each included instance, use the Edit button to add alarms for each variable.



Index	Descr	Type	WanInUtil	W.
1	Ethernet0	ethernet-csmacd	0.109	0.(
2	Serial0	frame-relay	0.264	0.!
3	Serial1	propPointToPointSerial	0	0

4. Select a variable name from the list at the bottom of the Instance Edit dialog.
5. Enter a simple expression at the Threshold edit box. This is an operator (>, <, =, >=, <=, !=) and a numeric constant.

   You can also optionally enter a name for this variable instance in the Instance Name edit box. This makes it easier to determine what the threshold alarm refers to.
6. Click OK. You will see a red exclamation mark next to the icon in the Instances Tree for any instances that have manual alarms.



Instance Name: New York T1 Link

Variable: ifWanOutUtil

Threshold: > 80

Name	Threshold
ifType	
ifWanInUtil	>80
ifWanOutUtil	> 80
ifTotalErrors	

Please keep in mind that for Counter variables, the values you set in the manual threshold will be compared against a polled sample. The polled sample will be larger or smaller depending on the trend report poll interval. For example, a link that shows 100K bytes in one minute might show 1,000K bytes in 10 minutes. This is different than what you see in trend graph, in which the samples are normalized to per-second values.

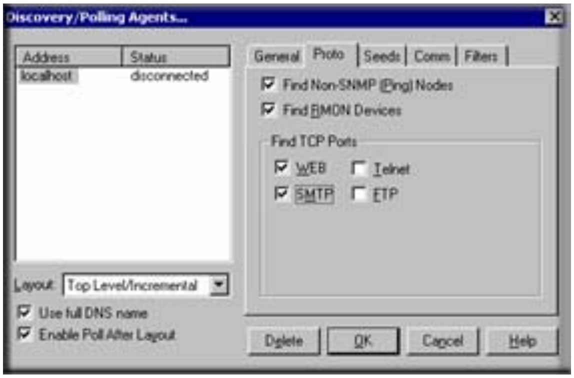
Polling TCP Application Services

ProSafe NMS supports customized polling of any TCP application service and simplified polling of four built-in TCP application services (FTP, SMTP, Web, and Telnet).

Discovery of Four Built-in Services

ProSafe NMS polling agents can automatically check for the existence of the built-in TCP services on discovered devices and configures these services to be polled.

Use the Proto tab of the Config/Discovery-Polling dialog to enable discovery of the four built-in services.



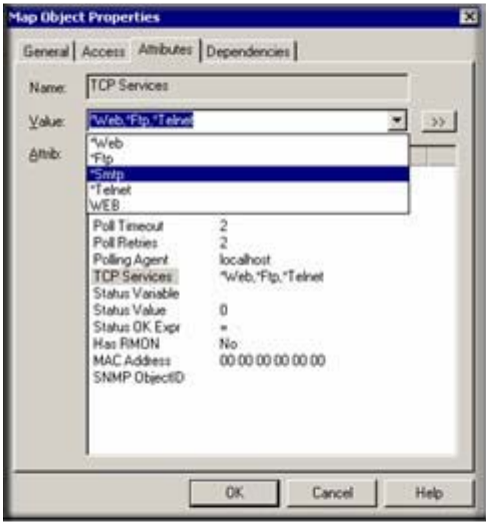
Address	Status
localhost	disconnected

☑ Find Non-SNMP (Ping) Nodes
☑ Find RMON Devices

Find TCP Ports
☑ WEB ☐ Telnet
☑ SMTP ☐ FTP

Layout: Top Level/Incremental
☑ Use full DNS name
☑ Enable Poll After Layout

TCP Service Polling



Name: TCP Services
Value: *Web,*Ftp,*Telnet

*Web
*Ftp
*Smtp
*Telnet
WEB

Attrib:

Poll Timeout	2
Poll Retries	2
Polling Agent	localhost
TCP Services	*Web,*Ftp,*Telnet
Status Variable	
Status Value	0
Status OK Expr	=
Has RMON	No
MAC Address	00:00:00:00:00:00
SNMP ObjectID	

1. To enable TCP service polling for a device, right-click the device object in a Map view and use the Properties menu then select the Attributes tab. Select the TCP Services attribute.
2. Use the Value pulldown list to select one of the available TCP services (*Ftp, *Telnet, *Smtp, *Web and custom names).
3. To select multiple services for the device, type in the service names in the Value edit box, separated by commas. For example: “*Ftp,*Web”.
4. Alternatively, double-click the TCP Services attribute, or use the “>>” button, to select multiple services.

Custom TCP Service Polling

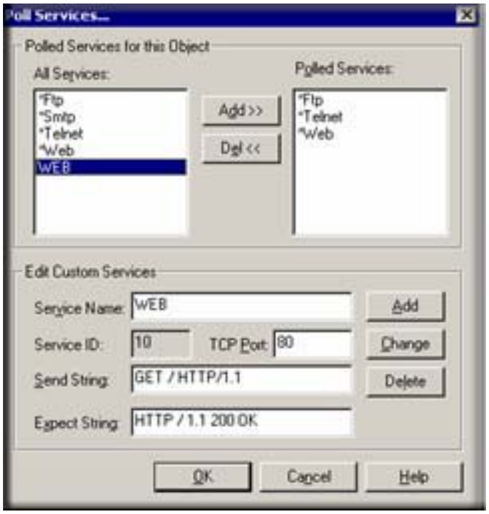
Custom TCP Service definitions allow more flexible and powerful polling of your application servers.

- You can optionally send a text string to the TCP service and compare the reply to a text pattern.
- Each map object can poll up to 16 different Custom TCP Services.
- There is no limit on the total number of Custom TCP Service definitions that can be created.

Double-click the TCP Services attribute, or use the “>>” button, to edit Custom TCP service definitions. The Poll Services dialog is displayed.

Managing Polling for the Device

Use the controls in the upper portion of the dialog box, Polled Services for this Object, to manage polling for the selected device.



All Services: *Ftp, *Smtp, *Telnet, *Web, WEB

Polled Services: *Ftp, *Telnet, *Web

Service Name: WEB

Service ID: 10

TCP Port: 80

Send String: GET / HTTP/1.1

Expect String: HTTP / 1.1 200 OK

To enable polling of a TCP service for the device:

1. Select the service name in the All Services list.
2. Click the Add>> button.

To disable polling of a TCP service for the device:

1. Select the service name in the All Services list.
2. Click the Del<< button.

Use the controls in the lower Edit Custom Services section to add, delete, and change Custom TCP Service definitions.

To add a new Custom TCP Service definition:

1. Enter a new name in the Service Name edit box.
2. Enter a TCP port number for the service in the TCP Port edit box.

   Optionally enter a short string to transmit to the service in the Send String edit box.

   Optionally enter a pattern string to match against the service response in the Expect String edit box. You may use ASCII text and asterisk wildcards (‘*’).
3. Click the Add button.

4. After adding a new service definition, you need to click the Add>> button if you want this service to be polled for the currently selected device.

To delete an existing Custom TCP Service definition:

1. Select the service name in the All Services list.
2. Click the Delete button.

To modify an existing Custom TCP Service definition:

1. Select the service name in the All Services list.
2. Make changes to the Service Name, TCP Port, Send String, or Expect String edit boxes.
3. Click the Change button.

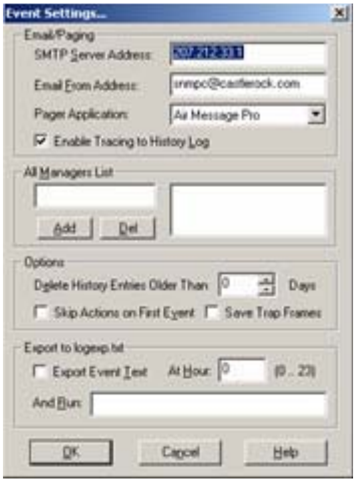
Note that service names prepended by an asterisk are built-in and cannot be changed or deleted. These services are *Ftp, *Telnet, *Smtp, and *Web. These services use a simplified connect-only form of polling.

Emailing or Paging the Administrator on an Event

This section shows you how to dial a pager or send email to the ProSafe NMS Administrator user when a selection of devices goes down.

1. **First, add the Administrator user to Air Messenger Pro**
   a. To use paging you must first install Air Messenger Pro by using the Windows Start/ Programs/NETGEAR ProSafe NMS/Install Air Messenger Pro menu.
   b. Start Air Messenger Pro and add a user (not a group) named Administrator.
   c. Configure and test the Air Messenger Pro modem/pager settings and make sure you can send pages.

2. **Then, set the Email/Paging global event options**
    - a. Use the Config/Event Options menu.
    - b. Set the SMTP Server Address to the IP Address of your email server in dot notation (a.b.c.d).
    - c. Set the Email From Address to an email address that is valid at your server (such as **nms-support@netgear.com**).
    - d. Select the Pager Application (Air Messenger Pro or Notify!Connect).
    - e. Select the Enable Tracing to History Log check box. Later, when you have verified that email works you can disable this option.



Event Settings...

Email/Paging

SMTP Server Address: 207.212.33.1

Email From Address: snmpc@castlerock.com

Pager Application: Air Message Pro

☑ Enable Tracing to History Log

All Managers List

Options

Delete History Entries Older Than 0 Days

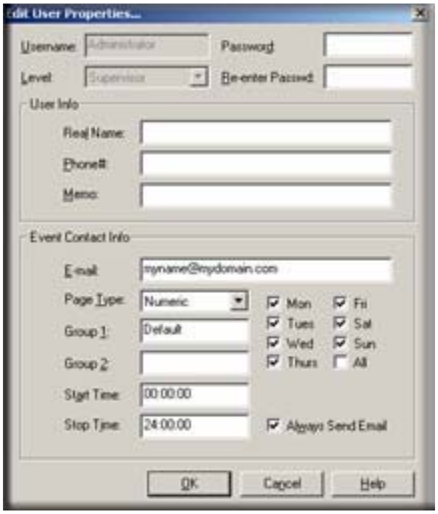
☐ Skip Actions on First Event ☐ Save Trap Frames

Export to logexp.txt

☐ Export Event Text At Hour: 0 (0 .. 23)

And Run:

3. **Next, set the Administrator Contact Information**
    - a. Use the Config/User Profiles menu.
    - b. Select the Administrator user and click Modify.
    - c. Set your email address in the E-mail edit box.
    - d. Select the Pager Type (numeric or alphanumeric).
    - e. Set the days and times you want to be emailed and paged.
    - f. You can use the Group1 and Group2 edit boxes to set two alias names for multiple users. For now, leave Group1 set to Default.



Edit User Properties...

Username: Administrator

Password:

Level: Supervisor

Re-enter Passwd:

User Info

Real Name:

Phone#:

Memo:

Event Contact Info

E-mail: myname@mydomain.com

Page Type: Numeric

Group 1: Default

Group 2:

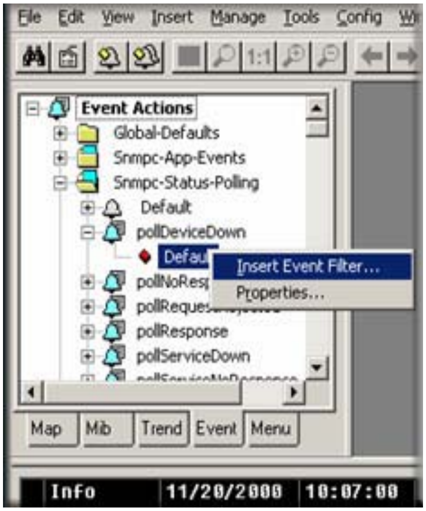
Start Time: 00:00:00

Stop Time: 24:00:00

☑ Mon ☑ Tues ☑ Wed ☑ Thurs ☑ Fri ☑ Sat ☑ Sun ☐ All

☑ Always Send Email

4. **Add an Event Filter for the pollDeviceDown event**



   a. Locate the ProSafe NMS Selection Tool at the left side of the console. If it is not there, use the View/ Selection Tool to show it.

   b. Select the Event tab on the Selection Tool.

   c. Open the Snmpc-Status-Polling subtree, which contains all polling related event actions.

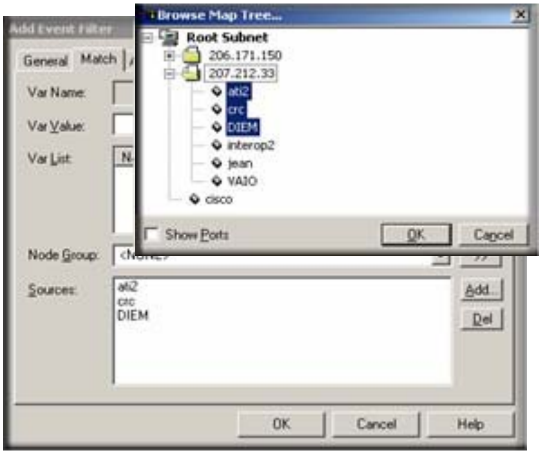
   d. Open the pollDeviceDown subtree, which contains all event filters for the Device Down event.

   e. Right-click on the Default event filter and use the Insert Event Filter menu to add a new event filter.

      The Add Event Filter dialog is displayed.

   f. Enter an Event Name for the new event filter at the General tab. For example, set the name to Primary Router Down.

5. **Select the devices to match the Event Filter**



Sources:
ati2
crc
DIEM

   a. Select the Match tab of the displayed Add Event Filter dialog.

   b. Click the Add button.

   c. Use the tree control to select one or more device names and click OK.

   d. The matching device names are displayed in the Sources list box.

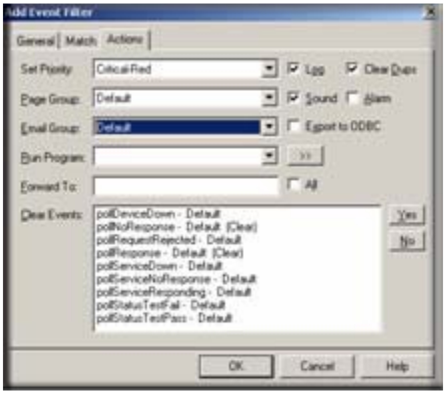
6. **Then, set the Email/Page event actions**

   a. Select the Actions tab of the displayed Add Event Filter dialog.

   b. Select Default from the Page Group pull-down to send a page to all users with a Group1 or Group2 alias set to Default (the Administrator user).

   c. Select Default from the Email Group pulldown to send email to all users with a Group1 or Group2 alias set to Default (the Administrator user).

   d. Click OK to save the new filter.



Set Priority: Critical-Red ☑ Log ☑ Clear Dups

Page Group: Default ☑ Sound □ Alarm

Email Group: Default □ Export to ODBC

Run Program:

Forward To: □ All

Clear Events:
pollDeviceDown - Default
pollNoResponse - Default (Clear)
pollRequestRejected - Default
pollResponse - Default (Clear)
pollServiceDown - Default
pollServiceNoResponse - Default
pollServiceResponding - Default
pollStatusTestFail - Default
pollStatusTestPass - Default

7. **Finally, test the new Event Filter**

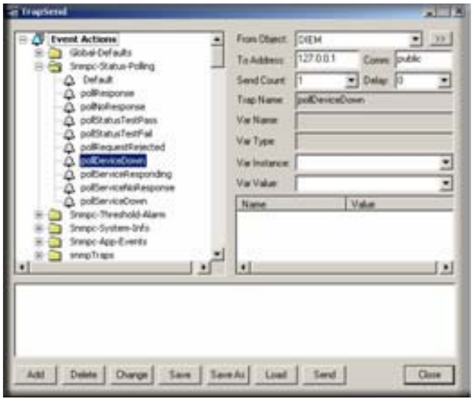
   a. Select the Map tab of the Selection Tool and select one of the devices you matched in the new event filter.

   b. Use the Tools/Trap Sender menu.

   c. The TrapSend tool shows an Event Actions tree on the left side. Open the Snmpc-Status-Polling subtree and select the pollDeviceDown event.

   d. Click the Send button.

   e. Close the TrapSend tool and look at the Event Log Tool (at the lower part of the console). If you do not see the Event Log Tool, use the View/Event Log Tool menu to show it.



From Object: OEM

To Address: 127.0.0.1 Comm: public

Send Count: 1 Delay: 0

Trap Name: pollDeviceDown

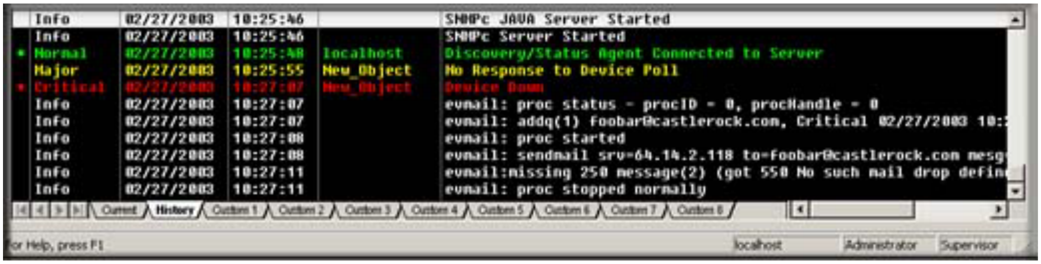
Var Name:

Var Type:

Var Instance:

Var Value:

   f. Select the History tab in the Event Log Tool. You will see a red Device Down event for the selected node and some white diagnostic messages about the email operation.



```
  Info      02/27/2003  10:25:46               SNMPc JAVA Server Started
  Info      02/27/2003  10:25:46               SNMPc Server Started
• Normal    02/27/2003  10:25:48  localhost    Discovery/Status Agent Connected to Server
  Major     02/27/2003  10:25:55  New_Object   No Response to Device Poll
• Critical  02/27/2003  10:27:07  New_Object   Device Down
  Info      02/27/2003  10:27:07               evmail: proc status - procID = 0, procHandle = 0
  Info      02/27/2003  10:27:07               evmail: addq(1) foobar@castlerock.com, Critical 02/27/2003 10::
  Info      02/27/2003  10:27:08               evmail: proc started
  Info      02/27/2003  10:27:08               evmail: sendmail srv=64.14.2.118 to=foobar@castlerock.com mesg
  Info      02/27/2003  10:27:11               evmail:missing 250 message(2) (got 550 No such mail drop defin
  Info      02/27/2003  10:27:11               evmail: proc stopped normally
```

Other Event Types

The pollDeviceDown event is an example used in this section. The mechanism is the same for other types of events, including those generated for Status Variable and Manual Threshold Alarms. The following table shows common events and when they occur.

Table 4-2. ProSafe NMS Events

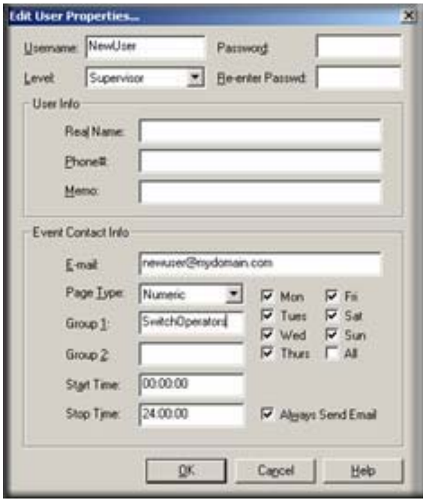
Event Subtree	Trap Name	Description
Snmpc-Status-Polling	pollDeviceDown	Device has not responded for three consecutive poll sequences.
	pollNoResponse	Device failed to respond to one poll sequence.
	pollRequestRejected	Device rejected the sysObjectId.0 or the user-set status polling variable.
	pollResponse	Device responded to a poll sequence.
	pollServiceDown	Could not connect to the TCP port after three consecutive attempts.
	pollServiceNoResponse	Could not connect to the TCP port after one attempt.
	pollServiceResponding	Connection to TCP port OK.
	pollStatusTestFail	Status variable test failed.
	pollStatusTestPass	Status variable test passed.
Snmpc-System-Info	pollAgentConnect	SNMPc polling agent connection to server established.
	pollAgentDisconnect	SNMPc polling agent connection to server lost.
Snmpc-Threshold-Alarm	alarmAutoThresholdExpand	Trend auto-baseline moved higher.
	alarmAutoThresholdReduce	Trend auto-baseline moved lower.
	alarmAutoThresholdSet	Trend auto-baseline initially set.
	alarmAutoThresholdTrigger	Trend auto-baseline exceeded.
	alarmManualThresholdTrigger	Trend manual alarm passed threshold.
	alarmManualThresholdReset	After being triggered, a trend manual alarm no longer passes the threshold test.
snmp-Traps	authenticationFailure	Trap generated by a device on an illegal access (bad community name).
	coldStart	Trap generated by a device after it restarts.
	linkDown	Trap generated by a device when a link fails.
	linkUp	Trap generated by a device when a link that was down recovers.

Note: A poll sequence occurs repeatedly every POLL INTERVAL seconds. During each poll sequence, a poll is sent and a reply expected within the POLL TIMEOUT period. If no response is received during the timeout period, the poll is sent again immediately (retried). During a single poll sequence, retries will be made up to the value set for POLL RETRIES. If the retries all fail then the poll sequence fails. The POLL INTERVAL must then elapse before another poll sequence is attempted.

Emailing or Paging Multiple Users

This section shows how to email or page two users when a selection of devices goes down. Please read and understand section "Emailing or Paging the Administrator on an Event" on page 5-6 before reading this one.

1. **First, add a grouped set of users**
   a. Use the Config/User Profiles menu.
   b. Click the Add button.
   c. Enter the Name of the new user.
   d. Set the user Email address and the user Pager type.
   e. Set the email/page days and times.
   f. Set the Group1 user alias to SwitchOperators (this can be any text).
   g. Click OK to save the new user.
   h. Repeat this process for a different user name, making sure to set the Group1 value to SwitchOperators, so that both users have the same value for Group1 for example, they have the same alias).



Username: NewUser
Password:
Level: Supervisor
Re-enter Passwd:
Real Name:
Phone#:
Memo:
E-mail: newuser@mydomain.com
Page Type: Numeric
Group 1: SwitchOperators
Group 2:
Start Time: 00:00:00
Stop Time: 24:00:00
☑ Mon ☑ Tues ☑ Wed ☑ Thurs
☑ Fri ☑ Sat ☑ Sun □ All
☑ Always Send Email

2. **Next, add the users to Air Messenger Pro**
   a. To use paging, start the Air Messenger Pro application and add two users with the same names as those you added to ProSafe NMS.

      Do not use Air Messenger Pro groups and do not use the ProSafe NMS Group1 name. Each ProSafe NMS user must have a matching user name in Air Messenger Pro.
   b. Set up the paging/modem options and make sure that you can send pages for each of the two new users.

3. **Then, add an Event Filter for the selected devices**

   a. Add a new event filter for a set of devices as described in Steps 4 through 7 of "Emailing or Paging the Administrator on an Event" on page 5-6.

   b. In the Action tab, select SwitchOperators in the Page pull-down to page the two new users.

   c. Select SwitchOperators in the Email pull-down to send email to the two new users.

   d. In the Match tab of the Add Event Filter dialog, make sure that you match different devices than those used in the previous section (emailing the Administrator). Otherwise, this new filter will not be unique and it will not match any incoming events.

   e. Remember to set the Auto-Clears flags for any matching events.

Chapter 5
Troubleshooting and Advanced Configuration

Troubleshooting Network Discovery

Duration of Network Discovery

During the ProSafe NMS Server installation you entered the address, netmask, and community name for one SNMP V1 discovery seed device. This is normally enough information to discover most of your network. When you first start ProSafe NMS it will take several minutes for discovery to start adding objects to the map. Use the Root Subnet button to display the top-level Map view.

If you used the Disable Discovery on Startup option of the installation, discovery will not be running when you first start ProSafe NMS. In this case, you need to set discovery filters before proceeding. Please refer to "Limiting the Scope of Discovery" on page 6-5 before reading this section.

Normal Discovery Map Layout

Discovery creates a two-level IP Subnet based topology. At the top-level, discovery adds any multi-port devices (routers) and subnet icons for each IP Subnet. Link objects are added between each router and the subnets it is connected to. The map is automatically arranged in a star configuration.

All single-port SNMP devices and ICMP (Ping) devices are added to the second level under each subnet icon, based on the device IP address and subnet mask. A single Bus Network is added to each subnet level, and all devices in the subnet are linked to this network.

Use the Root Subnet button to display the top-level Map view. You should see a mixture of SNMP device icons and subnet icons, connected by links in a star configuration. Double-click on one of the subnet icons. You should see a Bus Network with devices linked to it in a grid configuration.

The figure below shows a sample top-level and subnet Map view for a small network. Note that some devices have vendor-specific icons while others have generic icons. Each generic device icon is marked as SNMP or ICMP (Ping), which is important in determining discovery problems.

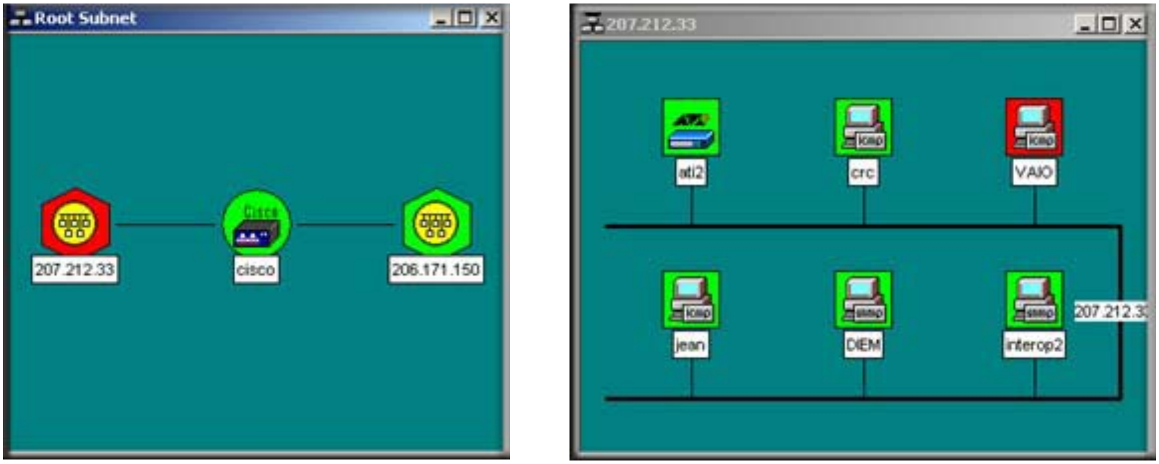


Figure 5-1: Sample top-level and Subnet Map views for a small network

Failure Symptoms and Solutions

The discovery agent uses a heuristic algorithm to find network devices. That means it is somewhat non-deterministic and will show different results from one run to another. There are many reasons for this, including lost broadcast responses such as buffer overflows, collisions, lost polls, and slow responses. This is completely normal. However, there are some permanent failure cases that you can resolve. The following symptoms are typical of a discovery failure:

1. Nothing added to the map (*after a suitable wait period of several minutes*).
2. Top-level map only or mostly contains subnet icons, with no links.
3. Some or all SNMP devices are added to lower level subnets as Ping icons.
4. Not all expected network devices are discovered.

The following sections describe solutions to these problems.

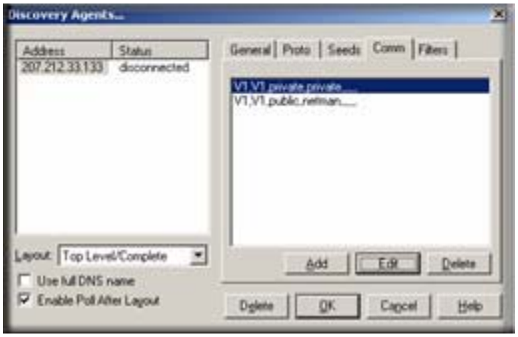
Discovery Agent Fails to Connect to the Server

Look at the Current tab of the Event Log Tool. If you do not see the Event Log Tool, use the View/ Event Log Tool to show it. Scroll to the top of the event log. You should see an entry that says DISCOVERY/STATUS AGENT CONNECTED TO SERVER. Also, use the Config/Discovery-Polling menu. You should see an entry in the list at the left for your system IP address and the status should be connected. If these two things are not true then the discovery agent has not properly connected to the server.

ProSafe NMS uses TCP/IP to communicate between different components. This can conflict with other software running on your system. Look for any other management applications or Windows services and stop them (for example, Windows SNMP Trap Service). Try installing on a different system that has less software installed to help identify the conflicting software. This is a rare failure case.

Incorrect or Missing Community Names

Each SNMP V1 device uses a Read Community password for SNMP access. This is typically set to public when the device is installed but in most cases your network administrator has changed the community name. Furthermore, many different community names may be in use on your network.



Address	Status
207.212.33.133	disconnected

V1,V1,private,private,...
V1,V1,public,netman,...

Layout: Top Level/Complete

□ Use full DNS name
☑ Enable Poll After Layout

1. Determine what community names are used in your network devices.
2. Use the Config/Discovery-Polling menu.
3. Select your system address in the agents list.
4. Click the Comm tab.
5. For each community name, click the Add button. Set the Read Access Mode and Read/Write Access Mode to SNMP V1 and set Read Community and Read/Write Community to valid community names
6. Click OK.
7. Use the File/Reset menu to delete the discovered map and restart discovery.

SNMP Device Access Control List

Many SNMP devices have an Access Control List (ACL). An ACL is a list of IP addresses from which the device accepts SNMP requests. This is a vendor-specific security feature that is configured at the device using a terminal or Telnet session. At a minimum, you need to go to each Discovery Seed device and check if it has an ACL and that your ProSafe NMS system address is in the list. For complete network discovery you must add your system address to any ACLs in your network.

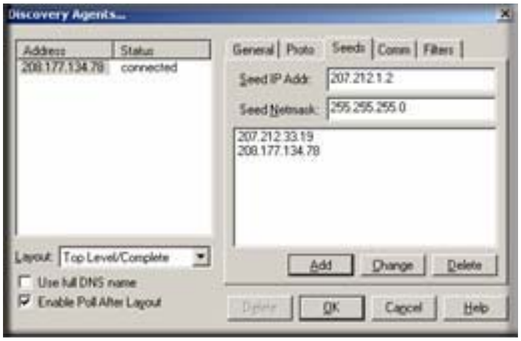
Firewalls Block SNMP Operations

Many networks use firewall devices to stop unauthorized intrusions. It is very usual for firewalls to block SNMP traffic because SNMP operations can shut down and reconfigure devices. If you have any firewalls in your network you need to make sure that your ProSafe NMS system can send and receive SNMP operations through the firewalls. This is normally done with a protocol filter in combination with an Access Control List (ACL). Firewall configuration is done with a terminal or Telnet session.

Not Enough Seeds

ProSafe NMS uses a combination of downloaded seed device information (address, routing, ARP tables) and broadcasts to discover devices. However, many devices inhibit broadcasts to networks outside of your LAN (subnet directed broadcasts). To get around this problem you need to add more seed addresses for routers around your network.

1. Use the Config/Discovery-Polling menu.
2. Select your system address in the agents list.
3. Click the Seeds tab.
4. For each new seed, enter the IP Address and Subnet mask in the supplied edit boxes and click Add.
5. Click the General tab and then the Restart button.
6. Click the OK button. There is no need to reset the map in this case.



Discovery Agents...

Address	Status
208.177.134.78	connected

Seed IP Addr: 207.212.1.2

Seed Netmask: 255.255.255.0

207.212.33.19
208.177.134.78

Layout: Top Level/Complete

☐ Use full DNS name

☑ Enable Poll After Layout

Broadcast Packet Losses

In many cases network discovery mostly works but you do not see as many devices as you expect. As many devices are not represented in SNMP ARP tables they can only be discovered with broadcasts. Broadcasts responses can be lost due to buffer overflows or collisions.

To get around this problem you can enable sequential polling of every possible address within a discovered subnet. Use the Config/Discovery-Polling menu and select the Ping Scan Subnets check box then click the Restart button.

Note that ProSafe NMS will not poll ranges that you specify, but only discovered subnets. To discover more subnets, add more seeds as described in the previous section.

Limiting the Scope of Discovery

If you have a large network but you only want to manage a small part of it, you need to set discovery address range filters. Discovery filters only specify what should be included. So if you set any discovery filters you must set enough of them to cover any address ranges you want to discover.

Address range filters are in dot notation with optional wild-card asterisk characters and numeric range specifiers. Unless the last element is an asterisk, there must be four dot-separated elements. The following are some valid examples:

207.*

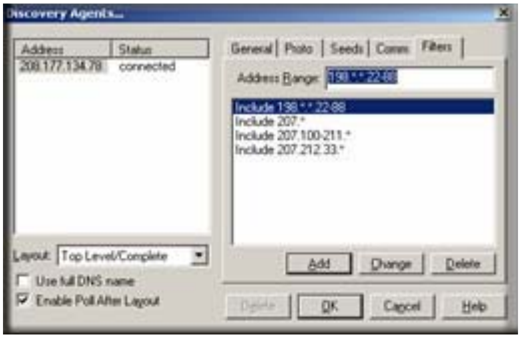
207.212.33.*

207.100-211.*

198.*.*.22-88

Setting Up New Filters

1. Use the Config/Discovery-Polling menu.
2. Select your system address from the agents list.
3. Click the Filters tab.
4. Enter a filter in the Address Range edit box and click Add.
5. Repeat for other filters.
6. Click OK.



Address	Status
208.177.134.78	connected

Address Range: 198.*.*.22-88

Include 198.*.*.22-88
Include 207.*
Include 207.100-211.*
Include 207.212.33.*

Layout: Top Level/Complete

☐ Use full DNS name
☑ Enable Poll After Layout

7. Use the File/Reset menu to delete the current map and restart discovery with the new filters.

Stopping Discovery Auto-Layout

Left unattended, discovery constantly rearranges your top-level map as new devices are added. This is undesirable if you want to manually change the map layout. To control discovery layout, use the Config/Discovery-Polling menu and do one of the following:

- Clear the Enable Discovery check box to disable further discovery.
- Select Discovered Objects from the Layout pull-down to add any new objects to a subnet named Discovered Objects instead of the top-level map.
- Select Top Level/Incremental from the Layout pull-down to add any new objects to the top-level using an incremental layout algorithm. The existing layout will not be disturbed.

8. Use the Test Interval and Test Retries edit boxes to set the time between checks of the primary server by the backup server and how many times to retry before taking over polling.

Appendix A

Event Parameters

Use Event Parameters in Event Action Filters to substitute information related to a specific event. Event Parameters can be used in the Event Message and as arguments to a program in the Exec Program action. The available Event Parameters and the associated expansion are described in the following table.

Table 5-1. Event Parameters

Event Parameters	Description
$$	The dollar ($) symbol
$V	Event message text (for Exec Program action).
$W	Console frame window number.
$M	Server IP Address.
$R	Address of sending entity (could be the same as the target device, or it could be a Polling Agent address).
$F	Event Action Filter name.
$f	Event Action Filter database record number.
$O	Trap Name as a textual string.
$o	Trap Object Identifier in dot format.
$A	Address of target device (device that the event is about)
$T	Trap Community Name.
$x	Date the event occurred, in local format at server.
$X	Time the event occurred, in time zone of server.
$@	Time the event occurred, in seconds since Jan 1, 1970.
$U	Value of sysUpTime in the event trap.
$N	The map object name of the target device.
$i	The map database record number of the target device.
$G	The Read Community name of the target device

Table 5-1. Event Parameters

Event Parameters	Description
$S	The Set Community name of the target device.
$E	The timeout attribute, in seconds, of the target device
$Y	The max retries for the target device
$P	The name of the map parent subnet object
$C	The number of variables in the event trap.
$*	All variables as "[seq] name (type): value".
$-n	The nth variable as "name (type): value"
$+n	The nth variable as "name: value".
$n	The nth variable as “value”
$>n	All variables from the nth as "value".
$>-n	All variables from the nth as "[seq] name (type): value.
$>+n	All variables from the nth as "name: value.

Glossary

Use the list below to find definitions for technical terms used in this manual.

List of Glossary Terms

10BASE-T

IEEE 802.3 specification for 10 Mbps Ethernet over twisted pair wiring.

100BASE-Tx

IEEE 802.3 specification for 100 Mbps Ethernet over twisted pair wiring.

802.1x

802.1x defines port-based, network access control used to provide authenticated network access and automated data encryption key management.

The IEEE 802.1x draft standard offers an effective framework for authenticating and controlling user traffic to a protected network, as well as dynamically varying encryption keys. 802.1x uses a protocol called EAP (Extensible Authentication Protocol) and supports multiple authentication methods, such as token cards, Kerberos, one-time passwords, certificates, and public key authentication. For details on EAP specifically, refer to IETF's RFC 2284.

802.11a

IEEE specification for wireless networking at 54 Mbps operating in unlicensed radio bands over 5GHz.

802.11b

IEEE specification for wireless networking at 11 Mbps using direct-sequence spread-spectrum (DSSS) technology and operating in the unlicensed radio spectrum at 2.5GHz.

802.11g

A soon to be ratified IEEE specification for wireless networking at 54 Mbps using direct-sequence spread-spectrum (DSSS) technology and operating in the unlicensed radio spectrum at 2.5GHz. 802.11g is backwards compatible with 802.11b.

ADSL

Short for asymmetric digital subscriber line, a technology that allows data to be sent over existing copper telephone lines at data rates of from 1.5 to 9 Mbps when receiving data (known as the downstream rate) and from 16 to 640 Kbps when sending data (known as the upstream rate).

ADSL requires a special ADSL modem. ADSL is growing in popularity as more areas around the world gain access.

AES

Advanced Encryption Standard, a symmetric 128-bit block data encryption technique.
It is an iterated block cipher with a variable block length and a variable key length. The block length and the key length can be independently specified to 128, 192 or 256 bits.The U.S government adopted the algorithm as its encryption technique in October 2000, replacing the DES encryption it used. AES works at multiple network layers simultaneously.

ARP

Address Resolution Protocol, a TCP/IP protocol used to convert an IP address into a physical address (called a DLC address), such as an Ethernet address.
A host wishing to obtain a physical address broadcasts an ARP request onto the TCP/IP network. The host on the network that has the IP address in the request then replies with its physical hardware address. There is also Reverse ARP (RARP) which can be used by a host to discover its IP address. In this case, the host broadcasts its physical address and a RARP server replies with the host's IP address.

Auto Uplink

Auto Uplink™ technology (also called MDI/MDIX) eliminates the need to worry about crossover vs. straight-through Ethernet cables. Auto Uplink™ will accommodate either type of cable to make the right connection.

Cat 5

Category 5 unshielded twisted pair (UTP) cabling. An Ethernet network operating at 10 Mbits/second (10BASE-T) will often tolerate low quality cables, but at 100 Mbits/second (10BASE-Tx) the cable must be rated as Category 5, or Cat 5 or Cat V, by the Electronic Industry Association (EIA).
This rating will be printed on the cable jacket. Cat 5 cable contains eight conductors, arranged in four twisted pairs, and terminated with an RJ45 type connector. In addition, there are restrictions on maximum cable length for both 10 and 100 Mbits/second networks.

Denial of Service attack

DoS. A hacker attack designed to prevent your computer or network from operating or communicating.

DHCP

An Ethernet protocol specifying how a centralized DHCP server can assign network configuration information to multiple DHCP clients. The assigned information includes IP addresses, DNS addresses, and gateway (router) addresses.

DMZ

A Demilitarized Zone is used by a company that wants to host its own Internet services without sacrificing unauthorized access to its private network.

The DMZ sits between the Internet and an internal network's line of defense, usually some combination of firewalls and bastion hosts. Typically, the DMZ contains devices accessible to Internet traffic, such as Web (HTTP) servers, FTP servers, SMTP (e-mail) servers and DNS servers.

DNS

Short for Domain Name System (or Service), an Internet service that translates domain names into IP addresses.

Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4. The DNS system is, in fact, its own network. If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned.

Domain Name

A descriptive name for an address or group of addresses on the Internet. Domain names are of the form of a registered entity name plus one of a number of predefined top level suffixes such as .com, .edu, .uk, etc. For example, in the address mail.NETGEAR.com, mail is a server name and NETGEAR.com is the domain.

DoS

A hacker attack designed to prevent your computer or network from operating or communicating.

DSL

Short for digital subscriber line, but is commonly used in reference to the asymmetric version of this technology (ADSL) that allows data to be sent over existing copper telephone lines at data rates of from 1.5 to 9 Mbps when receiving data (known as the downstream rate) and from 16 to 640 Kbps when sending data (known as the upstream rate).

ADSL requires a special ADSL modem. ADSL is growing in popularity as more areas around the world gain access.

DSLAM

DSL Access Multiplexor. The piece of equipment at the telephone company central office that provides the ADSL signal.

Dynamic Host Configuration Protocol

DHCP. An Ethernet protocol specifying how a centralized DHCP server can assign network configuration information to multiple DHCP clients. The assigned information includes IP addresses, DNS addresses, and gateway (router) addresses.

EAP

Extensible Authentication Protocol is a general protocol for authentication that supports multiple authentication methods.

EAP, an extension to PPP, supports such authentication methods as token cards, Kerberos, one-time passwords, certificates, public key authentication and smart cards. In wireless communications using EAP, a user requests connection to a WLAN through an AP, which then requests the identity of the user and transmits that identity to an authentication server such as RADIUS. The server asks the AP for proof of identity, which the AP gets from the user and then sends back to the server to complete the authentication. EAP is defined by RFC 2284.

ESP
Encapsulating Security Payload.

ESSID
The Extended Service Set Identification (ESSID) is a thirty-two character (maximum) alphanumeric key identifying the wireless local area network.

Gateway
A local device, usually a router, that connects hosts on a local network to other networks.

IETF
Internet Engineering Task Force. Working groups of the IETF propose standard protocols and procedures for the Internet, which are published as RFCs (Request for Comment) at *www.ietf.org*.
An open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet.

IP
Internet Protocol is the main internetworking protocol used in the Internet. Used in conjunction with the Transfer Control Protocol (TCP) to form TCP/IP.

IP Address
A four-byte number uniquely defining each host on the Internet, usually written in dotted-decimal notation with periods separating the bytes (for example, 134.177.244.57).
Ranges of addresses are assigned by Internic, an organization formed for this purpose.

IPX
Short for Internetwork Packet Exchange, a networking protocol used by the Novell NetWare operating systems.
Like UDP/IP, IPX is a datagram protocol used for connectionless communications. Higher-level protocols, such as SPX and NCP, are used for additional error recovery services.

ISP
Internet service provider.

Internet Protocol
The main internetworking protocol used in the Internet. Used in conjunction with the Transfer Control Protocol (TCP) to form TCP/IP.

LAN
A communications network serving users within a limited area, such as one floor of a building.

LDAP
A set of protocols for accessing information directories.

Lightweight Directory Access Protocol
LDAP. A set of protocols for accessing information directories.
LDAP is based on the standards contained within the X.500 standard, but is significantly simpler. And unlike X.500, LDAP supports TCP/IP, which is necessary for any type of Internet access. Because it's a simpler version of X.500, LDAP is sometimes called *X.500-lite.*

local area network
LAN. A communications network serving users within a limited area, such as one floor of a building.
A LAN typically connects multiple personal computers and shared network devices such as storage and printers. Although many technologies exist to implement a LAN, Ethernet is the most common for connecting personal computers.

MAC address
The Media Access Control address is a unique 48-bit hardware address assigned to every network interface card. Usually written in the form 01:23:45:67:89:ab.

Mbps
Megabits per second.

MDI/MDIX
In cable wiring, the concept of transmit and receive are from the perspective of the computer, which is wired as a Media Dependant Interface (MDI). In MDI wiring, a computer transmits on pins 1 and 2. At the hub, switch, router, or access point, the perspective is reversed, and the hub receives on pins 1 and 2. This wiring is referred to as Media Dependant Interface - Crossover (MDI-X). See also AES.

Maximum Receive Unit
The size in bytes of the largest packet that can be sent or received.

Maximum Transmit Unit
The size in bytes of the largest packet that can be sent or received.

Most Significant Bit or Most Significant Byte
MSB. The portion of a number, address, or field that is farthest left when written as a single number in conventional hexadecimal ordinary notation. The part of the number having the most value.

MRU
The size in bytes of the largest packet that can be sent or received.

MSB
MSB. The portion of a number, address, or field that is farthest left when written as a single number in conventional hexadecimal ordinary notation. The part of the number having the most value.

MTU

The size in bytes of the largest packet that can be sent or received.

NAT

A technique by which several hosts share a single IP address for access to the Internet.

NetBIOS

The Network Basic Input Output System is an application programming interface (API) for sharing services and information on local-area networks (LANs).

Provides for communication between stations of a network where each station is given a name. These names are alphanumeric names, up to 16 characters in length.

Network Address Translation

NAT. A technique by which several hosts share a single IP address for access to the Internet.

NIC

Network Interface Card. An adapter in a computer which provides connectivity to a network.

NID

Network Interface Device. The point of demarcation, where the telephone line comes into the house.

packet

A block of information sent over a network. A packet typically contains a source and destination network address, some protocol and length information, a block of data, and a checksum.

Perfect Forward Secrecy

Perfect Forward Secrecy (PFS) provides additional security by means of a Diffie-Hellman shared secret value. With PFS, if one key is compromised, previous and subsequent keys are secure because they are not derived from previous keys.

PKIX

PKIX. The most widely used standard for defining digital certificates.

Point-to-Point Protocol

PPP. A protocol allowing a computer using TCP/IP to connect directly to the Internet.

PPP

A protocol allowing a computer using TCP/IP to connect directly to the Internet.

PPPoA

PPPoA. PPP over ATM is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

PPPoE

PPPoE. PPP over Ethernet is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

PPP over ATM

PPPoA. PPP over ATM is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

PPP over Ethernet

PPPoE. PPP over Ethernet is a protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

PPTP

Point-to-Point Tunneling Protocol. A method for establishing a virtual private network (VPN) by embedding Microsoft's network protocol into Internet packets.

PSTN

Public Switched Telephone Network.

RADIUS

Short for Remote Authentication Dial-In User Service, RADIUS is an authentication system.
Using RADIUS, you must enter your user name and password before gaining access to a network. This information is passed to a RADIUS server, which checks that the information is correct, and then authorizes access. Though not an official standard, the RADIUS specification is maintained by a working group of the IETF.

RFC

Request For Comment. Refers to documents published by the Internet Engineering Task Force (IETF) proposing standard protocols and procedures for the Internet. RFCs can be found at *www.ietf.org*.

RIP

A protocol in which routers periodically exchange information with one another so that they can determine minimum distance paths between sources and destinations.

router

A device that forwards data between networks. An IP router forwards data based on IP source and destination addresses.

Routing Information Protocol

RIP. A protocol in which routers periodically exchange information with one another so that they can determine minimum distance paths between sources and destinations.

SSID

A Service Set Identification is a thirty-two character (maximum) alphanumeric key identifying a wireless local area network. For the wireless devices in a network to communicate with each other, all devices must be configured with the same SSID.
This is typically the configuration parameter for a wireless PC card. It corresponds to the ESSID in the wireless Access Point and to the wireless network name. *See also* Wireless Network Name and ESSID.

Subnet Mask

A mask used to determine what subnet an IP address belongs to. Subnetting enables a network administrator to further divide an IP address into two or more subnets.
An IP address has two components, the network address and the host address. For example, consider the IP address 150.215.017.009. Assuming this is part of a Class B network, the first two numbers (150.215) represent the Class B network address, and the second two numbers (017.009) identify a particular host on this network.
Subnetting enables the network administrator to further divide the host part of the address into two or more subnets. In this case, a part of the host address is reserved to identify the particular subnet. This is easier to see if we show the IP address in binary format. The full address is: 10010110.11010111.00010001.00001001
The Class B network part is: 10010110.11010111
and the host address is 00010001.00001001
If this network is divided into 14 subnets, however, then the first 4 bits of the host address (0001) are reserved for identifying the subnet.

The subnet mask is the network address plus the bits reserved for identifying the subnetwork. (By convention, the bits for the network address are all set to 1, though it would also work if the bits were set exactly as in the network address.) In this case, therefore, the subnet mask would be 11111111.11111111.11110000.00000000. It's called a mask because it can be used to identify the subnet to which an IP address belongs by performing a bitwise AND operation on the mask and the IP address. The result is the subnetwork address: Subnet Mask 255.255.240.000 11111111.11111111.11110000.00000000
IP Address 150.215.017.009 10010110.11010111.00010001.00001001
Subnet Address 150.215.016.000 10010110.11010111.00010000.00000000

The subnet address, therefore, is 150.215.016.000.

TCP/IP

The main internetworking protocols used in the Internet. The Internet Protocol (IP) used in conjunction with the Transfer Control Protocol (TCP) form TCP/IP.

TLS

Short for Transport Layer Security, TLS is a protocol that guarantees privacy and data integrity between client/server applications communicating over the Internet.
The TLS protocol is made up of two layers. The TLS Record Protocol ensures that a connection is private by using symmetric data encryption and ensures that the connection is reliable. The second TLS layer is the TLS Handshake Protocol, which allows authentication between the server and client and the negotiation of

an encryption algorithm and cryptographic keys before data is transmitted or received. Based on Netscape's SSL 3.0, TLS supercedes and is an extension of SSL. TLS and SSL are not interoperable.

Universal Plug and Play

UPnP. A networking architecture that provides compatibility among networking technology. UPnP compliant routers provide broadband users at home and small businesses with a seamless way to participate in online games, videoconferencing and other peer-to-peer services.

UTP

Unshielded twisted pair is the cable used by 10BASE-T and 100BASE-Tx Ethernet networks.

WAN

Wide Area Network. A long distance link used to extend or connect remotely located local area networks. The Internet is a large WAN.

WEB Proxy Server

A Web proxy server is a specialized HTTP server that allows clients access to the Internet from behind a firewall.

The proxy server listens for requests from clients within the firewall and forwards these requests to remote Internet servers outside the firewall. The proxy server reads responses from the external servers and then sends them to internal client clients.

WEP

Wired Equivalent Privacy is a data encryption protocol for 802.11b wireless networks.

All wireless nodes and access points on the network are configured with a 64-bit or 128-bit Shared Key for data encryption.

wide area network

WAN. A long distance link used to extend or connect remotely located local area networks. The Internet is a large WAN.

Wi-Fi

A trade name for the 802.11b wireless networking standard, given by the Wireless Ethernet Compatibility Alliance (WECA, see http://www.wi-fi.net), an industry standards group promoting interoperability among 802.11b devices.

Windows Internet Naming Service

WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses.

If a remote network contains a WINS server, your Windows PCs can gather information from that WINS server about its local hosts. This allows your PCs to browse that remote network using the Windows Network Neighborhood feature.

WINS

WINS. Windows Internet Naming Service is a server process for resolving Windows-based computer names to IP addresses.

Wireless Network Name (SSID)

Wireless Network Name (SSID) is the name assigned to a wireless network. This is the same as the SSID or ESSID configuration parameter.

WPA

Wi-Fi Protected Access (WPA) is a specification of standards-based, interoperable security enhancements that increase the level of data protection and access control for existing and future wireless LAN systems.

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