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# **N-TRON™ OPC Server and Diagnostic Monitor**

**VERSION 9**

**Software Installation & Users' Guide**

# N-TRON™ N-VIEW OPC Server and Diagnostic Monitor Users' Guide

**For use with the following N-VIEW™ capable N-TRON™ switches:**

- 200 Series (with –N extension)**
- 300 Series (with –N extension)**
- 400 Series (with –N extension)**
- 500 Series (with –N or –A extension)**
- 900 Series (with –N extension)**
- 7000 Series (all)**
- 9000 Series (all)**

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US Patent 6,728,262

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## **Minimum System Requirements:**

250MHz Pentium PC, with 64 MB RAM, 2GB Hard Disk, and CD Drive  
Windows NT 4.0 w/SP4 or later, Windows 2000, XP, or Windows 2003 Server  
Mouse, VGA Monitor  
NDIS compatible Ethernet Card  
Administrator Privileges  
Internet Explorer 6 or greater.

## **INSTALLING N-VIEW OPC SERVER and DIAGNOSTIC MONITOR SOFTWARE**

1. Insert the N-TRON Product CD into your CD Drive.
2. If it does not autorun, Double Click the *N-TronSplash.html* file name in the CD's root directory
3. Click on the *Install* button in the N-View OPC description area.
4. Click on the *Install Now* button located on the left side of the screen.
5. You may be prompted with a file download dialog box asking if you would like to open or save the file. Select *OPEN* to install from CD.
6. Follow the setup, and if desired, choose a custom [INSTALLDIR].
7. Finish the Setup

## THEORY OF OPERATION

The N-TRON Switches that are N-VIEW capable (models that contain **-N or -A** as well as the 7000 and 9000 series switches), generate a periodic multicast MAC packet for every port. This packet is then received and displayed by the N-TRON OPC server software.

The N-TRON OPC Server Software consists of two parts:

1. Nview OPC (Configurator and Diagnostic Monitor)
2. N-Tron OPC Server (Windows Service)

### N-View OPC

The N-VIEW OPC Configurator and Diagnostic Monitor is a Windows program that:

- creates and configures the database used by the OPC server, and/or
- can be used to monitor diagnostic data from the switch without requiring an OPC based ( or any other) application, and/or
- can launch N-View OPC from a batch file, and have it generate a list of all the switch aliases that it found on-line to a text file.

**The N-View OPC Configuration must be completed prior to connecting an OPC client to the N-Tron OPC Server.** Users can assign each switch a meaningful alias name before saving and closing the configuration program.

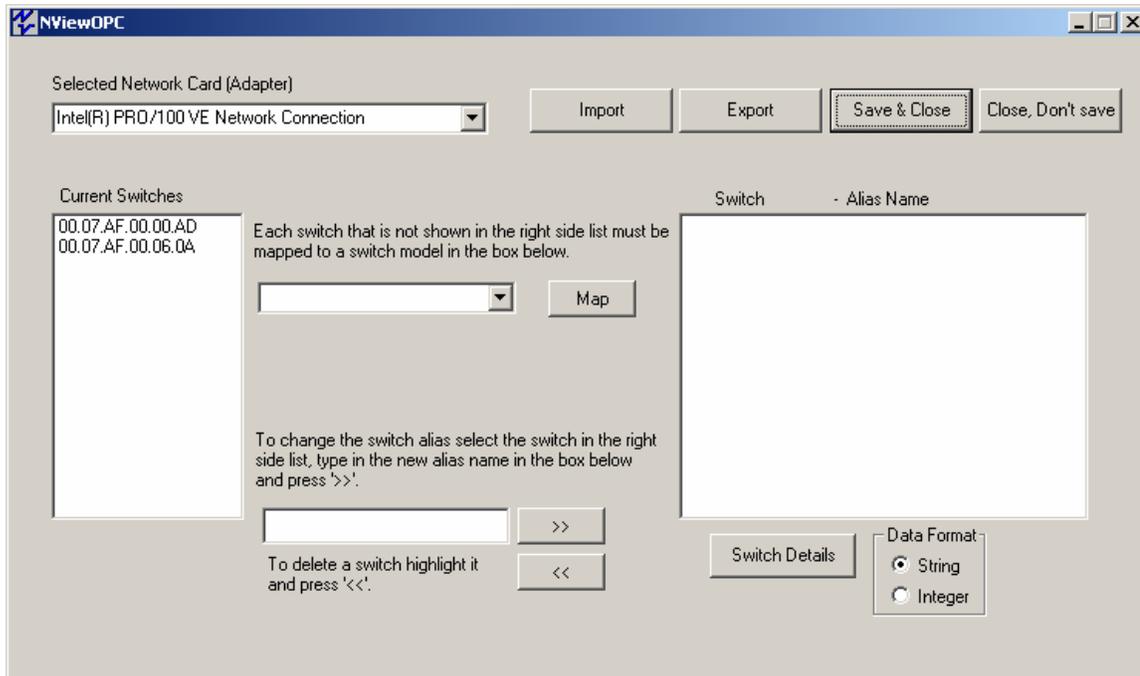
### N-Tron OPC Server

The N-Tron OPC Server is a service that is launched by the N-View OPC Configurator and Client applications. The Server supplies configuration and real time tag data to the OPC Client. Please note that only one application can communicate with the N-Tron OPC Server at a time.

## LAUNCHING N-VIEW OPC CONFIGURATOR

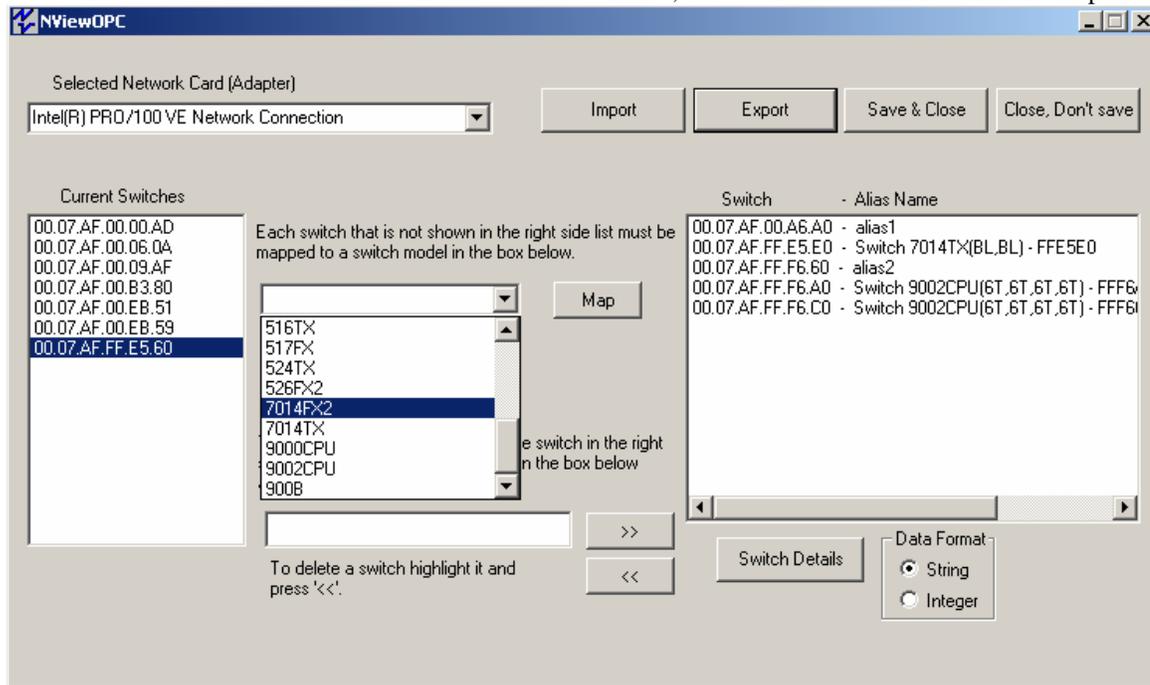
Select: Start > Programs > NViewOPC

The following Screen appears:



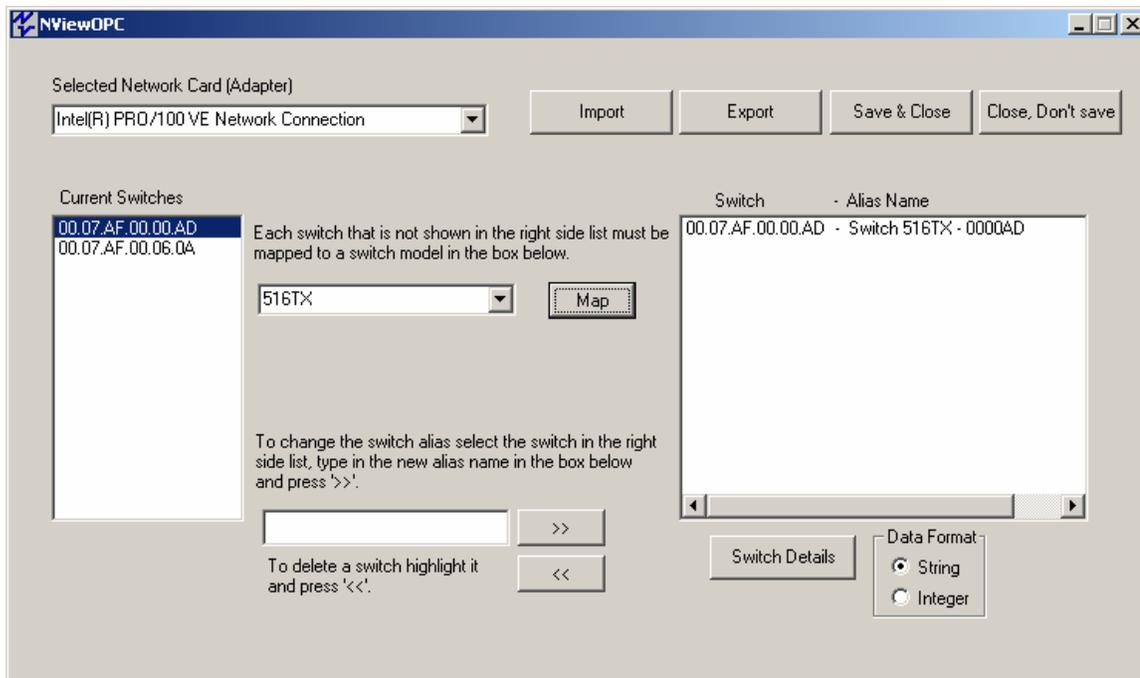
If the Network Adapter that is displayed by default is not the adapter to which the switches of interest are connected, then select the correct adapter.

Select the switch of interest in the “Current Switches” window, and define the switch model from the pulldown:



Note: Several N-Tron switches report their model and configuration to N-View OPC, and in those cases the switch model and configuration may automatically fill in the center pulldowns. These include all 7000 and 9000, and the –N and –A versions of 508FX2, 509FX, and 508TX. Verify that these values are correct on both N-View and the switch before proceeding to map it. Note that the N-View OPC pulldowns will reflect the user’s configuration for 7000 and 9000.

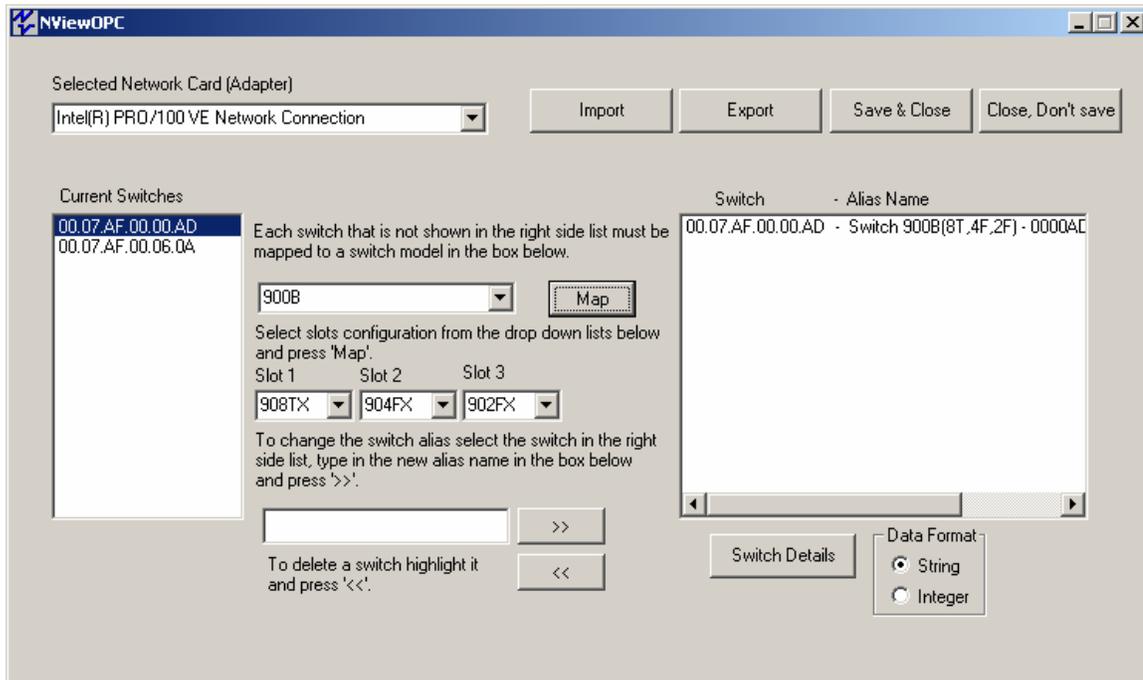
If not a 900 series or 7000 series switch or 9000 series switch, press the “Map” button:  
(More on 900, 7000, and 9000 series below.)



## 900 Series CONFIGURATION

If “900B” is selected as the switch type, then the modules (or blanks) for each slot must be defined from the now available pull-down menus.

Below is an example of a 900B with a 908TX installed in the top slot, a 904FX in the middle slot and a 902FX in the bottom slot.



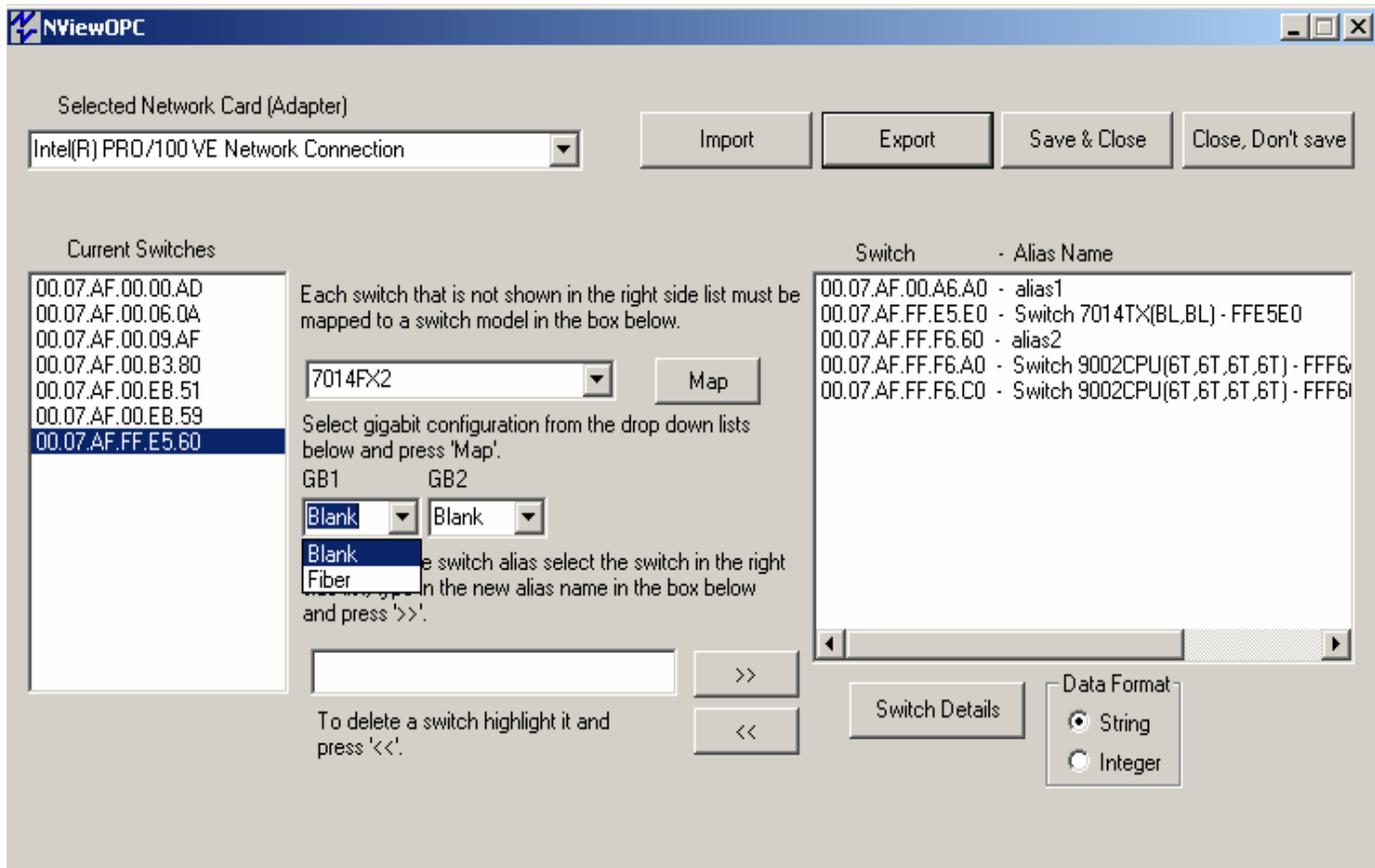
Once the correct modules have been defined for the 900 series, you may press the “Map” button.

## 7000 Series CONFIGURATION

If “7014TX” or “7014FX2” is selected as the switch type, then configure the Gigabit transceiver presence or not.

Note: Selecting a 7000 series switch may automatically fill in the switch model and gigabit values in the pulldowns. Verify the values are correct on both N-View and the switch before proceeding to map it.

Below is an example with a 7014FX2. 7014TX is similar in this regard. GB1 and/or GB2 can be present, or neither.



Once the correct Gigabit transceivers (or not) have been defined for the 7000 series, you may press the “Map” button.



## CHANGING SERVER TIMEOUT (OPTIONAL)

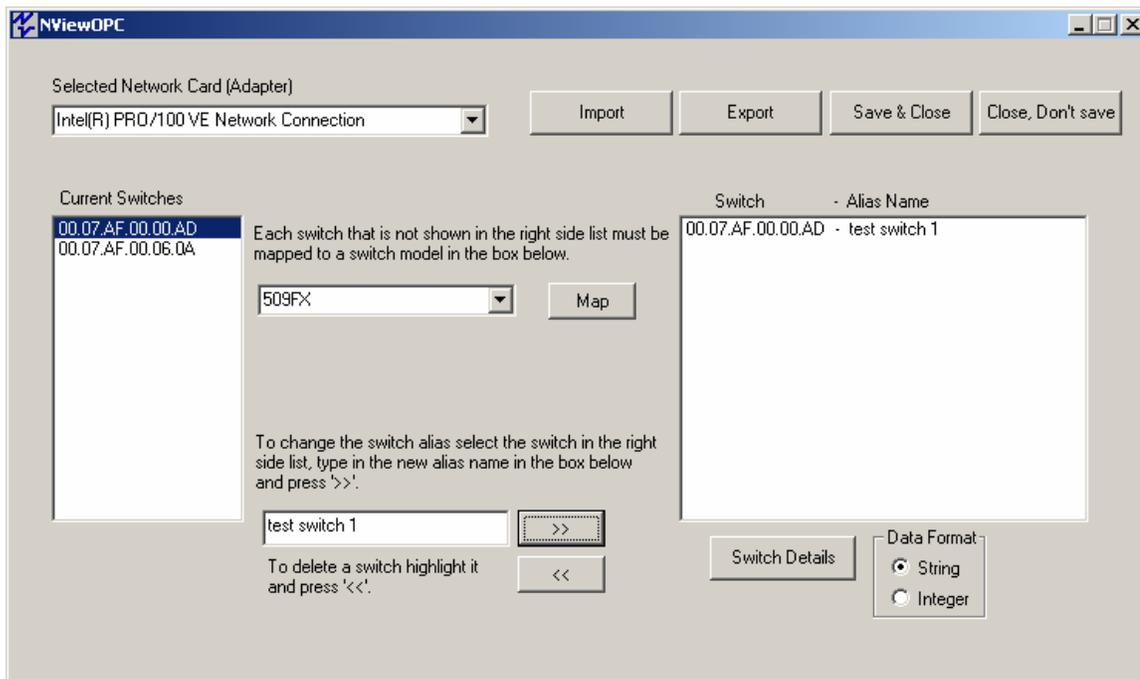
If desired, you can change the timeout value of the OPC Server by selecting “Change Timeout Value...” from the system menu. This value has a range of 20-1500 seconds. If a Switch has become unreachable, after this time all tags associated with it will be invalidated (OFFLINE). If a switch hasn't sent data associated with a port on the switch, all tags associated with the port will be invalidated after this time. Each adapter can have its own value for server timeout.



If changed, “Save & Close” must be selected to save this value.

## ASSIGNING SWITCH ALIASES (OPTIONAL)

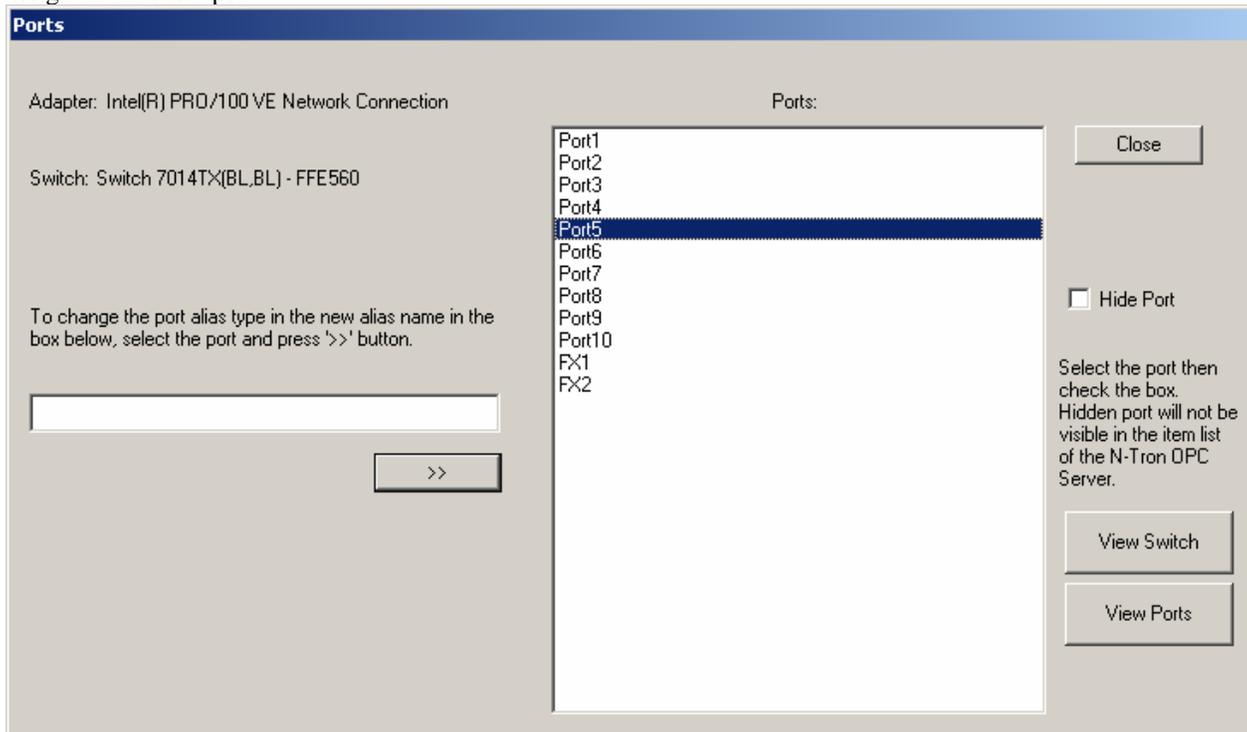
Next, if desired, you can give the switch an Alias Name by highlighting the switch in the right side window, typing an Alias Name, and left mouse clicking on the >> button:



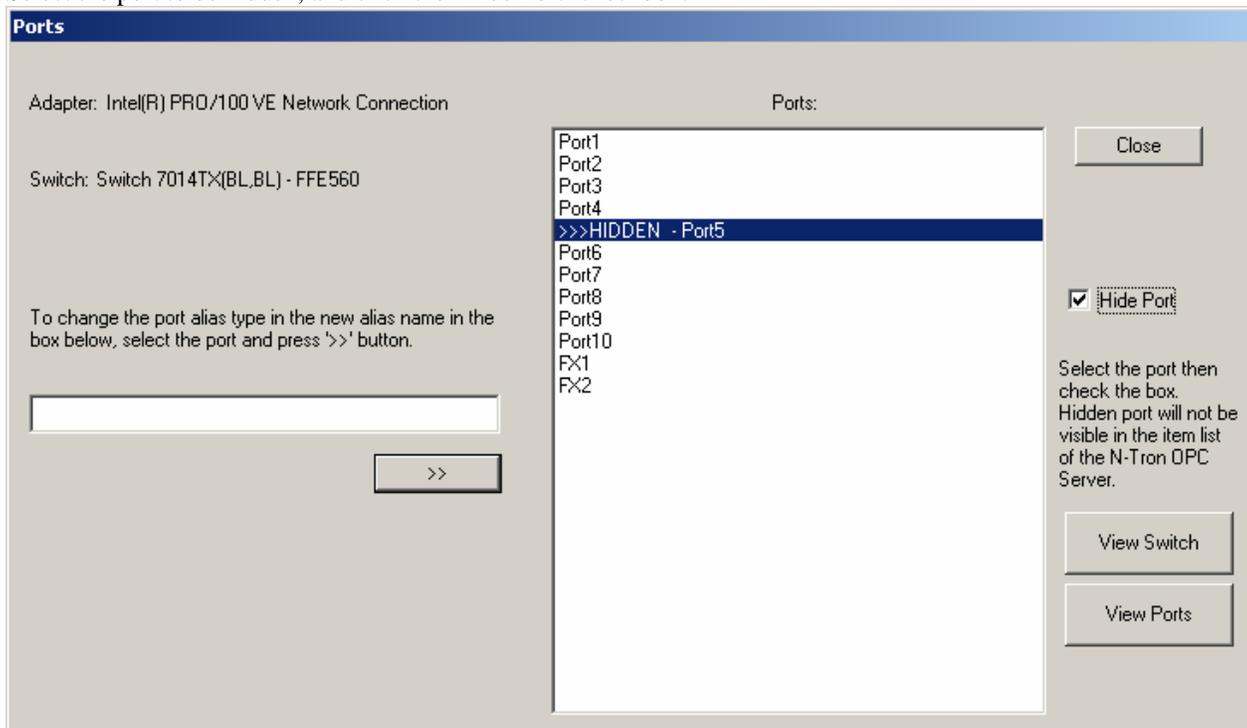
Note: Users can assign switches custom alias names to create meaningful tags (handles). A switch alias can contain up to 35 characters, and can contain spaces.

## HIDING PORTS (OPTIONAL) AND ASSIGNING PORT ALIASES (OPTIONAL)

Next, select the switch and click on Switch Details. The following window will appear. This allows you to hide unused ports, or to assign an alias to a port.



Select the port to be hidden, and click the 'Hide Port' checkbox:



If desired, follow the directions at left to assign a port alias. A port alias can contain up to 24 characters, and can contain spaces.

## SAVING THE CONFIGURATION

Once the remapping has been completed, the configuration must be saved to insure the OPC client correctly picks up the new mapping.

After configuring the ports, close the windows back to the initial (main) window.

After configuring all switches and ports, **“Save & Close”** at the main window.

**Note:** The configurator must be closed and saved to create the data base XML file required by the OPC Server.

**Note: The configurator must be saved and closed before the OPC client is connected to the N-TRON NVIEW OPC Server.** Failure to follow this rule may cause application errors.

**Note:** The N-VIEW OPC Configurator and the N-VIEW OPC Server cannot run simultaneously. Only one application can attach to the N-Tron OPC server at a time. Failure to follow this rule may cause application errors.

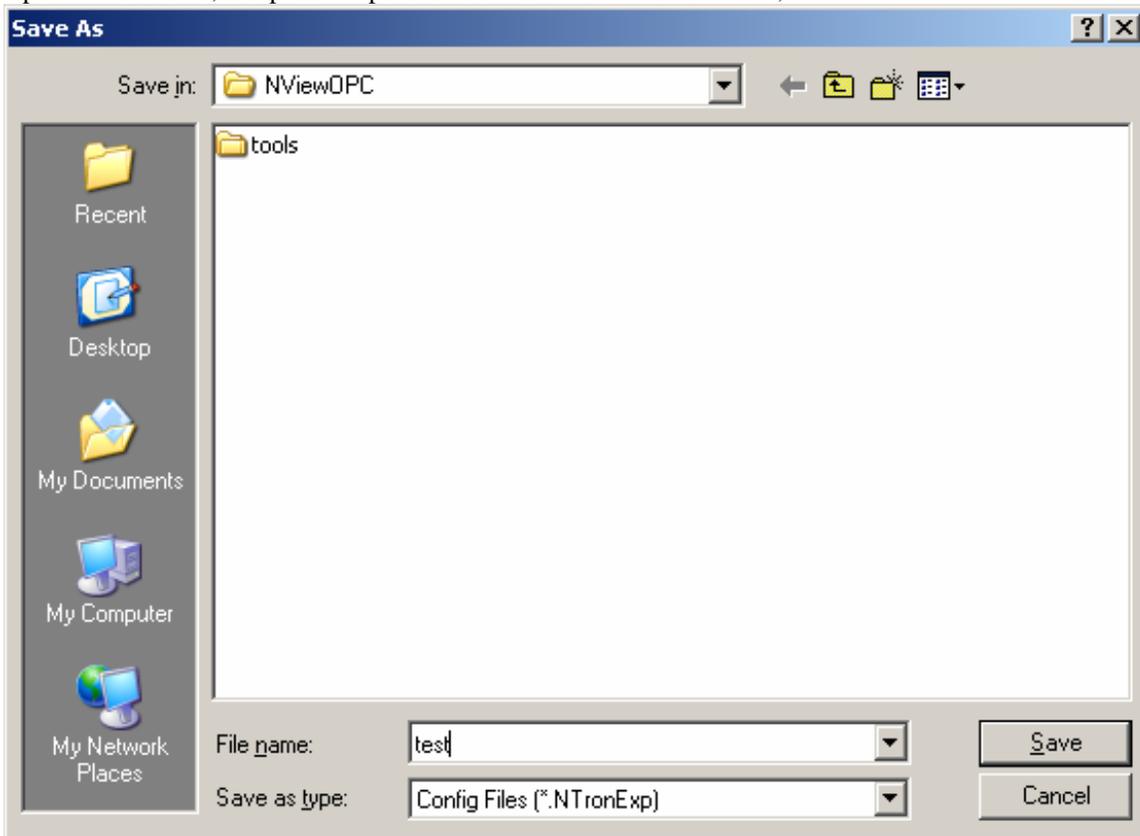
**Note:** When updating to N-View version 8 the saved mapping and aliasing will be retained if it was performed on an N-View version of 2.0 or greater. If the N-View configuration was saved with an N-View version prior to 2.0, then it will not function with N-View 8.0 directly, but the data will be saved at the install folder (default 'C:\Program Files\N-Tron\NViewOPC' or as chosen) in a file named "NTronOPC.xmlOLD".

## EXPORT/IMPORT CONFIGURATION FEATURE

N-View OPC includes an export/import feature that allows easy and accurate transfer of these switch and port alias configurations from one PC to another. Export on a source PC, bring the file to the target PC, and import it there. Then a normal save & close results in the switch and port aliases from the source PC being available on the target PC.

### EXPORTING THE CONFIGURATION

After configuring all switches and ports, “Save & Close” at the main window.  
Open N-View OPC, and press ‘Export’ on the main N-View OPC screen, and see:

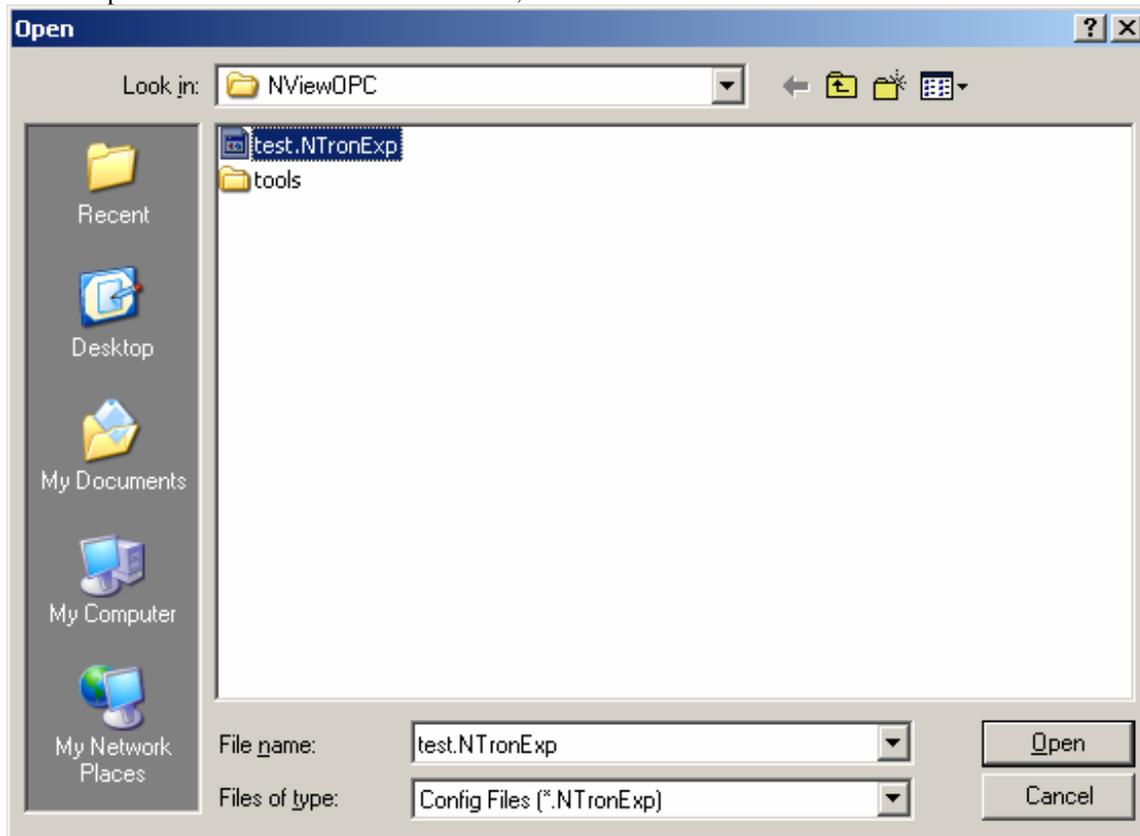


This dialog defaults to the install folder, though that can be changed.

By default, only the filename without extension need be entered, and the normal default path and file extension will be:  
'C:\Program Files\N-Tron\NViewOPC\\*.NTronExp'

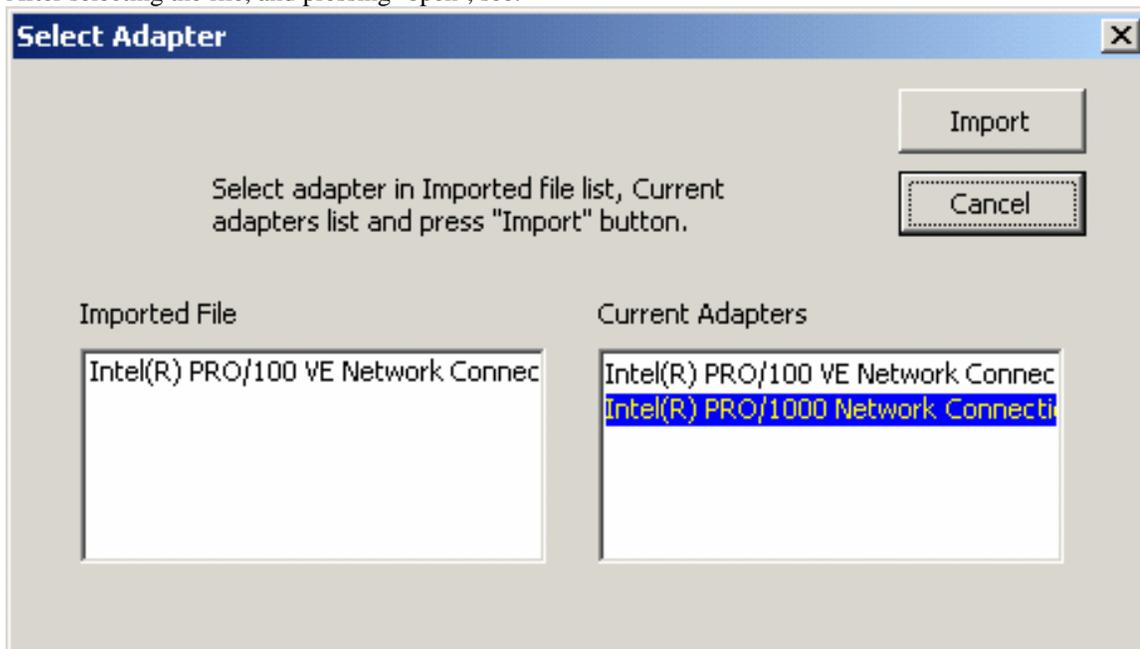
## IMPORTING THE CONFIGURATION

Press 'Import' on the main N-View OPC screen, and see:



This defaults to the install folder, and there is a filter to show only files with the 'NTronExp' file extension, though both can be changed. The normal default path and file extension will be:  
'C:\Program Files\N-Tron\NViewOPC\\*.NTronExp'

After selecting the file, and pressing 'open', see:



Select one NIC in each window to assign which LANs the mapped and aliased switches are coming from (on source PC) and going to (on target PC).

The import is cumulative (appendable), so the switches previously mapped to that NIC will remain. Note that if the same switch (same unique MAC) was already mapped and is ALSO mapped on the import file, it will be remapped based upon the import file.

Confirm the operation:



The switch mapping and switch and port aliases show at this point in the right hand window of the main N-View screen.

Once the remapping has been completed, use “Save & Close” to save the configuration and insure that the OPC client correctly picks up the new mapping.

## CONFIGURING OPC CLIENTS

The N-VIEW OPC Server Service is started automatically.

The following steps should be taken to configure the OPC clients:

1. Connect to the Server.
2. Add Group
3. Select Group
4. Add Item

The choice of 'String' or 'Integer' determines the format in which most parameters are passed via OPC. Details are below. When the information is presented by N-View itself as monitor diagnostic data from the switch without requiring an OPC or other application, the data is presented as depicted below for String, except as noted.

### TAGS

If a switch becomes unreachable, all tags associated with that switch are invalidated (OFFLINE) after a user changeable timeout. If a switch doesn't send any data associated with a port, all tags associated with that port are invalidated (OFFLINE) after the same timeout (Defaults to 20 seconds)

#### SWITCH TAGS:

The following tags are available via OPC on a per switch basis:

		String	Integer
Switch Alias	This is the alias name given by the user during the NVIEW Configuration Process. A switch alias can contain up to 35 characters.	Format: ASCII Example: Switch 516TX	Format: ASCII Example: Switch 516TX (Same as String)
Switch Status	Indicates if the switch is Online or Offline	Format: ASCII Online. or Offline	Format: Integer 1 = Online 0 = Offline
Switch Last Update	Seconds since last data update from the switch	Format: ASCII Example: 2	Format: Integer Example: 2
Switch MAC Address	Switch MAC Address	Format: ASCII Example: 00.07.AF.00.A6.A0	Format: ASCII Example: 00.07.AF.00.A6.A0 (Same as String)
MAC5 through MAC0	Only available in integer mode. Six one byte values representing the Switch MAC Address. MAC0 is the high byte.	N/A	Format: Integer Example: MAC1= 7
Switch Total Ports	Total number of ports on the switch	Format: ASCII Example: 26	Format: Integer Example: 26

The following switch tags are only of use on certain switches that can have and can report an IP Address, otherwise they will show a default IP address of 0.0.0.0:

		String	Integer
Switch IP Address	Switch IP Address	Format: ASCII Example: 192.168.1.1	Format: ASCII Example: 192.168.1.1 (Same as String)
IP0 through IP3	Only available in integer mode. Four one byte values representing the Switch IP Address. IP0 is the high byte.	N/A	Format: Integer Example: IP1 = 168

### N-RING TAGS:

The following is a list of N-Ring tags. These tags are only of use on N-Ring capable switches, otherwise they will be defaults as shown below:

		String	Integer
N-Ring Manager	Indicates if the switch is in N-Ring Manager Mode	Format: ASCII Yes or No (N/A if no N-Ring Capability)	Format: Integer 1 = Yes 0 = No (Also no N-Ring)
N-Ring Member	Indicates if the switch is an Active N-Ring Member	Format: ASCII Yes or No (N/A if no N-Ring Capability)	Format: Integer 1 = Yes 0 = No (Also no N-Ring)
N-Ring State	Indicates the current N-Ring State if the switch is an N-Ring Manager	Format: ASCII Not Manager Ok Partial Fault (high port rx error) Partial Fault (low port rx error) Fault (N/A if no N-Ring Capability)	Format: Integer 4 = Not Manager 3 = Ok 2 = Partial Fault (high rx) 1 = Partial Fault (low rx) 0 = Fault (Also no N-Ring)
N-Ring Version	Indicates the version of the N-Ring Protocol	Format: ASCII Example: 1 (0 if no N-Ring Capability)	Format: Integer Example: 1 (0 if no N-Ring Capability)

### PORT STATUS TAGS:

The following is a list of port status tags. The tags most commonly passed via OPC are highlighted:

		String	Integer
<b>Port Alias</b>	User assigned port alias name. A port alias can contain up to 24 characters, and cannot contain spaces.	Format: ASCII Example: Port1	Format: ASCII Example: Port1 (Same as "String")
<b>Port Duplex</b>	Reflects the current duplex of the particular port. Values can be Full, Half, or NA.	Format: ASCII N/A if link is down; If link is up: Half or Full	Format: Integer: 0 if link is down; If link is up: 0 = Half 1 = Full
Port Last Update	Seconds since last data update from the switch for the port	Format: ASCII Example: 2	Format: Integer Example: 2
<b>Port Link Status</b>	The current status of the port (UP/Down)	Format: ASCII Down or Up	Format: Integer: 0 = Down 1 = Up
Port PortID	1 to 26 ( via OPC only )	Format: ASCII Port Number: Examples: 1, 2,...	Always zero Integer
<b>Port Speed</b>	The current speed of the port represented as 10, 100, 1000, or /NA	Format: ASCII N/A if link is down If link is up: 10, 100, or 1000	Format: Integer: 0 if link is down If link is up: 10, 100, or 1000
<b>Port Usage</b>	Current bandwidth utilization shown from 0 to 100 % RX or TX, whichever is greater.	Format: ASCII to two decimal places. Example: 82.17	Format: Integer: Example: 82

### N-View Port Traffic Variables

N-View Port Traffic Variables have a 32 bit accuracy, which is the maximum for OPC v2. These parameters thus have a range of 0 to 4,294,967,295, and roll over through zero (to 1,2,...) if more than that number is reached. If 'Integer' is selected, these are passed via OPC as a 32 bit binary number. If 'String' is selected, these are passed via OPC as ASCII characters.

The following is a list of port traffic variables:

Port pkts 64 octets	The number of packets (including error packets) 64 bytes in size that have been received by the port, except that for the 9000 it is transmitted and received packets total.
Port pkts 65 to127 octets	The number of packets (including error packets) between 65 and 127 bytes in size that have been received by the port, except that for the 9000 it is transmitted and received packets total.
Port pkts 128 to 255 octets	The number of packets (including error packets) between 128 and 255 bytes in size that have been received by the port, except that for the 9000 it is transmitted and received packets total.
Port pkts 256 to 511 octets	The number of packets (including error packets) between 256 and 511 bytes in size that have been received by the port, except that for the 9000 it is transmitted and received packets total.
Port pkts 512 to 1023 octets	The number of packets (including error packets) between 512 and 1023 bytes in size that have been received by the port, except that for the 9000 it is transmitted and received packets total.

Port pkts 1024 to 1522 octets	The number of packets (including error packets) between 1024 and 1522 bytes in size that have been received by the port, except that for the 9000 it is transmitted and received packets total.
Port rx octets	The total number of bytes that have been received over the port, including bad packets.
Port rx good octets	The total number of bytes in all good packets that have been received over the port.
Port rx broadcast pkts	The total number of good packets that have been received over the port that are directed to the broadcast address.
Port rx multicast pkts	The total number of good packets that have been received over the port that are directed to multicast addresses.
Port rx unicast pkts	The total number of good packets that have been received over the port that are directed to unicast addresses.
Port rx pause pkts	The number of PAUSE frames received by a port. The PAUSE frame must: have a valid MAC Control frame EtherType field; have a destination MAC address of either the MAC control frame reserved multicast (01-80-c2-00-00-01) or the unique MAC address associated with the specific port; have a valid PAUSE opcode, (00-01); be a minimum of 64 bytes in length; and have a valid CRC.
Port tx octets	The total number of bytes that have been transmitted over the port.
Port tx collisions	The total number of collisions that have been experienced over the port during packet transmissions.
Port tx multiple collision	The number of packets successfully transmitted by a port that experienced more than one collision.
Port tx single collision	The number of packets successfully transmitted by a port that experienced exactly one collision.
Port tx broadcast pkts	The total number of good packets that have been transmitted over the port that are directed to the broadcast address.
Port tx multicast pkts	The total number of good packets that have been transmitted over the port that are directed to multicast addresses.
Port tx unicast pkts	The total number of good packets that have been transmitted over the port that are directed to unicast addresses.
Port tx pause pkts	The number of PAUSE frames transmitted by a port.

## N-View Port Error Variables

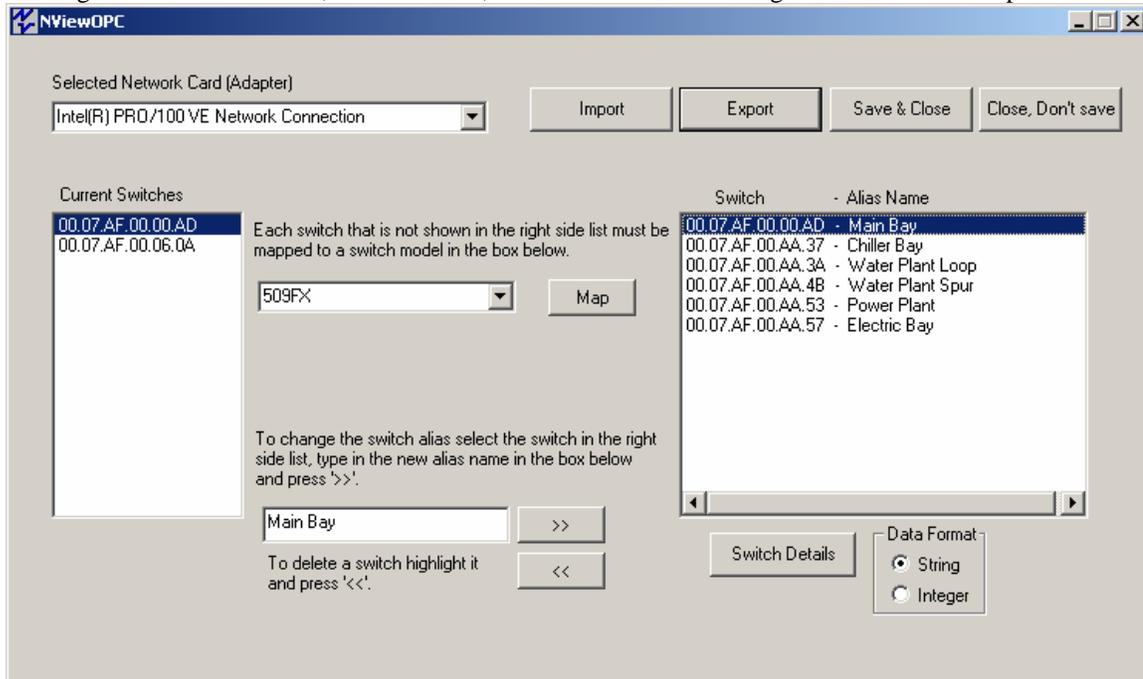
N-View Port Error Variables have a 32 bit accuracy, which is the maximum for OPC v2. These parameters thus have a range of 0 to 4,294,967,295, and roll over through zero (to 1,2,...) if more than that number is reached. If 'Integer' is selected, these are passed via OPC as a 32 bit binary number. If 'String' is selected, these are passed via OPC as ASCII characters.

The following is a list of port error variables:

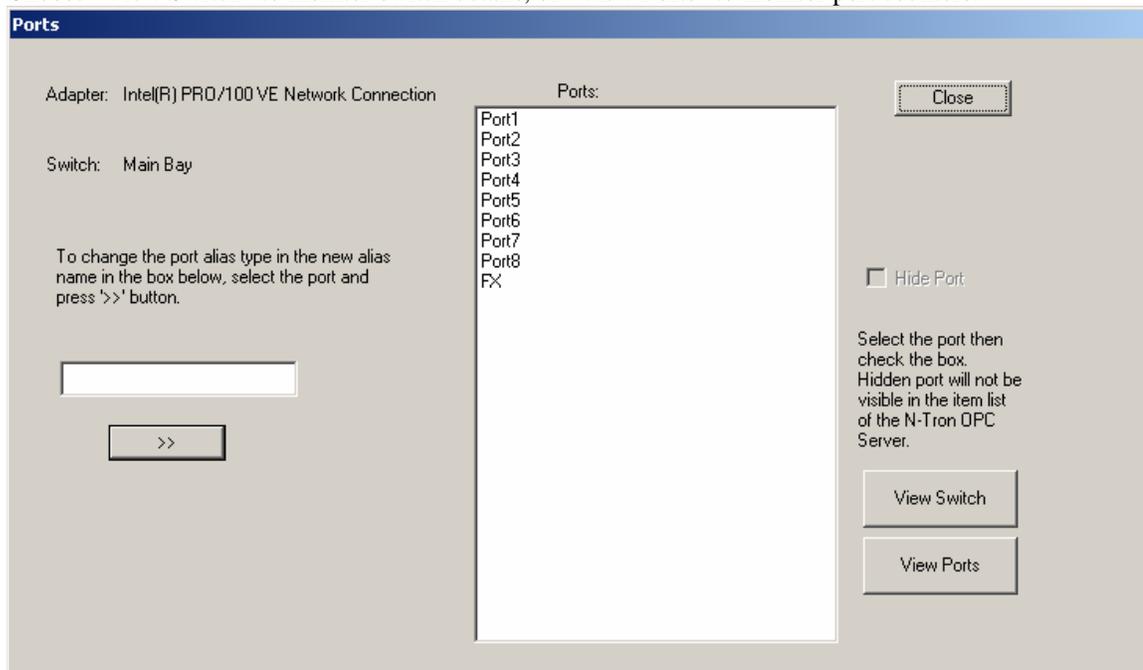
Port rx alignment errors	The number of packets received by a port that have enough length between 64 and 1522 bytes, and have a bad FCS with a non-integral number of bytes.
Port rx dropped pkts	The number of good packets received by a port that were dropped due to the lack of resources. The counter is only incremented if the error was not counted by rx fcs errors, or rx alignment errors.
Port rx fcs errors	The number of packets received by a port that have enough length between 64 and 1522 bytes, and have a bad FCS with a non-integral number of bytes.
Port rx fragments	The number of packets received by a port that have less than 64 bytes, and have a either an FCS error or an alignment error.
Port rx jabbers	The number of packets received by a port that are longer than 1522 bytes and have either an FCS error or an alignment error.
Port rx over size pkts	The number of good packets received by a port that are greater than 1522 bytes.
Port rx sa changes	The number of times the source address of good receive packets has changed from the previous value. A count of greater than one usually indicates the port is connected to a repeater based network.
Port rx symbol errors	The total number of times a valid length packet was received at a port and at least one invalid data symbol was detected. The counter only increments once per carrier event and does not increment if a collision occurs during that event.
Port rx under size pkts	The number of good packets received by a port that are less than 64 bytes in length.
Port rx excessive disc size	The number of good packets received by a port that are greater than 1536 bytes (excluding framing bits but including the FCS) and were discarded due to excessive length. Note: The Port rx over size pkts counter alone is incremented for packets in the range 1523 – 1536 bytes inclusive, whereas both this counter and the Port rx over size pkts counter are incremented for packets of 1537 bytes and higher.
Port tx deferred transmit	The number of packets transmitted by a port for which the first transmission attempt is delayed because the medium is busy.
Port tx dropped pkts	The number of transmit packets dropped by a port due to the lack of resources. The counter is only incremented if the error was not counted by tx late collision, or tx excessive collision.
Port tx excessive collision	The number of packets that are not transmitted from a port because the packet experienced 16 transmission attempts.
Port tx frame in disc	The number of valid packets received which are discarded by the forwarding process due to lack of space on an output queue.
Port tx late collisions	The number of times that a collision is detected later than 512 bit-times into the transmission of a packet.

## DIAGNOSTIC MONITOR

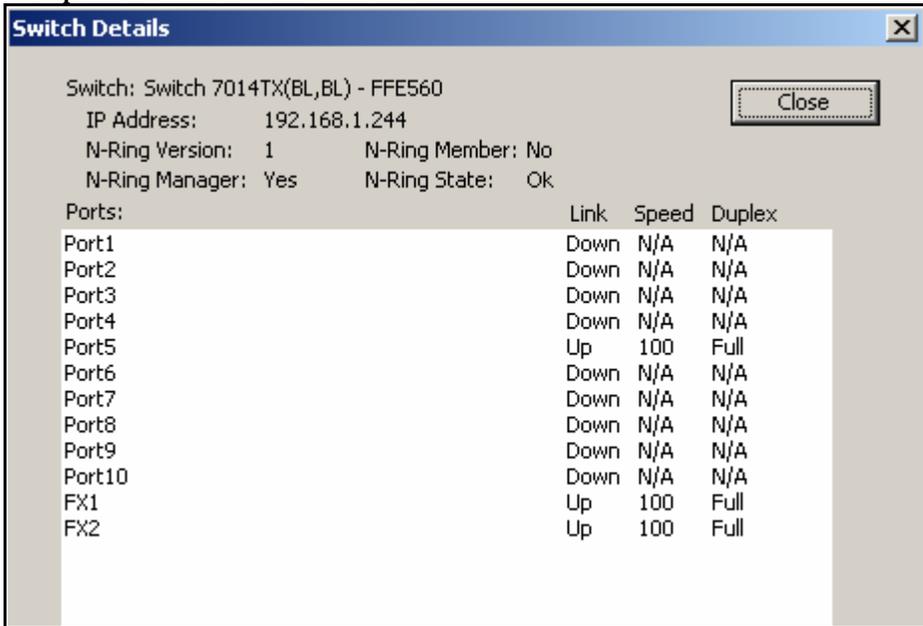
Starting from the main screen, as seen below, select a switch from the right hand window and press 'Switch Details'.



Choose "View Switch" to monitor switch details, or "View Ports" to monitor port counters:



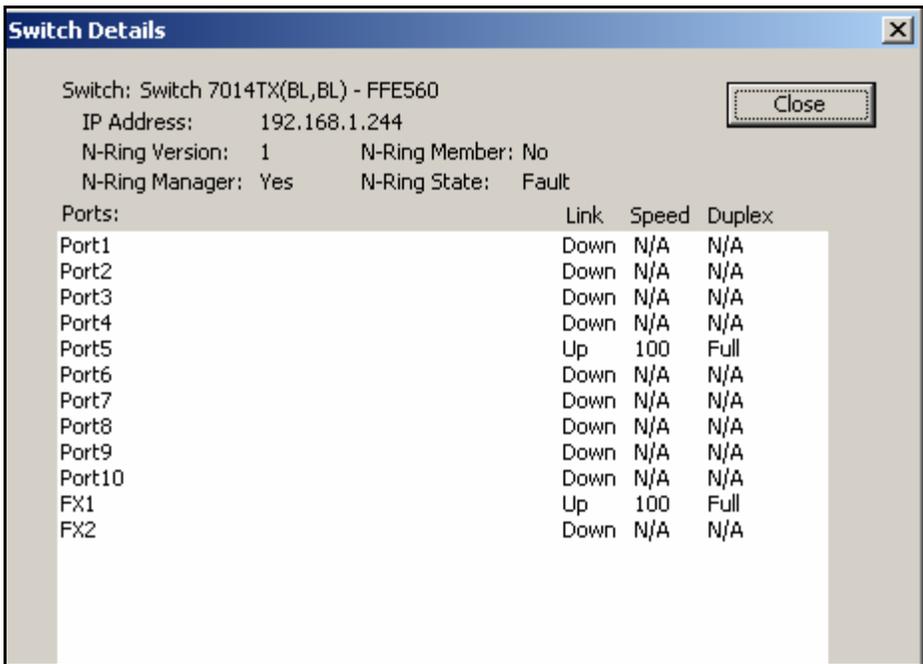
Examples of the "Switch Details" screen:



Note the IP Address and the N-Ring protocol version, which are presented from 7000 and 9000 series switches.

Each 7000 and 9000 series N-Ring Manager reports that he is an N-Ring Manager or not, and the state of the N-Ring.

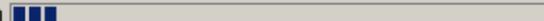
Each 7000 and 9000 series switch also reports if he is an active N-Ring member or not.



Example of the "Port Counters" screen:

The screenshot shows a window titled "Port Counters" with a close button in the top right corner. The window displays the following information:

Switch: Switch 7014TX(BL,BL) - FFE560  
IP Address: 192.168.1.244  
Port: FX1  
Speed: 100 Mbps    Link: Up    N-Ring Version: 1    N-Ring Member: No  
Duplex: Full    Enable: Yes    N-Ring Manager: Yes    N-Ring State: Fault

Usage: 0  100 %

7.27

Tx Octets	5662894	Rx Octets	1339092
Tx Dropped Packets	0	Rx Dropped Packets	0
Tx Broadcast Packets	355	Rx Broadcast Packets	0
Tx Multicast Packets	83984	Rx Multicast Packets	15029
Tx Unicast Packets	223	Rx Unicast Packets	32
Tx Collisions	0	Rx Undersize Packets	0
Tx Single Collision	0	Rx Oversize Packets	0
Tx Multiple Collision	0	Rx Jabbers	0
Tx Deferred Transmit	0	Rx Alignment Errors	0
Tx Late Collision	0	Rx Good Octets	1339092
Tx Excessive Collision	0	Rx SA Changes	0
Tx Frame In Disc	0	Rx FCS Errors	0
Tx Pause Packets	0	Rx Pause Packets	0
64 Packets	92469	Rx Fragments	0
65 to 127 Packets	2380	Rx Excessive Disc Size	0
128 to 255 Packets	4774	Rx Symbol Errors	0
256 to 511 Packets	0	1024 to 1522 Packets	0
512 to 1023 Packets	0		

Select the port from the list below:

- Port1
- Port2
- Port3
- Port4
- Port5
- Port6
- Port7
- Port8
- Port9
- Port10
- FX1**
- FX2

## AUTOMATED REPORT

N-View OPC can be launched from a command line or from a batch file, and it can generate a list of all the switch aliases that it found on-line to a text file.

For example, this makes it possible for on-site servers to run a batch file each morning that queries the switches, records the results in a simple text file, which is then automatically emailed to Customer Service, who can deploy the field techs to check a switch to see why it is off line. Problems can be solved before the end users even know there was one.

1. If you start NViewOPC.exe from a command line (or a batch file) with two arguments in single quotes it will run minimized for 6+ seconds, and produce a file named report.txt in the same directory where NViewOPC.exe resides. If you took the default, that directory will be:

“C:\Program Files\N-Tron\NViewOPC”.

NViewOPC will terminate itself.

2. Example of the command line (or a batch file) is below

NViewOPC.exe 'FE575C-3COM 10/100 LAN CardBus-Fast Ethernet' 'report'

The first argument in the single quotes is the name of the adapter exactly as it is shown in the adapters list of NView. The best way to get it right is to copy it from the drop down box of NViewOPC.

The word 'report' is not case sensitive.

3. The produced file (report.txt) will contain the time when it was created, MAC addresses and aliases for all the switches that showed up during that 6+ seconds period. If report.txt already existed it will be overwritten with the new information. To keep a running log and/or to keep records on one or more adapters, a batch file or script will be needed to concatenate sequential report.txt files to another file or files.

Here is an example of a report.txt file:

Active Switches
12/05/2003 09:59:17 AM
00.07.AF.00.05.09 - Switch 509FX
00.07.AF.00.05.17 - Switch 517FX

4. If there are no command line arguments, or there are any mistakes in arguments, the NViewOPC will start normally.

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