CHAPTER

2

MANAGED SWITCH QUICK START

In This Chapter...

Connecting to the Switch for the first time

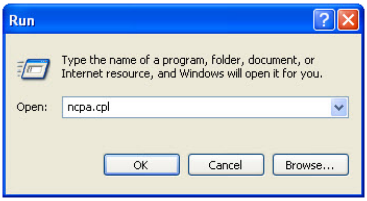
Connecting to the switch over Ethernet:

NOTE: *See Setting up PC for USB connection to Switch later in this chapter for the option of using USB for switch connection.*

Connecting to the switch for the first time over Ethernet requires no extra tools or driver installation and is, therefore, the recommended way to accomplish this.

The default IP address and subnet mask of the switch is 192.168.0.1 and 255.255.255.0. This means that your PC's network interface card (NIC) that is connected to the switch must be set to a compatible IP address and subnet mask to access the web-based switch configuration tool. It is recommended that you connect your PC directly to the switch for the initial setup of the network settings. An example IP address and subnet mask to set your PC's network interface to is 192.168.0.100 and 255.255.255.0.

1. Go to the Start Button and click on "Run" (if you do not see a "Run" option, type Run in the search box and hit Enter). Type in ncpa.cpl and hit OK.

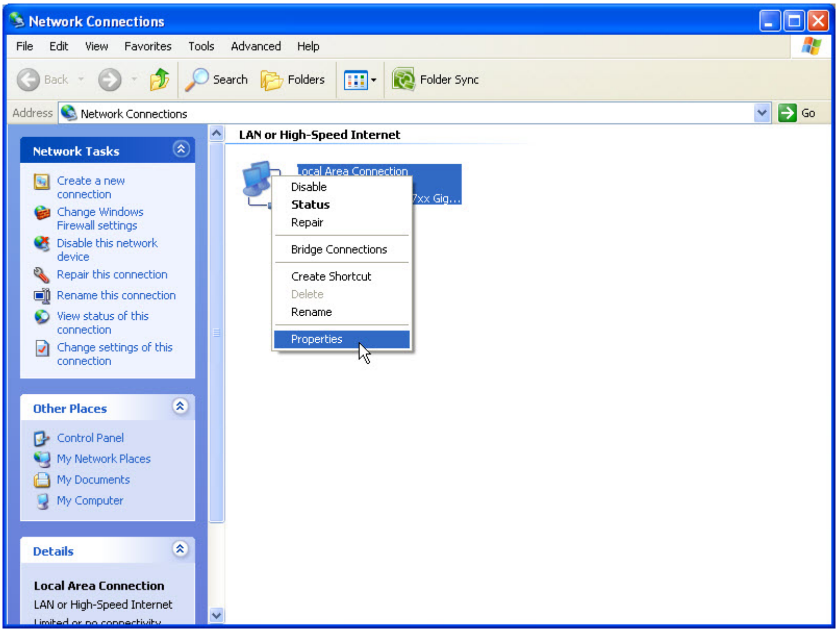


Run

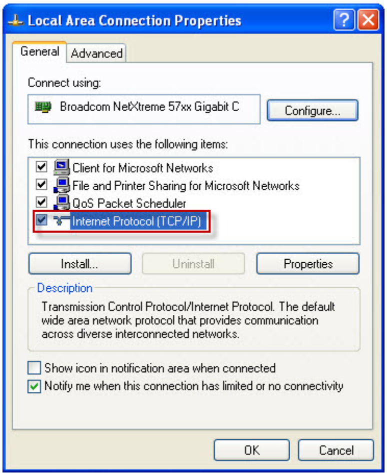
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: ncpa.cpl

2. Right click on the Network Interface that is connected to your switch and choose Properties.


Network Connections
File Edit View Favorites Tools Advanced Help
Back Search Folders Folder Sync
Address Network Connections Go
Network Tasks
Create a new connection
Change Windows Firewall settings
Disable this network device
Repair this connection
Rename this connection
View status of this connection
Change settings of this connection
Other Places
Control Panel
My Network Places
My Documents
My Computer
Details
Local Area Connection
LAN or High-Speed Internet
Limited or no connectivity
LAN or High-Speed Internet
Local Area Connection
...7xx Gig...
Disable
Status
Repair
Bridge Connections
Create Shortcut
Delete
Rename
Properties

3. Scroll down and highlight the "Internet Protocol Version 4 (TCP/IPv4)" selection and click on the Properties button.


Local Area Connection Properties
General Advanced
Configure...
Install... Uninstall Properties
OK Cancel

Connect using:

Broadcom NetXtreme 57xx Gigabit C

This connection uses the following items:

☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ QoS Packet Scheduler
☑ Internet Protocol (TCP/IP)

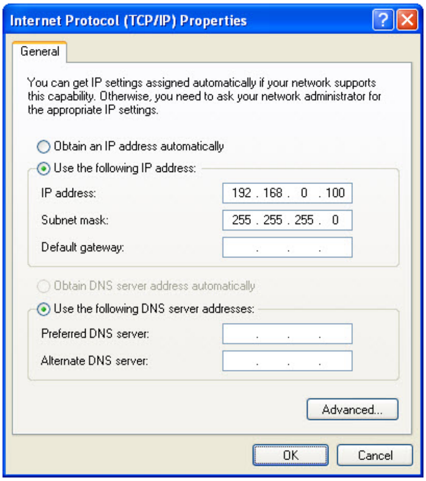
Description

Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

□ Show icon in notification area when connected
☑ Notify me when this connection has limited or no connectivity

4. Write down the current settings so that you may put them back in after configuring the Network settings of the switch to a compatible setup for your environment.

5. Type in the IP address and subnet mask of 192.168.0.100 and 255.255.255.0 or another compatible IP address and subnet mask. Click on the OK button. Click on the OK button for the Network Interface Properties window and close the Network Connections window.



Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 0 . 100

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

○ Obtain DNS server address automatically

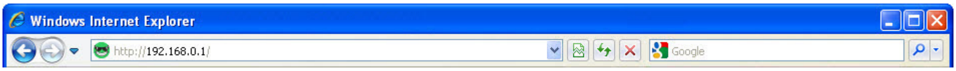
● Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

__NOTE:__ Neither the Network Address nor the Broadcast Address for you subnet are valid host addresses. For our example that has a Subnet Mask or 255.255.255.0 and the first three octets are 192.168.0, neither the pc nor the switch are permitted to be assigned 192.168.0.0 or 192.168.0.255 as an IP address.

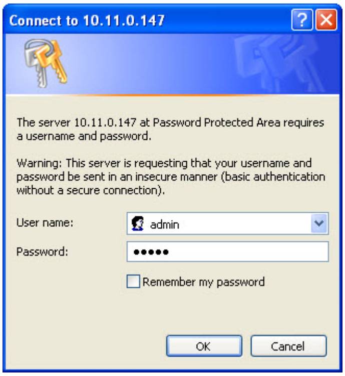
6. Open up your web browser program such as Internet Explorer, Mozilla Firefox or other and type in 192.168.0.1 in the URL line.



Windows Internet Explorer

http://192.168.0.1/

7. Enter in admin for the User name and admin for the password and click on OK.



Connect to 10.11.0.147

The server 10.11.0.147 at Password Protected Area requires a username and password.

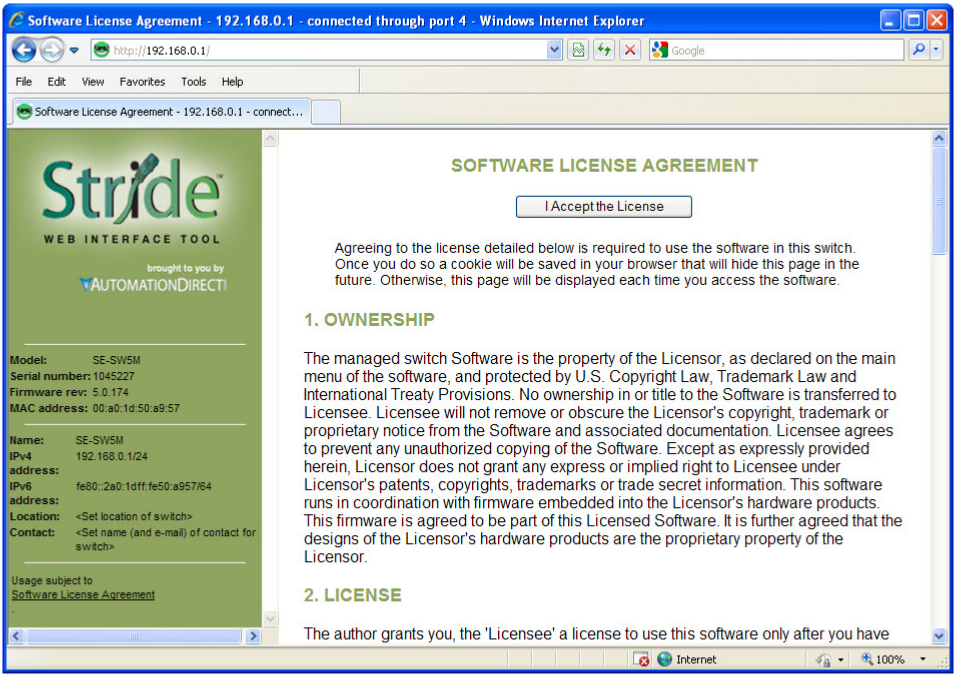
Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

User name: admin

Password: •••••

□ Remember my password

8. Read the Software License Agreement and click the “I Accept the License” button.


Software License Agreement - 192.168.0.1 - connected through port 4 - Windows Internet Explorer
http://192.168.0.1/
Google
File
Edit
View
Favorites
Tools
Help
Software License Agreement - 192.168.0.1 - connect...
Stride
WEB INTERFACE TOOL
brought to you by
AUTOMATIONDIRECT
Internet
100%

Model: SE-SW5M
Serial number: 1045227
Firmware rev: 5.0.174
MAC address: 00:a0:1d:50:a9:57

Name: SE-SW5M
IPv4 address: 192.168.0.1/24
IPv6 address: fe80::2a0:1dff:fe50:a957/64
Location: <Set location of switch>
Contact: <Set name (and e-mail) of contact for switch>

Usage subject to
Software License Agreement

SOFTWARE LICENSE AGREEMENT

I Accept the License

Agreeing to the license detailed below is required to use the software in this switch. Once you do so a cookie will be saved in your browser that will hide this page in the future. Otherwise, this page will be displayed each time you access the software.

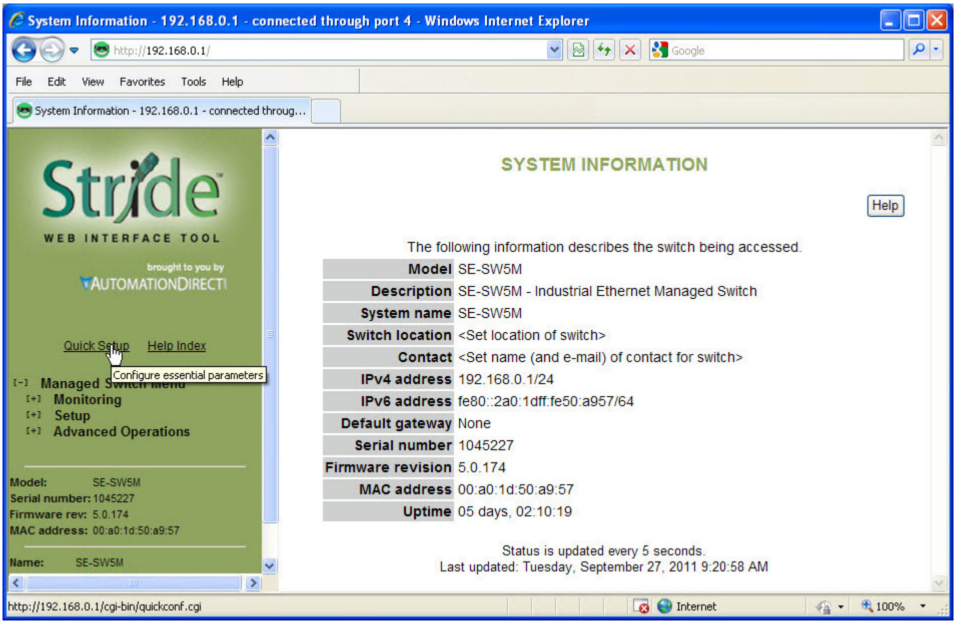
1. OWNERSHIP

The managed switch Software is the property of the Licensor, as declared on the main menu of the software, and protected by U.S. Copyright Law, Trademark Law and International Treaty Provisions. No ownership in or title to the Software is transferred to Licensee. Licensee will not remove or obscure the Licensor's copyright, trademark or proprietary notice from the Software and associated documentation. Licensee agrees to prevent any unauthorized copying of the Software. Except as expressly provided herein, Licensor does not grant any express or implied right to Licensee under Licensor's patents, copyrights, trademarks or trade secret information. This software runs in coordination with firmware embedded into the Licensor's hardware products. This firmware is agreed to be part of this Licensed Software. It is further agreed that the designs of the Licensor's hardware products are the proprietary property of the Licensor.

2. LICENSE

The author grants you, the 'Licensee' a license to use this software only after you have

9. Click on the "Quick Setup" link on the upper left hand side of the window to access the Network Settings.



System Information - 192.168.0.1 - connected through port 4 - Windows Internet Explorer

http://192.168.0.1/

Model: SE-SW5M
Serial number: 1045227
Firmware rev: 5.0.174
MAC address: 00:a0:1d:50:a9:57

Name: SE-SW5M

SYSTEM INFORMATION

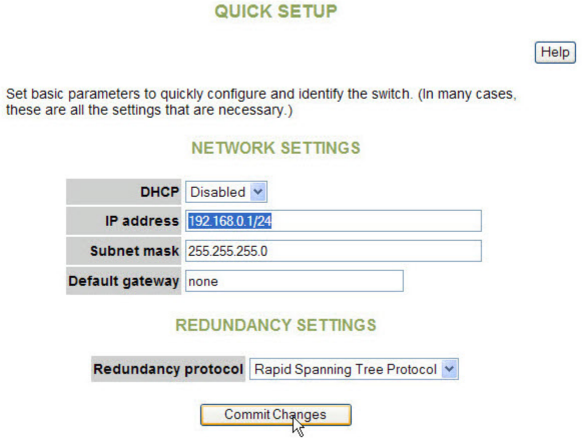
The following information describes the switch being accessed.

Model	SE-SW5M
Description	SE-SW5M - Industrial Ethernet Managed Switch
System name	SE-SW5M
Switch location	<Set location of switch>
Contact	<Set name (and e-mail) of contact for switch>
IPv4 address	192.168.0.1/24
IPv6 address	fe80::2a0:1dff:fe50:a957/64
Default gateway	None
Serial number	1045227
Firmware revision	5.0.174
MAC address	00:a0:1d:50:a9:57
Uptime	05 days, 02:10:19

Status is updated every 5 seconds.
Last updated: Tuesday, September 27, 2011 9:20:58 AM

http://192.168.0.1/cgi-bin/quickconf.cgi

10. Enter in the desired IP address and subnet mask that is compatible with the network that the switch will go on or enable DHCP if that is the method you choose to assign the network settings. Click on the "Commit Changes" button to enable the new settings.



QUICK SETUP

Set basic parameters to quickly configure and identify the switch. (In many cases, these are all the settings that are necessary.)

NETWORK SETTINGS

DHCP	Disabled
IP address	192.168.0.1/24
Subnet mask	255.255.255.0
Default gateway	none

REDUNDANCY SETTINGS

Redundancy protocol	Rapid Spanning Tree Protocol

***NOTE:** Neither the Network Address nor the Broadcast Address for you subnet are valid host addresses. For our example that has a Subnet Mask or 255.255.255.0 and the first three octets are 192.168.0, neither the pc nor the switch are permitted to be assigned 192.168.0.0 or 192.168.0.255 as an IP address.*

11. Return to steps 1 – 4 to put in the original network settings for your PC.
12. Connect your PC and the switch to the network and enter in the new IP address into your web browser URL to access the switch. If you chose DHCP as the method for assigning the network settings to your switch, you will need to contact the network administrator to see which IP address has been assigned to the switch or connect via USB or serial (explained further down in this document) to ascertain what the IP address is on the switch.
13. Now that you can access the switch, you may begin to configure the switch with the settings appropriate for your network. If you are unsure of where to start with the configuration, go the section titled, "Why do you need a managed switch?" to understand more about the Stride managed switch, its capabilities and how these features can be used. Note that the default settings enable RSTP and IGMP which will be adequate for many networks with no further configuration.

Setting up PC for USB connection to switch:

This method can be used to initially configure the switch settings. It may also be needed if the switch has been previously configured and the network settings are unknown. If the switch has been set to DHCP, this method can be used to ascertain the current IP address that has been assigned to the switch by the DHCP server.

Three things will be required in order to connect to the switch via the USB port:

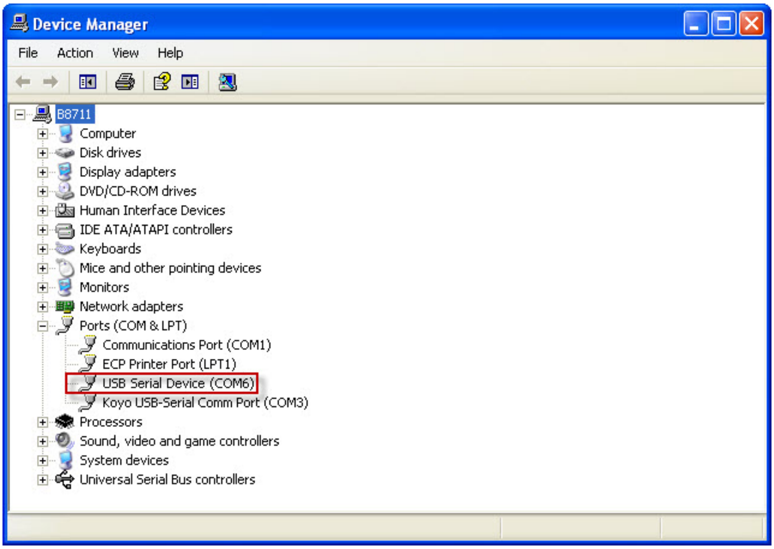
1. **USB driver:** This can be obtained from *www.automationdirect.com*. Download the executable and run it to install the driver.
2. **Cable:** The cable required is a Male-A connector (plugs into PC) to Male Mini B-type (5 pin) connector (plugs into switch).
3. **Terminal software tool:** Hyperterminal used to come pre-installed in Windows until Windows Vista and 7 were released. TeraTerm is another tool that can be downloaded and installed for free.

After the USB driver EXE file has been downloaded and run, plug the USB cable into the PC and switch.

Windows will install the driver. If the New Hardware Wizard appears, select the "No, not this time" selection and click Next. On the following screen, select the "Install Software automatically" option and click Next. Once the driver is loaded, you may get prompted by a window that says the driver has not been verified by Windows. Click on the "Continue Anyway" button to complete the installation.

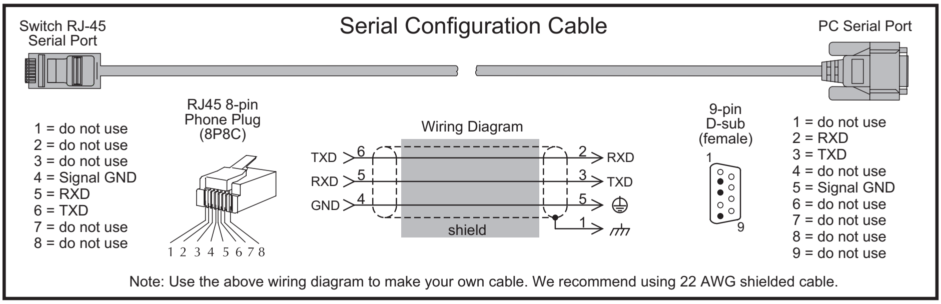
To locate which COM Port has been assigned to the switch, click on “Start” menu in the PC taskbar and choose “Control Panel”. Double click on the “System” icon. Select the “Hardware” tab.

Click on the “Device Manager” button and then expand the “Ports (COM & LPT)” option on the left hand side and you should see a “USB Serial Device” with a COMxx beside it. This will be the COM port number that you will select with your Terminal software tool.



- B8711
  - Computer
  - Disk drives
  - Display adapters
  - DVD/CD-ROM drives
  - Human Interface Devices
  - IDE ATA/ATAPI controllers
  - Keyboards
  - Mice and other pointing devices
  - Monitors
  - Network adapters
  - Ports (COM & LPT)
    - Communications Port (COM1)
    - ECP Printer Port (LPT1)
    - USB Serial Device (COM6)
    - Koyo USB-Serial Comm Port (COM3)
  - Processors
  - Sound, video and game controllers
  - System devices
  - Universal Serial Bus controllers

PC to switch using Serial Port:



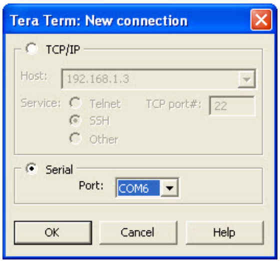
Note: Use the above wiring diagram to make your own cable. We recommend using 22 AWG shielded cable.

In addition to the USB console port, the switches have an RJ45 console port. The RJ45 console port can connect to a -pin serial port on your PC. A driver does not need to be installed.

USB and Serial connection to switch with Terminal Software Program:

The software terminal program used for this tutorial will be TeraTerm. Any serial terminal software should work fine. TeraTerm is free and can be downloaded from www.teraterm.org.

1. Open the TeraTerm software and choose Serial and the COM port connected to the switch.



○ TCP/IP

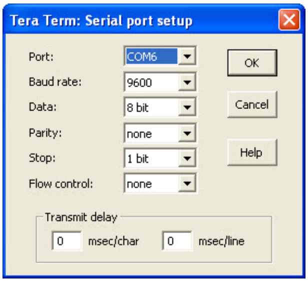
Host: 192.168.1.3

Service: ○ Telnet ● SSH ○ Other   TCP port#: 22

● Serial

Port: COM6

2. Configure the terminal program to connect to the switch with the following parameters:
   a. Baud rate: 9600
   b. Data bits: 8
   c. Parity: None
   d. Stop bits: 1
   e. Flow control: None



Port: COM6

Baud rate: 9600

Data: 8 bit

Parity: none

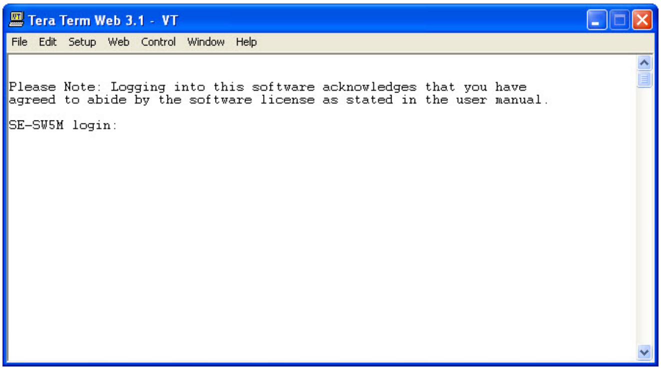
Stop: 1 bit

Flow control: none

Transmit delay

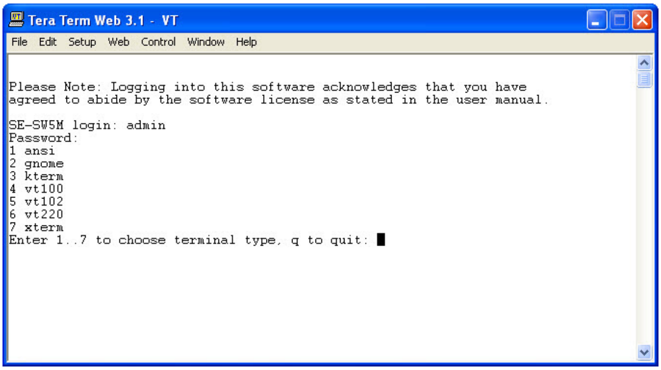
0 msec/char   0 msec/line

3. **Press Enter** to get the prompt shown below.



```
Please Note: Logging into this software acknowledges that you have
agreed to abide by the software license as stated in the user manual.

SE-SW5M login:
```

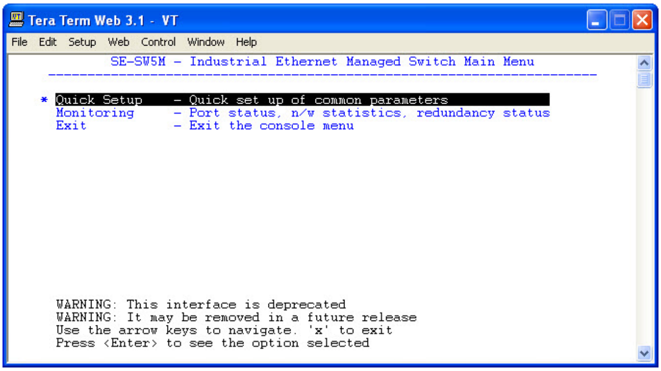
4. Enter the login, then the password. The default user name is **admin** and the default password is **admin**.



```
Please Note: Logging into this software acknowledges that you have
agreed to abide by the software license as stated in the user manual.

SE-SW5M login: admin
Password:
1 ansi
2 gnome
3 kterm
4 vt100
5 vt102
6 vt220
7 xterm
Enter 1..7 to choose terminal type, q to quit: █
```

5. Choose selection 4 for vt100.

6. Highlight (by using the up and down arrow keys on the PC keyboard) the “Quick Setup” option and press Enter.

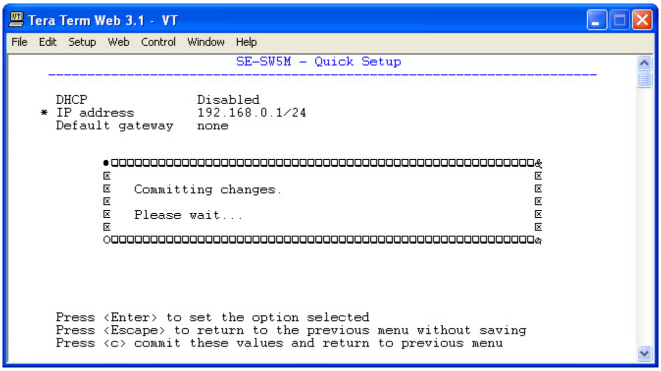


```
             SE-SW5M - Industrial Ethernet Managed Switch Main Menu
     ----------------------------------------------------------------------

    * Quick Setup      - Quick set up of common parameters
      Monitoring       - Port status, n/w statistics, redundancy status
      Exit             - Exit the console menu



      WARNING: This interface is deprecated
      WARNING: It may be removed in a future release
      Use the arrow keys to navigate. 'x' to exit
      Press <Enter> to see the option selected
```

7. To enable DHCP, highlight the DHCP option and press Enter. Arrow down and choose the Enable option and press Enter. Press the c key to commit the change.

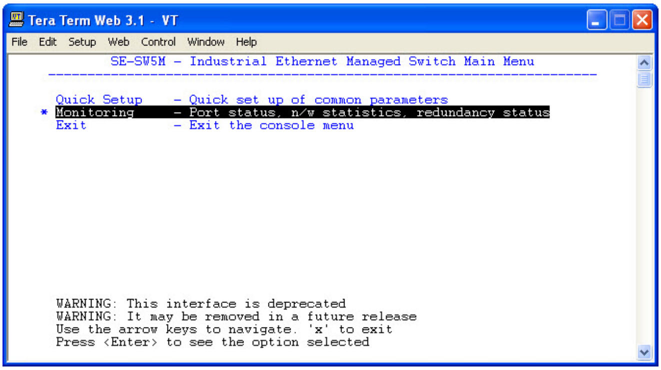
8. To set a static IP address, arrow down and highlight the “IP address” option and press Enter.

9. Enter in the desired IP address and subnet mask. Note that the subnet mask is configured using, what is called CIDR notation. The "/xx" number denotes how many 1's are in the subnet mask starting from the most significant bit. A /24 indicates a subnet mask of 255.255.255.0. A /16 indicates a subnet mask of 255.255.0.0 and a /8 indicates a subnet mask of 255.0.0.0. Once the IP address and subnet mask have been configured, press Enter. Press the c key to commit this change and to activate the new IP address for the switch.



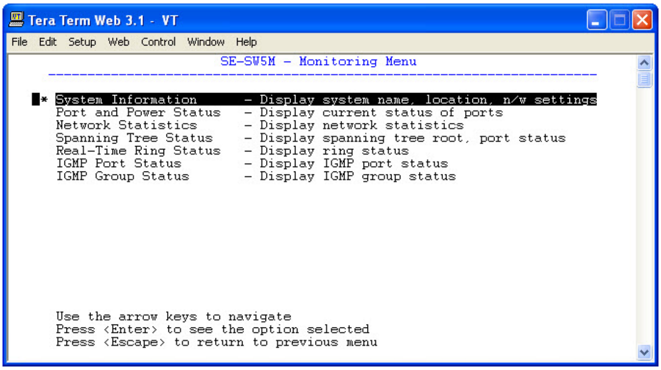
```
                           SE-SW5M - Quick Setup
     ----------------------------------------------------------------------

     DHCP                 Disabled
   * IP address           192.168.0.1/24
     Default gateway      none


             Committing changes.

             Please wait...


     Press <Enter> to set the option selected
     Press <Escape> to return to the previous menu without saving
     Press <c> commit these values and return to previous menu
```

10. If the switch has been configured to obtain an IP address from a DHCP server, you can also view the IP address that is currently assigned to the switch by hitting ESC to go back to the main menu. Arrow down and highlight the "Monitoring" option and press Enter.



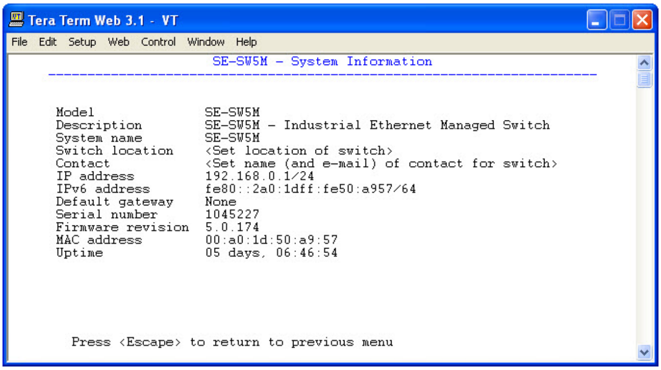
```
             SE-SW5M - Industrial Ethernet Managed Switch Main Menu
     ----------------------------------------------------------------------

     Quick Setup     - Quick set up of common parameters
   * Monitoring      - Port status, n/w statistics, redundancy status
     Exit            - Exit the console menu


     WARNING: This interface is deprecated
     WARNING: It may be removed in a future release
     Use the arrow keys to navigate. 'x' to exit
     Press <Enter> to see the option selected
```

11. Highlight the first option called, “System Information” and press Enter.



```
                         SE-SW5M - Monitoring Menu
     ----------------------------------------------------------------------

  * System Information       - Display system name, location, n/w settings
    Port and Power Status    - Display current status of ports
    Network Statistics       - Display network statistics
    Spanning Tree Status     - Display spanning tree root, port status
    Real-Time Ring Status    - Display ring status
    IGMP Port Status         - Display IGMP port status
    IGMP Group Status        - Display IGMP group status





    Use the arrow keys to navigate
    Press <Enter> to see the option selected
    Press <Escape> to return to previous menu
```

12. The IP address currently assigned to the switch will be shown here.



```
                        SE-SW5M - System Information
     ----------------------------------------------------------------------


    Model                SE-SW5M
    Description          SE-SW5M - Industrial Ethernet Managed Switch
    System name          SE-SW5M
    Switch location      <Set location of switch>
    Contact              <Set name (and e-mail) of contact for switch>
    IP address           192.168.0.1/24
    IPv6 address         fe80::2a0:1dff:fe50:a957/64
    Default gateway      None
    Serial number        1045227
    Firmware revision    5.0.174
    MAC address          00:a0:1d:50:a9:57
    Uptime               05 days, 06:46:54




      Press <Escape> to return to previous menu
```

You are now able to use your web browser with the new IP address to configure the switch.

Default Setup

The table below shows the Default settings for the switch:

Stride Managed Switch Default Settings			
Configuration Parameter			Default Setting
Main Settings	*System Settings*	*DHCP*	Disabled
		IP Address	192.168.0.1
		Subnet Mask	255.255.255.0
		Default Gateway	none
		Primary DNS Server	none
		Secondary DNS Server	none
		Domain	
		Redundancy Protocol	Rapid Spanning Tree Protocol
		System Name	Switch model (i.e. SE-SW8MG-4P)
		Switch Location	<Set Location of Switch>
		Contact	<Set Name (and email) of contact for Switch>
	Remote Access Security	*SNMP Access*	Basic and secure SNMP access
		Terminal Access	SSH and telnet access
		Web Access	Basic and secute SNMP access
		SNMP Firmware Loading	Disabled
		Command Line Access	Enabled
		Automatic Logout	Disabled
		SNMP Read-Only	Name: public No Password
		SNMP Read/Write	Name: private No Password
		Terminal and Web	Name: admin Password: admin
	Port Settings	*Name*	port x (x being port number)
		Admin	Enabled
		Negotiation	Auto
		Speed/Duplex	For non Gigabit Switches: 10h,10f,100h,100f all on
			For Gigabit Switches: 10h,10f,100h,100f,1000f all on
		Flow Control	Off
		SFP	1000f selected
	Set IP per Port	*Provide/Do Not Provide IP*	Do not provide IP address to any device
		Enabled	Off for all ports
		Address	blank for all ports
	Switch Time Settings	*NTP Server*	none
		Timezone	Not set
		Set Switch Date	1970-01-01
		Set Switch Time	current time
	Manage Firmware	*Default*	Top line selected
	Install Firmware	*Protocol*	HTTP
		All Other Fields	blank

Stride Managed Switch Default Settings (cont'd)			
Configuration Parameter			Default Setting
Redundancy Settings	Spanning Tree Settings	Redundancy Protocol	Rapid Spanning Tree Protocol
		Bridge Priority	32768
		Maximum Age	20
		Hello Time	2
		Forward Delay	15
		Transmission Limit	6
		Region Name	
		Configiguration Revision	0 (grayed out)
		Max Hops	20 (grayed out)
		MST Instance	None by default
	Spanning Tree Port Settings	Exclude	Off for all ports
		Priority	128 for all ports
		Path Cost	20000 for all 10 / 100 / 1000 Ports, 200,000 for all 10 / 100 ports
		Type	Auto for all ports
		Point-to-Point	Auto for all ports
	Real-time Ring Settings	Enable	Off for all ports
		Ring Name	Ring x (x being port number) Grayed out by default
		Primary Port	none
		Backup Port	none
		Ring Master	Automatic Master
Settings	QoS/CoS Settings	Priority Frame Setting	Send all high priority fames before any others
		Use 802.1p Tag Priority	On for all ports
		Use IP ToS/DiffServ	On for all ports
		Priority Precedence	Tag for all ports
		Default Out Q	Normal for all ports
		Type	Transparent for all ports
	802.1p Tag Settings	Priority 0 (Best Effort)	Normal
			Background
		Priority 2 (Spare)	Background
		Priority 3 (Excellent Effort)	Normal
		Priority 4 (Controlled Load)	Expedited
		Priority 5 (Video)	Expedited
		Priority 6 (Voice)	Urgent
		Priority 7 (Network Control)	Urgent
	Message Rate Limiting	Limit Broadcast and Multicast	Disabled for all ports
		Forward Unknown	Enabled for all ports

Stride Managed Switch Default Settings (cont'd)

Configuration Parameter			Default Setting
Multicast Filtering (IGMP)	*Protocol Settings*	*IGMP Mode*	Active IGMP handling
		Multicast Suppression	All unreserved multicast
		IGMP Version	Version 2
		Robustness	2
		Query Interval	125
		Query Response Interval	10
	Port Settings	*Exclude*	Disabled for all ports
		Router	Auto detect for all ports
Virtual LANs (VLANs)	*VLAN Settings*	*VLAN Mode*	Disabled
		Core Type	0x8100
		Learning	Shared
		Default VLAN Settings	Management: Tag-Based, ID=1, FID=0, CPU selected as well as all ports
	VLAN Port Settings	*PVID*	1
		Force	Off for all ports
		Type	Transparent for all ports
Security Settings	*Remote Access Security*	*Same settings as in Main Settings*	
	Port Security Enables	*Global Security Enable*	Off
		Port Enabled	Off for all ports
	Port Security MAC Entries	*Entry*	None
	Ipsec Settings	*Disabled by default*	
	IKE Policy	*IKE Phase 1 Policies*	None
		IKE Phase 2 Policies	1 by default but Disabled with 8h lifetime (anonymous source and dest)
		IKE Phase 2 Algorithms	Cipher aes (AES Rijndael) Enabled
			Cipher 3DES Enabled
			Hash hmac_SHA1 Enabled
			Hash hmac_SHA256 Enabled
			Compression deflate Enabled
			All others disabled
Monitoring Settings	*Alarm (OK) Output*	*A power input lost enabled*	
		All others disabled	
	Modbus	*Enabled*	Disabled
		Station Number	1
		Transport Layers	TCP & UDP
		TCP Timeout	0
		TCP Connection Limit	4
		Port	502
	SNMP Notifications	*Everything disabled by default*	

Why might you need a Managed Switch?

Enhanced traffic filtering:

An unmanaged switch will filter out many packets from an end device that a hub would not but there are still many types of packets that an unmanaged switch cannot determine what to do with and must forward on to all ports. Whenever a device receives a packet that is not specifically targeted to that device, there is a certain amount of processing time that takes away from other important tasks that the device may really need to be spending time on. These ‘unintentional’ packets also get in the way of the packets that are intended for that device. This hurts the determinism of a process. A managed switch can help with this in several different ways:

- **Multicast Filtering (IGMP):** It is common in a control system to see a large amount of Multicast packets. These packets cannot be filtered out by an unmanaged switch. The Stride managed switch can intelligently ‘learn’ whether certain Multicast packets should be sent to the devices on its ports and will filter them or not filter them appropriately.
- **VLANs:** A VLAN is a logical way to separate networks in ways that used to require physical separation. Because of existing network infrastructure or for ease of wiring (and reduced cost), it may be difficult to physically separate networks that need separation due to the type of packets that are on them. Setting up VLANs can simplify the setup for these situations.
- **Traffic Priority (QoS/CoS):** Some traffic may be more important to a specific device than other traffic. Using the Quality of Service feature, the Stride switch can apply tags to a packet coming into the switch to give that packet a higher priority going to another switch. The last switch will then remove the tag before sending the packet to the device. It can also use the tags applied to the packets by the devices themselves if they support this.

Troubleshooting:

As Ethernet messaging becomes more of the standard for communications between devices in a control system, it may become more necessary to gain visibility to these types of communications. With hubs, it was possible to see the messages between devices because hubs broadcast every packet to all ports. Unmanaged switches took away this capability as they filter unicast packets to only the intended physical ports. Managed switches can help with this by utilizing the Port Mirroring feature. The Stride managed switch can also give you visibility in to the type of packets that are being sent across the switch by viewing the Network Statistics page in the configuration.

- Port Mirroring: With the Port Mirroring feature you simply specify which ports’ data you want to view and where to send that data. Plug your PC into that port and use Ethernet sniffing software (such as Wireshark) and you can now see the data being sent back and forth.
- Network Statistics: By looking at what kind of packets that are coming in and out of the switch, you can determine what action needs to be taken to make your network work better. If you see a lot of Multicast traffic, utilize the Multicast Filtering feature. If there are lots of broken packets, troubleshoot the wiring to determine where the problem lies.

Redundancy:

The downside of any Ethernet switch is the simple fact that it is another electronic component in the system that could be subject to failure. There is also the risk that as a network grows and more switches are added to it, a ‘ring’ may accidentally be created causing the network to go down. Utilizing the Spanning Tree and/or Real-Time Ring feature of the Stride managed switch can reduce these risks.

- **STP:** The Spanning Tree protocol simply allows you to purposely create a ring that allows for multiple, redundant paths on the network but intelligently decides one path when the network comes up and assigns alternate paths if some part of the original path goes down.
- **RSTP:** The Rapid Spanning Tree Protocol is the preferred method in the industry today as the manner in which it decides the original paths and the time in which it changes over to alternate paths is much, much faster than the original Spanning Tree Protocol. It is really only useful to enable the older STP if your legacy network requires this protocol. The RSTP feature is enabled by default.
- **Real-Time Ring:** In many Control Systems, the time it takes for the RSTP algorithm to change paths upon some network event is too slow. The Real-Time Ring is proprietary to the Stride managed switches but it has the advantage of changing paths very, very quickly.

Security:

Network security has become a great concern for facilities these days. And while the network devices themselves are only one part of a network security strategy, the Stride managed switches have several security features:

- **Port Control:** In the “Port Settings” setup, you can disable ports that are not being used. This can limit unauthorized access.
- **Security Settings:** There are several different methods of enabling security in the switch. There are security methods to prevent access to the switch (Remote Access Security), you can determine which devices can connect to the switch (Port Security MAC Entries) and you can enable encryption for data going between switches (IPsec).
- **Remote Access Security:** You can disable access to the switch or implement secure pass-wording in order to access the switch.
- **IPsec:** There are many different methods that can be employed to encrypt the data going to or from the switch. The particular method (encryption protocol/algorithm) will most likely be determined by your network administrator.

Better Network 'Awareness':

The ability of the process to know when something is wrong with the network and what is wrong with the network is a great feature of the Stride managed switches. Your PLC or controlling device can make 'smarter' decisions as to what alarms or fallback behavior to trigger based upon the different diagnostic data that is supplied by the switch.

- **Modbus Stats:** If you have a controlling device on the network that has Modbus TCP or UDP client capability, there are several diagnostic tags that can be read from the switch to indicate the health of the network.
- **SNMP:** SNMP stands for Simple Network Management Protocol and is used for just that. There are many software tools out there that can query or receive 'traps' sent by the Stride managed switch to ascertain events or health of the switch.
- **Port and Power Status (Alarm Output):** The Stride managed switch has two power inputs that can be used for redundancy. If one of the power inputs fails, there is a relay contact that can be configured to report this failure.
- **Spanning Tree Status:** The switch can be configured to report when something in the Spanning Tree has changed.
- **Real-Time Ring Status:** The Real-Time Ring status can be ascertained from other devices as well.
- **MAC Table:** The switch keeps a table of the MAC IDs of devices that are communicating on it