Warranty Registration:
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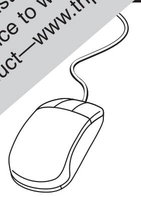

Owner's Manual

Console Server Management Switch

Models: B096-016 / B096-048

&

Console Server with PowerAlert

Model: B092-016

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INDEX

1. INTRODUCTION

This Manual

This User Manual is provided to help you get the most from your B096-016 / B096-048 Console Server Management Switch or B092-016 Console Server with PowerAlert product. These products are referred to generically in this manual as ***Console Servers***.

Once configured, you will be able to use your Console Server to securely monitor, access and control the computers, networking devices, telecommunications equipment, power supplies and operating environment in your data center, branch office or communications room. This manual guides you in managing this infrastructure locally (at the rack side or across your operations or management LAN or through the local serial console port), and remotely (across the Internet, private network or via dial up).

FCC Information

This is an FCC Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

RoHS

This product is RoHS compliant.

User Notice

All information, documentation and specifications contained in this manual are subject to change without prior notification by the manufacturer. The manufacturer makes no representations or warranties, either expressed or implied, with respect to the contents hereof and specifically disclaims any warranties as to merchantability or fitness for any particular purpose. Any of the manufacturer's software described in this manual is sold or licensed `as is'. Should the programs prove defective following their purchase, the buyer (and not the manufacturer, its distributor, or its dealer), assumes the entire cost of all necessary servicing, repair and any incidental or consequential damages resulting from any defect in the software.

The manufacturer of this system is not responsible for any radio and/or TV interference caused by unauthorized modifications to this device. It is the responsibility of the user to correct such interference. The manufacturer is not responsible for any damage incurred in the operation of this system if the correct operational voltage setting was not selected prior to operation.

Please take care to follow the safety precautions below when installing and operating the Console Server:

- ***Do not remove the metal covers. There are no operator-serviceable components inside. Opening or removing the cover may expose you to dangerous voltage which may cause fire or electric shock. Refer all service to Tripp Lite qualified personnel***
- ***To avoid electric shock the power cord protective grounding conductor must be connected through to ground***
- ***Always pull on the plug, not the cable, when disconnecting the power cord from the socket***
- ***Do not connect or disconnect the Console Server during an electrical storm***
- ***Also it is recommended you use a surge suppressor or UPS to protect the equipment from transients***

Manual Organization

This User Manual covers all aspects of installation, configuration and operation and an overview of the information found in the manual is provided below.

1. Introduction	An overview of the features of the Console Server and information on this manual
2. Installation	Details physical installation of the Console Server and the interconnection of controlled devices
3. System Configuration	Describes the initial installation and configuration using the Management Console of the Console Server on the network and the services that will be supported
4. Serial and Network	Covers configuring serial ports and connected network hosts, and setting up Users and Groups
5. Failover and OoB dial-in	Describes setting up the high-availability access features of the Console Server
6. Secure Tunneling (SDT)	Covers secure remote access using SSH and configuring for RDP, VNC, HTTP, HTTPS, etc. access to network and serially connected devices
7. Alerts and Logging	Explains the setting up of local and remote event/ data logs and triggering SNMP and email alerts
8. Power & Environment	Management of USB, serial and network attached Power Distribution units and UPS units including Network UPS Tool (NUT) operation and IPMI power control. EMD environmental sensor configuration
9. Authentication	All access to the Console Server requires usernames and passwords which are locally or externally authenticated

10. Nagios Integration	Setting Nagios central management with SDT extensions and configuring the Console Server as a distributed Nagios server
11. System Management	Covers access to and configuration of services to be run on the Console Server
12. Status Reports	View the status and logs of serial and network connected devices (ports, hosts, power and environment)
13. Management	Includes port controls and reports that can accessed by Users
14. Basic Configuration	Command line installation and configuration using the *config* command
15. Advanced Config	More advanced command line configuration activities where you will need to use Linux commands
16. Thin Client	Configuration and use of the thin client and other applications (including Power Alert) embedded in the Console Server with PowerAlert (B092-016) product

Types of users

The Console Server supports two classes of users:

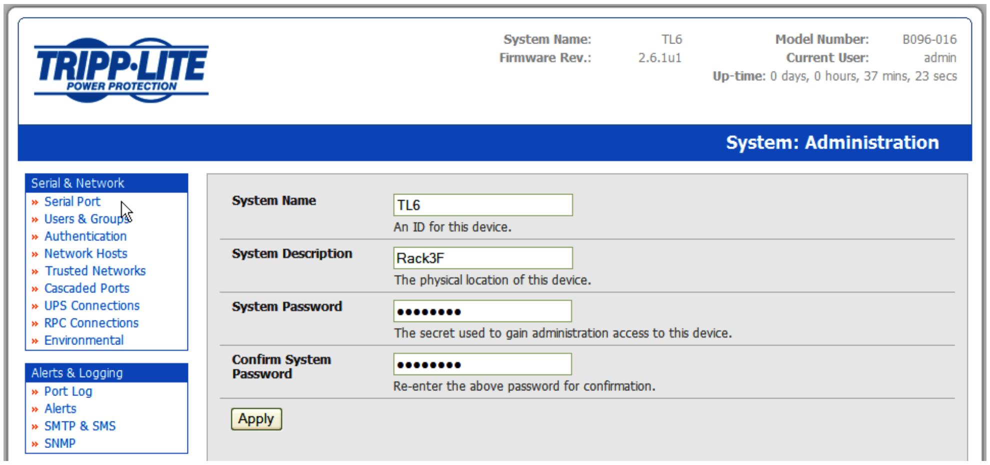
I. Administrative users: Those who will be authorized to configure and control the Console Server; and to access and control all the connected devices. These administrative users will be set up as members of the **admin** user group. Any user in this class is referred to generically in this manual as an ***Administrator***. An Administrator can access and control the Console Server using the *config* utility, the Linux command line or the browser-based Management Console. By default the Administrator has access to all services and ports to control all the serial connected devices and network connected devices (*hosts*).

II. Users: Embraces those who have been set up by the Administrator with specific limits on their access and control authority. These users are set up as members of the **users** user group (or some other user groups the Administrator may have added). They are only authorized to perform specified controls on specific connected devices and are referred to as ***Users***. These Users (when authorized) can access serial or network connected devices; and control these devices using the specified services (e.g. Telnet, HHTPS, RDP, IPMI, Serial over LAN, Power Control). An authorized User can also use the Management Console to access configured devices and review port logs.

In this manual, when the term ***user*** (lower case) is used, it is referring to both the above classes of users. This document also uses the term ***remote users*** to describe users who are not on the same LAN segment as the Console Server. These remote users may be Users*,* who are on the road connecting to managed devices over the public Internet, or it may be an Administrator in another office connecting to the Console Server itself over the enterprise VPN, or the remote user may be in the same room or the same office but connected on a separate VLAN to the Console Server.

Management Console

The Console Server Management Console runs in a browser. It provides a view of your Console Server Management Switch (B096-016/048) or Console Server with PowerAlert (B092-016) product and all the connected equipment. Administrators can use the Management Console, either locally or from a remote location, to configure the Console Server, set up Users, configure the ports and connected hosts, and set up logging and alerts.



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 37 mins, 23 secs

System: Administration

System Name: TL6
An ID for this device.

System Description: Rack3F
The physical location of this device.

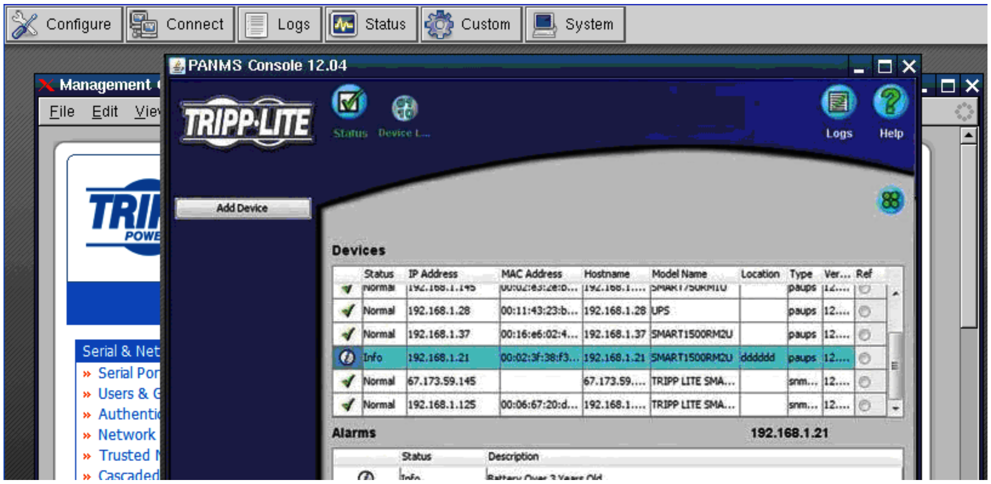
System Password: ••••••••
The secret used to gain administration access to this device.

Confirm System Password: ••••••••
Re-enter the above password for confirmation.

An authorized User can use the Management Console to access and control configured devices, review port logs, use the in-built java terminal to access serially attached consoles and control power to connected devices.

The Console Server runs an embedded Linux operating system. Experienced Linux and UNIX users may prefer to undertake configuration at the command line. As an Administrator you can get command line access by connecting through a terminal emulator or communications program to the console serial port; or by SSH or Telnet connecting to the Console Server over the LAN; or by connecting to the Console Server through an SSH tunnel using the SDTConnector.

The B092-016 Console Server also has PowerAlert software and a selection of thin clients embedded (RDP, Firefox etc). You will be able to use these consoles as well as the standard Management Console for access and control.



Devices

	Status	IP Address	MAC Address	Hostname	Model Name	Location	Type	Ver...	Ref
✓	Normal	192.168.1.145	00:02:e3:2e:b...	192.168.1....	SMART750RM1U		paups	12....	○
✓	Normal	192.168.1.28	00:11:43:23:b...	192.168.1.28	UPS		paups	12....	○
✓	Normal	192.168.1.37	00:16:e6:02:4...	192.168.1.37	SMART1500RM2U		paups	12....	○
ⓘ	Info	192.168.1.21	00:02:3f:38:f3...	192.168.1.21	SMART1500RM2U	dddddd	paups	12....	○
✓	Normal	67.173.59.145		67.173.59....	TRIPP LITE SMA...		snm...	12....	○
✓	Normal	192.168.1.125	00:06:67:20:d...	192.168.1....	TRIPP LITE SMA...		snm...	12....	○

Alarms 192.168.1.21

	Status	Description
ⓘ	Info	Battery Over 3 Years Old

Manual Conventions

This manual uses different fonts and typefaces to show specific actions:

Note Text presented like this indicates issues which need to be noted

⚠ ***Text presented like this highlights important issues and it is essential you read and take heed of these warnings***

- ➢ Text presented with an arrow head indent indicates an action you should take as part of the procedure.

Bold text indicates text that you type, or the name of a screen object (*e.g.* a menu or button) on the Management Console.

Italic text is also used to indicate a text command to be entered at the command line level.

Publishing history

Date	Revision	Update details
January 2009	0.9	Initial draft
February 2009	0.91	Pre-release

2. INSTALLATION

Introduction

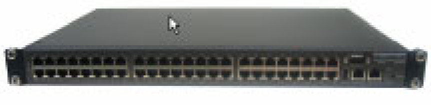
This chapter describes the physical installation of the Console Server hardware and connection to controlled devices

2.1 Models

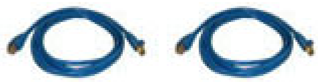
There are a number of Console Server models, each with a different number of network, USB and serial ports and power supplies:

	Serial Ports	Network Ports	Console Port	USB Port	Modem	Power
B096-048	48	2	1	1	Internal	Dual AC Universal Input
B096-016	16	2	1	1	Internal	Dual AC Universal Input
B092-016	16	1	1+KVM	4	-	Single AC Universal Input

2.1.1 Kit components: B096-048 and B096-016 Console Server Management Switch



B096-048 or B096-016
Console Server Management Switch



2 x Cable UTP Cat5 blue

Connectors
DB9F-RJ45S straight and cross-over

Dual IEC AC power cords

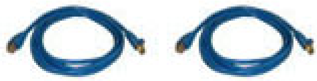
Quick Start Guide and CD-ROM

- ➢ Unpack your Console Server Management Switch kit and verify you have all the parts shown above, and that they all appear in good working order

- If you are installing your Console Server Management Switch in a rack you will need to attach the rack mounting brackets supplied with the unit, and install the unit in the rack. Take care to head the Safety Precautions
- Connect your Console Server Management Switch to the network, to the serial ports of the controlled devices, and to power as outlined below

2.1.2 Kit components: B092-016 Console Server with PowerAlert

B092-016
Console Server with PowerAlert



2 x Cable UTP Cat5 blue

Connector DB9F-RJ45S straight and DB9F-RJ45S cross-over

AC power cable

Quick Start Guide and CD-ROM

- Unpack your Console Server and verify you have all the parts shown above, and that they all appear in good working order
- If you are installing your Console Server in a rack, you will need to attach the rack mounting brackets supplied with the unit, and install the unit in the rack. Take care to heed the Safety Precautions listed earlier
- Proceed to connect your B092-016 to the network, to the serial and USB ports of the controlled devices, to any rack side LCD console or KVM switch, and to power as outlined below

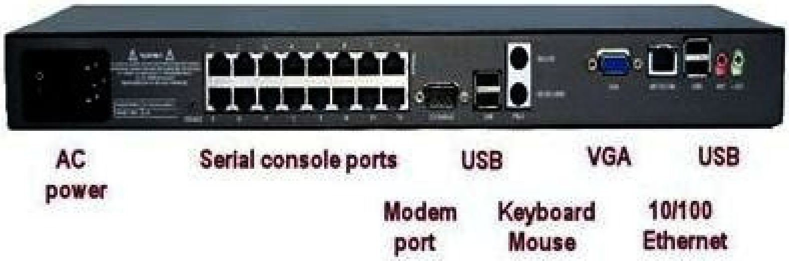
2.2 Power connection

2.2.1 Power: Console Server Management Switch

The B096-048/16 Console Server Management Switch has dual universal AC power supplies with auto failover built in. These power supplies each accept AC input voltage between 100 and 240 VAC with a frequency of 50 or 60 Hz and the total power consumption per Console Server is less than 30W. Two IEC AC power sockets are located at the rear of the metal case, and these IEC power inlets use conventional IEC AC power cords. A North American power cord is provided by default. Power cords for other regions are available separately from Tripp Lite.

2.2.2 Power: Console Server with PowerAlert

The standard B092-016 Console Server has a built-in universal auto-switching AC power supply. This power supply accepts AC input voltage between 100 and 240 VAC with a frequency of 50 or 60 Hz and the power consumption is less than 40W.



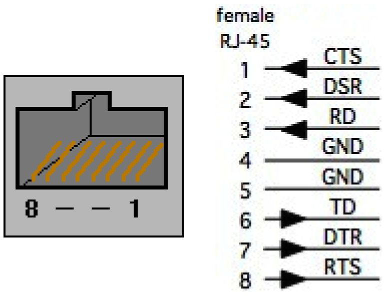
The AC power socket is located at the rear of the B092-016. This power inlet uses a conventional AC power cord. A North American power cord is provided by default. Power cords for other regions are available separately from Tripp Lite.

2.3 Network connection

The RJ45 10/100 LAN port is located on the rear of the B092-016 Console Server, and on the front of the B096-048/016 Console Server Management Switch. All physical connections are made using industry standard Cat5e patch cables (Tripp Lite N001 and N002 series cables). Ensure you only connect the LAN port to an Ethernet network that supports 10Base-T/100Base-T. For the initial configuration of the Console Server you must connect a computer to the Console Server's principal network port.

2.4 Serial Port connection

The RJ45 serial ports are located on the rear of the B092-016 Console Server and on the front of the B096-048/016 Console Server Management Switch. These Console Servers use the RJ45 pinout used by Cisco. Use straight through RJ-45 cabling to connect to equipment such as Cisco, Juniper, SUN, and more.



PIN	SIGNAL	DEFINITION	DIRECTION
1	CTS	Clear To Send	Input
2	DSR	Data Set Ready	Input
3	RXD	Receive Data	Input
4	GND	Signal Ground	NA
5	GND	Signal Ground	NA
6	TXD	Transmit Data	Output
7	DTR	Data Terminal Ready	Output
8	RTS	Request To Send	Output

Conventional Cat5 cabling with RJ45 jacks are used for serial connections. Before connecting the console port of an external device to the Console Server serial port, confirm that the device supports standard RS-232C (EIA-232).

The Console Server also has a DB9 LOCAL (Console/Modem) port. This DB-9 connector is on the rear panel of the B092-016 Console Server, and on the front panel of the B096-048/016 Console Server Management Switch.

2.5 USB Port Connection

The B096-048/016 Console Server Management Switch has one USB port on the front panel. External USB devices can be plugged into this USB port. The B096-048/016 Console Server Management Switch ships with a USB memory stick so that it will be installed in this port for extended log file storage.

There are four USB 2.0 ports on the rear panel of the B092-016 Console Server. These ports are used to connect to USB consoles (of managed UPS hardware) and to other external devices (such as a USB memory stick or keyboard).

External USB devices (including USB hubs) can be plugged into any Console Server USB port.

2.6 Rackmount Console / KVM Connection (B092-016 only)

B092-016 Console Server with PowerAlert can be connected directly to a rack mount console (such as B021-000-17 or B021-019 by Tripp Lite) to provide direct local management right at the rack. Connect the rack mount console’s PS/2 Keyboard/Mouse and VGA connectors directly to the PS/2 and VGA connectors on the B092-016. The default video resolution is 1024 x768. The B092-016 Console Server also supports the use of a USB keyboard/mouse.

Alternately, the B092-016 Console Server can also be connected locally to a KVM (or KVMoIP) switch at the rack. The B092-016 Console Server with PowerAlert will enable you then to use this KVM infrastructure to run PowerAlert, to manage your power devices and to run the thin clients to manage other devices.

Note Care should be taken in handling all Console Server products. There are no operator-serviceable components inside, so do not remove cover. Refer any service to qualified personnel

3. INITIAL SYSTEM CONFIGURATION

Introduction

This chapter provides step-by-step instructions for the initial configuration of your Console Server and connecting it to your management or operational network. This involves the Administrator:

- Activating the Management Console
- Changing the Administrator password
- Setting the IP address for the Console Server's principal LAN port
- Selecting the network services to be supported

This chapter also discusses the communications software tools that the Administrator may use to access the Console Server. It also covers the configuration of the additional LAN ports on the B096-016/048 Console Server Management Switch.

3.1 Management Console Connection

Your Console Server has a default IP Address 192.168.0.1 Subnet Mask 255.255.255.0

- ➢ Directly connect a computer to the Console Server

Note For initial configuration it is recommended that the Console Server be connected directly to a single computer. However, if you choose to connect your LAN before completing the initial setup steps, it is important that:

- you ensure there are no other devices on the LAN with an **address of 192.168.0.1**
- the Console Server and the computer are on the same LAN segment, with no interposed router appliances

3.1.1 Connected computer set up

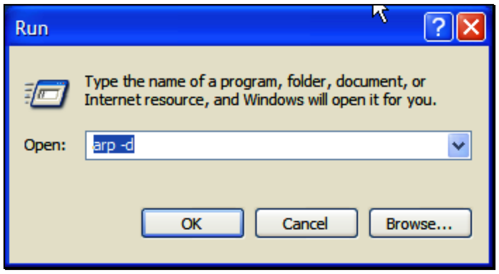
To configure the Console Server with a browser, the connected computer should have an IP address in the same range as the Console Server (e.g. 192.168.0.100):

- ➢ To configure the IP Address of your Linux or Unix computer simply run *ifconfig*
- ➢ For Windows computers (Win9x/Me/2000/XP/ Vista/ NT):
  - Click **Start** -> (**Settings** ->) **Control Panel** and double click **Network Connections** (for 95/98/Me, double click **Network**).
  - Right-click on **Local Area Connection** and select **Properties**
  - Select **Internet Protocol (TCP/IP)** and click **Properties**
  - Select **Use the following IP address** and enter the following details:

- IP address: **192.168.0.100**
- Subnet mask: **255.255.255.0**

- If you wish to retain your existing IP settings for this network connection, click **Advanced** and **Add** the above as a secondary IP connection.

- If it is not convenient to change your computer network address, you can use the *ARP-Ping* command to reset the Console Server IP address. To do this from a Windows computer:
  - Click **S**tart -> **R**un
  - Type *cmd* and click **OK** to bring up the command line
  - Type *arp –d* to flush the ARP cache
  - Type *arp –a* to view the current ARP cache which should be empty


Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
OK
Cancel
Browse...

Open: arp -d

Now add a static entry to the ARP table and *ping* the Console Server to have it get the IP address. In the example below we have a Console Server with a MAC Address 00:13:C6:00:02:0F (designated on the label on the bottom of the unit) and we are setting its IP address to 192.168.100.23. The computer issuing the *arp* command must be on the same network segment as the Console Server (i.e. have an IP address of 192.168.100.xxx)

- Type *arp -s 192.168.100.23 00-13-C6-00-02-0F* (Note for UNIX the syntax is: *arp -s 192.168.100.23 00:13:C6:00:02:0F*)
- Type *ping -t 192.18.100.23* to start a continuous ping to the new IP Address.
- Turn on the Console Server and wait for it to configure itself with the new IP address. It will start replying to the ping at this point
- Type *arp –d* to flush the ARP cache again

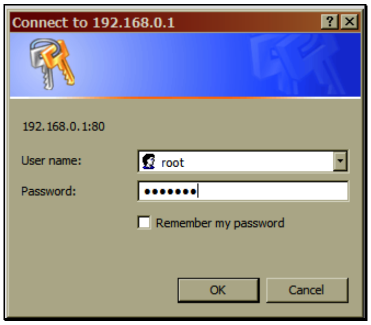
3.1.2 Browser connection

- Activate your preferred browser on the connected computer and enter **https://192.168.0.1** The Console Server supports all current versions of the popular browsers (Netscape, Internet Explorer, Mozilla Firefox and more)

- You will be prompted to log in. Enter the default administration username and administration password:

  Username: **root**

  Password: **default**

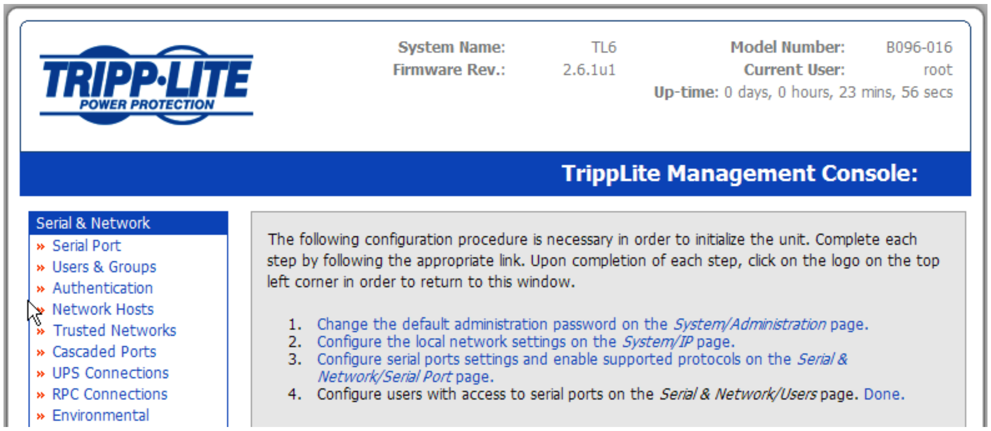


192.168.0.1:80

User name: root

Password: •••••••

□ Remember my password



System Name: TL6

Firmware Rev.: 2.6.1u1

Model Number: B096-016

Current User: root

Up-time: 0 days, 0 hours, 23 mins, 56 secs

TrippLite Management Console:

The following configuration procedure is necessary in order to initialize the unit. Complete each step by following the appropriate link. Upon completion of each step, click on the logo on the top left corner in order to return to this window.

1. Change the default administration password on the *System/Administration* page.
2. Configure the local network settings on the *System/IP* page.
3. Configure serial ports settings and enable supported protocols on the *Serial & Network/Serial Port* page.
4. Configure users with access to serial ports on the *Serial & Network/Users* page. Done.

The above screen, which lists four initial installation configuration steps, will be displayed:

1. **Change the default administration password on the System/Administration page** (*Chapter 3*)
2. **Configure the local network settings on the System/IP page** (*Chapter 3*)
3. **Configure port settings and enable the Serial & Network/Serial Port page** (*Chapter 4*)
4. **Configure users with access to serial ports on the Serial & Network/Users page** (*Chapter 3*)

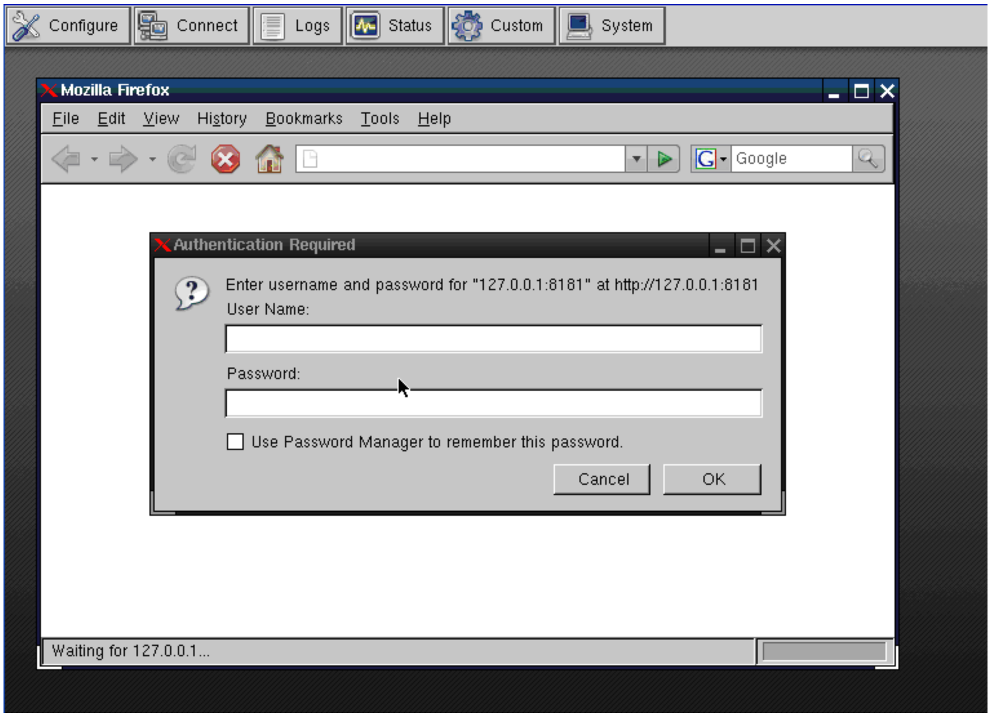
After completing each of the above steps, you can return to the configuration list by clicking in the top left corner of the screen on the logo:

Note If you are not able to connect to the Management Console at 192.168.0.1 or if the default Username / Password were not accepted then reset your Console Server (refer to *Chapter 10*)

3.1.3 Initial B092-016 connection

For the initial configuration of the B092-016 Console Server, you will need to connect a console (keyboard, mouse and display) or a KVM switch directly to its mouse, keyboard and VGA ports. When you initially power on the B092-016, you will be prompted on your directly connected video console to log in

- Enter the default administration username and password (Username: **root** Password: **default**). The B092-016 control panel will be displayed
- Click the **Configure** button on the control panel. This will load the Firefox browser and open the B092-016 Management Console



Enter username and password for "127.0.0.1:8181" at http://127.0.0.1:8181

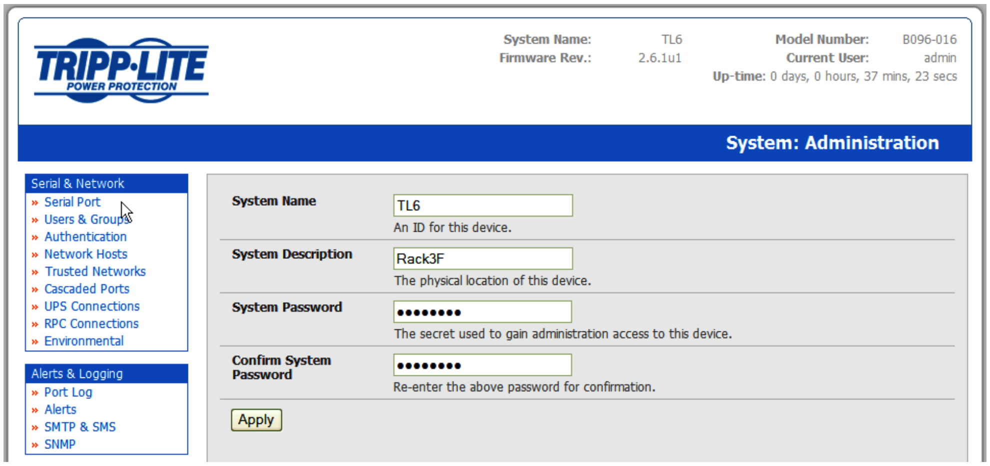
Waiting for 127.0.0.1...

- At the *Management Console* menu select **System: Administration**

3.2 Administrator Password

For security reasons, only the administration user named **root** can initially log into your Console Server. Only those people who know the root password can access and reconfigure the Console Server itself. However, anyone who correctly guesses the root password (and the default root password which is **default**) could gain access. It is therefore essential that you enter and confirm a new root password before giving the Console Server any access to, or control of, your computers and network appliances.

Note: It is also recommended that you set up a new Administrator user as soon as convenient and log-in as this new user for all ongoing administration functions (rather than *root*). This Administrator can be configured in the *admin* group with full access privileges through the **Serial & Network: Users & Groups** menu as detailed in Ch*apter 4*



System Name: TL6
An ID for this device.

System Description: Rack3F
The physical location of this device.

System Password: ••••••••
The secret used to gain administration access to this device.

Confirm System Password: ••••••••
Re-enter the above password for confirmation.

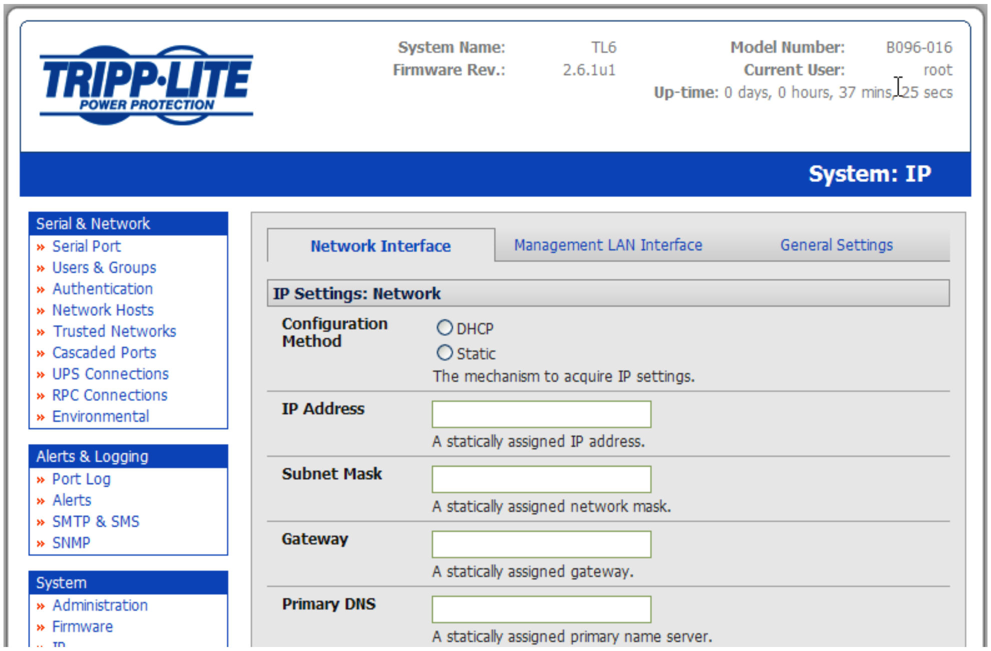
- Select **System: Administration**
- Enter a new **System Password** then re-enter it in **Confirm System Password.** This is the new password for **root**, the main administrative user account, so it is important that you choose a complex password, and keep it safe
- You may now wish to enter a **System Name** and **System Description** for the Console Server to give it a unique ID and make it simple to identify
- Click **Apply**. As password has been changed, you will be prompted to log in again. This time use the new password

Note If you are not confident your Console Server has been supplied with the current release of firmware, you can upgrade. Refer to *Upgrade Firmware - Chapter 10*

3.3 Network IP address

It is time to enter an IP address for the principal *10/100 LAN* port on the Console Server; or enable its DHCP client so that it automatically obtains an IP address from a DHCP server on the network to which it is to be connected.

- On the **System: IP** menu select the **Network Interface** page then check **DHCP** or **static** for the **Configuration Method**
- If you select **static** you must manually enter the new **IP Address**, **Subnet Mask**, **Gateway** and **DNS** server details. This selection automatically disables the DHCP client



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 0 days, 0 hours, 37 mins, 25 secs

System: IP

IP Settings: Network

Configuration Method ○ DHCP ○ Static
The mechanism to acquire IP settings.

IP Address
A statically assigned IP address.

Subnet Mask
A statically assigned network mask.

Gateway
A statically assigned gateway.

Primary DNS
A statically assigned primary name server.

- If you select **DHCP**, the Console Server will look for configuration details from a DHCP server on your management LAN. This selection automatically disables any static address. The Console Server MAC address can be found on a label on the base plate

Note In its factory default state (with no Configuration Method selected) the Console Server has its DHCP client enabled, so it automatically accepts any network IP address assigned by a DHCP server on your network. In this initial state, the Console Server will then respond to both its Static address (192.168.0.1) and its newly assigned DHCP address

- By default, the Console Server 10/100 LAN port auto detects the Ethernet connection speed. However you can use the **Media** menu to lock the Ethernet to 10 Mb/s or 100Mb/s and to Full Duplex (FD) or Half Duplex (HD)

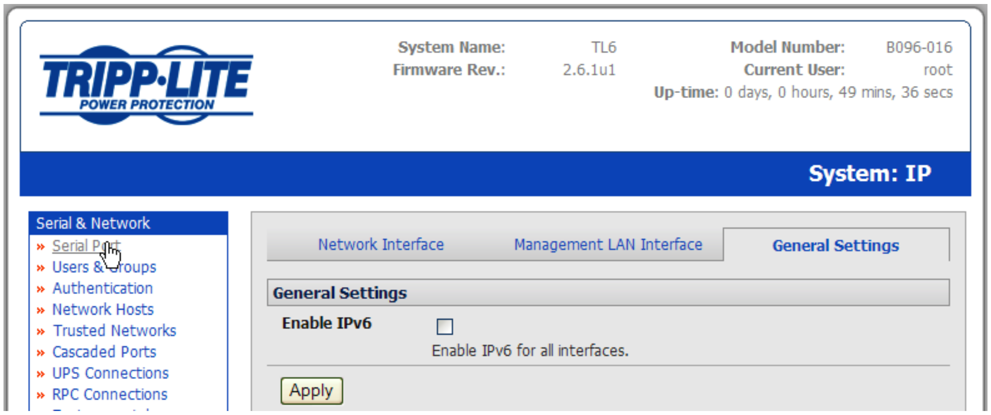
Note If you have changed the Console Server IP address, you may need to reconfigure your Computer so it has an IP address that is in the same network range as this new address (as detailed in an earlier note in this chapter)

- Click **Apply**
- You will need to reconnect the browser on the Computer that is connected to the Console Server by entering **http://new IP address**

3.3.1 IPv6 configuration

By default, the Console Server Ethernet interfaces support IPv4, however, they can also be configured for IPv6 operation:

- On the **System: IP** menu select **General Settings** page and check **Enable IPv6**



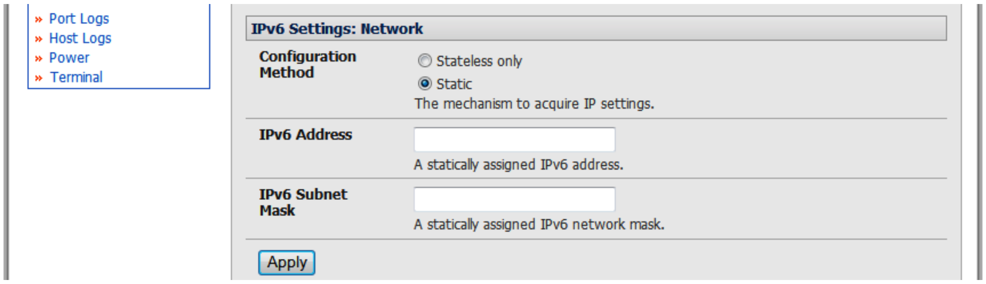
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 0 days, 0 hours, 49 mins, 36 secs

System: IP

General Settings

Enable IPv6 □
Enable IPv6 for all interfaces.

- You will then need to configure the IPv6 parameters on each interface page



IPv6 Settings: Network

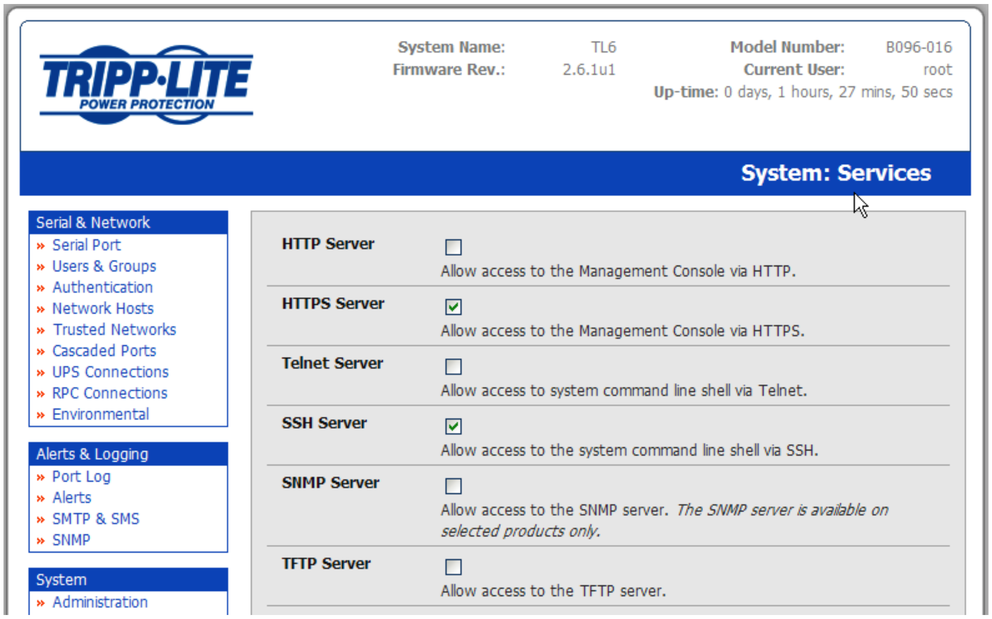
Configuration Method ○ Stateless only ● Static
The mechanism to acquire IP settings.

IPv6 Address
A statically assigned IPv6 address.

IPv6 Subnet Mask
A statically assigned IPv6 network mask.

3.4 System Services

The Administrator has a selection of access protocols that can be used to access the Console Server. The factory default enables HTTPS and SSH access to the Console Server and disables HTTP and Telnet. The User can also use the nominated services for limited access to the Console Server itself. The Administrator can configure the services to be enabled:



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 0 days, 1 hours, 27 mins, 50 secs

System: Services

HTTP Server □
Allow access to the Management Console via HTTP.

HTTPS Server ☑
Allow access to the Management Console via HTTPS.

Telnet Server □
Allow access to system command line shell via Telnet.

SSH Server ☑
Allow access to the system command line shell via SSH.

SNMP Server □
Allow access to the SNMP server. *The SNMP server is available on selected products only.*

TFTP Server □
Allow access to the TFTP server.

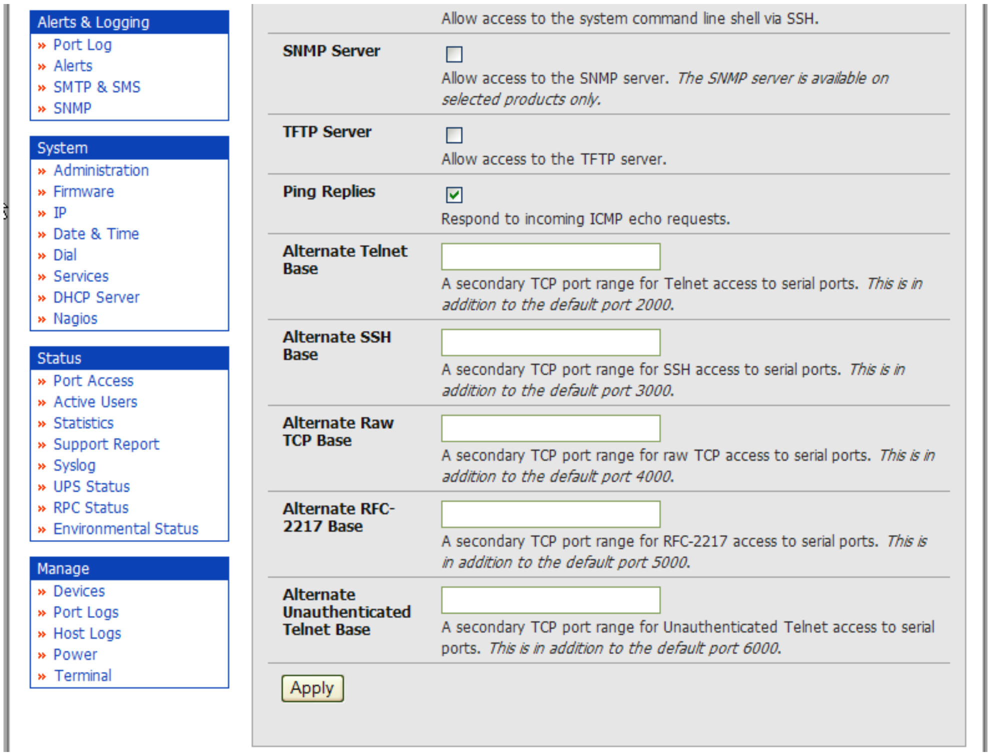
- Select **System: Services**. Then select /deselect the service to be enabled /disabled. The following access protocol options are available:

HTTPS Ensures secure browser access to all the Management Console menus. It also allows appropriately configured Users secure browser access to selected Management Console *Manage* menus. If HTTPS is enabled, the Administrator will be able to use a secure browser connection to the Console Server's Management Console. For information on certificate and user/client software configuration, refer to *Chapter 9 - Authentication*. By default, HTTPS is enabled, and it is recommended that only HTTPS access be used if the Console Server is to be managed over any public network (e.g. the Internet).

HTTP Allows the Administrator basic browser access to the Management Console. It is recommended that you disable the HTTP service if the Console Server is to be remotely accessed over the Internet.

Telnet Gives the Administrator Telnet access to the system command line shell (Linux commands). While this may be suitable for a local direct connection over a management LAN, it is recommended this service be disabled if the Console Server is to be remotely administered.

SSH Provides secure SSH access to the Linux command line shell. It is recommended you choose SSH as the protocol when the Administrator is connecting to the Console Server over the Internet or over any other public network. This will provide authenticated communications between the SSH client program on the remote Computer and the SSH sever in the Console Server. For more information on SSH configuration, refer to *Chapter 9 - Authentication*.



Allow access to the system command line shell via SSH.

SNMP Server □ Allow access to the SNMP server. *The SNMP server is available on selected products only.*

TFTP Server □ Allow access to the TFTP server.

Ping Replies ☑ Respond to incoming ICMP echo requests.

Alternate Telnet Base A secondary TCP port range for Telnet access to serial ports. *This is in addition to the default port 2000.*

Alternate SSH Base A secondary TCP port range for SSH access to serial ports. *This is in addition to the default port 3000.*

Alternate Raw TCP Base A secondary TCP port range for raw TCP access to serial ports. *This is in addition to the default port 4000.*

Alternate RFC-2217 Base A secondary TCP port range for RFC-2217 access to serial ports. *This is in addition to the default port 5000.*

Alternate Unauthenticated Telnet Base A secondary TCP port range for Unauthenticated Telnet access to serial ports. *This is in addition to the default port 6000.*

- There are also a number of related service options that can be configured at this stage:

SNMP Enables *netsnmp* in the Console Server which will keep a remote log of all posted information. SNMP is disabled by default. To modify the default SNMP settings, the Administrator must make the edits at the command line as described in *Chapter 15 – Advanced Configuration*

TFTP The Console Servers set up default *TFTP* server on the USB flash card. This server can be used to store *config* files, maintain access and transaction logs, etc.

Ping Allows the Console Server to respond to incoming ICMP *echo* requests. Ping is enabled by default, however, for security reasons this service should generally be disabled post initial configuration

- And there are some serial port access parameters that can be configured on this menu:

Base The Console Server uses specific default ranges for the TCP/IP ports for the various access services that Users and Administrators can use to access devices attached to serial ports (as covered in *Chapter 4 – Configuring Serial Ports*). The Administrator can also set alternate ranges for these services, and these secondary ports will then be used in addition to the defaults.

The default TCP/IP **base** port address for *Telnet* access is 2000, and the range for *Telnet* is IP Address: Port (2000 + serial port #) *i.e.* 2001 – 2048. So if the Administrator were to set 8000 as a secondary base for Telnet then serial port #2 on the Console Server can be Telnet accessed at IP Address: 2002 and at IP Address: 8002.

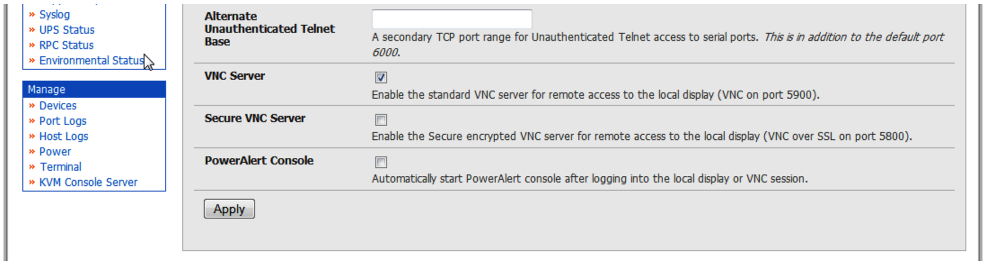
The default base for SSH is 3000; for Raw TCP is 4000; for RFC2217 it is 5000 and for Unauthenticated Telnet it is 6000.

- The B092-016 Console Server with PowerAlert also presents some additional service and configuration options:

VNC The B092-016 Console Server has an internal VNC server. When enabled, it allows remote users to connect to the Console Server and run the PowerAlert software and any other embedded thin client programs as if they were plugged in locally to the KVM connectors on the B092-016 (refer to *Chapter* 16 for more details). Users connect using port 5900 and need to run a VNC client applet

Secure VNC This enables a secure encrypted remote connection using VNC over SSL on port 5800 to the B092-016 Console Server (refer to *Chapter* 16)

PowerAlert This configuration option will automatically start the PowerAlert application on the B092-016 and display the console as soon as you log into the local display or VNC session (refer to *Chapter* 16). The complete PowerAlert manual can be downloaded at www.tripplite.com/EN/support/PowerAlert/Downloads.cfm



Alternate Unauthenticated Telnet Base	A secondary TCP port range for Unauthenticated Telnet access to serial ports. *This is in addition to the default port 6000.*
VNC Server	☑ Enable the standard VNC server for remote access to the local display (VNC on port 5900).
Secure VNC Server	□ Enable the Secure encrypted VNC server for remote access to the local display (VNC over SSL on port 5800).
PowerAlert Console	□ Automatically start PowerAlert console after logging into the local display or VNC session.

- Click **Apply**. As you apply your services selections, the screen will be updated with a confirmation message:

  Message Changes to configuration succeeded.

3.5 Communications Software

You need to configure the access protocols that the communications software on the Administrator and User Computer will use when connecting to the Console Server (and when connecting to serial devices and network hosts which are attached to the Console Server).

This section provides an overview of the communications software tools that can be used on the remote computer. Tripp Lite recommends the *SDT Connector* software tool that is provided with the Console Server, however, generic tools such as PuTTY and SSHTerm may also be used.

3.5.1 SDT Connector

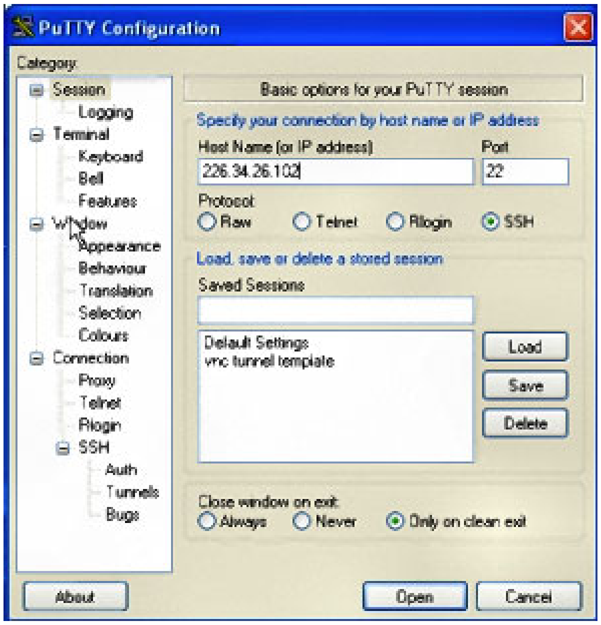
We recommend using the *SDT Connector* communications software for all communications with Console Servers. Each Console Server is supplied with an unlimited number of *SDT Connector* licenses to use with that Console Server.

SDT Connector is a lightweight tool that enables Users and Administrators to securely access the Console Server, and the various computers, network devices and appliances that may be serially or network-connected to the Console Server.

SDT Connector can be installed on Windows 2000, XP, 2003, Vista and on most Linux, UNIX and Solaris computers as detailed in *Chapter 7.*

3.5.2 PuTTY

Communications packages like *PuTTY* can be also used to connect to the Console Server command line (and to connect to serially attached devices as covered in *Chapter 4*). *PuTTY* is a freeware implementation of Telnet and SSH for Win32 and UNIX platforms. It runs as an executable application without needing to be installed onto your system. *PuTTY* (the Telnet and SSH client itself) can be downloaded at http://www.tucows.com/preview/195286.html



Host Name (or IP address): 226.34.26.102
Port: 22

Protocol: ○ Raw ○ Telnet ○ Rlogin ● SSH

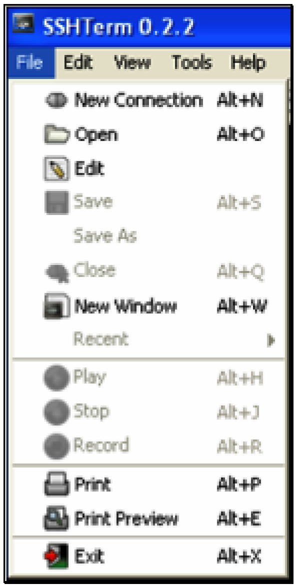
Saved Sessions:
Default Settings
vnc tunnel template

Close window on exit: ○ Always ○ Never ● Only on clean exit

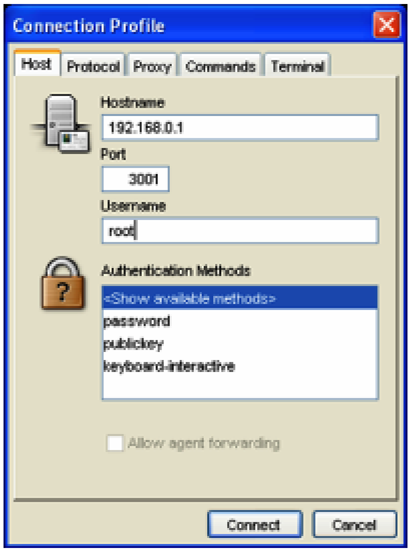
- To use PuTTY for an SSH terminal session from a Windows client, enter the Console Server's IP address as the 'Host Name (or IP address)'
- To access the Console Server command line, select 'SSH' as the protocol and use the default IP Port 22
- Click 'Open' and the Console Server login prompt will appear. (You may also receive a 'Security Alert' that the host's key is not cached. Choose 'yes' to continue.)
- Using the Telnet protocol is similarly simple, but you need to use the default port 23

3.5.3 SSHTerm

Another common communications package that may be useful is *SSHTerm.* This is an open source package that can be downloaded from http://sourceforge.net/projects/sshtools



- To use *SSHTerm* for an SSH terminal session from a Windows Client, simply Select the 'File' option and click on 'New Connection'.
- A new dialog box will appear for your 'Connection Profile'. Type in the host name or IP address (for the Console Server unit) and the TCP port that the SSH session will use (port 22). Then type in your username and choose password authentication and click Connect.



Hostname: 192.168.0.1

Port: 3001

Username: root

Authentication Methods:
<Show available methods>
password
publickey
keyboard-interactive

□ Allow agent forwarding

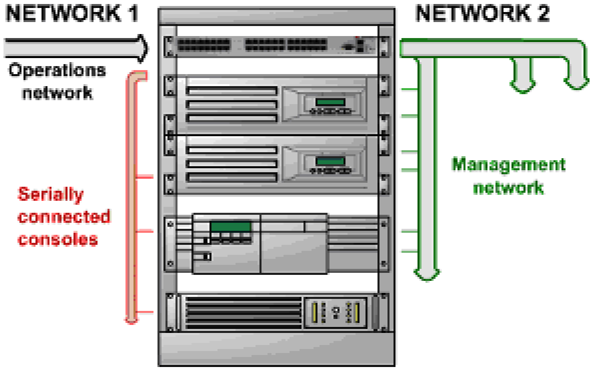
- A message may appear about the host key fingerprint. You will need to select 'Yes' or 'Always' to continue.
- The next step is password authentication. You will be prompted for your username and password from the remote system. You will then be logged on to the Console Server

3.6 Management Network Configuration (B096-048/016 only)

The B096-048/016 Console Server Management Switches have a second Ethernet network port that can be configured as a management Console Server/LAN port or as a failover/OoB access port.

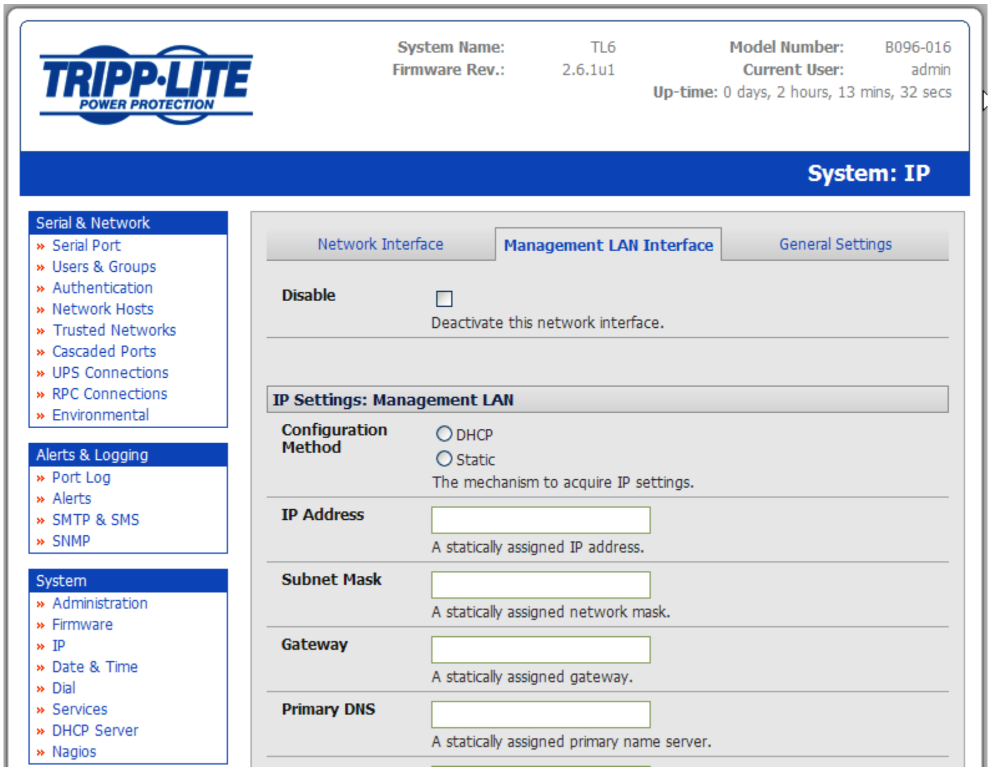
3.6.1 Configure Management Switch as a Management LAN gateway

The Management Switch in the B096-048/016 Console Servers can be configured to provide a management LAN gateway. With this configuration, the B096-048/016 provides firewall, router and DHCP server features and you can connect managed hosts to this management LAN.



These features are all disabled by default. To configure the Management LAN gateway:

- Select the **Management LAN** page on the **System: IP** menu and uncheck **Disable**
- Configure the **IP Address** and **Subnet Mask** for the Management LAN (leaving the **Gateway** and **DNS** fields blank) then click **Apply**
- The management LAN gateway function is now enabled with default firewall and router rules. These rules can be reconfigured at the command line.



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 2 hours, 13 mins, 32 secs

System: IP

Disable □
Deactivate this network interface.

IP Settings: Management LAN

Configuration Method ○ DHCP ○ Static
The mechanism to acquire IP settings.

IP Address
A statically assigned IP address.

Subnet Mask
A statically assigned network mask.

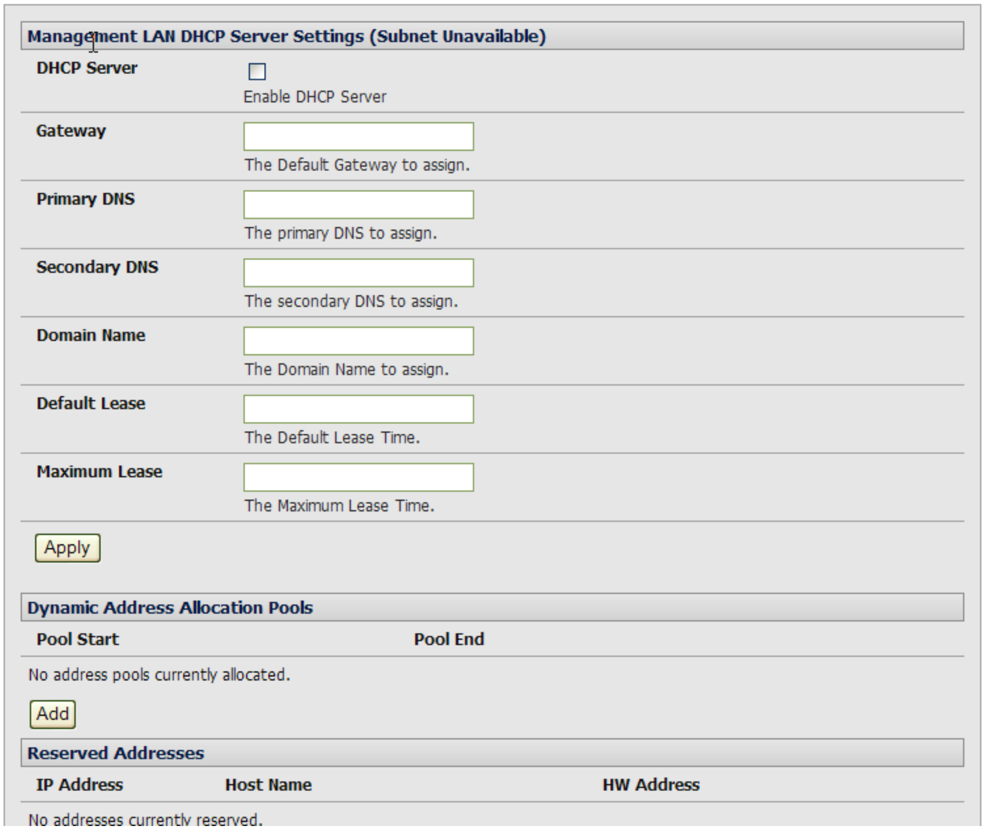
Gateway
A statically assigned gateway.

Primary DNS
A statically assigned primary name server.

Note The second Ethernet port on the B096-048/016 can be configured as either a Management LAN gateway port **or** it can be configured as an OoB/Failover port - but not both. So be sure that you did not allocate **Management LAN** as the **Failover Interface** when you configured the principal **Network** connection on the **System: IP** menu

The B096-048/016 Console Server Management Switches also host a DHCP server which by default is set at disabled. The DHCP server enables the automatic distribution of IP addresses to hosts running DHCP clients on the Management LAN. To enable the DHCP server:

➢ On the **System: IP** menu select the **Management LAN** page and click the **Disabled** label in the **DHCP Server** field; or go to the **System: DHCP Server** menu and check **Enable DHCP Server**



Management LAN DHCP Server Settings (Subnet Unavailable)

DHCP Server	□ Enable DHCP Server
Gateway	The Default Gateway to assign.
Primary DNS	The primary DNS to assign.
Secondary DNS	The secondary DNS to assign.
Domain Name	The Domain Name to assign.
Default Lease	The Default Lease Time.
Maximum Lease	The Maximum Lease Time.

Dynamic Address Allocation Pools

Pool Start	Pool End

No address pools currently allocated.

Reserved Addresses

IP Address	Host Name	HW Address

No addresses currently reserved.

To configure the DHCP server for the Management LAN:

- Enter the **Gateway** address that is to be issued to the DHCP clients. If this field is left blank, the IP address of the B096-048/016 will be used
- Enter the **Primary DNS** and **Secondary DNS** address to issue the DHCP clients. Again if this field is left blank, the IP address of the B096-048/016 is used, so leave this field blank for automatic DNS server assignment
- Optionally enter a **Domain Name** suffix to issue DHCP clients
- Enter the **Default Lease** time and **Maximum Lease** time in seconds. The lease time is the time that a dynamically assigned IP address is valid before the client must request it again
- Click **Apply**

The DHCP server will sequentially issue IP addresses from a specified address pool(s):

- Click **Add** in the **Dynamic Address Allocation Pools** field
- Enter the **DHCP Pool Start Address** and **End Address** and click **Apply**

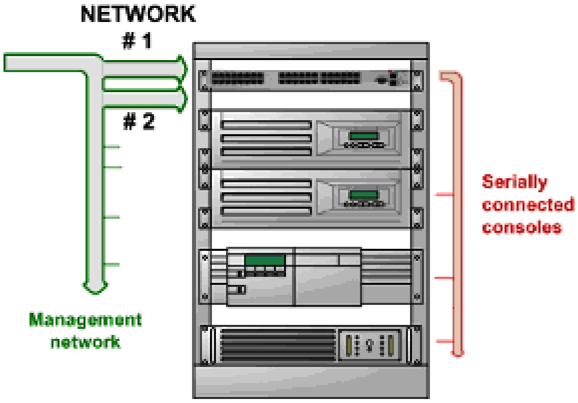
The DHCP server also supports pre-assigning IP addresses to be allocated only to specific MAC addresses and reserving IP addresses to be used by connected hosts with fixed IP addresses. To reserve an IP addresses for a particular host:

- Click **Add** in the **Reserved Addresses** field
- Enter the **Hostname,** the **Hardware Address** (MAC) and the **Statically Reserved IP** address for the DHCP client and click **Apply**

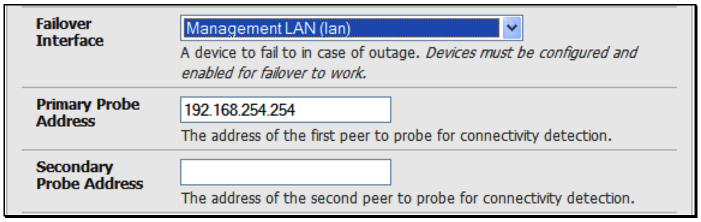
Once DHCP has initially allocated hosts addresses, it is recommended to copy these into the pre-assigned list so the same IP address will be reallocated in the event of a reboot.

3.6.3 Configure Management Switch for Failover or Broadband OoB

The Management Switch in the B096-048/016 Console Server can be configured to provide a failover option. In the event of a problem using the main LAN connection for accessing the Console Server, an alternate access path is used.



- ➢ By default, the failover is not enabled. To enable, select the **Network** page on the **System: IP** menu
- ➢ Now select the **Failover Interface** to be used in the event of an outage on the main network. This can be:
    - o an alternate broadband Ethernet connection or
    - o the B096-048/016 internal modem or
    - o an external serial modem/ISDN device connected to the B096-048/016 console port (for out-dialing to an ISP or the remote management office)



Failover Interface	Management LAN (lan) A device to fail to in case of outage. *Devices must be configured and enabled for failover to work.*
Primary Probe Address	192.168.254.254 The address of the first peer to probe for connectivity detection.
Secondary Probe Address	The address of the second peer to probe for connectivity detection.

- ➢ Click **Apply**. You have selected the failover method. However, it is not active until you have specified the external sites to be probed to trigger failover and set up the failover ports themselves. This is covered in *Chapter 5*.

Note The second Ethernet port on the B096-048/016 can be configured as either a Management LAN gateway port **or** it can be configured as an OoB/Failover port - but not both. So ensure you did not configure this port as the **Management LAN** on the **System: IP** menu

4. SERIAL PORT AND NETWORK HOST

Introduction

The Console Server enables access and control of serially-attached devices and network-attached devices (*hosts*). The Administrator must configure access privileges for each of these devices, and specify the services that can be used to control the devices. The Administrator can also set up new users and specify each user's individual access and control privileges.

This chapter covers each of the steps in configuring hosts and serially attached devices:

Configure Serial Ports ***– setting up the protocols to be used in accessing serially-connected devices***

Users & Groups ***– setting up users and defining the access permissions for each of these users***

Authentication ***– covered in Chapter 9***

Network Hosts ***– configuring access to local network connected computers or appliances (referred to as hosts)***

Configuring Trusted Networks

Cascading and Redirection of Serial Console Ports

Connecting to Power (UPS, PDU and IPMI) and Environmetal Monitoring (EMD) devices

4.1 Configuring Serial Ports

To configure a serial port you must first set the **Common Settings** (*Chapter 4.1.1*) that are to be used for the data connection to that port (e.g. baud rate) and the *mode* the port is to operate in. Each port can be set to support one of five operating modes:

i. **Console Server Mode** (*Chapter 4.1.2*) is the default setting and enables general access to the serial console port on serially attached devices

ii. **Device Mode** (*Chapter 4.1.3*) sets the serial port up to communicate with an intelligent serial controlled PDU, UPS or Environmental Monitor Devices (EMD)

iii. **SDT Mode** (*Chapter 4.1.4*) enables graphical console access (with RDP, VNC, HTTPS etc) to hosts that are serially connected

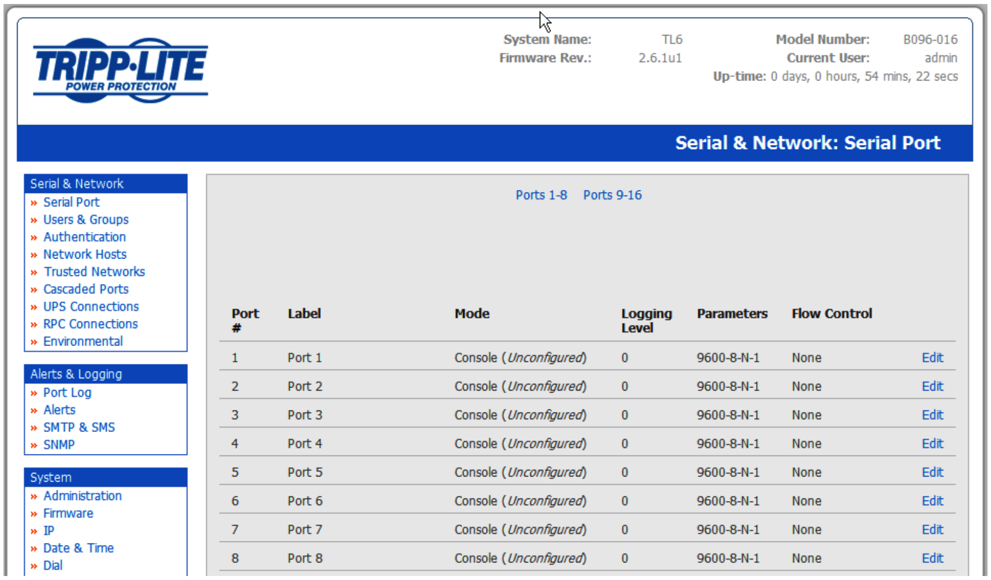
iv. **Terminal Server Mode** (*Chapter 4.1.5*) sets the serial port to await an incoming terminal login session

v. **Serial Bridge Mode** (*Chapter 4.1.6*) enables the transparent interconnection of two serial port devices over a network

To select the serial port to configure:

- Select **Serial & Network: Serial Port** and click **Edit** on the port to be reconfigured

Note If you wish to set the same protocol options for multiple serial ports at once, click **Edit Multiple Ports** and select which ports you wish to configure as a group



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 54 mins, 22 secs

Serial & Network: Serial Port

Port #	Label	Mode	Logging Level	Parameters	Flow Control	
1	Port 1	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
2	Port 2	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
3	Port 3	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
4	Port 4	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
5	Port 5	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
6	Port 6	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
7	Port 7	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit
8	Port 8	Console (*Unconfigured*)	0	9600-8-N-1	None	Edit

- When you have configured the common settings and the mode for each port, set up any remote syslog (*Chapter 4.1.7*), then click **Apply**

- If the Console Server has been configured with distributed Nagios monitoring enabled then you will also be presented with **Nagios Settings** options to enable nominated services on the Host to be monitored (refer *to Chapter 10 – Nagios Integration*)

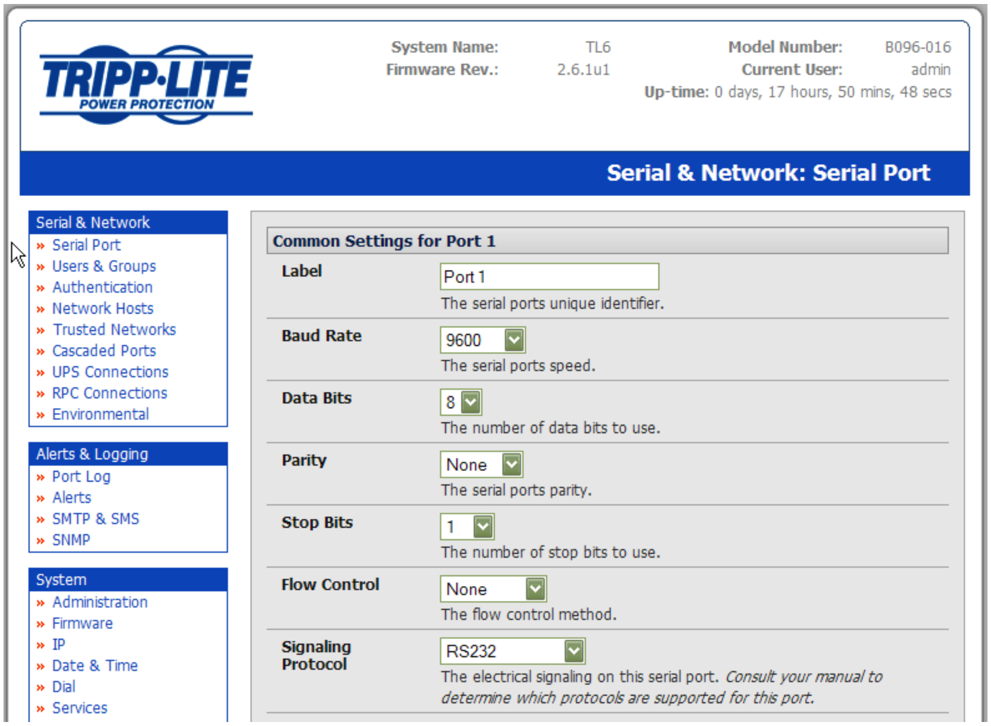
4.1.1 Common Settings

There are a number of common settings available for each serial port. These are independent of the mode in which the port is being used. These serial port parameters must be set so they match the serial port parameters on the device which is attached to that port:

- Specify a label for the port

- Select the appropriate **Baud Rate**, **Parity**, **Data Bits**, **Stop Bits** and **Flow Control** for each port (and ensure they match the settings for serial device that is connected). The Signaling Protocol is hard configured to be RS232

Note The serial ports are all set at the factory to RS232 9600 baud, no parity, 8 data bits, 1 stop bit and Console Server Mode. The baud rate can be changed to 2400 – 230400 baud using the management console. Lower baud rates (50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800 baud) can be configured from the command line as detailed in *Chapter 14*



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 17 hours, 50 mins, 48 secs

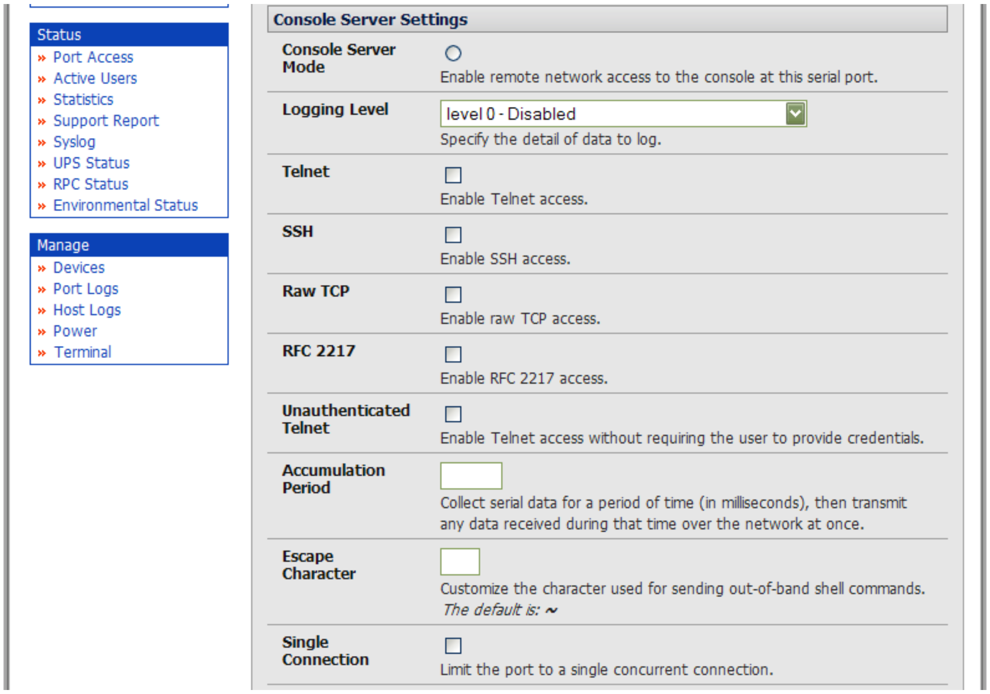
Serial & Network: Serial Port

Common Settings for Port 1

Label	Port 1 The serial ports unique identifier.
Baud Rate	9600 The serial ports speed.
Data Bits	8 The number of data bits to use.
Parity	None The serial ports parity.
Stop Bits	1 The number of stop bits to use.
Flow Control	None The flow control method.
Signaling Protocol	RS232 The electrical signaling on this serial port. *Consult your manual to determine which protocols are supported for this port.*

4.1.2 Console Server Mode

Select **Console Server Mode** to enable remote management access to the serial console that is attached to the serial port:



Console Server Settings

Console Server Mode	○ Enable remote network access to the console at this serial port.
Logging Level	level 0 - Disabled Specify the detail of data to log.
Telnet	□ Enable Telnet access.
SSH	□ Enable SSH access.
Raw TCP	□ Enable raw TCP access.
RFC 2217	□ Enable RFC 2217 access.
Unauthenticated Telnet	□ Enable Telnet access without requiring the user to provide credentials.
Accumulation Period	Collect serial data for a period of time (in milliseconds), then transmit any data received during that time over the network at once.
Escape Character	Customize the character used for sending out-of-band shell commands. *The default is: ~*
Single Connection	□ Limit the port to a single concurrent connection.

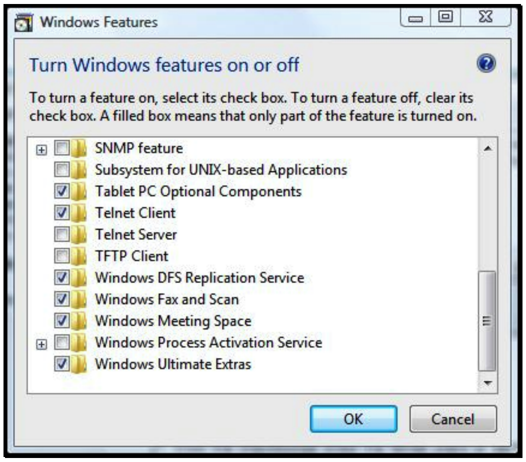
Logging Level This specifies the level of information to be logged and monitored (refer to *Chapter 7 - Alerts and Logging)*

Telnet Check to enable Telnet access to the serial port. When enabled, a Telnet client on a User or Administrator's computer can connect to a serial device attached to this serial port on the Console Server. The default port address is IP Address _ Port (2000 + serial port #) i.e. 2001 – 2048

Telnet communications are unencrypted, so this protocol is generally recommended for local connections only. However, if the remote communications are being tunneled with *SDT Connector*, then Telnet can be used to securely access these attached devices (*see Note below*).

With Win2000/XP/NT you can run Telnet from the command prompt (*cmd.exe*). Vista comes with a Telnet client and server but they are not enabled by default. To enable Telnet, simply:

- Log in as *Admin* and go to *Start/ Control Panel/Programs and Features*
- Select *Turn Windows Features On or Off,* check the *Telnet Client* and click *OK*



Windows Features

Turn Windows features on or off

To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.

- ⊞ □ SNMP feature
- □ Subsystem for UNIX-based Applications
- ☑ Tablet PC Optional Components
- ☑ Telnet Client
- □ Telnet Server
- □ TFTP Client
- ☑ Windows DFS Replication Service
- ☑ Windows Fax and Scan
- ☑ Windows Meeting Space
- ⊞ □ Windows Process Activation Service
- ☑ Windows Ultimate Extras

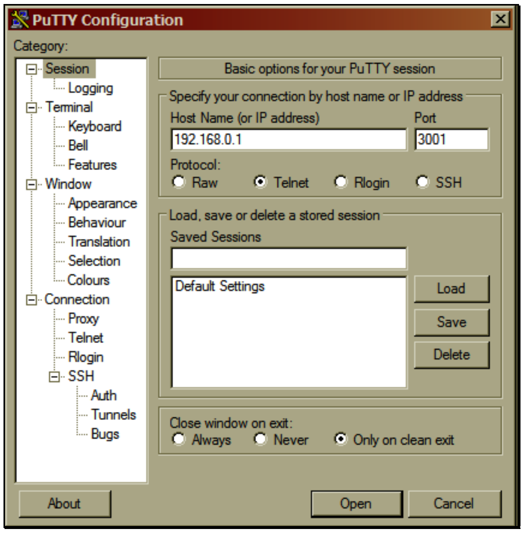
Note In Console Server mode, Users and Administrators can use *SDT Connector* to set up secure Telnet connections that are SSH tunneled from their client computers to the serial port on the Console Server with a simple point-and-click.

To use *SDT Connector* to access consoles on the Console Server serial ports, configure the *SDT Connector* with the Console Server as a *gateway*, then as a *host*. Now enable Telnet service on Port (2000 + serial port #) *i.e.* 2001–2048. Refer to *Chapter 6* for more details on using *SDT Connector* for Telnet and SSH access to devices attached to the Console Server serial ports.

You can also use standard communications packages like *PuTTY* to set a direct Telnet (or SSH) connection to the serial ports (refer Note below):

Note *PuTTY* also supports Telnet (and SSH). The procedure to set up a Telnet session is simple: Enter the Console Server's IP address as the 'Host Name (or IP address)'. Select 'Telnet' as the protocol and set the 'TCP port' to 2000 plus the physical serial port number (*i.e.* 2001 to 2048).

Click the 'Open' button. You may then receive a 'Security Alert' that the host's key is not cached. Choose 'yes' to continue. You will then be presented with the login prompt of the remote system connected to the serial port chosen on the Console Server. You can login as normal and use the host serial console screen.



Host Name (or IP address): 192.168.0.1
Port: 3001

Protocol: ○ Raw ● Telnet ○ Rlogin ○ SSH

Saved Sessions: Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

PuTTY can be downloaded at http://www.tucows.com/preview/195286.html

SSH

It is recommended that the User or Administrator uses SSH as the protocol for connecting to serial consoles attached to the Console Server when communicating over the Internet or any other public network. This will provide an authenticated, encrypted connection between the SSH client program on the remote user's computer and the Console Server. The user's communication with the serial device attached to the Console Server is therefore secure.

It is recommended for Users and Administrators to use *SDT Connector* when making an SSH connection to the consoles on devices attached to the Console Server's serial ports. Configure the *SDT Connector* with the Console Server as a *gateway*, then as a *host*, and enable SSH service on Port (3000 + serial port #) *i.e.* 3001-3048 (refer to *Chapter 6).*

You can also use common communications packages, like *PuTTY* or *SSHTerm* to SSH connect directly to port address IP Address _ Port (3000 + serial port #) *i.e.* 3001–3048.

Alternately SSH connections can be configured using the standard SSH port 22. The serial port being accessed is then identified by appending a descriptor to the username. This syntax supports any of:

<username>:<portXX>

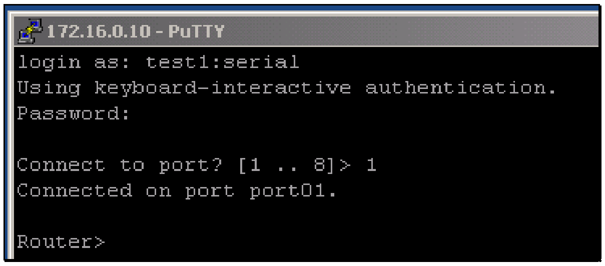
<username>:<port label>

<username>:<ttySX>

<username>:<serial>

So for a user named 'fred' to access serial port 2, when setting up the SSHTerm or the PuTTY SSH client, instead of typing *username = fred* and *ssh port = 3002*, the alternate is to type *username = fred:port02* (or *username = fred:ttyS1)* and *ssh port = 22.*

Or, by typing *username=fred:serial* and *ssh port = 22,* the user is presented with a port selection option:



```
login as: test1:serial
Using keyboard-interactive authentication.
Password:

Connect to port? [1 .. 8]> 1
Connected on port port01.

Router>
```

This syntax enables users to set up SSH tunnels to all serial ports with only a single IP port 22 having to be opened in their firewall/gateway.

TCP RAW TCP allows connections directly to a TCP socket. Communications programs such as *PuTTY* also support RAW TCP, however, this protocol would usually be used by a custom application. For RAW TCP, the default port address is IP Address _ Port (4000 + serial port #) *i.e.* 4001 – 4048.

RAW TCP also enables the serial port to be tunneled to a remote Console Server, so two serial port devices can be transparently interconnected over a network (see *Chapter 4.1.6 – Serial Bridging*).

RFC2217 Selecting *RFC2217* enables serial port redirection on that port. For RFC2217, the default port address is IP Address _ Port (5000 + serial port #) *i.e.* 5001 – 5048.

You will also need to run serial port redirector software on your desktop computer. This software, which supports RFC2217 virtual com ports, is available commercially and as freeware, for Windows UNIX and Linux, and it allows you to use a serial device connected to the remote Console Server as if it were connected to your local serial port.

Unauthenticated Telnet Selecting *Unauthenticated Telnet* enables Telnet access to the serial port without requiring the user to provide credentials. When a user accesses the Console Server to Telnet to a serial port they are normally given a login prompt. However, with unauthenticated Telnet, they connect directly through to port with any Console Server login at all. This mode is mainly used when you have an external system (such as *conserver*) managing user authentication and access privileges at the serial device level.

For Unauthenticated Telnet, the default port address is IP Address _ Port (6000 + serial port #) i.e. 6001 – 6048.

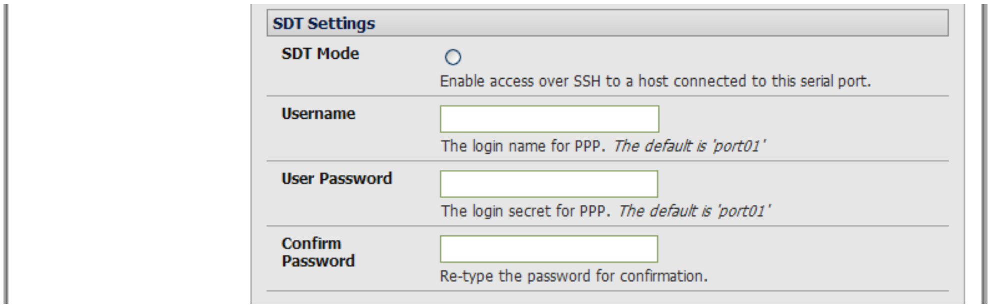
Accumulation Period By default, once a connection has been established for a particular serial port (such as a RFC2217 redirection or Telnet connection to a remote computer), then any incoming characters on that port are forwarded over the network on a character by character basis. The accumulation period changes this by specifying a period of time that incoming characters will be collected before being sent as a packet over the network

Escape Character This enables you to change the character used for sending escape characters. The default is **~.**

Single Connection This setting limits the port to a single connection, so if multiple users have access privileges for a particular port, only one user at a time can be accessing that port (i.e. port “snooping” is not permitted).

4.1.3 SDT Mode

This setting allows port forwarding of LAN protocols such as RDP, VNC, HTPP, HTTPS, SSH and Telnet through to computers which are connected locally to the Console Server by their serial COM port. However such port forwarding requires a PPP link to be set up over this serial port.



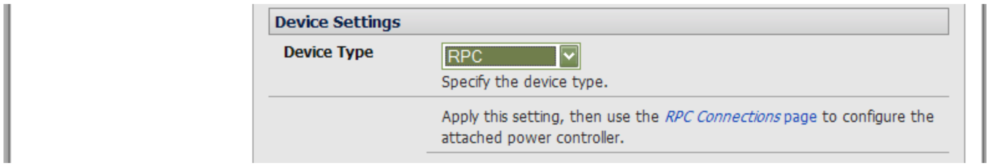
SDT Settings

SDT Mode	○ Enable access over SSH to a host connected to this serial port.
Username	The login name for PPP. *The default is 'port01'*
User Password	The login secret for PPP. *The default is 'port01'*
Confirm Password	Re-type the password for confirmation.

Refer to Chapter* 6.6** - Using SDT Connector to Telnet or SSH connect to devices that are serially attached to the Console Server ***for configuration details

4.1.4 Device (RPC, UPS, EMD) Mode

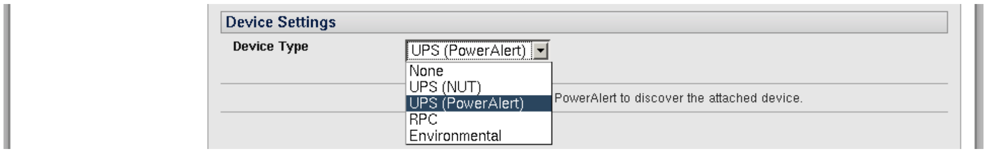
This mode configures the selected serial port to communicate with a serial controlled Uninterruptible Power Supply (UPS), serial Remote Power Controller/ Power Distribution Unit (RPC) or Environmental Monitoring Device (EMD)



Device Settings

Device Type	RPC Specify the device type.
	Apply this setting, then use the *RPC Connections* page to configure the attached power controller.

- ➢ Select the desired **Device Type** (UPS, RPC or EMD)
- ➢ Proceed to the appropriate device configuration page (**Serial & Network: UPS Connections, RPC Connection** or **Environmental**) as detailed in *Chapter 8 - Power & Environmental Management)*
- ➢ The B092-016 Console Server also allows you to configure ports as UPS devices that PowerAlert will manage. PowerAlert will discover the attached UPS device and auto-configure. See www.tripplite.com/EN/support/PowerAlert/Downloads.cfm for a complete PowerAlert manual.



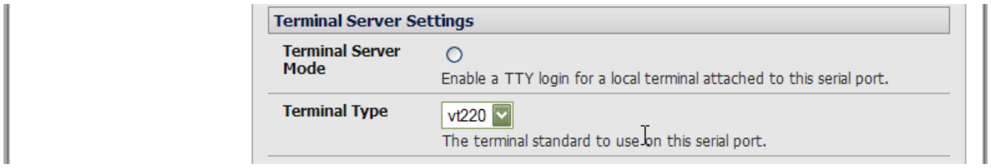
Device Settings

Device Type: UPS (PowerAlert)

PowerAlert to discover the attached device.

4.1.5 Terminal Server Mode

- ➢ Select **Terminal Server Mode** and the **Terminal Type** (vt220, vt102, vt100, Linux or ANSI) to enable a *getty* on the selected serial port.



Terminal Server Settings

Terminal Server Mode ○
Enable a TTY login for a local terminal attached to this serial port.

Terminal Type: vt220
The terminal standard to use on this serial port.

The *getty* will then configure the port and wait for a connection to be made. An active connection on a serial device is usually indicated by the Data Carrier Detect (DCD) pin on the serial device being raised. When a connection is detected, the *getty* program issues a login: prompt, and then invokes the login program to handle the actual system login.

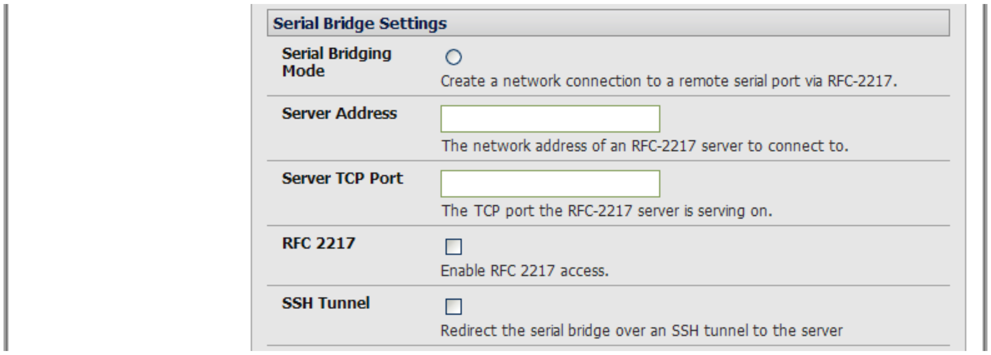
Note Selecting Terminal Server mode will disable Port Manager for that serial port, so data is no longer logged for alerts etc.

4.1.6 Serial Bridging Mode

With serial bridging, the serial data on a nominated serial port on one Console Server is encapsulated into network packets and then transported over a network to a second Console Server, where it is then represented as serial data. So the two Console Servers effectively act as a virtual serial cable over an IP network.

One Console Server is configured to be the *Server*. The *Server* serial port to be bridged is set in Console Server mode with either RFC2217 or RAW enabled (as described in *Chapter 4.1.2 – Console Server Mode*).

For the *Client* Console Server, the serial port to be bridged must be set in Bridging Mode:



Serial Bridge Settings

Serial Bridging Mode ○
Create a network connection to a remote serial port via RFC-2217.

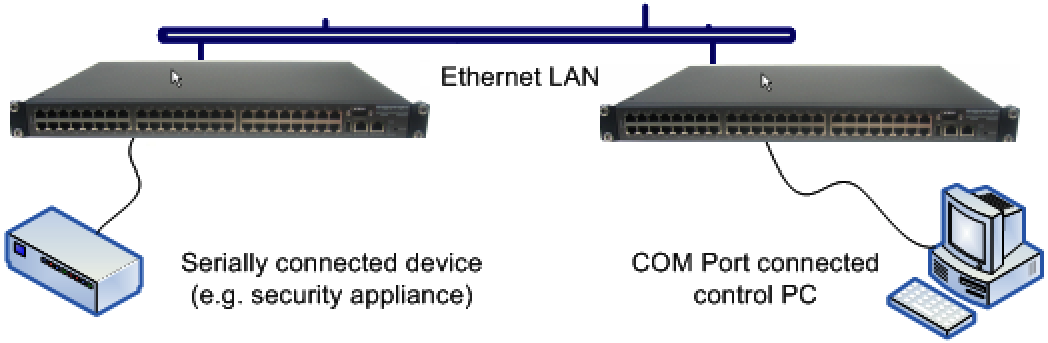
Server Address
The network address of an RFC-2217 server to connect to.

Server TCP Port
The TCP port the RFC-2217 server is serving on.

RFC 2217 □
Enable RFC 2217 access.

SSH Tunnel □
Redirect the serial bridge over an SSH tunnel to the server

- Select **Serial Bridging Mode** and specify the IP address of the *Server* Console Server and the TCP port address of the remote serial port (for RFC2217 bridging this will be 5001-5048)
- By default, the bridging client will use RAW TCP so you must select RFC2217 if this is the Console Server mode you have specified on the server Console Server

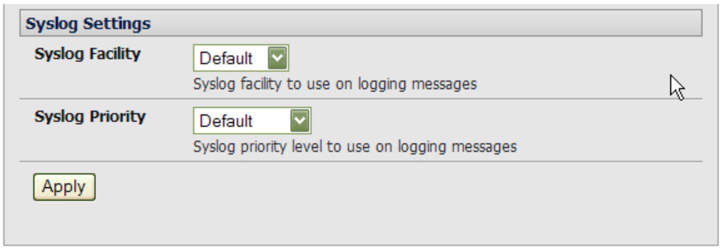


- ➢ You may secure the communications over the local Ethernet by enabling SSH however you will need to generate and upload keys (refer to *Chapter 14 – Advanced Configuration*)

4.1.7 Syslog

In addition to built-in logging and monitoring (which can be applied to serial-attached and network-attached management accesses, as covered in *Chapter* 7 - *Alerts and Logging*), the Console Server can also be configured to support the remote *syslog* protocol on a per serial port basis:

- ➢ Select the **Syslog Facility/Priority** fields to enable logging of traffic on the selected serial port to a syslog server; and to appropriately sort and action those logged messages (i.e. redirect them/ send alert email etc.)



Syslog Settings

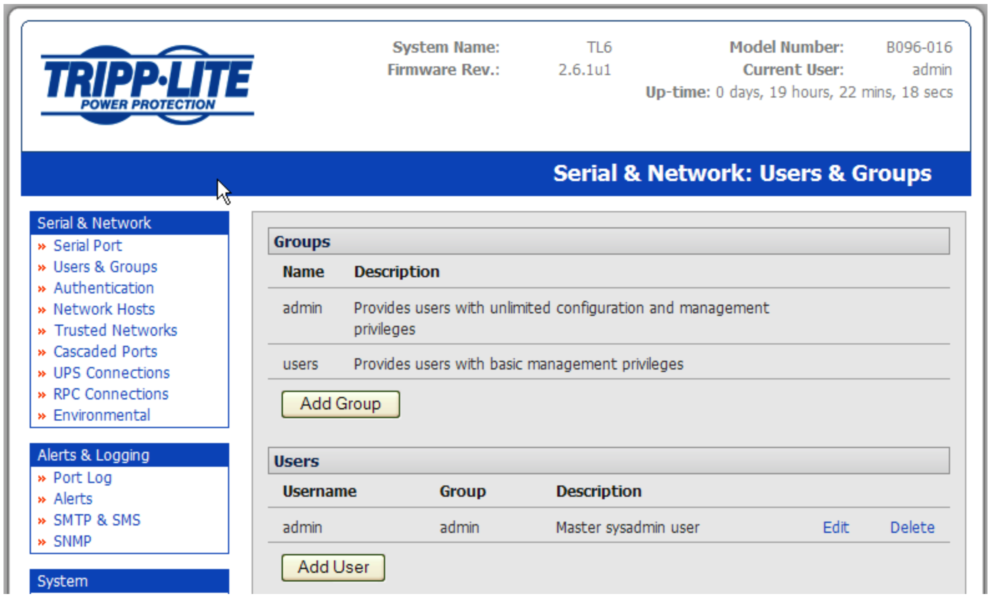
Syslog Facility Default
Syslog facility to use on logging messages

Syslog Priority Default
Syslog priority level to use on logging messages

For example if the computer attached to serial port 3 should never send anything out on its serial console port, the Administrator can set the **Facility** for that port to *local0* (*local0* .. *local7* are meant for site local values), and the **Priority** to *critical*. At this priority, if the Console Server syslog server does receive a message, it will automatically raise an alert. Refer to *Chapter 7.*

4.2 Add/Edit Users

The Administrator uses this menu selection to set up, edit and delete users and to define the access permissions for each of these users.



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 19 hours, 22 mins, 18 secs

Serial & Network: Users & Groups

Groups

Name	Description
admin	Provides users with unlimited configuration and management privileges
users	Provides users with basic management privileges

Users

Username	Group	Description		
admin	admin	Master sysadmin user	Edit	Delete

Users can be authorized to access specified Console Server serial ports and specified network-attached hosts. These users can also be given full Administrator status (with full configuration and management and access privileges).

To simplify user setup, they can be configured as members of Groups. There are two Groups set up by default (*admin* and *user*).

1. Membership of the ***admin*** group provides the user with full Administrator privileges. The *admin* user (referred to in this manual as Administrator) can access the Console Server using any of the services which have been enabled in *System: Services* e.g. if only HTTPS has been enabled then the Administrator can only access the Console Server using HTTPS. However, once logged in, they can reconfigure the Console Server settings (e.g. to enabled HTTP/Telnet for future access). They can also access any of the connected Hosts or serial port devices using any of the services that have been enabled for these connections. However, since the Administrator can reconfigure the access services for any Host or serial port, only trusted users should have Administrator access.

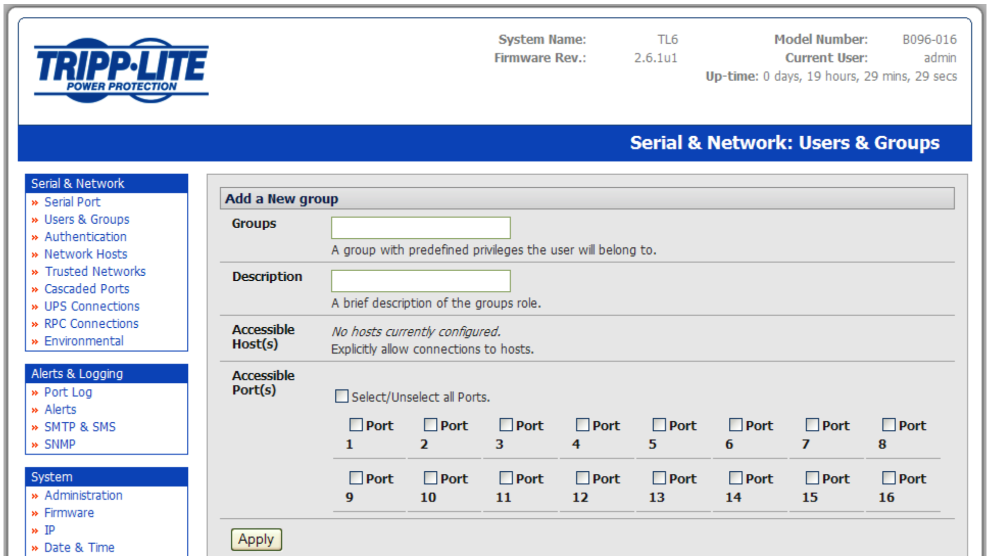
Note: For convenience the SDT Connector "Retrieve Hosts" function retrieves and auto-configures checked serial ports and checked hosts only, even for admin group users.

2. Membership of the **user** group provides the user with limited access to the Console Server and connected Hosts and serial devices. These Users can access only the Management section of the Management Console menu and they have no command line access to the Console Server. They also can only access those Hosts and serial devices that have been checked for them, using services that have been enabled.

3. The Administrator can also set up additional Groups with specific serial port and host access permissions (same as Users). However users in these additional groups don't have any access to the Management Console menu nor to any command line access to the Console Server itself. Lastly the Administrator can also set up users who are not a member of any Groups and they will have the same access as users in the additional groups.

To set up new users and classify them as members of particular Groups:

- ➢ Select **Serial & Network: Users & Groups** to display the configured Groups and Users
- ➢ Click **Add Group** to add a new Group



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: admin
Up-time: 0 days, 19 hours, 29 mins, 29 secs

Add a New group

Groups [ ]
A group with predefined privileges the user will belong to.

Description [ ]
A brief description of the groups role.

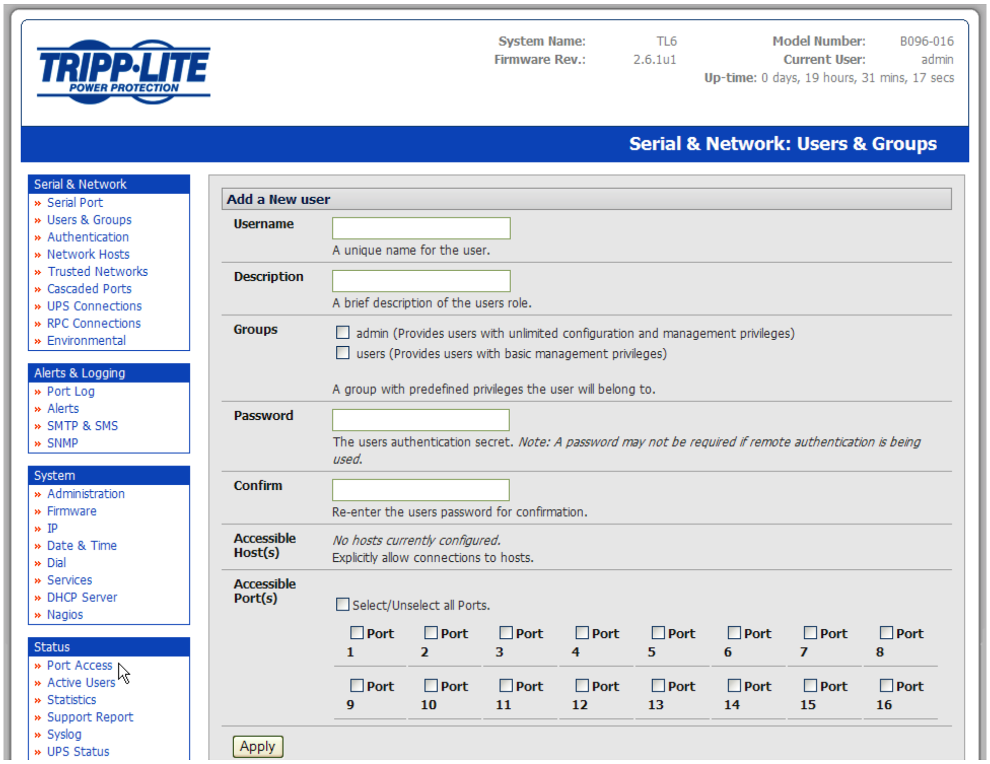
Accessible Host(s) *No hosts currently configured.*
Explicitly allow connections to hosts.

Accessible Port(s) □ Select/Unselect all Ports.

□ Port 1 □ Port 2 □ Port 3 □ Port 4 □ Port 5 □ Port 6 □ Port 7 □ Port 8

□ Port 9 □ Port 10 □ Port 11 □ Port 12 □ Port 13 □ Port 14 □ Port 15 □ Port 16

- ➢ Add a **Group** name and **Description** for each new Group, then nominate **Accessible Hosts** and **Accessible Ports** to specify the serial ports and hosts you wish any users in this new Group to be able to access
- ➢ Click **Apply**
- ➢ Select **Serial & Network: Users** to display the configured users
- ➢ Click **Add User** to add a new user



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: admin
Up-time: 0 days, 19 hours, 31 mins, 17 secs

Add a New user

Username [ ]
A unique name for the user.

Description [ ]
A brief description of the users role.

Groups
□ admin (Provides users with unlimited configuration and management privileges)
□ users (Provides users with basic management privileges)
A group with predefined privileges the user will belong to.

Password [ ]
The users authentication secret. *Note: A password may not be required if remote authentication is being used.*

Confirm [ ]
Re-enter the users password for confirmation.

Accessible Host(s) *No hosts currently configured.*
Explicitly allow connections to hosts.

Accessible Port(s) □ Select/Unselect all Ports.

□ Port 1 □ Port 2 □ Port 3 □ Port 4 □ Port 5 □ Port 6 □ Port 7 □ Port 8

□ Port 9 □ Port 10 □ Port 11 □ Port 12 □ Port 13 □ Port 14 □ Port 15 □ Port 16

- Add a **Username** and a confirmed **Password** for each new User. You may also include information related to the user (*e.g.* contact details) in the **Description** field
- Nominate **Accessible Hosts** and **Accessible Ports** to specify which serial ports and which LAN connected hosts you wish the user to have access to
- Specify which **Group** (or Groups) you wish the user to be a member of.
- Click **Apply**

Your new user will now be able to access the nominated network devices and the devices attached to the nominated serial ports.

Note There are no specific limits on the number of users you can set up; nor on the number of users per serial port or host. Multiple users (Users and Administrators) can control/monitor one port or host. Similarly there are no specific limits on the number of Groups and each user can be a member of a number of Groups (in which case they take on the cumulative access privileges of each of those Groups). A user does not have to be a member of any Groups (but if the User is not even a member of the default *user* group then they will not be able to use the Management Console to manage ports).

Note that while there are no specific limits, the time to re-configure does increase as the number and complexity increases so we recommend the aggregate number if users and groups be kept under 250 (or 1000 for B092-016)

The Administrator can also edit the access settings for any existing users:

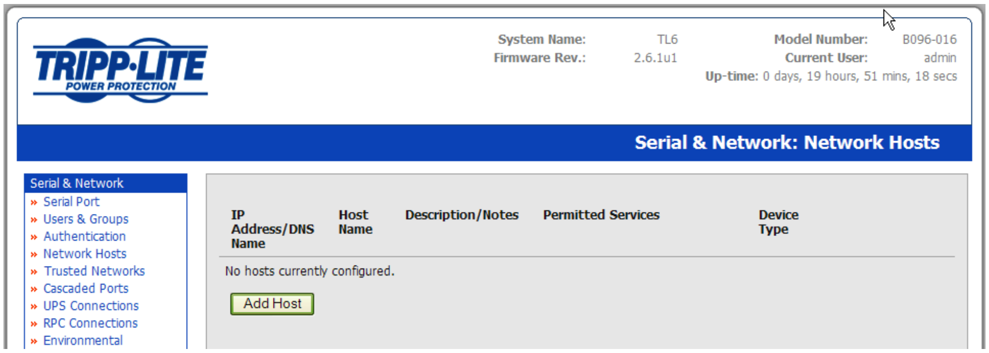
- Select **Serial & Network: Users & Groups** and click **Edit** for the User to be modified

4.3 Authentication

Refer to *Chapter 9.1 - Remote Authentication Configuration* for authentication configuration details

4.4 Network Hosts

To access a locally networked computer or appliances (referred to as a *Host*), you must identify the network connected Host; and then specify the TCP or UDP ports/services that are permitted to be used for communicating to that Host:



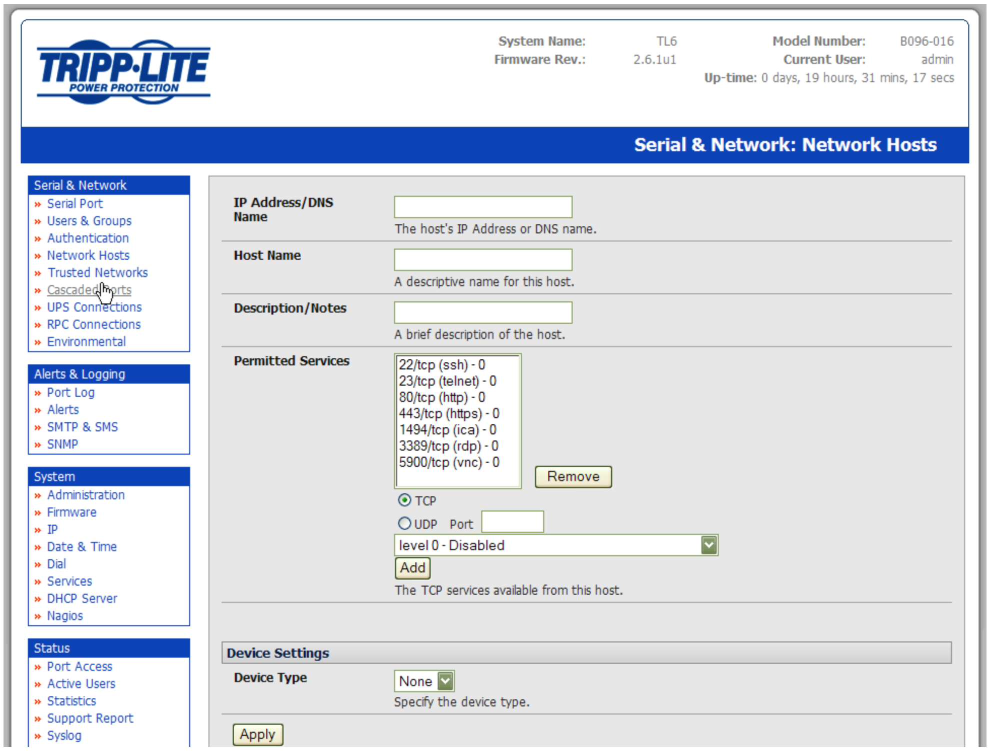
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 19 hours, 51 mins, 18 secs

IP Address/DNS Name	Host Name	Description/Notes	Permitted Services	Device Type

No hosts currently configured.

- Selecting **Serial & Network: Network Hosts** presents all the network connected Hosts that have been enabled for access, and the related access TCP ports/services

- Click **Add Host** to enable access to a new Host (or select **Edit** to update the settings for existing Host)



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 19 hours, 31 mins, 17 secs

Serial & Network: Network Hosts

IP Address/DNS Name
The host's IP Address or DNS name.

Host Name
A descriptive name for this host.

Description/Notes
A brief description of the host.

Permitted Services
22/tcp (ssh) - 0
23/tcp (telnet) - 0
80/tcp (http) - 0
443/tcp (https) - 0
1494/tcp (ica) - 0
3389/tcp (rdp) - 0
5900/tcp (vnc) - 0
● TCP
○ UDP Port
level 0 - Disabled
The TCP services available from this host.

Device Settings

Device Type None
Specify the device type.

- Enter the **IP Address** or **DNS Name** of the new network connected Host (and optionally enter a **Description**)

- Add or edit the **Permitted Services** (or TCP/UDP port numbers) that are authorized to be used in controlling this host. Only these *permitted services* will be port forwarded through to the Host. All other services (TCP/UDP ports) will be blocked.

- If the Console Server has been configured with distributed Nagios monitoring enabled then you will also be presented with **Nagios Settings** options to enable nominated services on the Host to be monitored (refer *to Chapter 10 – Nagios Integration*)

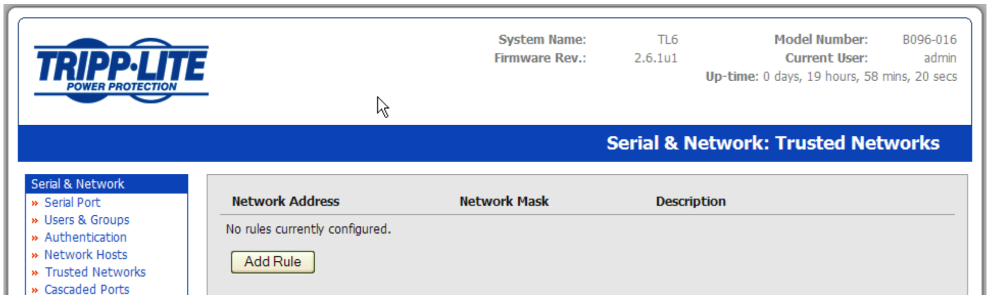
- The **Logging Level** specifies the level of information to be logged and monitored for each Host access (refer *to Chapter 7 - Alerts and Logging*)

- If the Host is a networked server with IPMI power control, then the Administrator can enable users (Users and Administrators) to remotely cycle power and reboot (refer to *Chapter 8.2 - Configuring IPMI Power Management*)

- Click **Apply**

4.5 Trusted Networks

The **Trusted Networks** facility gives you the option to nominate specific IP addresses that users (Administrators and Users) must be located at in order to have access to Console Server serial ports:



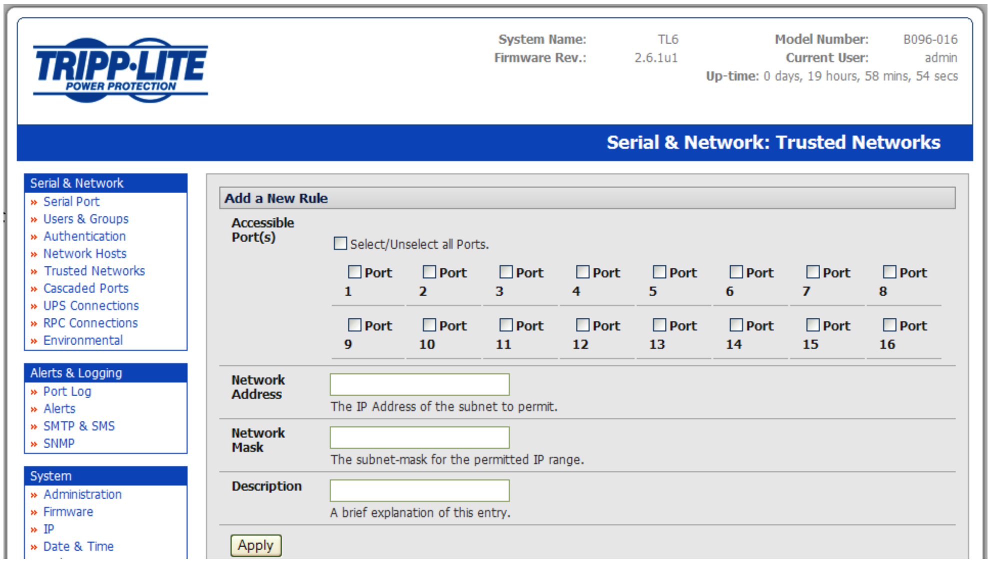
System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 19 hours, 58 mins, 20 secs

Serial & Network: Trusted Networks

Network Address	Network Mask	Description

No rules currently configured.

- ➢ Select **Serial & Network: Trusted Networks**
- ➢ To add a new trusted network, select **Add Rule**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 19 hours, 58 mins, 54 secs

Serial & Network: Trusted Networks

Add a New Rule

Accessible Port(s)
☐ Select/Unselect all Ports.
☐ Port 1 ☐ Port 2 ☐ Port 3 ☐ Port 4 ☐ Port 5 ☐ Port 6 ☐ Port 7 ☐ Port 8
☐ Port 9 ☐ Port 10 ☐ Port 11 ☐ Port 12 ☐ Port 13 ☐ Port 14 ☐ Port 15 ☐ Port 16

Network Address
The IP Address of the subnet to permit.

Network Mask
The subnet-mask for the permitted IP range.

Description
A brief explanation of this entry.

- ➢ Select the **Accessible Port(s)** that the new rule is to be applied to
- ➢ Then enter the **Network Address** of the subnet to be permitted access
- ➢ Then specify the range of addresses that are to be permitted by entering a **Network Mask** for that permitted IP range *e.g.*
  - ▪ To permit all the users located with a particular Class C network (204.15.5.0 say) connection to the nominated port, add the following Trusted Network New Rule:

Network IP Address	204.15.5.0
Subnet Mask	255.255.255.0

  - ▪ If you want to permit only the one user who is located at a specific IP address (204.15.5.13 say) to connect:

Network IP Address	204.15.5.0
Subnet Mask	255.255.255.255

- If however you want to allow all the users operating from within a specific range of IP addresses (say any of the thirty addresses from 204.15.5.129 to 204.15.5.158) to be permitted connection to the nominated port:

Host /Subnet Address	204.15.5.128
Subnet Mask	255.255.255.224

- Click **Apply**

Note The above Trusted Networks will limit access by Users and the Administrator to the console serial ports. However they do not restrict access by the Administrator to the Console Server itself or to attached hosts. To change the default settings for this access, you will to need to edit the *IPtables* rules as described in the *Chapter 14 - Advanced.*

4.6 Serial Port Cascading

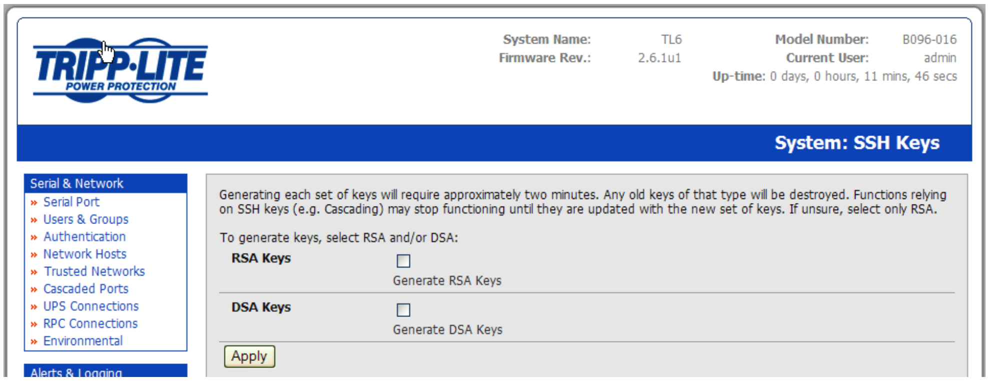
Cascaded Ports enables you to cluster distributed Console Servers so that a large number of serial ports (up to 1000) can be configured and accessed through one IP address and managed through the one Management Console. One Console Server, the Master, controls other Console Servers as Slave units and all the serial ports on the Slave units appear as if they are part of the Master.

Each Slave connects to the Master with an SSH connection using public key authentication. So the Master accesses each Slave using an SSH key pair, rather than using passwords, ensuring secure authenticated communications. So the Slave Console Server units can be distributed locally on a LAN or remotely over public networks around the world.

4.6.1 Automatically generate and upload SSH keys

To set up public key authentication, you must first generate an RSA or DSA key pair and upload them into the Master and Slave Console Servers. This can all be done automatically from the Master:

- Select **System: Administration** on Master’s Management Console
- Check **Generate SSH keys automatically** and click **Apply**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 11 mins, 46 secs

System: SSH Keys

Generating each set of keys will require approximately two minutes. Any old keys of that type will be destroyed. Functions relying on SSH keys (e.g. Cascading) may stop functioning until they are updated with the new set of keys. If unsure, select only RSA.

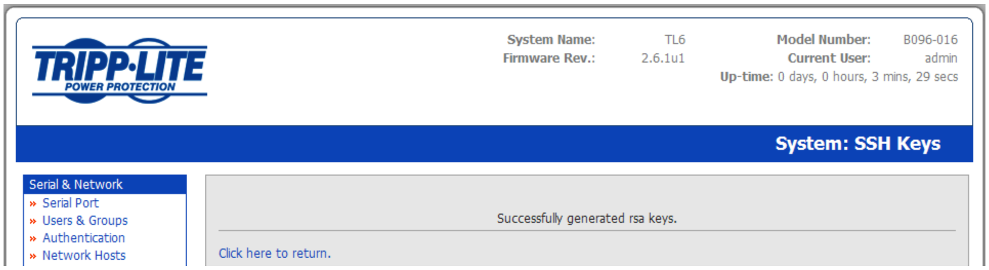
To generate keys, select RSA and/or DSA:

RSA Keys □ Generate RSA Keys

DSA Keys □ Generate DSA Keys

Now select whether to generate the keys using RSA and/or DSA (if unsure, select only RSA). Generating each set of keys will require approximately two minutes and the new keys will destroy any old keys of that type that may previously been uploaded. Also while the new generation is under way on the master, functions relying on SSH keys (e.g. cascading) may stop functioning until they are updated with the new set of keys. To generate keys:

- Select **RSA Keys** and/or **DSA Keys**
- Click **Apply**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 3 mins, 29 secs

System: SSH Keys

Successfully generated rsa keys.

Click here to return.

- Once the new keys have been successfully generated simply **Click here to return** and the keys will automatically be uploaded to the Master and connected Salves

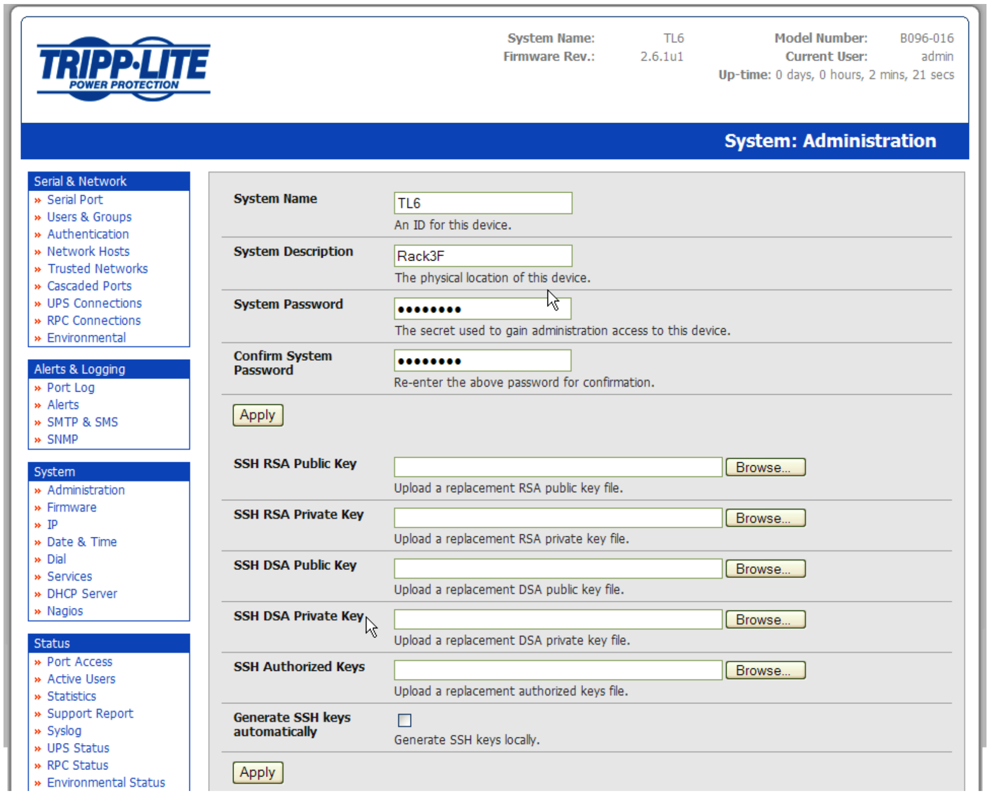
4.6.2 Manually generate and upload SSH keys

Alternately if you have a RSA or DSA key pair, you can manually upload them to the Master and Slave Console Servers.

Note If you do not already have an RSA or DSA key pair and you do not wish to use it, you will need to create a key pair using *ssh-keygen, PuTTYgen* or a similar tool as detailed in Chapter 15.6

To manually upload the key public and private key pair to the Master Console Server:

- Select **System: Administration** on Master's Management Console
- Browse to the location you have stored RSA (or DSA) Public Key and upload it to **SSH RSA (DSA) Public Key**
- Browse to the stored RSA (or DSA) Private Key and upload it to **SSH RSA (DSA) Private Key**
- Click **Apply**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 2 mins, 21 secs

System: Administration

System Name: TL6
An ID for this device.

System Description: Rack3F
The physical location of this device.

System Password: ••••••••
The secret used to gain administration access to this device.

Confirm System Password: ••••••••
Re-enter the above password for confirmation.

SSH RSA Public Key
Upload a replacement RSA public key file.

SSH RSA Private Key
Upload a replacement RSA private key file.

SSH DSA Public Key
Upload a replacement DSA public key file.

SSH DSA Private Key
Upload a replacement DSA private key file.

SSH Authorized Keys
Upload a replacement authorized keys file.

Generate SSH keys automatically: □
Generate SSH keys locally.

Next, you must register the Public Key as an Authorized Key on the Slave. In the simple case with only one Master with multiple Slaves, you need only upload the one RSA or DSA public key for each Slave.

Note The use of key pairs can be confusing because in many cases one file (Public Key) fulfills two roles – Public Key and Authorized Key. For a more detailed explanation, refer to the *Authorized Keys* section of *Chapter 15.* Also refer to this chapter if you need to use more than one set of Authorized Keys in the Slave

- Select **System: Administration** on the Slave's Management Console
- Browse again to the stored RSA (or DSA) Public Key and upload it to Slave's **SSH Authorized Key**
- Click **Apply**

The next step is to *Fingerprint* each new Slave-Master connection. This once-off step will validate that you are establishing an SSH session with the correct target. On the first connection the Slave will receive a *fingerprint* from the Master which will be used on all future connections:

- To establish the fingerprint, first log in the Master server as *root* and establish an SSH connection to the Slave remote host:

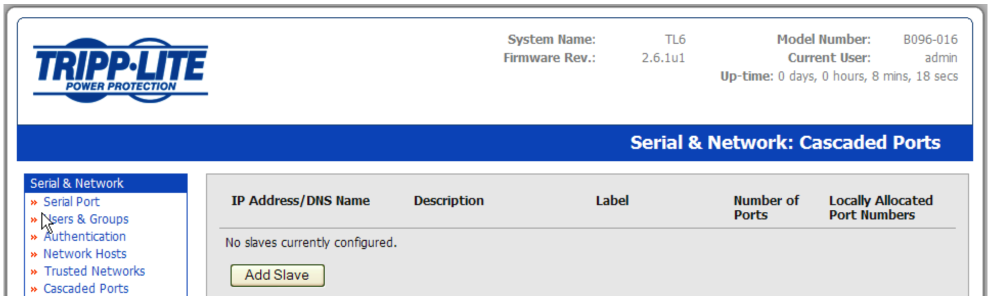
  # ssh remhost

Once the SSH connection has been established, you will be asked to accept the key. Answer *yes* and the *fingerprint* will be added to the list of known hosts. For more details on Fingerprinting, refer to Chapter 15.6

- If you are asked to supply a password, then there has been a problem with uploading keys. The keys should remove any need to supply a password.

4.6.3 Configure the Slaves and their serial ports

You can now begin setting up the Slaves and configuring Slave serial ports from the Master Console Server:



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 0 hours, 8 mins, 18 secs

Serial & Network: Cascaded Ports

IP Address/DNS Name	Description	Label	Number of Ports	Locally Allocated Port Numbers
No slaves currently configured.				

- Select **Serial & Network: Cascaded Ports** on the Master's Management Console
- To add clustering support select **Add Slave**

Note You will be prevented from adding any Slaves until you have automatically or manually generated SSH keys:

To define and configure a Slave:

- Enter the remote **IP Address** (or DNS Name) for the Slave Console Server
- Enter a brief **Description** and a short **Label** for the Slave (use a convention that enables effective management of large networks of clustered Console Servers and the connected devices)
- Enter the full number of serial ports on the Slave unit in **Number of Ports**
- Click **Apply**. This will establish the SSH tunnel between the Master and the new Slave

The **Serial & Network: Cascaded Ports** menu displays all the Slaves and the port numbers that have been allocated on the Master. If the Master Console Server has 16 ports of its own, then ports 1-16 are pre-allocated to the Master. So the first Slave added will be assigned port number 17 and onwards.

Once you have added all the Slave Console Servers, the Slave serial ports and the connected devices are configurable and accessible from the Master's Management Console menu, and accessible through the Master's IP address.

- Select the appropriate **Serial & Network: Serial Port** and **Edit** to configure the serial ports on the Slave
- Select the appropriate **Serial & Network: Users & Groups** to add new users with access privileges to the Slave serial ports (or to extend existing users access privileges)
- Select the appropriate **Serial & Network: Trusted Networks** to specify network addresses that can access nominated Slave serial ports
- Select the appropriate **Alerts & Logging: Alerts** to configure Slave port Connection, State Change or Pattern Match alerts
- The configuration changes made on the Master are propagated out to all the Slaves when you click **Apply**.

4.6.4 Managing the Slaves

The Master is in control of the Slave serial ports. So, for example, if you change a User's access privileges or edit any serial port setting on the Master, the updated configuration files will be sent out to each Slave in parallel. Each Slave will then automatically make changes to their local configurations (and only make those changes that relate to its particular serial ports).

You can still use the local Slave Management Console to change the settings on any Slave serial port (such as to alter the baud rates). However these changes will be overwritten next time the Master sends out a configuration file update.

Also while the Master is in control of all Slave serial port related functions, it is not master over the Slave network host connections or over the Slave Console Server system itself.

So Slave functions such as IP, SMTP & SNMP Settings, Date &Time, DHCP server must be managed by accessing each Slave directly and these functions are not overwritten when configuration changes are propagated from the Master. Similarly, the Slave's Network Host and IPMI settings have to be configured at each Slave.

Also, the Master's Management Console provides a consolidated view of the settings for its own and all the Slave's serial ports. However, the Master does not provide a fully consolidated view. For example, if you want to find out who is logged in to cascaded serial ports from the Master, you'll see that *Status: Active Users* only displays those users active on the Master's ports, so you may need to write custom scripts to provide this view. This is covered in *Chapter 11*.

5. FAILOVER AND OUT-OF-BAND ACCESS

Introduction

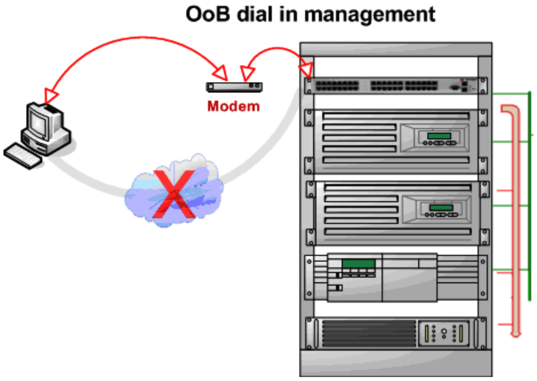
The Console Server has a number of failover and out-of-band access capabilities to ensure availability in the event there are difficulties in accessing the Console Server through the principal network path. This chapter covers:

- Out-of-band (OoB) access from a remote location using dial-up modem
- Out-dial failover
- OoB access using an alternate broadband link (B096-048/016 models only)
- Broadband failover

5.1 OoB Dial-In Access

To enable OoB dial-in access, first set up the Console Server configuration for dial-in PPP access. Once the Console Server is so configured, it will wait for an incoming connection from a dial-in at a remote site.

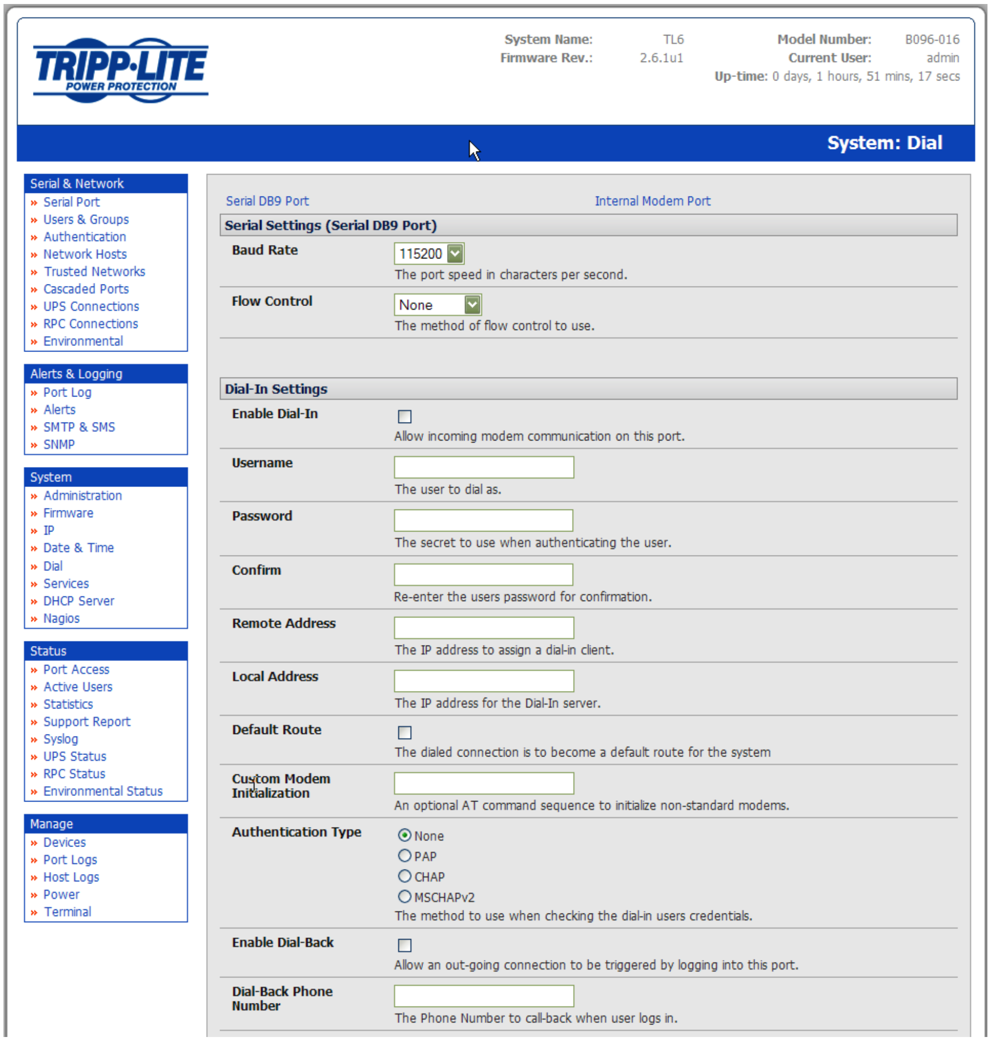
Then remote Administrator's must be configured to dial-in and must establish a network connection to the Console Server.



Note The B096-048/016 Console Servers have an internal modem for dial-up OoB access. The B092-016 Console Servers need an external modem to be attached via a serial cable to their DB9 port.

5.1.1 Configure dial-in PPP

To enable dial-in PPP access on the Console Server modem port/ internal modem:



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 1 hours, 51 mins, 17 secs

System: Dial

Serial Settings (Serial DB9 Port)

Baud Rate: 115200
The port speed in characters per second.

Flow Control: None
The method of flow control to use.

Dial-In Settings

Enable Dial-In: □
Allow incoming modem communication on this port.

Username:
The user to dial as.

Password:
The secret to use when authenticating the user.

Confirm:
Re-enter the users password for confirmation.

Remote Address:
The IP address to assign a dial-in client.

Local Address:
The IP address for the Dial-In server.

Default Route: □
The dialed connection is to become a default route for the system

Custom Modem Initialization:
An optional AT command sequence to initialize non-standard modems.

Authentication Type: ● None ○ PAP ○ CHAP ○ MSCHAPv2
The method to use when checking the dial-in users credentials.

Enable Dial-Back: □
Allow an out-going connection to be triggered by logging into this port.

Dial-Back Phone Number:
The Phone Number to call-back when user logs in.

- Select the **System: Dial** menu option and the port to be configured (**Serial DB9 Port** or **Internal Modem Port**)

Note The Console Server's console/modem serial port is set by default to 115200 baud, No parity, 8 data bits and 1 stop bit, with software (Xon-Xoff) flow control enabled. You can modify the baud rate and flow control using the Management Console. You can further configure the console/modem port settings by editing */etc/mgetty.config* files as described in *Chapter 14.*

- Select the **Baud Rate** and **Flow Control** that will communicate with the modem
- Check the **Enable Dial-In Access** box
- Enter the **User name** and **Password** to be used for the dial-in PPP link
- In the **Remote Address** field, enter the IP address to be assigned to the dial-in client. You can select any address for the Remote IP Address. However, it and the Local IP Address must both be in the same network range (*e.g.* 200.100.1.12 and 200.100.1.67)
- In the **Local Address** field, enter the IP address for the Dial-In PPP Server. This is the IP address that will be used by the remote client to access Console Server once the modem connection is

established. Again, you can select any address for the Local IP Address but both must be in the same network range as the Remote IP Address

- The **Default Route** option enables the dialed PPP connection to become the default route for the Console Server
- The **Custom Modem Initialization** option allows a custom AT string modem initialization string to be entered (*e.g*. AT&C1&D3&K3)
- Then select the **Authentication Type** to be applied to the dial-in connection. The Console Server uses authentication to challenge Administrators who dial-in to the Console Server. (For dial-in access, the username and password received from the dial-in client are verified against the local authentication database stored on the Console Server). The Administrator must also have their client computer configured to use the selected authentication scheme. Select **PAP CHAP MSCHAPv2** or **None** and click **Apply**

None With this selection, no username or password authentication is required for dial-in access. This is not recommended.

PAP Password Authentication Protocol (PAP) is the usual method of user authentication used on the internet: sending a username and password to a server where they are compared with a table of authorized users. Whilst most common, PAP is the least secure of the authentication options.

CHAP Challenge-Handshake Authentication Protocol (CHAP) is used to verify a user's name and password for PPP Internet connections. It is more secure than PAP, the other main authentication protocol.

MSCHAPv2 Microsoft Challenge Handshake Authentication Protocol (MSCHAP) is authentication for PPP connections between a computer using a Microsoft Windows operating system and a network access server. It is more secure than PAP or CHAP, and is the only option that also supports data encryption

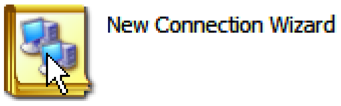
- Console Servers all support dial-back for additional security. Check the **Enable Dial-Back** box and enter the phone number to be called to re-establish an OoB link once a dial-in connection has been logged

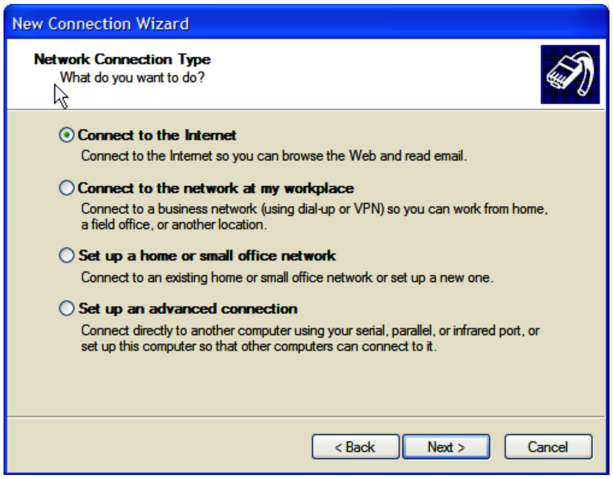
5.1.2 Using SDT Connector client for dial-in

Administrators can use their *SDT Connector* client to set up secure OoB dial-in access to all their remote Console Servers. With a point and click you can initiate a dial-up connection. Refer to *Chapter 6.5.*

5.1.3 Set up Windows XP/ 2003/Vista client for dial-in

- Open **Network Connections** in Control Panel and click the **New Connection Wizard**




New Connection Wizard

Network Connection Type

What do you want to do?

● Connect to the Internet

Connect to the Internet so you can browse the Web and read email.

○ Connect to the network at my workplace

Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.

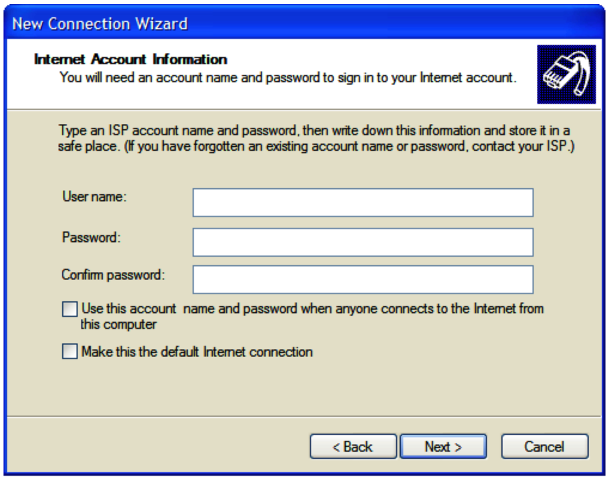
○ Set up a home or small office network

Connect to an existing home or small office network or set up a new one.

○ Set up an advanced connection

Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.

- Select **Connect to the Internet** and click **Next**
- On the **Getting Ready** screen select **Set Up My Connection Manually** and click **Next**
- On the **Internet Connection** screen select **Connect Using a Dial-Up Modem** and click **Next**
- Enter a **Connection Name** (any name you choose) and the dial-up **Phone Number** that will connect thru to the Console Server modem


New Connection Wizard

Internet Account Information

You will need an account name and password to sign in to your Internet account.

Type an ISP account name and password, then write down this information and store it in a safe place. (If you have forgotten an existing account name or password, contact your ISP.)

User name:

Password:

Confirm password:

□ Use this account name and password when anyone connects to the Internet from this computer

□ Make this the default Internet connection

- Enter the PPP **User Name** and **Password** for have set up for the Console Server

5.1.4 Set up earlier Windows clients for dial-in

- For Windows 2000, the PPP client set up procedure is the same as above, except you get to the **Dial-Up Networking Folder** by clicking the **Start** button and selecting **Settings.** Then click **Network and Dial-up Connections** and click **Make New Connection**
- Similarly, for Windows 98, you double-click **My Computer** on the Desktop, then open **Dial-Up Networking** and double click **Make New Connection** and proceed as above

5.1.5 Set up Linux clients for dial-in

The online tutorial http://www.yolinux.com/TUTORIALS/LinuxTutorialPPP.html presents a selection of methods for establishing a dial up PPP connection:

- Command line PPP and manual configuration (which works with any Linux distribution)
- Using the *Linuxconf* configuration tool (for Red Hat compatible distributions). This configures the scripts *ifup/ifdown* to start and stop a PPP connection
- Using the Gnome control panel configuration tool -
- WVDIAL and the Redhat "Dialup configuration tool"
- GUI dial program X-isp. Download/Installation/Configuration

Note For all PPP clients:

- Set the PPP link up with TCP/IP as the only protocol enabled
- Specify that the Server will assign IP address and do DNS
- Do not set up the Console Server PPP link as the default for Internet connection

5.2 OoB Broadband Access (B096-048/016 only)

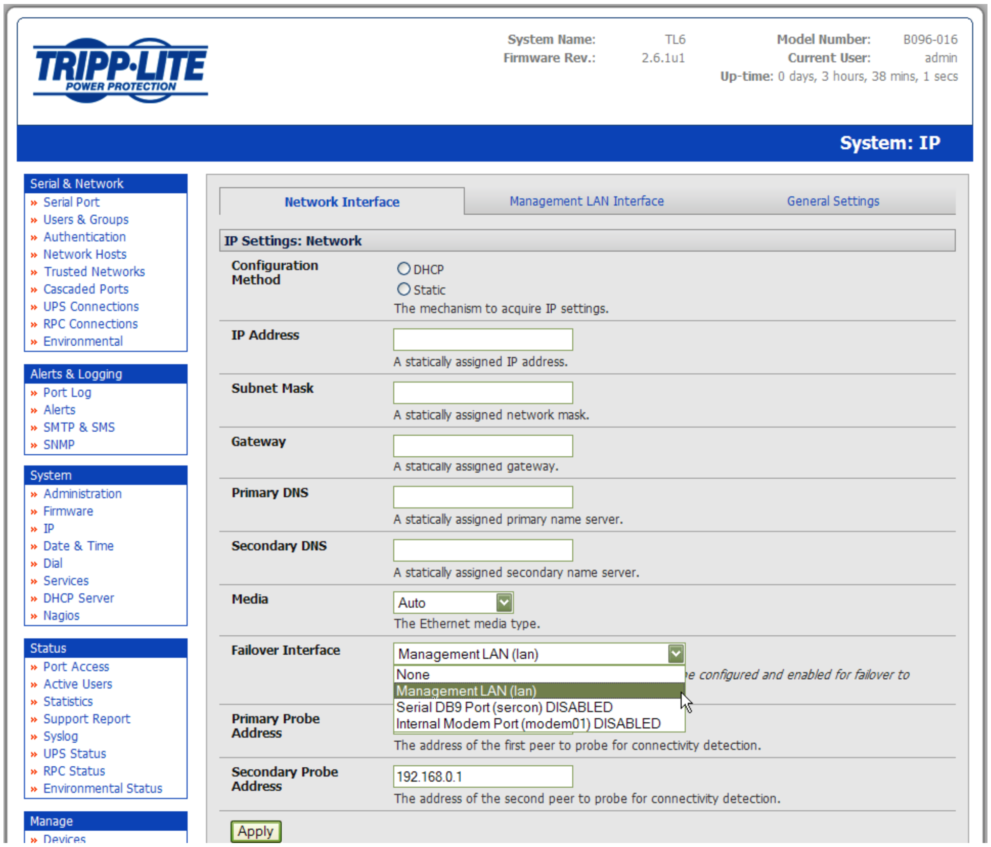
The B096-048/016 Console Server Management Switch has a second Ethernet network port that can be configured for alternate and OoB (out-of-band) broadband access. With two active broadband access paths to the Console Server, in the event you are unable to access through the primary management network, you may still have access through the alternate broadband path (e.g. a T1 link):

- ➢ On the **System: IP** menu, select **Management LAN Interface** and configure the **IP Address, Subnet Mask**, **Gateway** and **DNS** with the access settings that relate to the alternate link

- ➢ Ensure that when configuring the principal **Network Interface** connection, you set the **Failover Interface** to *None*

5.3 Broadband Ethernet Failover (B096-048/016 only)

The second Ethernet port on the B096-048/016 Console Server Management Switch can also be configured for failover to ensure transparent high availability.



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 3 hours, 38 mins, 1 secs

System: IP

IP Settings: Network

Configuration Method ○ DHCP ○ Static
The mechanism to acquire IP settings.

IP Address
A statically assigned IP address.

Subnet Mask
A statically assigned network mask.

Gateway
A statically assigned gateway.

Primary DNS
A statically assigned primary name server.

Secondary DNS
A statically assigned secondary name server.

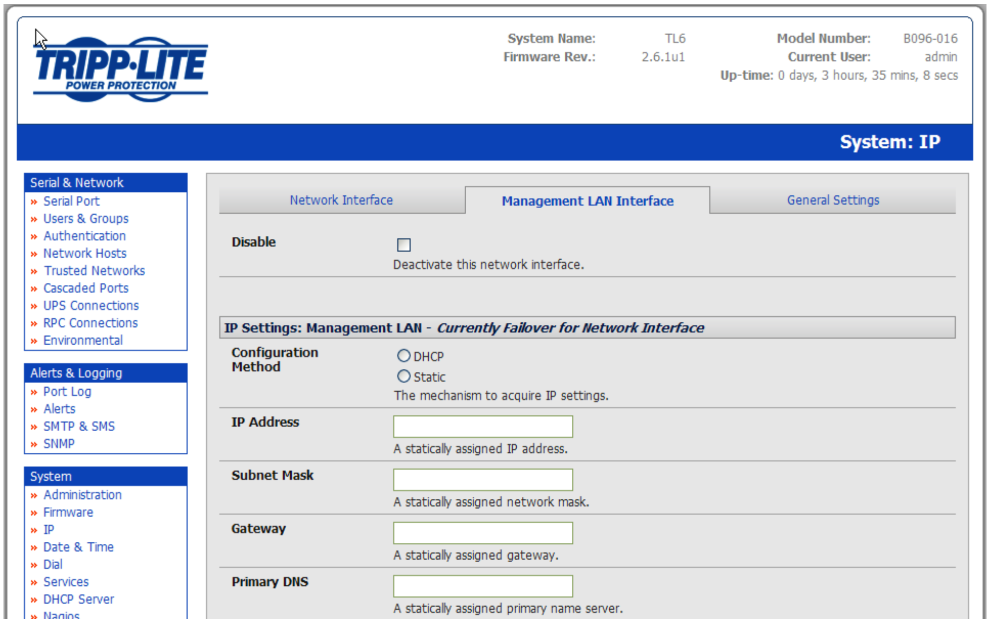
Media: Auto
The Ethernet media type.

Failover Interface: Management LAN (lan)
None
Management LAN (lan)
Serial DB9 Port (sercon) DISABLED
Internal Modem Port (modem01) DISABLED
e configured and enabled for failover to

Primary Probe Address
The address of the first peer to probe for connectivity detection.

Secondary Probe Address: 192.168.0.1
The address of the second peer to probe for connectivity detection.

- When configuring the principal network connection on the **System: IP Network Interface** menu, select **Management LAN** (eth1) as the **Failover Interface** to be used when a fault has been detected with main Network Interface (eth0)
- Specify the **Probe Addresses** of two sites (the **Primary** and **Secondary**) that the B096-048/016 is to *ping* to determine if Network (eth0) is still operational



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 3 hours, 35 mins, 8 secs

System: IP

Disable □
Deactivate this network interface.

IP Settings: Management LAN - *Currently Failover for Network Interface*

Configuration Method ○ DHCP ○ Static
The mechanism to acquire IP settings.

IP Address
A statically assigned IP address.

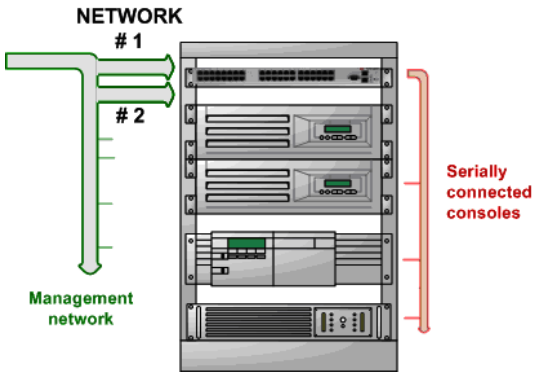
Subnet Mask
A statically assigned network mask.

Gateway
A statically assigned gateway.

Primary DNS
A statically assigned primary name server.

- Then configure **Management LAN Interface** (**eth1**) with the same IP setting that you used for the main **Network Interface** (**eth0**) to ensure transparent redundancy

Redundant LAN connection



In this mode, Network 2 (eth1) is available as the transparent back-up port to Network 1 (eth0) for accessing the management network. Network 2 will automatically and transparently take over the work of Network 1 if for any reason Network 1 becomes unavailable. And when Network 1 becomes available again, it takes over the work again.

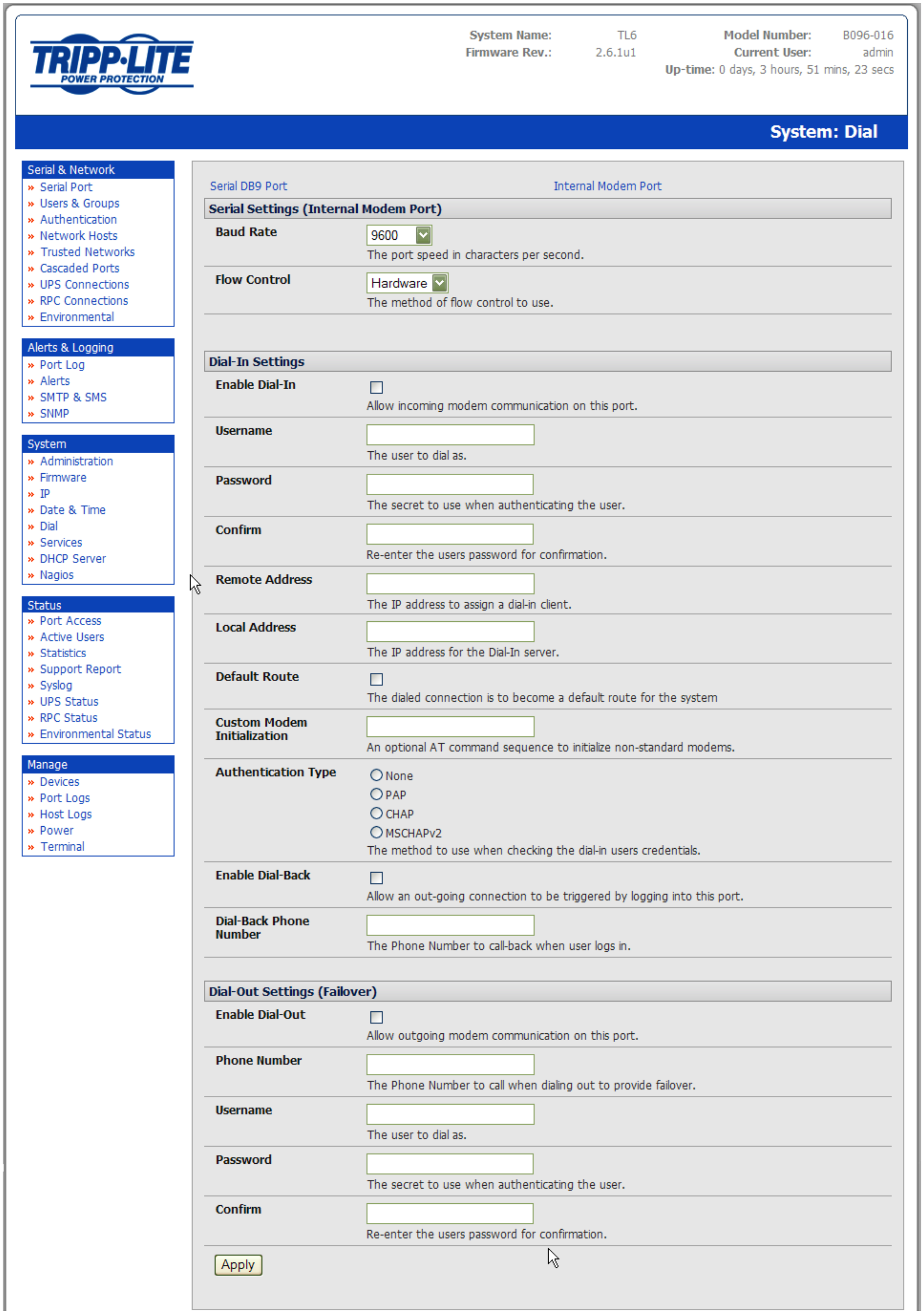
5.4 Dial-Out Failover

The Console Servers can be configured so a dial-out PPP connection is automatically set up in the event of a disruption in the principal management network:

- When configuring the principal network connection in **System: IP**, specify **Internal Modem** (or the **Dial Serial DB9** if using an external modem on the Console port) as the **Failover Interface** to be used when a fault has been detected with Network1 (eth0)
- Specify the **Probe Addresses** of two sites (the **Primary** and **Secondary**) that the Console Server is to *ping* to determine if Network1 is still operational
- Select the **System: Dial** menu option and the port to be configured (**Serial DB9 Port** or **Internal Modem Port**)
- Select the **Baud Rate** and **Flow Control** that will communicate with the modem

Note You can further configure the console/modem port (*e.g.* to include *modem init* strings) by editing */etc/mgetty.config* files as described in Chapter 13.

- Check the **Enable Dial-Out Access** box and enter the access details for the remote PPP server to be called



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 3 hours, 51 mins, 23 secs

System: Dial

Serial Settings (Internal Modem Port)

Baud Rate 9600
The port speed in characters per second.

Flow Control Hardware
The method of flow control to use.

Dial-In Settings

Enable Dial-In □
Allow incoming modem communication on this port.

Username
The user to dial as.

Password
The secret to use when authenticating the user.

Confirm
Re-enter the users password for confirmation.

Remote Address
The IP address to assign a dial-in client.

Local Address
The IP address for the Dial-In server.

Default Route □
The dialed connection is to become a default route for the system

Custom Modem Initialization
An optional AT command sequence to initialize non-standard modems.

Authentication Type
○ None
○ PAP
○ CHAP
○ MSCHAPv2
The method to use when checking the dial-in users credentials.

Enable Dial-Back □
Allow an out-going connection to be triggered by logging into this port.

Dial-Back Phone Number
The Phone Number to call-back when user logs in.

Dial-Out Settings (Failover)

Enable Dial-Out □
Allow outgoing modem communication on this port.

Phone Number
The Phone Number to call when dialing out to provide failover.

Username
The user to dial as.

Password
The secret to use when authenticating the user.

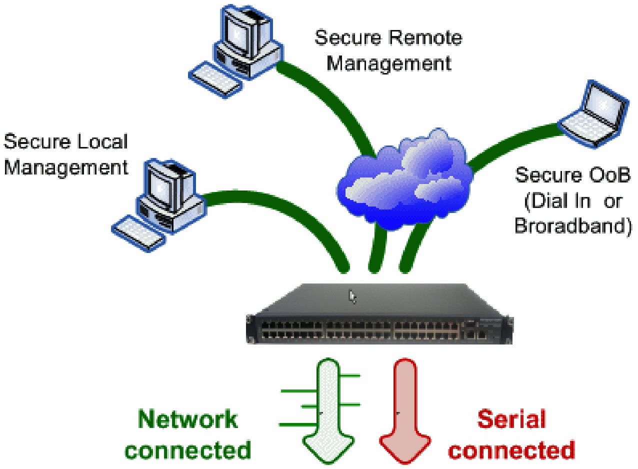
Confirm
Re-enter the users password for confirmation.

6. SECURE TUNNELING AND SDT CONNECTOR

Introduction

Each Console Server has an embedded SSH server and uses SSH tunneling. This enables one Console Server to securely manage all the systems and network devices in the data center, using text-based console tools (such as SSH, Telnet, SoL) or graphical desktop tools (VNC, RDP, HTTPS, HTTP, X11, VMware, DRAC, iLO etc).

To set up Secure Tunnel access, the computer being accessed can be located on the same local network as the Console Server, or attached to the Console Server via its serial COM port. The remote User/Administrator then connects to the Console Server through an SSH tunnel (via dial-up, wireless or ISDN modem); a broadband Internet connection; an enterprise VPN network or a local network.



To set up the secure SSH tunnel from the Client computer to the Console Server, you must install and launch SSH client software on the User/Administrator's computer. It is recommended that you use the *SDT Connector* client software supplied with the Console Server to do this. *SDT Connector* is simple to install and it auto-configures. It provides all your users with point-and-click access to all the systems and devices in the secure network. With one click, *SDT Connector* sets up a secure SSH tunnel from the client to the selected Console Server and then establishes a port forward connection to the target network connected host or serial connected device. It will then execute the client application that will be used in communicating with the host.

This chapter details the basic SDT Connector operations:

- Configuring the Console Server for SSH tunneled access to network attached hosts and setting up permitted Services and Users access (*Section 6.1*)
- Setting up the SDT Connector client with gateway, host, service and client application details and making connections between the Client computer and hosts connected to the Console Server (*Section 6.2*)
- Using SDT Connector to browser access the Management Console (*Section 6.3*)

- Using SDT Connector to Telnet or SSH connect to devices that are serially attached to the Console Server (*Section 6.4*)

The chapter then covers more advanced SDT Connector and SDT tunneling topics:

- Using SDT Connector for out of band access (*Section 6.5*)
- Automatic importing and exporting of configurations (*Section 6.6*)
- Configuring Public Key Authentication (*Section 6.7*)
- Setting up a SDT Secure Tunnel for Remote Desktop (*Section 6.8*)
- Setting up a SDT Secure Tunnel for VNC (*Section 6.9*)
- Using SDT to IP connect to hosts that are serially attached to the Console Server (*Section 6.10*)

6.1 Configuring for SDT Tunneling to Hosts

To set up the Console Server to SDT access a network attached *host*, the *host* and the permitted *services* that are to be used in accessing that host need to be configured on the gateway, and User access privileges need to be specified:

➢ Add the new *host* and the *permitted services* using the **Serial & Network: Network Hosts** menu as detailed in *Network Hosts (Chapter 4.4).* Only these *permitted services* will be forwarded by SDT to the *host*. All other services (TCP/UDP ports) will be blocked.

Note Following are some of the TCP Ports used by SDT in the Console Server:

22	SSH (All SDT Tunneled connections)
23	Telnet on local LAN (forwarded inside tunnel)
80	HTTP on local LAN (forwarded inside tunnel)
3389	RDP on local LAN (forwarded inside tunnel)
5900	VNC on local LAN (forwarded inside tunnel)
73XX	RDP over serial from local LAN – where XX is the serial port number (i.e. 7301to 7348)
79XX	VNC over serial from local LAN – where XX is the serial port number

➢ Add the new *Users* using **Serial & Network: Users & Groups** menu as detailed in *Network Hosts (Chapter 4.4).* Users can be authorized to access the Console Server ports and specified network-attached hosts. To simplify configuration, the Administrator can first set up *Groups* with group access permissions, then Users can be classified as members of particular *Groups*.

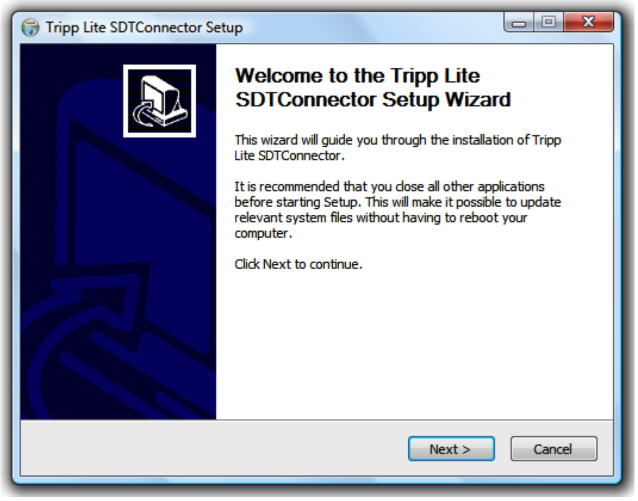
6.2 SDT Connector Configuration

The *SDT Connector* client works with all Console Servers. Each of these remote Console Servers has an embedded OpenSSH based server. This server can be configured to *port forward* connections from the *SDT Connector* client to hosts on their local network, as detailed in the previous chapter. The *SDT Connector* can also be pre-configured with the access tools and applications that will be available when access to a particular host has been established.

SDT Connector can connect to the Console Server using an alternate OoB access. It can also be configured to access the Console Server itself and to access devices connected to serial ports on the Console Server.

6.2.1 SDT Connector client installation

- The *SDT Connector* set up program (***SDTConnector Setup-1.n.exe*** or ***sdtcon-1.n.tar.gz***) is included on the CD supplied with your Console Server
- Run the set-up program:



Welcome to the Tripp Lite SDTConnector Setup Wizard

This wizard will guide you through the installation of Tripp Lite SDTConnector.

It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.

Click Next to continue.

Note For Windows clients, the *SDTConnectorSetup-1.n.exe* application will install the *SDT Connector 1.n.exe* and the config file *defaults.xml.* If a config file already exists on the Windows computer, then it will not be overwritten. To remove an earlier config file, run the *regedit* command, search for “SDT Connector” and then remove the directory with this name.

For Linux and other Unix clients, *SDTConnector.tar.gz* application will install the *sdtcon-1.n.jar* and the config file *defaults.xml*

Once the installer completes, you will have a working *SDT Connector* client installed on your machine and an icon on your desktop:

- Click the *SDT Connector* icon on your desktop to start the client

Note *SDT Connector* is a Java application so it must have a Java Runtime Environment (JRE) installed. This can be freely downloaded from http://java.sun.com/j2se/ . It will install on Windows 2000, XP, 2003, Vista computers and on most Linux platforms. Solaris platforms are also supported however they must have Firefox installed. *SDT Connector* can run on any system with Java 1.4.2 and above installed, but it assumes the web browser is Firefox, and that *xterm -e Telnet* opens a Telnet window

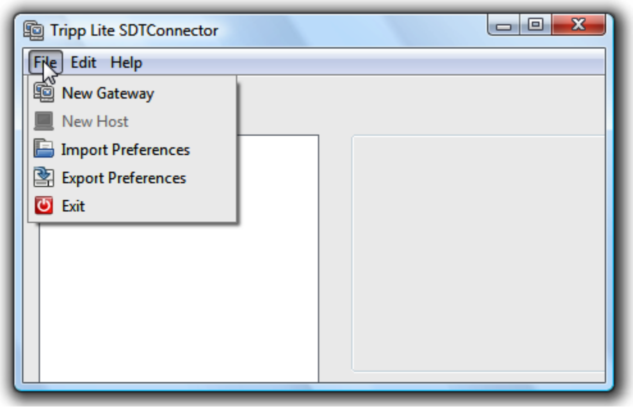
To operate *SDT Connector,* add the new gateways to the client software by entering the access details for each Console Server (refer to *Section 6.2.2*). Then let the client auto-configure with all host and serial port connections from each Console Server (refer *Section 6.2.3*). Now point-and-click to connect to the Hosts and serial devices (refer to *Section 6.2.4*)

Alternately you can manually add network connected hosts (refer *Section 6.2.5*) as well as manually configure new services to be used when accessing the Console Server and the hosts (refer *Section 6.2.6*). Manually configure clients to run on the computer that will use the service to connect to the hosts and serial port devices (refer to *Section 6.2.7 and 6.2.9*). *SDT Connector* can also be set up to make an out-of-band connection to the Console Server (refer to *Section 6.2.9*)

6.2.2 Configuring a new gateway in the SDT Connector client

To create a secure SSH tunnel to a new Console Server:

- Click the *New Gateway* icon or select the **File: New Gateway** menu option

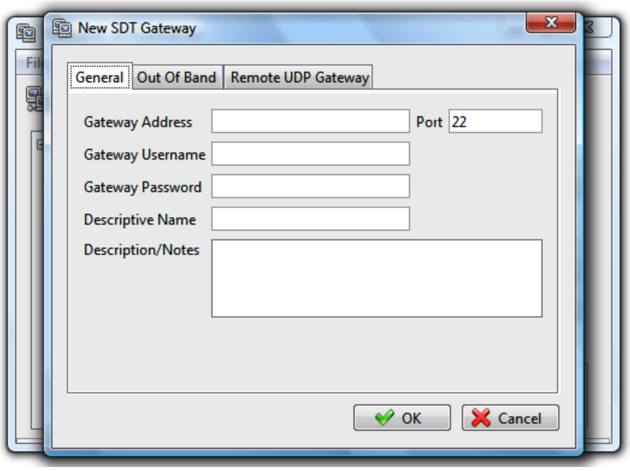


- Enter the IP or DNS **Address** of the Console Server and the SSH port that will be used (typically 22)

Note If *SDT Connector* is connecting to a remote Console Server through the public Internet or routed network, you will need to:

- Determine *the public IP address* of the Console Server (or of the router/ firewall that connects the Console Server to the Internet) as assigned by the ISP. One way to find the public IP address is to access http://checkip.dyndns.org/ or http://www.whatismyip.com/ from a computer on the same network as the Console Server and note the reported IP address
- Set port forwarding for TCP port 22 through any firewall/NAT/router that is located between *SDT Connector* and the Console Server so that it points to the Console Server. http://www.portforward.com has port forwarding instructions for a range of routers. Also you can use the Open Port Check tool from http://www.canyouseeme.org to check if port forwarding through local firewall/NAT/router devices has been properly configured

- Enter the **Username** and **Password** of a user on the gateway that has been enabled to connect via SSH and/or create SSH port redirections



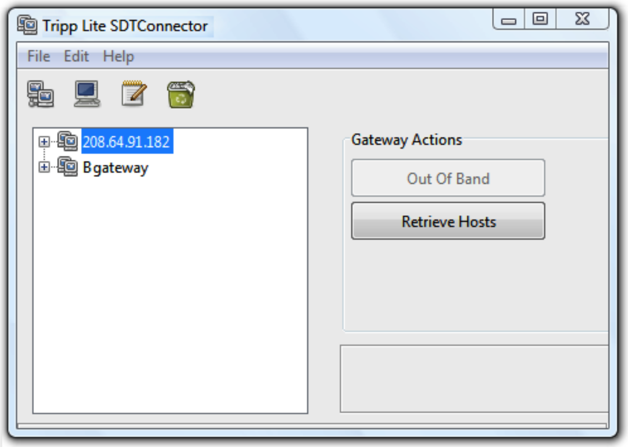
Port 22

- Optionally, you can enter a **Descriptive Name** to display instead of the IP or DNS address, and any **Notes** or a **Description** of this gateway (such as its firmware version, site location or anything special about its network configuration).
- Click **OK** and an icon for the new gateway will now appear in the *SDT Connector* home page

Note For an *SDT Connector* user to access a Console Server (and then access specific hosts or serial devices connected to that Console Server), that user must first be set up on the Console Server, and must be authorized to access the specific ports / hosts (refer to Chapter 5). Only these *permitted services* will be forwarded through by SDT to the Host. All other services (TCP/UDP ports) will be blocked.

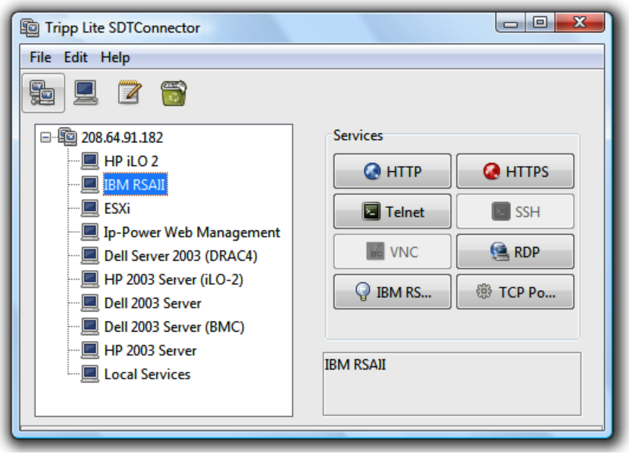
6.2.3 Auto-configure SDT Connector client with the user's access privileges

Each user on the Console Server has an access profile. This has been configured with the specific connected hosts and serial port devices the user has authority to access, and a specific set of the enabled services for each of them. This configuration can be auto-uploaded into the SDT Connector client:



- Click on the new gateway icon and select **Retrieve Hosts**. This will:

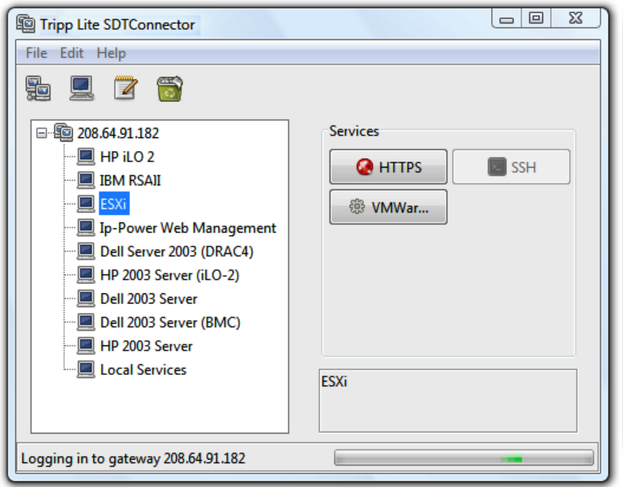
- configure access to network-connected Hosts that the user is authorized to access and set up (for each of these Hosts) the services (e.g. HTTPS, IPMI2.0) and the related IP ports being redirected
- configure access to the Console Server itself (this is shown as a *Local Services* host)
- configure access with the enabled services for the serial port devices connected to the Console Server



Note The Retrieve Hosts function will auto-configure all classes of user (i.e. they can be members of *user* or *admin* or some other group or no group). SDT Connector will, however, not auto-configure the *root* (and it is recommended that this account is only used for initial config and for adding an initial *admin* account to the Console Server)

6.2.4 Make an SDT connection through the gateway to a host

➢ Simply ***point*** at the host to be accessed ***and click*** on the service to be used in accessing that host. The SSH tunnel to the gateway is then automatically established, the appropriate ports redirected through to the host, and the appropriate local client application is launched pointing at the local endpoint of the redirection:



Logging in to gateway 208.64.91.182

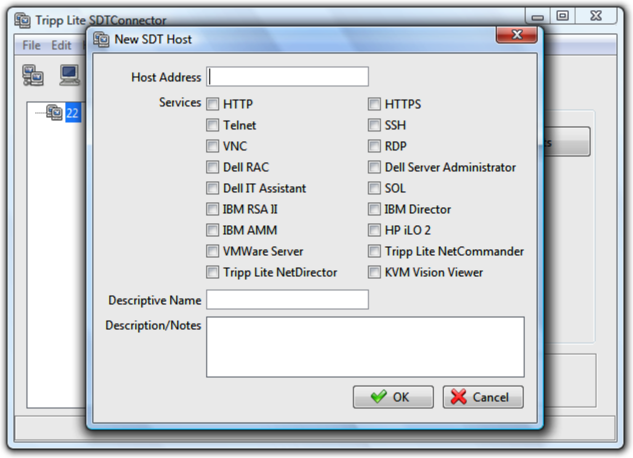
Note The SDT Connector client can be configured with an unlimited number of Gateways. Each Gateway can be configured to port forward to an unlimited number of locally networked Hosts. Similarly there is no limit on the number of SDT Connector clients who can be configured to access the one Gateway. There are also no limits on the number of Host connections that an SDT Connector client can concurrently have open through the one Gateway tunnel.

However, there is a limit on the number of SDT Connector SSH tunnels that can be open at one time on a particular Gateway. The B096-016 / B096-048 Console Server Management Switch and B092-016 Console Server with PowerAlert each support at least 50 such concurrent connections. So for a site with a B096-016 gateway you can have, at any time, up to 50 users securely controlling an unlimited number of network attached computers, power devices and other appliances (routers, etc) at that site.

6.2.5 Manually adding hosts to the SDT Connector gateway

For each gateway, you can manually specify the network connected hosts that will be accessed through that Console Server; and for each host, specify the services that will used in communicating with the host

- Select the newly added gateway and click the *Host* icon to create a host that will be accessible via this gateway. (Alternatively select **File: New Host**)



New SDT Host

Host Address

Services
☐ HTTP ☐ HTTPS
☐ Telnet ☐ SSH
☐ VNC ☐ RDP
☐ Dell RAC ☐ Dell Server Administrator
☐ Dell IT Assistant ☐ SOL
☐ IBM RSA II ☐ IBM Director
☐ IBM AMM ☐ HP iLO 2
☐ VMWare Server ☐ Tripp Lite NetCommander
☐ Tripp Lite NetDirector ☐ KVM Vision Viewer

Descriptive Name

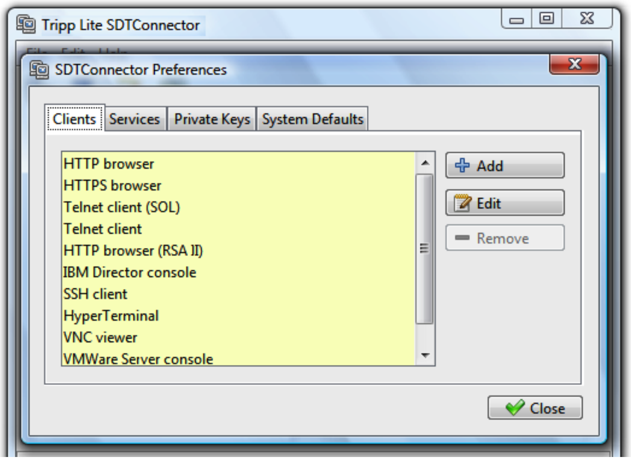
Description/Notes

- Enter the IP or DNS **Host Address** of the host (if this is a DNS address, it must be resolvable by the gateway)
- Select which **Services** are to be used when accessing the new host. A range of service options are pre-configured in the default *SDT Connector* client (RDP, VNC, HTTP, HTTPS, Dell RAC, VMWare etc). However if you wish to add new services to the range then proceed to the next section (**Adding a new service**) then return here
- Optionally, you can enter a **Descriptive Name** for the host to be displayed instead of the IP or DNS address, as well as any **Notes** or a **Description** of this host (such as its operating system/release, or anything special about its configuration)
- Click **OK**

6.2.6 Manually adding new services to the new hosts

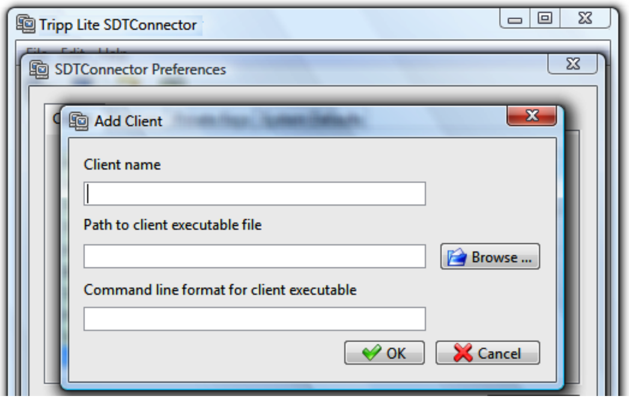
To extend the range of services that can be used when accessing hosts with *SDT Connector*:

- Select **Edit: Preferences** and click the **Services** tab. Click **Add**
- Enter a **Service Name** and click **Add**
- Under the **General** tab, enter the TCP Port that this service runs on (e.g. 80 for HTTP). Optionally, select the client to be used to access the local endpoint of the redirection



HTTP browser
HTTPS browser
Telnet client (SOL)
Telnet client
HTTP browser (RSA II)
IBM Director console
SSH client
HyperTerminal
VNC viewer
VMWare Server console

- Select which **Client** application is associated with the new service. A range of client application options are pre-configured in the default *SDT Connector* (RDP client, VNC client, HTTP browser, HTTPS browser, Telnet client etc). However if you wish to add new client applications to this range, then proceed to the next section (**Adding a new client**) and then return here



Client name

Path to client executable file

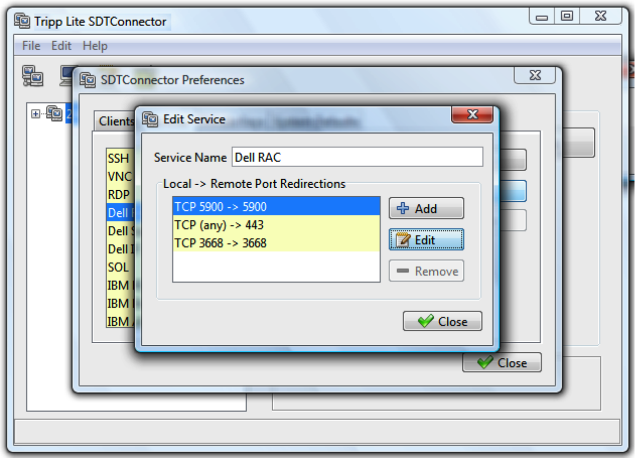
Command line format for client executable

- Click **OK**, then **Close**

A service typically consists of a single SSH port redirection and a local client to access it. However it may consist of several redirections; some or all of which may have clients associated with them.

An example is the Dell RAC service. The first redirection is for the HTTPS connection to the RAC server: it has a client associated with it (web browser) that is launched immediately upon clicking the button for this service.

The second redirection is for the VNC service that the user may choose to launch later from the RAC web console. It automatically loads in a Java client served through the web browser, so it does not need a local client associated with it.



Service Name: Dell RAC

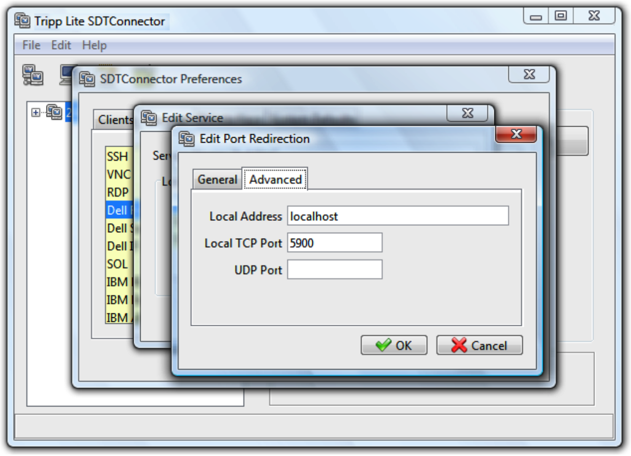
Local -> Remote Port Redirections

TCP 5900 -> 5900
TCP (any) -> 443
TCP 3668 -> 3668

- ➢ On the Add Service screen, you can click **Add** as many times as needed to add multiple new port redirections and associated clients

You may also specify **Advanced** port redirection options:

- ➢ Enter the local address to bind to when creating the local endpoint of the redirection. It is not usually necessary to change this from "localhost".
- ➢ Enter a local TCP port to bind to when creating the local endpoint of the redirection. If this is left blank, a random port will be selected.



Local Address: localhost
Local TCP Port: 5900
UDP Port:

Note *SDT Connector* can also tunnel UDP services. *SDT Connector* tunnels the UDP traffic through the TCP SSH redirection, so in effect it is a tunnel within a tunnel.

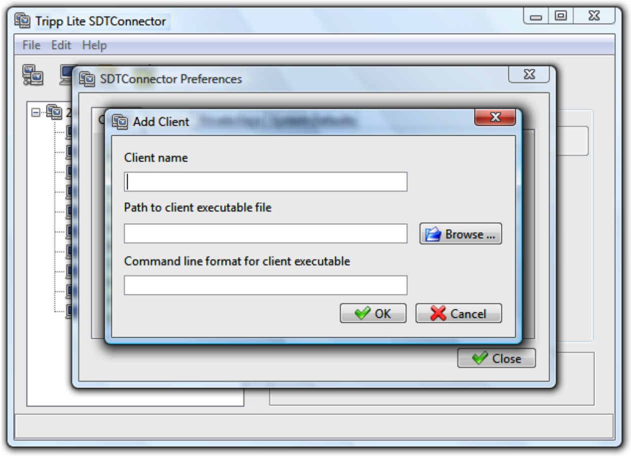
Enter the UDP port on which the service is running on the host. This will also be the local UDP port that *SDT Connector* binds as the local endpoint of the tunnel.

Note that for UDP services, you still need to specify a TCP port under General. This will be an arbitrary TCP port that is not in use on the gateway. An example of this is the SOL Proxy service. It redirects local UDP port 623 to remote UDP port 623 over the arbitrary TCP port 6667

6.2.7 Adding a client program to be started for the new service

Clients are local applications that may be launched when a related service is clicked. To add to the pool of client programs:

- Select **Edit: Preferences** and click the **Client** tab. Click **Add**



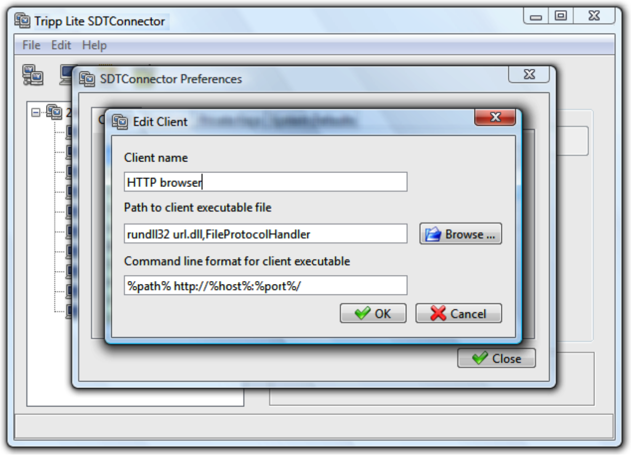
- Enter a **Name** for the client. Enter the **Path** to the executable file for the client (or click **Browse** to locate the executable)
- Enter a **Command Line** associated with launching the client application. *SDT Connector* typically launches a client using command line arguments to point it to the local endpoint of the redirection. There are three special keywords for specifying the command line format. When launching the client, *SDT Connector* substitutes these keywords with the appropriate values:

  %path% is path to the executable file, i.e. the previous field.

  %host% is the local address to which the local endpoint of the redirection is bound, i.e. the Local Address field for the Service redirection Advanced options.

  %port% is the local port to which the local endpoint of the redirection is bound, i.e. the Local TCP Port field for the Service redirection Advanced options. If this port is unspecified (i.e. "Any"), the appropriate randomly selected port will be substituted.

For example, *SDT Connector* is preconfigured for Windows installations with a HTTP service client that will connect with whichever local browser the local Windows user has configured as the default. Otherwise the default browser used is Firefox:



Client name

HTTP browser

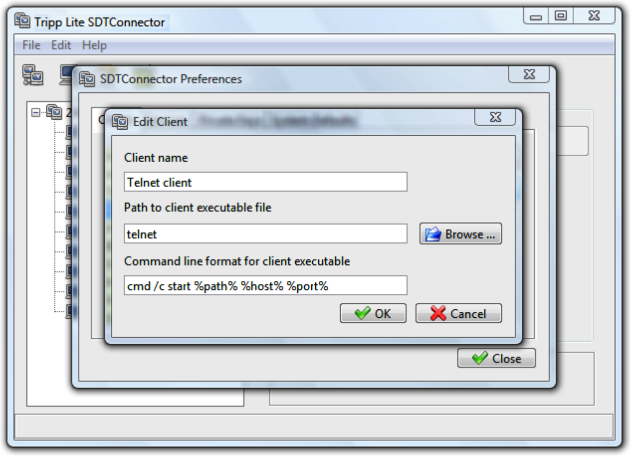
Path to client executable file

rundll32 url.dll,FileProtocolHandler

Command line format for client executable

%path% http://%host%:%port%/

Also some clients are launched in a command line or terminal window. The Telnet client is an example of this:



Client name

Telnet client

Path to client executable file

telnet

Command line format for client executable

cmd /c start %path% %host% %port%

- Click **OK**

6.2.8 Dial-in configuration

If the client computer is dialing into *Local/Console* port on the Console Server, you will need to set up a dial-in PPP link:

- Configure the Console Server for dial-in access (following the steps in the ***Configuring for Dial-In PPP Access*** section in *Chapter 5*, *Configuring Dial In Access*)
- Set up the PPP client software at the remote User computer (following the ***Set up the remote Client*** section in *Chapter 5*)

Once you have a dial-in PPP connection established, you can then set up the secure SSH tunnel from the remote Client computer to the Console Server.

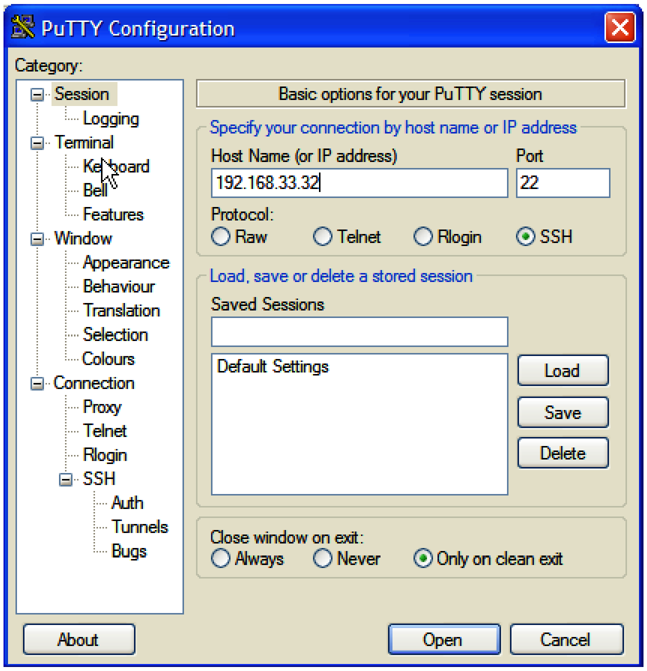
6.2.9 Choosing an alternate SSH client (e.g. PuTTY)

To set up the secure SSH tunnel from the Client computer to the Console Server, you must install and launch SSH client software on the Client computer. As described above it is recommended you use the

SDT Connector client software that is supplied with the gateway. However there is also a wide selection of commercial and free SSH client programs that are supported:

- PuTTY is a complete (though not very user-friendly:) freeware implementation of SSH for Win32 and UNIX platforms
- SSHTerm is a useful open source SSH communications package
- SSH Tectia is a leading end-to-end commercial communications security solution for the enterprise
- Reflection for Secure IT (formerly F-Secure SSH) is another good commercial SSH-based security solution

By way of example, the steps below show the establishment of an SSH connection and then forwarding the RDP port over this SSH connection, using the PuTTY client software:



PuTTY Configuration

Basic options for your PuTTY session

Specify your connection by host name or IP address

Host Name (or IP address): 192.168.33.32

Port: 22

Protocol: ○ Raw ○ Telnet ○ Rlogin ● SSH

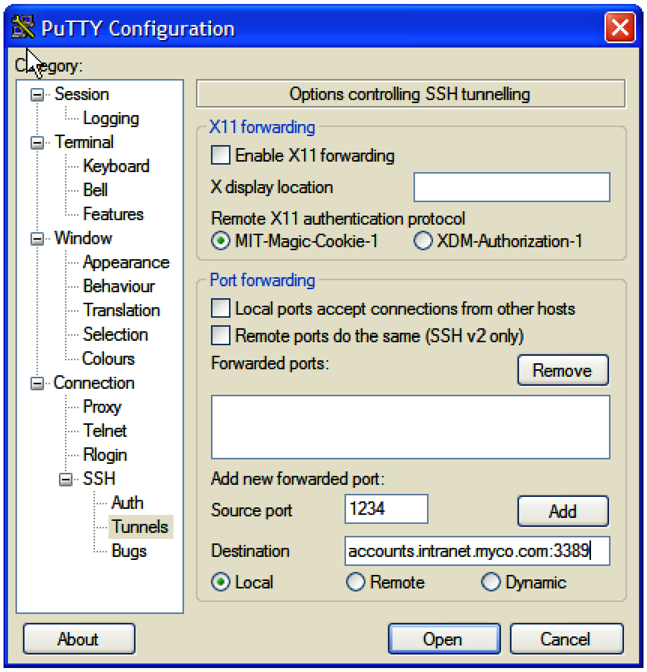
Load, save or delete a stored session

Saved Sessions: Default Settings

Close window on exit: ○ Always ○ Never ● Only on clean exit

- ➢ Under the Session tab, enter the IP address of the Console Server in the **Host Name or IP address** field.
  - For dial-in connections, this IP address will be the **Local** Address that you assigned to the Console Server when you set it up as the Dial-In PPP Server
  - For Internet (or local/VPN connections) connections this will be the public IP address of the Console Server
- ➢ Select the **SSH Protocol**, and the **Port** will be set as 22
- ➢ Under the **SSH -> Tunnels** tab, **Add new forwarded port** specifying the **Source port** as *1234* (or any number you choose)
- ➢ Set the **Destination:**
  - If your destination computer is network-connected to the Console Server, set the Destination as *<SDT Host IP address/DNS Name>:3389.* For example, if the SDT Host IP Address you

specified when setting up the *SDT Hosts* on the Console Server was *accounts.myco.intranet.com*, then specify the Destination as *accounts.myco.intranet.com:3389*



PuTTY Configuration

Category:

Options controlling SSH tunnelling

X11 forwarding

□ Enable X11 forwarding

X display location

Remote X11 authentication protocol

● MIT-Magic-Cookie-1 ○ XDM-Authorization-1

Port forwarding

□ Local ports accept connections from other hosts

□ Remote ports do the same (SSH v2 only)

Forwarded ports:

Add new forwarded port:

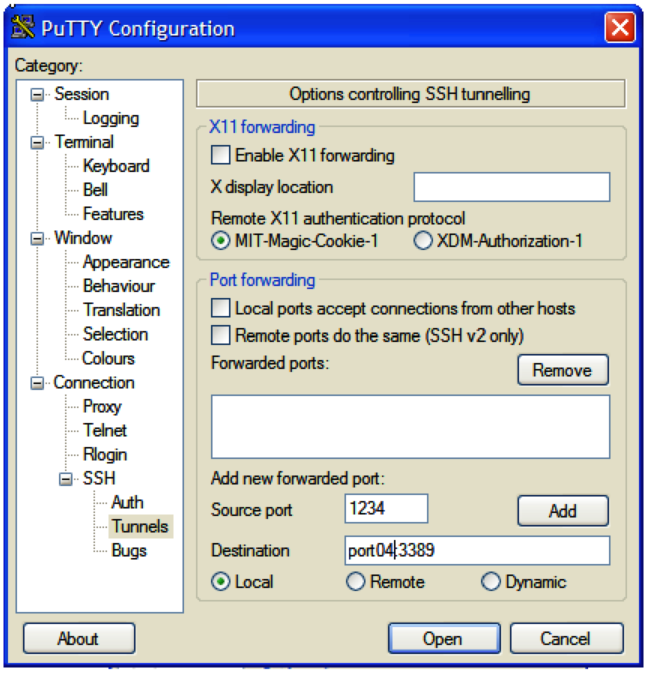
Source port: 1234

Destination: accounts.intranet.myco.com:3389

● Local ○ Remote ○ Dynamic

- If your destination computer is serially connected to the Console Server, set the *Destination* as *<port label>:3389.* For example, if the **Label** you specified on the SDT enabled serial port on the Console Server is *win2k3*, then specify the remote host as *win2k3:3389*. Alternately, you can set the *Destination* as *portXX:3389* where XX is the SDT enabled serial port number. So for example, if port 4 is on the Console Server is to carry the RDP traffic then specify *port04:3389*

Note http://www.jfitz.com/tips/putty_config.html has examples on configuring PuTTY for SSH tunneling



X11 forwarding

□ Enable X11 forwarding

X display location

Remote X11 authentication protocol

● MIT-Magic-Cookie-1 ○ XDM-Authorization-1

Port forwarding

□ Local ports accept connections from other hosts

□ Remote ports do the same (SSH v2 only)

Source port: 1234

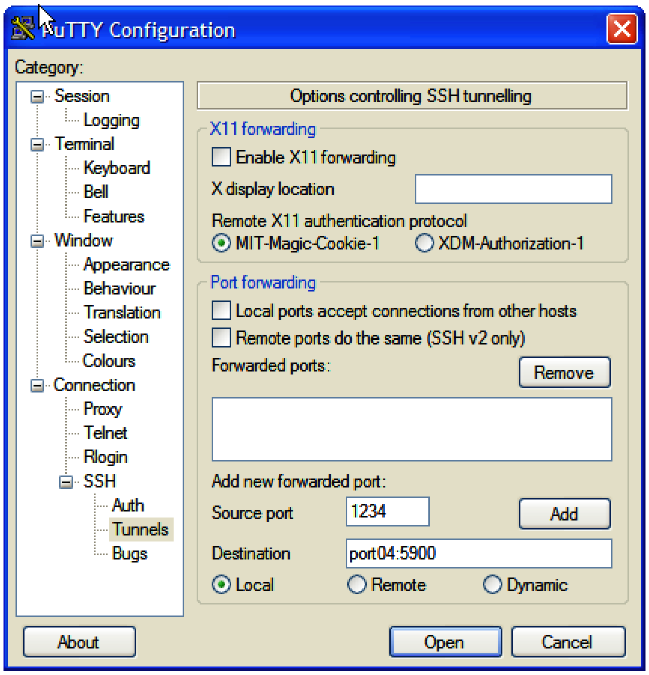
Destination: port04:3389

● Local ○ Remote ○ Dynamic

- ➢ Select **Local** and click the **Add** button
- ➢ Click **Open** to SSH connect the Client computer to the Console Server. You will now be prompted for the Username/Password for the Console Server User you SDT enabled

Note You can also secure the SDT communications from local and enterprise VPN-connected Client computers using SSH as above. This will protect against the risk of the "man in the middle" attacks to which RDP has a vulnerability http://www.securiteam.com/windowsntfocus/5EP010KG0G.html

To set up the secure SSH tunnel from the Client (Viewer) computer to the Console Server for VNC, follow the steps above. However, when configuring the VNC port redirection specify port 5900 (rather than port 3389 as was used for RDP) e.g. if using PuTTY:



□ Enable X11 forwarding

X display location

Remote X11 authentication protocol

● MIT-Magic-Cookie-1 ○ XDM-Authorization-1

□ Local ports accept connections from other hosts

□ Remote ports do the same (SSH v2 only)

Forwarded ports:

Add new forwarded port:

Source port: 1234

Destination: port04:5900

● Local ○ Remote ○ Dynamic

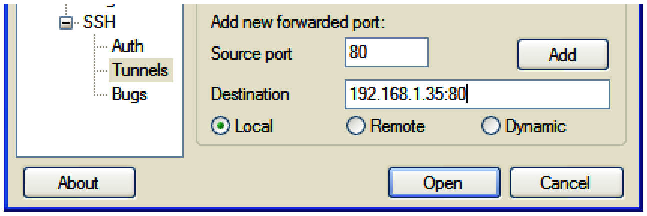
Note How secure is VNC? VNC access generally allows access to your whole computer, so security is very important. VNC uses a random challenge-response system to provide the basic authentication that allows you to connect to a VNC server. This is reasonably secure and the password is not sent over the network.

However, once connected, all subsequent VNC traffic is unencrypted. So a malicious user could snoop your VNC session. Also there are VNC scanning programs available, which will scan a subnet looking for computers which are listening on one of the ports which VNC uses.

Tunneling VNC over a SSH connection ensures all traffic is strongly encrypted. Also no VNC port is ever open to the internet, so anyone scanning for open VNC ports will not be able to find your computers. When tunneling VNC over a SSH connection, the only port which you're opening on your Console Server is the SDT port 22.

So sometimes it may be prudent to tunnel VNC through SSH even when the Viewer computer and the Console Server are both on the same local network.

To set up the secure SSH tunnel for an HTTP browser connection from the client computer, follow the steps above. However when configuring the port redirection, specify port 80 (rather than port 3389 as was used for RDP) e.g. if using PuTTY:



Add new forwarded port:

Source port: 80

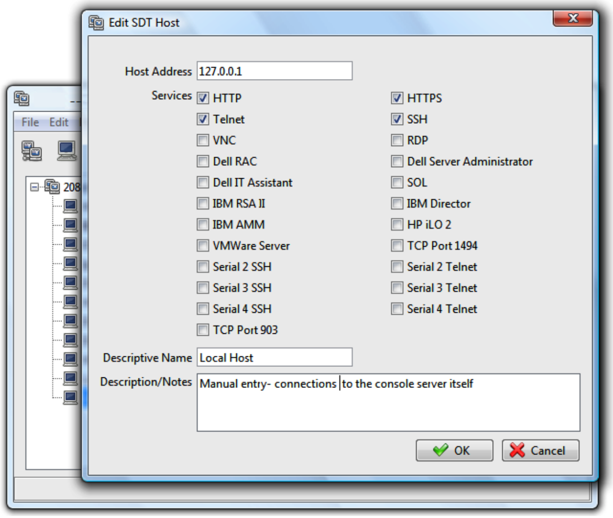
Destination: 192.168.1.35:80

● Local ○ Remote ○ Dynamic

6.3 SDT Connector to Management Console

SDT Connector can also be configured for browser access to the gateway's Management Console – and for Telnet or SSH access to the gateway command line. For these connections to the gateway itself, you must configure *SDT Connector* to access the gateway (itself) by setting the Console Server up as a *host*, and then configuring the appropriate services:

- Launch *SDT Connector* on your computer. Assuming you have already set up the Console Server as a *Gateway* in your *SDT Connector* client (with *username/ password* etc), select this newly added *Gateway* and click the Host icon to create a host. Alternatively, select **File -> New Host**
- Enter 127.0.0.1 as the **Host Address** and give some details in **Descriptive Name/Notes**. Click OK



Edit SDT Host

Host Address 127.0.0.1

Services

☑ HTTP
☑ Telnet
□ VNC
□ Dell RAC
□ Dell IT Assistant
□ IBM RSA II
□ IBM AMM
□ VMWare Server
□ Serial 2 SSH
□ Serial 3 SSH
□ Serial 4 SSH
□ TCP Port 903

☑ HTTPS
☑ SSH
□ RDP
□ Dell Server Administrator
□ SOL
□ IBM Director
□ HP iLO 2
□ TCP Port 1494
□ Serial 2 Telnet
□ Serial 3 Telnet
□ Serial 4 Telnet

Descriptive Name Local Host

Description/Notes Manual entry- connections to the console server itself

OK Cancel

- Click the **HTTP** or **HTTPS** Services icon to access the gateway's Management Console, and/or click **SSH** or **Telnet** to access the gateway command line console

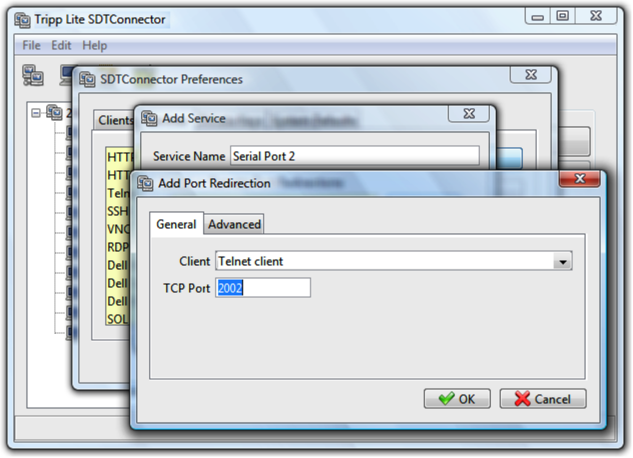
Note: To enable SDT access to the gateway console, you must now configure the Console Server to allow port forwarded network access to itself:

- Browse to the Console Server and select **Network Hosts** from **Serial & Network**. Click **Add Host** and in the **IP Address/DNS Name** field enter 127.0.0.1 (this is the Console Server's network loopback address). Then enter *Loopback* in **Description**
- Remove all entries under **Permitted Services** except for those that will be used in accessing the Management Console (80/http or 443/https) or the command line (22/ssh or 23/Telnet). Scroll to the bottom and click **Apply**
- Administrators by default have gateway access privileges. However for Users to access the gateway Management Console, you will need to give those Users the required access privileges. Select **Users & Groups** from **Serial & Network**. Click **Add User**. Enter a **Username**, **Description** and **Password/Confirm**. Select 127.0.0.1 from **Accessible Host**(s) and click **Apply**

6.4 SDT Connector - Telnet or SSH connect to serially attached devices

SDT Connector can also be used to access text consoles on devices that are attached to the Console Server’s serial ports. For these connections, you must configure the *SDT Connector* client software with a Service that will access the target gateway serial port, and then set the gateway up as a host:

- Launch *SDT Connector* on your computer. Select **Edit -> Preferences** and click the **Services** tab. Click **Add**
- Enter *"Serial Port 2"* in **Service Name** and click **Add**
- Select **Telnet** client as the Client. Enter 2002 in **TCP Port**. Click **OK**, then **Close** and **Close** again



Service Name: Serial Port 2

Client: Telnet client

TCP Port: 2002

- Assuming you have already set up the target Console Server as a *gateway* in your *SDT Connector* client (with *username/ password* etc), select this *gateway* and click the **Host** icon to create a host. Alternatively, select **File -> New Host**.
- Enter 127.0.0.1 as the **Host Address** and select **Serial Port 2** for Service. In **Descriptive Name**, enter something along the lines of Loopback ports, or Local serial ports. Click **OK.**
- Click *Serial Port 2* icon for Telnet access to the serial console on the device attached to serial port #2 on the gateway

To enable *SDT Connector* to access to devices connected to the gateway’s serial ports, you must also configure the Console Server itself to allow port forwarded network access to itself, and enable access to the nominated serial port:

- Browse to the Console Server and select **Serial Port** from **Serial & Network**
- Click **Edit** to selected Port # (e.g. Port 2 if the target device is attached to the second serial port). Ensure the port's serial configuration is appropriate for the attached device
- Scroll down to **Console Server Setting** and select **Console Server Mode**. Check **Telnet** (or SSH) and scroll to the bottom and click **Apply**
- Select **Network Hosts** from **Serial & Network** and click **Add Host**
- In the **IP Address/DNS Name** field, enter *127.0.0.1* (this is the Console Server's network loopback address) and enter *Loopback* in **Description**
- Remove all entries under **Permitted Services** and select **TCP** and enter *200n* in **Port**. (This configures the Telnet port enabled in the previous step, so for Port 2 you would enter *2002*)

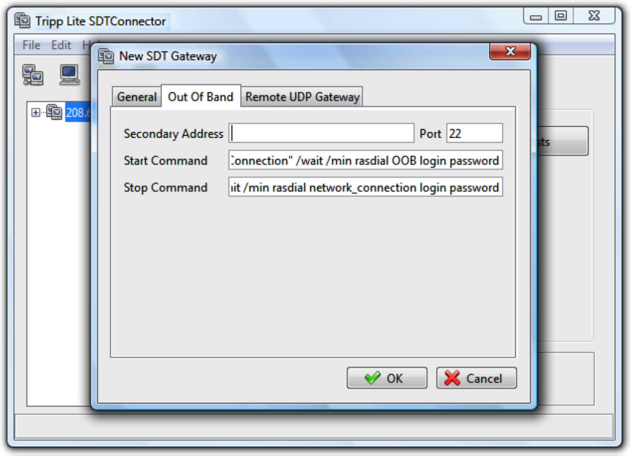
- Click **Add** then scroll to the bottom and click **Apply**
- Administrators by default have gateway and serial port access privileges; however for Users to access the gateway and the serial port, you will need to give those Users the required access privileges. Select **Users & Groups** from **Serial & Network**. Click **Add User**. Enter a **Username**, **Description** and **Password/Confirm**. Select 127.0.0.1 from **Accessible Host**(s) and select Port 2 from Accessible Port(s). Click **Apply.**

6.5 Using SDT Connector for out-of-band connection to the gateway

SDT Connector can also be set up to connect to the Console Server (gateway) via out-of-band (OoB). OoB access uses an alternate path for connecting to the gateway (i.e. not the one used for regular data traffic). OoB access is useful when the primary link into the gateway is unavailable or unreliable.

Typically a gateway's primary link is a broadband Internet connection or Internet connection via a LAN or VPN, and the secondary out-of-band connectivity is provided by a dial-up or wireless modem directly attached to the gateway. So out-of-band access enables you to access the hosts and serial devices on the network, diagnose any connectivity issues, and restore the gateway's primary link.

In *SDT Connector*, OoB access is configured by providing the secondary IP address of the gateway, and telling *SDT Connector* how to start and stop the OoB connection. Starting an OoB connection may be achieved by initiating a dial-up connection, or adding an alternate route to the gateway. *SDT Connector* allows for maximum flexibility by allowing you to provide your own scripts or commands for starting and stopping the OoB connection.



Secondary Address
Port 22
Start Command :onnection" /wait /min rasdial OOB login password
Stop Command iit /min rasdial network_connection login password

To configure *SDT Connector* for OoB access:

- When adding a new gateway or editing an existing gateway, select the **Out Of Band** tab
- Enter the secondary OoB IP address for the gateway (e.g. the IP address to be used when dialing in directly). You may also modify the gateway's SSH port if it's not using the default of 22
- Enter the command or path to a script to start the OoB connection in **Start Command**
  - To initiate a pre-configured dial-up connection under Windows, use the following Start Command:

cmd /c start "Starting Out of Band Connection" /wait /min rasdial network_connection login password

The *network_connection* in the above is the name of the network connection as displayed in *Control Panel -> Network Connections*. *Login* is the dial-in username, and *password* is the dial-in password for the connection.

- To initiate a pre-configured dial-up connection under Linux, use the following Start Command:

  pon network_connection

  The *network_connection* in the above is the name of the connection.

➢ Enter the command or path to a script to stop the OoB connection in **Stop Command**

- To stop a pre-configured dial-up connection under Windows, use the following Stop Command:

  cmd /c start "Stopping Out of Band Connection" /wait /min rasdial network_connection /disconnect

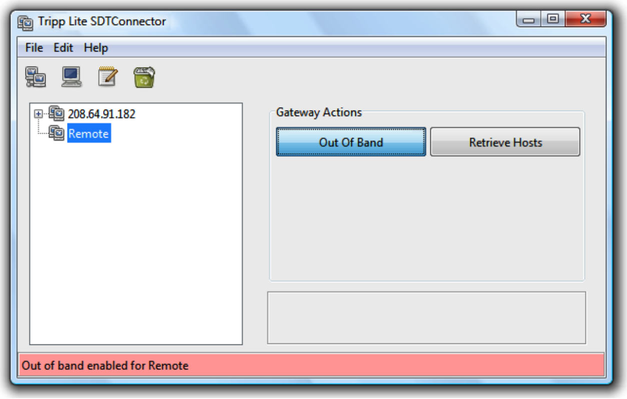
  The *network_connection* in the above is the name of the network connection as displayed in *Control Panel -> Network Connections*.

- To stop a pre-configured dial-up connection under Linux, use the following Stop Command:

  poff network_connection

To make the OoB connection using *SDT Connector:*

➢ Select the gateway and click Out Of Band. The status bar will change color to indicate this gateway is now being access using the OoB link rather than the primary link

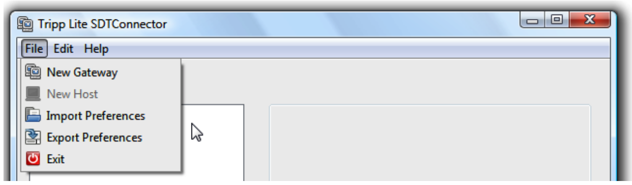


Out of band enabled for Remote

When you connect to a service on a host behind the gateway, or to the Console Server gateway itself, *SDT Connector* will initiate the OoB connection using the provided Start Command. The OoB connection isn't stopped (using the provided Stop Command) until Out Of Band under Gateway Actions is clicked off, at which point the status bar will return to its normal color.

6.6 Importing (and exporting) preferences

To enable the distribution of pre-configured client config files, *SDT Connector* has an *Export/Import* facility:



- To save a configuration .xml file (for backup or for importing into other *SDT Connector* clients), select **File -> Export Preferences** and select the location to save the configuration file
- To import a configuration, select **File -> Import Preferences** and select the .xml configuration file to be installed

6.7 SDT Connector Public Key Authentication

SDT Connector can authenticate against an SSH gateway using your SSH key pair rather than requiring your to enter your password. This is known as public key authentication.

To use public key authentication with SDT Connector, you must first add the public part of your SSH key pair to your SSH gateway:

- Ensure the SSH gateway allows public key authentication. This is typically the default behavior
- If you do not already have a public/private key pair for your client computer (the one which the SDT Connector is running) generate them now using *ssh-keygen, PuTTYgen* or a similar tool. You may use RSA or DSA, however it is important that you leave the passphrase field blank:
  - PuTTYgen: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
  - OpenSSH: http://www.openssh.org/
  - OpenSSH (Windows): http://sshwindows.sourceforge.net/download/
- Upload the public part of your SSH key pair (this file is typically named *id_rsa.pub* or *id_dsa.pub*) to the SSH gateway, or add it to the *.ssh/authorized keys* in your home directory on the SSH gateway
- Next, add the private part of your SSH key pair (this file is typically named *id_rsa* or *id_dsa*) to SDT Connector. Click **Edit -> Preferences -> Private Keys -> Add**, locate the private key file and click **OK**

You do not have to add the public part of your SSH key pair; it is calculated using the private key.

SDT Connector will now use public key authentication when connecting through the SSH gateway (Console Server). You may have to restart SDT Connector to shut down any existing tunnels that were established using password authentication.

If you have a host behind the Console Server that you connect to by clicking the SSH button in SDT Connector, you may also wish to configure access to it for public key authentication as well. This configuration is entirely independent of SDT Connector and the SSH gateway. You must configure the

SSH client that SDT Connector launches (e.g. Putty, OpenSSH) and the host's SSH server for public key authentication. Essentially, what you are using is SSH over SSH, and the two SSH connections are entirely separate.

6.8 Setting up SDT for Remote Desktop Access

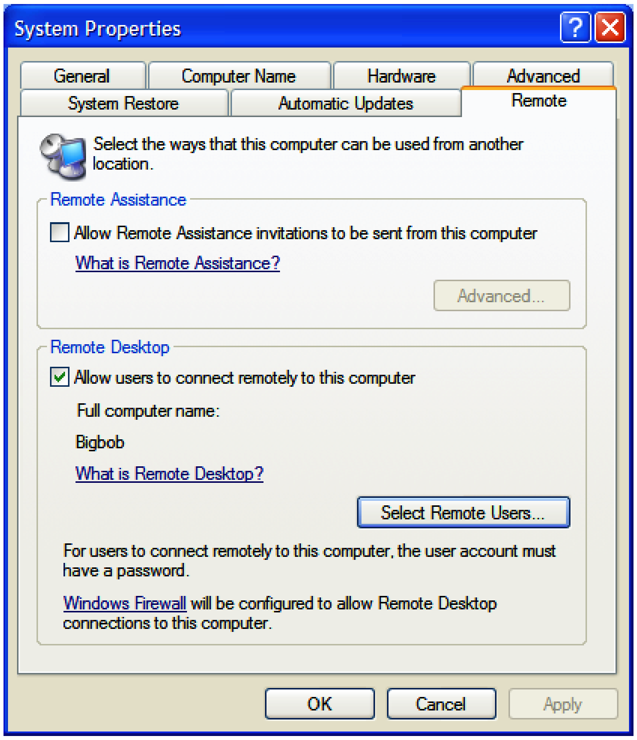
Microsoft's Remote Desktop Protocol (RDP) enables the system manager securely to access and manage remote Windows computers: to reconfigure applications and user profiles, upgrade the server's operating system, reboot the machine, etc. Secure Tunneling uses SSH tunneling, so this RDP traffic is securely transferred through an authenticated and encrypted tunnel.

SDT with RDP also allows remote Users to connect to Windows XP, Vista, Windows 2003 computers and to Windows 2000 Terminal Servers, and to have access to all of the applications, files, and network resources (with full graphical interface just as though they were in front of the computer screen itself). To set up a secure Remote Desktop connection, you must enable Remote Desktop on the target Windows computer that is to be accessed and configure the RPD client software on the client computer.

6.8.1 Enable Remote Desktop on the target Windows computer to be accessed

To enable **Remote Desktop** on the Windows computer being accessed:

- ➢ Open **System** in the Control Panel and click the **Remote** tab



Select the ways that this computer can be used from another location.

□ Allow Remote Assistance invitations to be sent from this computer

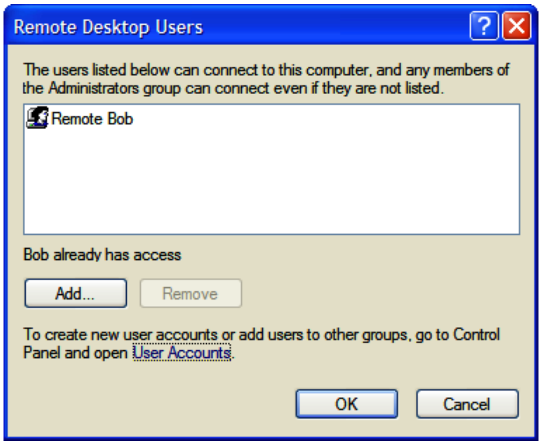
☑ Allow users to connect remotely to this computer

Full computer name:
Bigbob

For users to connect remotely to this computer, the user account must have a password.

Windows Firewall will be configured to allow Remote Desktop connections to this computer.

- ➢ Check **Allow users to connect remotely to this computer**
- ➢ Click **Select Remote Users**


Remote Desktop Users

The users listed below can connect to this computer, and any members of the Administrators group can connect even if they are not listed.

Remote Bob

Bob already has access

To create new user accounts or add users to other groups, go to Control Panel and open User Accounts.

- To set the user(s) who can remotely access the system with RDP, click **Add** on the **Remote Desktop Users** dialog box

Note If you need to set up new users for Remote Desktop access, open **User Accounts** in the Control Panel and proceed through the steps to nominate the new user's name, password and account type (Administrator or Limited)

Note With Windows XP Professional and Vista, you have only one Remote Desktop session and it connects directly to the Windows root console. With Windows Server 2008 you can have multiple sessions, and with Server 2003 you have three sessions (the console session and two other general sessions). Therefore, more than one user can have an active session on a single computer.

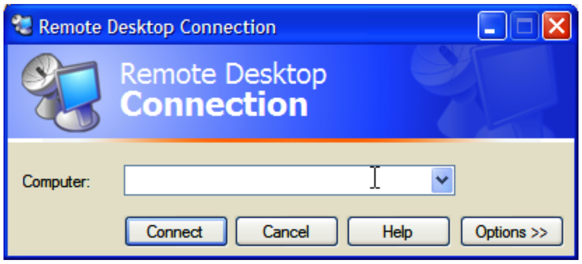
When the remote user connects to the accessed computer on the console session, Remote Desktop automatically locks that computer (so no other user can access the applications and files). When you come back to the computer, you can unlock it by typing CTRL+ALT+DEL.

6.8.2 Configure the Remote Desktop Connection client

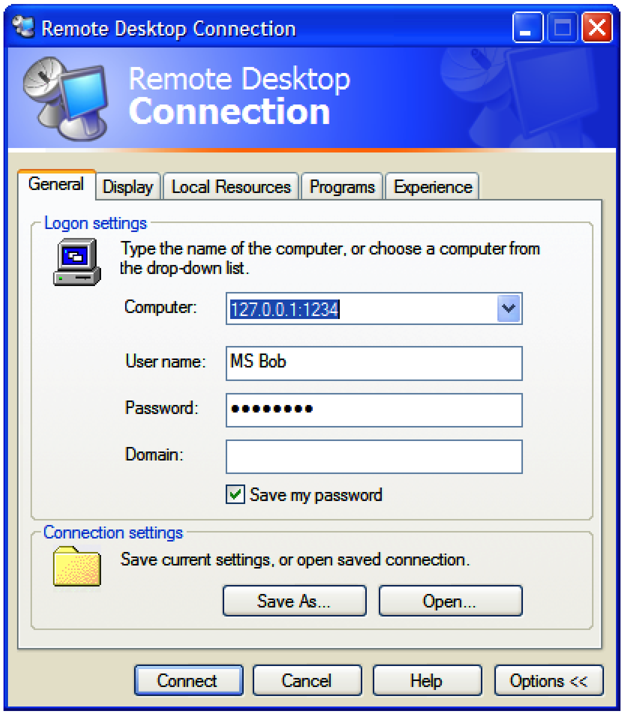
Now that you have the Client computer securely connected to the Console Server (either locally, or remotely, thru the enterprise VPN, or a secure SSH internet tunnel or a dial-in SSH tunnel), you are ready to establish the Remote Desktop connection from the Client. To do this you simply enable the **Remote Desktop Connection** on the remote client computer then point it to the SDT Secure Tunnel port in the Console Server:

A. On a Windows client computer

- Click **Start**. Point to **Programs**, then to **Accessories**, then **Communications**, and click **Remote Desktop Connection**



- In **Computer**, enter the appropriate IP Address and Port Number:
  - Where there is a direct local or enterprise VPN connection, enter the IP Address of the Console Server, and the Port Number of the SDT Secure Tunnel for the Console Server's serial port (the one that is attached to the Windows computer to be controlled). For example, if the Windows computer is connected to serial Port 3 on a Console Server located at 192.168.0.50 then you would enter *192.168.0.50:7303.*
  - Where there is an SSH tunnel (over a dial-up PPP connection or over a public internet connection or private network connection), simply enter the *localhost* as the IP address, i.e. *127.0.0.1*. For Port Number, enter the *source port* you created when setting SSH tunneling/port forwarding (in Section 6.1.6) e.g. *:1234.*
- Click **Option.** In the **Display** section, specify an appropriate color depth (e.g. for a modem connection it is recommended you not use over 256 colors). In **Local Resources,** specify the peripherals on the remote Windows computer that are to be controlled (printer, serial port, etc.)



Type the name of the computer, or choose a computer from the drop-down list.

Computer: 127.0.0.1:1234

User name: MS Bob

Password: ••••••••

Domain:

☑ Save my password

Save current settings, or open saved connection.

- Click **Connect**

Note The Remote Desktop Connection software is pre-installed on Windows XP. However, for earlier Windows computers, you will need to download the RDP client:

- Go to the Microsoft Download Center site http://www.microsoft.com/downloads/details.aspx?familyid=80111F21-D48D-426E-96C2-08AA2BD23A49&displaylang=en and click the **Download** button

This software package will install the client portion of Remote Desktop on Windows 95, Windows 98 and 98 Second Edition, Windows Me, Windows NT 4.0, Windows 2000, and Windows 2003. When run, this software allows these older Windows platforms to remotely connect to a computer running Windows XP Professional or Windows 2003 Server

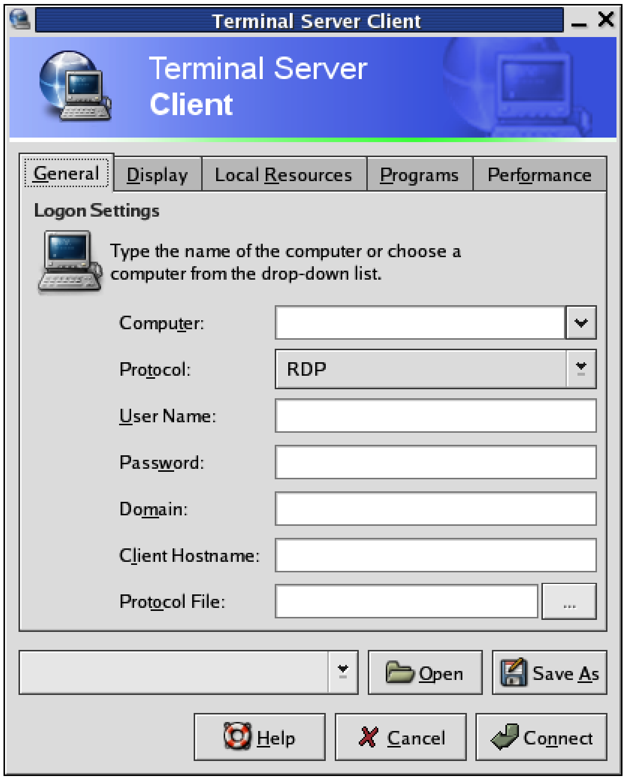
B. On a Linux or UNIX client computer:

- Launch the open source *rdesktop* client:

  rdesktop -u *windows-user-id* -p *windows-password* -g 1200x950 *ms-windows-terminal-server-host-name*

option	description
-a	Color depth: 8, 16, 24
-r	Device redirection. i.e. Redirect sound on remote machine to local device i.e. -0 -r sound (MS/Windows 2003)
-g	Geometry: *widthxheight* or 70% screen percentage.
-p	Use -p - to receive password prompt.

- You can use GUI front end tools like the GNOME Terminal Services Client *tsclient* to configure and launch the *rdesktop* client. (Using *tsclient* also enables you to store multiple configurations of *rdesktop* for connection to many servers.)



Logon Settings

Type the name of the computer or choose a computer from the drop-down list.

Computer:

Protocol: RDP

User Name:

Password:

Domain:

Client Hostname:

Protocol File:

Note The *rdesktop* client is supplied with Red Hat 9.0:

- rpm -ivh rdesktop-1.2.0-1.i386.rpm

For Red Hat 8.0 or other distributions of Linux; download source, untar, configure, make, make then install.

rdesktop currently runs on most UNIX based platforms with the X Window System and can be downloaded from http://www.rdesktop.org/

C. On a Macintosh client:

- Download Microsoft's free Remote Desktop Connection client for Mac OS X http://www.microsoft.com/mac/otherproducts/otherproducts.aspx?pid=remotedesktopclient

6.9 SDT SHH Tunnel for VNC

Alternately, with SDT and Virtual Network Computing (VNC), Users and Administrators can securely access and control Windows 98/NT/2000/XP/2003, Linux, Macintosh, Solaris and UNIX computers. There's a range of popular VNC software available (UltraVNC, RealVNC, TightVNC) freely and commercially. To set up a secure VNC connection, install and configure the VNC Server software on the computer to be accessed. Then install and configure the VNC Viewer software on the Viewer computer.

6.9.1 Install and configure the VNC Server on the computer to be accessed

Virtual Network Computing (VNC) software enables users to remotely access computers running Linux, Macintosh, Solaris, UNIX, all versions of Windows and most other operating systems.

A. For Microsoft Windows servers (and clients):

Windows does not include VNC software, so you will need to download, install and activate a third party VNC Server software package:

RealVNC http://www.realvnc.com is fully cross-platform, so a desktop running on a Linux machine may be displayed on a Windows computer, on a Solaris machine, or on any number of other architectures. There is a Windows server, allowing you to view the desktop of a remote Windows machine on any of these platforms using exactly the same viewer. RealVNC was founded by members of the AT&T team who originally developed VNC.

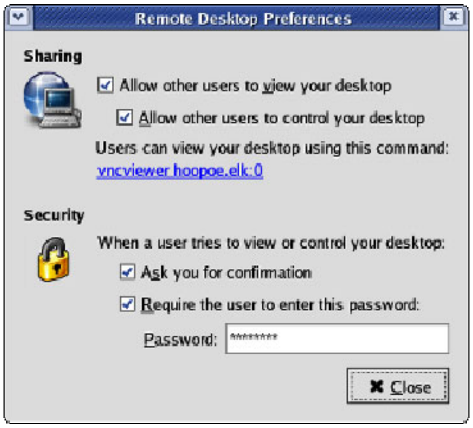
TightVNC http://www.tightvnc.com is an enhanced version of VNC. It has added features such as file transfer, performance improvements and read-only password support. They have just recently included a video drive much like UltraVNC. TightVNC is still free, cross-platform (Windows Unix and Linux) and compatible with the standard (Real) VNC.

UltraVNC http://ultravnc.com is easy to use, fast and free VNC software that has pioneered and perfected features that the other flavors have consistently refused or been very slow to implement for cross platform and minimalist reasons. UltraVNC runs under Windows operating systems (95, 98, Me, NT4, 2000, XP, 2003) Download UltraVNC from Sourceforge's UltraVNC file list

B. For Linux servers (and clients):

Most Linux distributions now include VNC Servers and Viewers. They are generally launched from the (Gnome/KDE etc) front end. For example, there's VNC Server software with Red Hat Enterprise Linux 4 and a choice of Viewer client software. To launch:

- Select the **Remote Desktop** entry in the **Main Menu -> Preferences** menu
- Click the **Allow other users** checkbox to allow remote users to view and control your desktop



Remote Desktop Preferences

Sharing

☑ Allow other users to view your desktop

☑ Allow other users to control your desktop

Users can view your desktop using this command:
vncviewer hoopoe.elk:0

Security

When a user tries to view or control your desktop:

☑ Ask you for confirmation

☑ Require the user to enter this password:

Password: ********

- ➢ To set up a persistent VNC server on Red Hat Enterprise Linux 4:
  - ○ Set a password using **vncpasswd**
  - ○ Edit **/etc/sysconfig/vncservers**
  - ○ Enable the service with **chkconfig vncserver on**
  - ○ Start the service with **service vncserver start**
  - ○ Edit **/home/*username*/.vnc/xstartup** if you want a more advanced session than just *twm* and an *xterm*

C. For Macintosh servers (and clients):

OSXvnc http://www.redstonesoftware.com/vnc.html is a robust, full-featured VNC server for Mac OS X that allows any VNC client to remotely view and/or control Mac OS X machine. OSXvnc is supported by Redstone Software

D. Most other operating systems (Solaris, HPUX, PalmOS etc) either come with VNC bundled, or have third-party VNC software that you can download

6.9.2 Install, configure and connect the VNC Viewer

VNC is truly platform-independent, so a VNC Viewer on any operating system can connect to a VNC Server on any other operating system. There are Viewers (and Servers) from a wide selection of sources (e.g. UltraVNC TightVNC or RealVNC) for most operating systems. There are also a wealth of Java viewers available so that any desktop can be viewed with any Java-capable browser (http://en.wikipedia.org/wiki/VNC lists many of the VNC Viewers sources).

- ➢ Install the VNC Viewer software and set it up for the appropriate speed connection

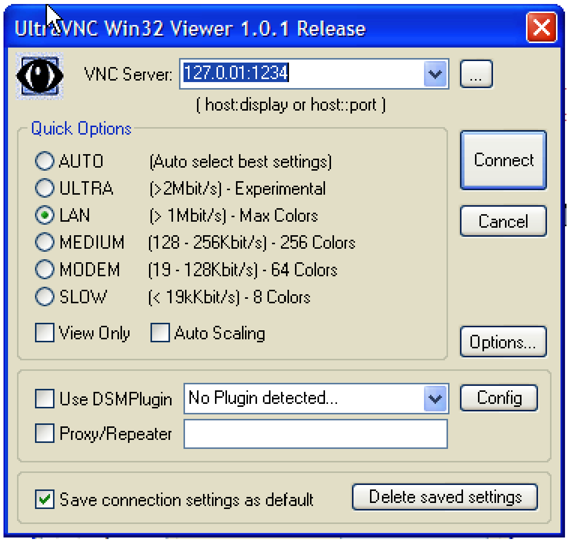
Note To make VNC faster, when you set up the Viewer:

- ▪ Set encoding to ZRLE (if you have a fast enough CPU)
- ▪ Decrease color level (e.g. 64 bit)
- ▪ Disable the background transmission on the Server or use a plain wallpaper

(Refer to http://doc.uvnc.com for detailed configuration instructions)

- ➢ To establish the VNC connection, first configure the VNC Viewer, entering the VNC Server IP address

A. When the Viewer computer is connected to the Console Server through an SSH tunnel (over the public Internet, or a dial-in connection, or private network connection), enter *localhost* (or 127.0.0.1) as the IP VNC Server IP address and *the source port* you entered when setting SSH tunneling/port forwarding (in Section 6.2.6) e.g. *:1234*



UltraVNC Win32 Viewer 1.0.1 Release

VNC Server: 127.0.01:1234

(host:display or host::port)

Quick Options

○ AUTO (Auto select best settings)
○ ULTRA (>2Mbit/s) - Experimental
● LAN (> 1Mbit/s) - Max Colors
○ MEDIUM (128 - 256Kbit/s) - 256 Colors
○ MODEM (19 - 128Kbit/s) - 64 Colors
○ SLOW (< 19kKbit/s) - 8 Colors

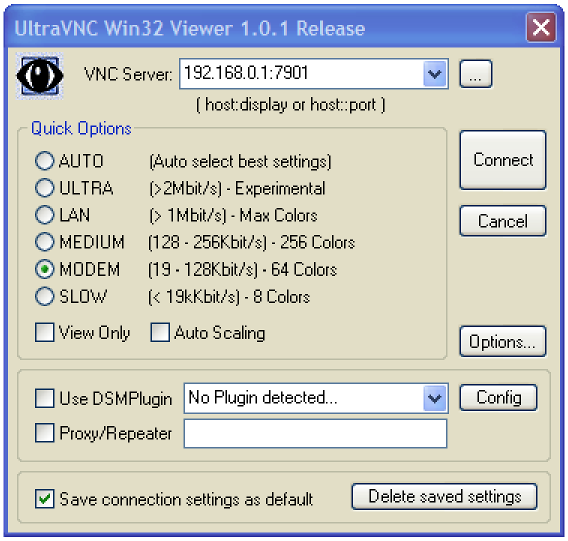
□ View Only □ Auto Scaling

□ Use DSMPlugin No Plugin detected...

□ Proxy/Repeater

☑ Save connection settings as default

B. When the Viewer computer is connected directly to the Console Server (either locally or remotely through a VPN or dial-in connection) and the VNC Host computer is serially connected to the Console Server, then enter the IP address of the Console Server unit with the TCP port that the SDT tunnel will use. The TCP port will be 7900 plus the physical serial port number (*i.e.* 7901 to 7948, so all traffic directed to port 79xx on the Console Server is tunneled through to port 5900 on the PPP connection on serial Port xx). For example, for a Windows Viewer computer using UltraVNC connecting to a VNC Server which is attached to Port 1 on a Console Server, enter 192.168.0.1



UltraVNC Win32 Viewer 1.0.1 Release

VNC Server: 192.168.0.1:7901

(host:display or host::port)

Quick Options

○ AUTO (Auto select best settings)
○ ULTRA (>2Mbit/s) - Experimental
○ LAN (> 1Mbit/s) - Max Colors
○ MEDIUM (128 - 256Kbit/s) - 256 Colors
● MODEM (19 - 128Kbit/s) - 64 Colors
○ SLOW (< 19kKbit/s) - 8 Colors

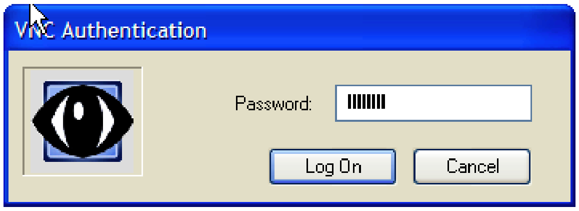
□ View Only □ Auto Scaling

□ Use DSMPlugin No Plugin detected...

□ Proxy/Repeater

☑ Save connection settings as default

- You can then establish the VNC connection by simply activating the VNC Viewer software on the Viewer computer and entering the password



Note For general background reading on Remote Desktop and VNC access, we recommend the following:

- *The Microsoft Remote Desktop How-To* http://www.microsoft.com/windowsxp/using/mobility/getstarted/remoteintro.mspx
- *The Illustrated Network Remote Desktop* help page http://theillustratednetwork.mvps.org/RemoteDesktop/RemoteDesktopSetupandTroubleshooting.html
- *What is Remote Desktop in Windows XP and Windows Server 2003?* by Daniel Petri http://www.petri.co.il/what's_remote_desktop.htm
- *Frequently Asked Questions about Remote Desktop* http://www.microsoft.com/windowsxp/using/mobility/rdfaq.mspx
- *Secure remote access of a home network using SSH, Remote Desktop and VNC for the home user* http://theillustratednetwork.mvps.org/RemoteDesktop/SSH-RDP-VNC/RemoteDesktopVNCandSSH.html
- *Taking your desktop virtual with VNC,* Red Hat magazine http://www.redhat.com/magazine/006apr05/features/vnc/ and http://www.redhat.com/magazine/007may05/features/vnc/
- *Wikipedia* general background on VNC http://en.wikipedia.org/wiki/VNC

6.10 Using SDT to IP connect to hosts that are serially attached to the gateway

Network (IP) protocols like RDP, VNC and HTTP can also be used to connect to host devices that are serially connected through their COM port to the Console Server. To do this you must:

- establish a PPP connection (Section 6.7.1) between the host and the gateway, then
- set up Secure Tunneling - Ports on the Console Server (Section 6.7.2), then
- configure *SDT Connector* to use the appropriate network protocol to access IP consoles on the host devices that are attached to the Console Server serial ports (Section 6.7.3)

6.10.1 Establish a PPP connection between the host COM port and Console Server

(This step is only necessary for serially connected computers)

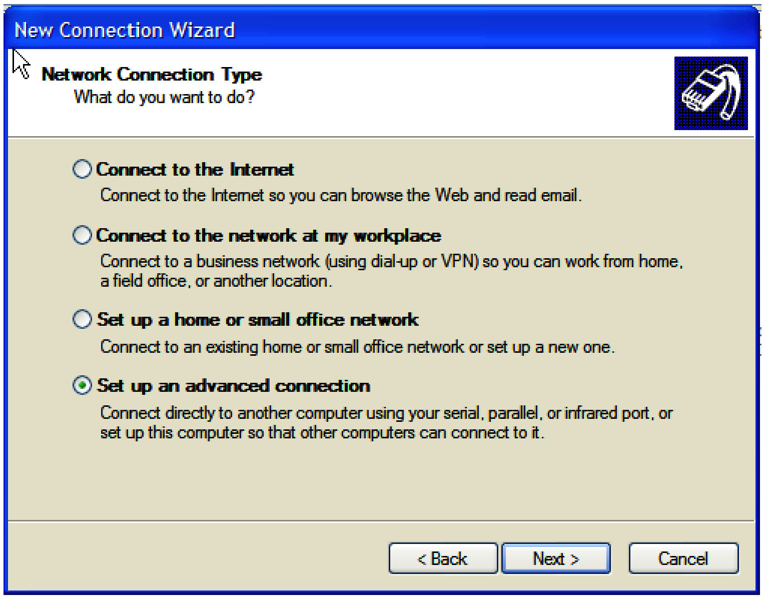
Firstly, physically connect the COM port on the host computer that is to be accessed to the serial port on the Console Server. Then:

A. For non-Wndows computers (Linux, UNIX, Solaris etc), establish a PPP connection over the serial port. The online tutorial http://www.yolinux.com/TUTORIALS/LinuxTutorialPPP.html presents a selection of methods for establishing a PPP connection for Linux

B. For Windows XP and 2003 computers, follow the steps below to set up an advanced network connection between the Windows computer, through its COM port, to the Console Server. Both

Windows 2003 and Windows XP Professional allow you to create a simple dial-in service which can be used for the Remote Desktop/VNC/HTTP/X connection to the Console Server:

- Open **Network Connections** in Control Panel and click the **New Connection Wizard**



New Connection Wizard

Network Connection Type

What do you want to do?

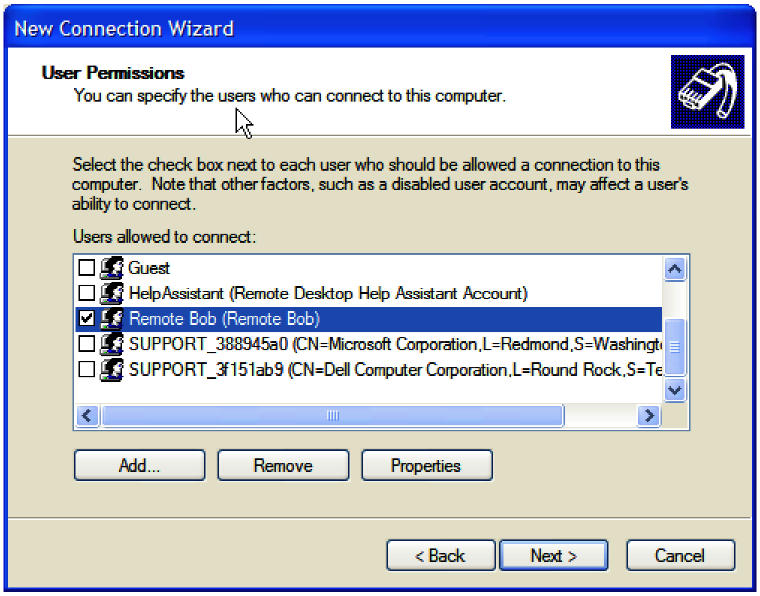
○ **Connect to the Internet**
Connect to the Internet so you can browse the Web and read email.

○ **Connect to the network at my workplace**
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.

○ **Set up a home or small office network**
Connect to an existing home or small office network or set up a new one.

● **Set up an advanced connection**
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.

- Select **Set up an advanced connection** and click **Next**
- On the **Advanced Connection Options** screen, select **Accept Incoming Connections** and click **Next**
- Select the **Connection Device** (i.e. the serial COM port on the Windows computer that you cabled through to the Console Server). By default, select **COM1**. The COM port on the Windows computer should be configured to its maximum baud rate. Click **Next**
- On the **Incoming VPN Connection Options** screen, select **Do not allow virtual private connections** and click **Next**



New Connection Wizard

User Permissions

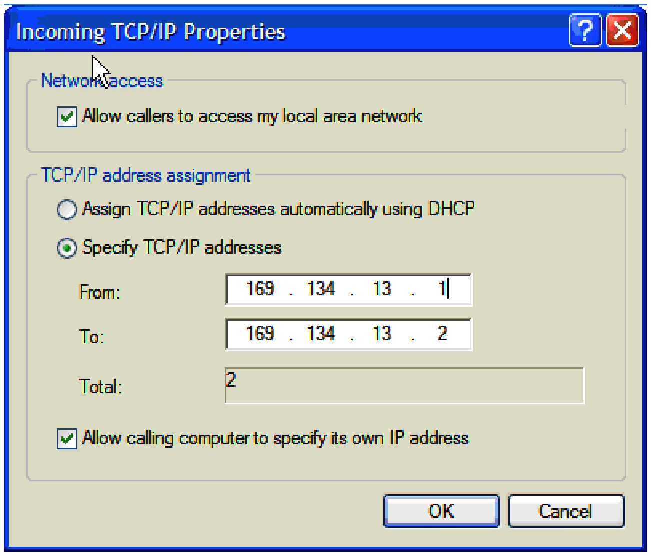
You can specify the users who can connect to this computer.

Select the check box next to each user who should be allowed a connection to this computer. Note that other factors, such as a disabled user account, may affect a user's ability to connect.

Users allowed to connect:

☐ Guest
☐ HelpAssistant (Remote Desktop Help Assistant Account)
☑ Remote Bob (Remote Bob)
☐ SUPPORT_388945a0 (CN=Microsoft Corporation,L=Redmond,S=Washingt
☐ SUPPORT_3f151ab9 (CN=Dell Computer Corporation,L=Round Rock,S=Te

- Specify which Users will be allowed to use this connection. This should be the same Users who were given Remote Desktop access privileges in the earlier step. Click **Next**
- On the **Network Connection** screen, select **TCP/IP** and click **Properties**



Incoming TCP/IP Properties

Network access

☑ Allow callers to access my local area network

TCP/IP address assignment

○ Assign TCP/IP addresses automatically using DHCP

● Specify TCP/IP addresses

From: 169 . 134 . 13 . 1

To: 169 . 134 . 13 . 2

Total: 2

☑ Allow calling computer to specify its own IP address

- Select **Specify TCP/IP addresses** on the **Incoming TCP/IP Properties** screen**.** Nominate a *From:* and a *To:* TCP/IP address and click **Next**

Note You can choose any TCP/IP addresses as long as they are addresses which are not used anywhere else on your network. The *From:* address will be assigned to the Windows XP/2003 computer and the *To:* address will be used by the Console Server. For simplicity, use the IP address as shown in the illustration above:

From: 169.134.13.1

To: 169.134.13.2

Alternately you can set the advanced connection and access on the Windows computer to use the Console Server defaults:

- Specify 10.233.111.254 as the *From:* address
- Select *Allow calling computer to specify its own address*

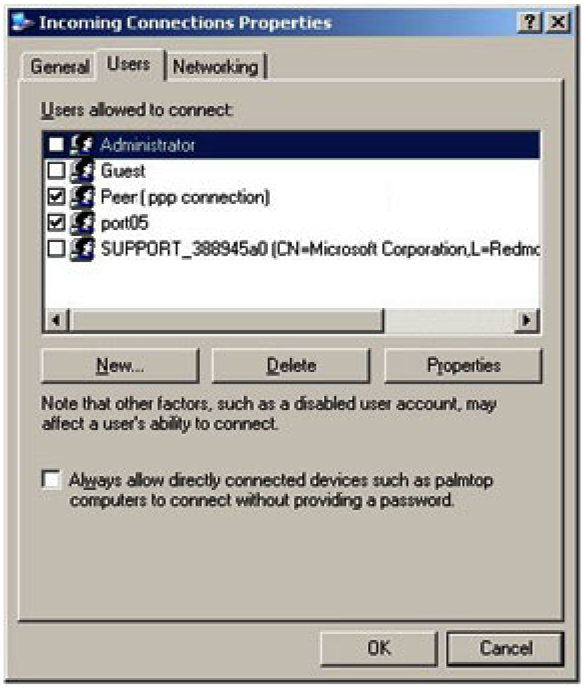
Also you could use the Console Server default username and password when you set up the new Remote Desktop User and give this User permission to use the advance connection to access the Windows computer:

- The Console Server default *Username is portXX* where XX is the serial port number on the Console Server.
- The default *Password is portXX*

So to use the defaults for an RDP connection to the serial port 2 on the Console Server, you would have set up a Windows user named *port02*

- When the PPP connection has been set up, a network icon will appear in the Windows task bar

Note The above notes describe setting up an incoming connection for Windows XP. The steps are the same for Windows 2003, except that the setup screens present slightly differently:



Users allowed to connect:

- ☐ Administrator
- ☐ Guest
- ☑ Peer (ppp connection)
- ☑ port05
- ☐ SUPPORT_388945a0 (CN=Microsoft Corporation,L=Redmc

Note that other factors, such as a disabled user account, may affect a user's ability to connect.

☐ Always allow directly connected devices such as palmtop computers to connect without providing a password.

Put a check in the box for *Always allow directly connected devices such as palmtop…..*

Also, the option to **Set up an advanced connection** is not available in Windows 2003 if RRAS is configured. If RRAS has been configured, it is a simple task to enable the null modem connection for the dial-in configuration.

C. For earlier version Windows computers, follow the steps in Section B, above. To get to the **Make New Connection** button:

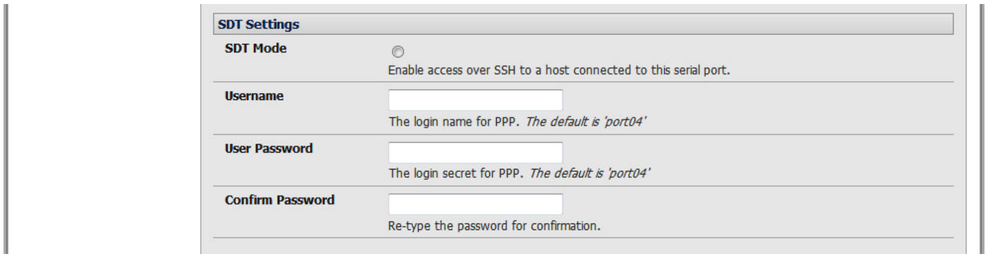
- For Windows 2000, click **Start** and select **Settings.** At the **Dial-Up Networking Folder**, click **Network and Dial-up Connections** and click **Make New Connection.** Note: you first may need to set up a connection over the COM port using **Connect directly to another computer** before proceeding to **Set up an advanced connection**
- For Windows 98, you double-click **My Computer** on the Desktop, then open **Dial-Up Networking** and double-click

6.10.2 Set up SDT Serial Ports on Console Server

To set up *RDP (and VNC) forwarding* on the Console Server's Serial Port that is connected to the Windows computer COM port:

- Select the **Serial & Network: Serial Port** menu option and click **Edit** (for the particular Serial Port that is connected to the Windows computer COM port)

- On the SDT Settings menu, select **SDT Mode** (which will enable port forwarding and SSH tunneling) and enter a **Username** and **User Password.**



SDT Settings

SDT Mode ○ Enable access over SSH to a host connected to this serial port.

Username The login name for PPP. *The default is 'port04'*

User Password The login secret for PPP. *The default is 'port04'*

Confirm Password Re-type the password for confirmation.

Note When you enable SDT, this will override all other Configuration protocols on that port

Note If you leave the *Username* and *User Password* fields blank, they default to *portXX* and *portXX* where XX is the serial port number. So the default username and password for Secure RDP over Port 2 is *port02*

- Ensure the Console Server **Common Settings** (Baud Rate, Flow Control) are the same as were set up on the Windows computer COM port and click **Apply**
- RDP and VNC forwarding over serial ports is enabled on a Port basis. You can add Users who can have access to these ports (or reconfigure User profiles) by selecting **Serial & Network :User & Groups** menu tag - as described earlier in Chapter 4 *Configuring Serial Ports*

6.10.3 Set up SDT Connector to SSH port forward over the Console Server Serial Port

In the *SDT Connector* software running on your remote computer, specify the gateway IP address of your Console Server and a username/password for a user you have setup on the Console Server that has access to the desired port.

Next, add a New SDT Host. In the Host address you need to put portxx where xx = the port to which you are connecting. Example, for port 3 you would have a Host Address of: port03 and then select the RDP Service check box.

7. ALERTS AND LOGGING

Introduction

This chapter describes the alert generation and logging features of the Console Server. The alert facility monitors the serial ports, all logins, the power status and environmental monitors and probes. It sends emails, SMS, Nagios or SNMP alerts when specified trigger events occurs.

- First, enable and configure the service that will be used to carry the alert (*Section 7.1*)
- Then specify the alert trigger condition and the actual destination to which that particular alert is to be sent (*Section 7.2*)

The Console Servers can also be configured selectively to maintain log records of all access and communications with the Console Server and with the attached serial devices, all system activity and a history of the status of any attached environmental monitors, UPS and PDU devices. The Console Servers can also log access and communications with network attached hosts.

- If port logs are to be maintained on a remote server, then the access path to this location needs to be configured *(Section 7.3)*
- Then you need to activate and set the desired levels of logging for each serial *(Section 7.4)* and/or network port *(Section 7.5)* and/or power and environment devices (refer to *Chapter 8*)

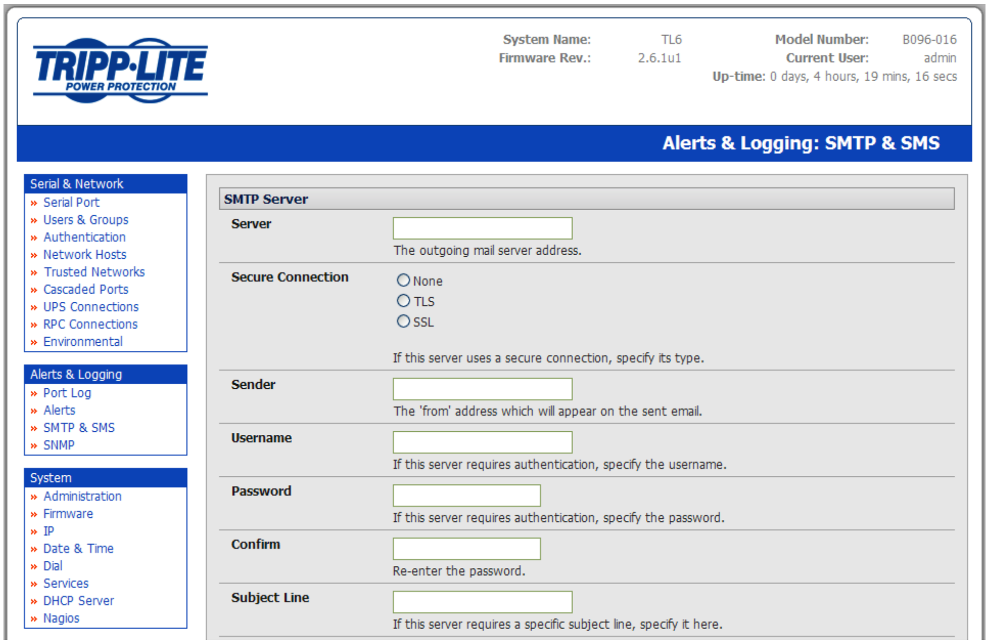
7.1 Configure SMTP/SMS/SNMP/Nagios alert service

The Alerts facility monitors nominated serial ports/hosts/UPSs/PDUs/EMDs, etc. for trigger conditions and, when triggered, sends an alert notification over the nominated alert service. Before setting up the alert trigger, you must configure these alert services:

7.1.1 Email alerts

The Console Server uses SMTP (Simple Mail Transfer Protocol) for sending the email alert notifications. To use SMTP, the Administrator must configure a valid SMTP server for sending the email:

➢ Select **Alerts & Logging: SMTP &SMS**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 4 hours, 19 mins, 16 secs

Alerts & Logging: SMTP & SMS

SMTP Server

Server
The outgoing mail server address.

Secure Connection
○ None
○ TLS
○ SSL
If this server uses a secure connection, specify its type.

Sender
The 'from' address which will appear on the sent email.

Username
If this server requires authentication, specify the username.

Password
If this server requires authentication, specify the password.

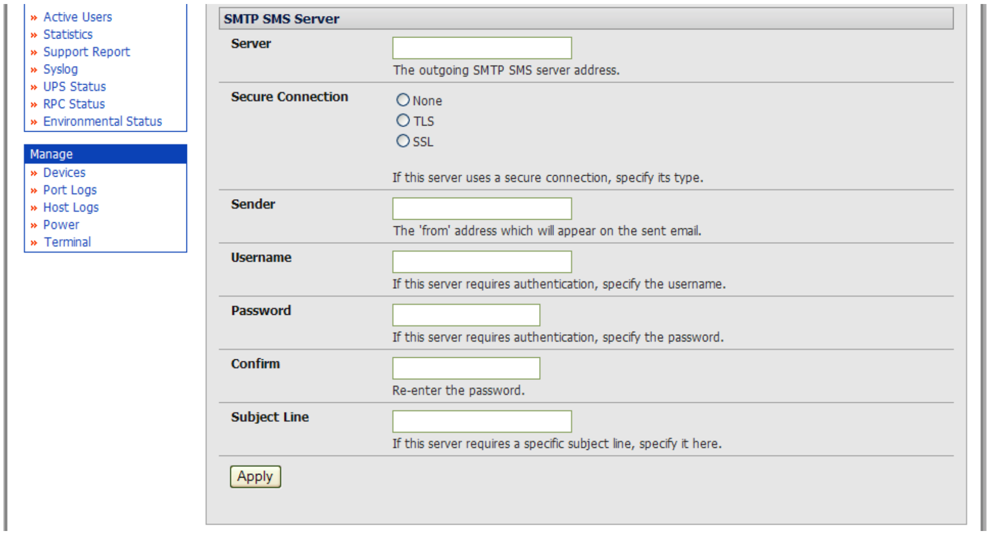
Confirm
Re-enter the password.

Subject Line
If this server requires a specific subject line, specify it here.

- In the **SMTP Server** field, enter the IP address of the outgoing mail **Server**
- You may enter a **Sender** email address which will appear as the *"from"* address in all email notifications sent from this Console Server. Many SMTP servers check the sender's email address with the host domain name to verify the address as authentic. So it may be useful to assign an email address for the Console Server such as consoleserver2@mydomian.com
- You may also enter a **Username** and **Password** if the SMTP server requires authentication
- Similarly you can specify the **Subject Line** that will be sent with the email
- Click **Apply** to activate SMTP

7.1.2 SMS alerts

The Console Server uses email-to-SMS services to send SMS alert notifications to mobile devices. Sending SMS via email using SMTP (Simple Mail Transfer Protocol) is much faster than sending text pages via a modem using the TAP Protocol. Almost all mobile phone carriers provide an SMS gateway service that forwards email to mobile phones on their networks. There is also a wide selection of SMS gateway aggregators who provide email to SMS forwarding to phones on any carriers. To use SMTP SMS, the Administrator must configure a valid SMTP server for sending the email:



SMTP SMS Server

Server

The outgoing SMTP SMS server address.

Secure Connection

○ None
○ TLS
○ SSL

If this server uses a secure connection, specify its type.

Sender

The 'from' address which will appear on the sent email.

Username

If this server requires authentication, specify the username.

Password

If this server requires authentication, specify the password.

Confirm

Re-enter the password.

Subject Line

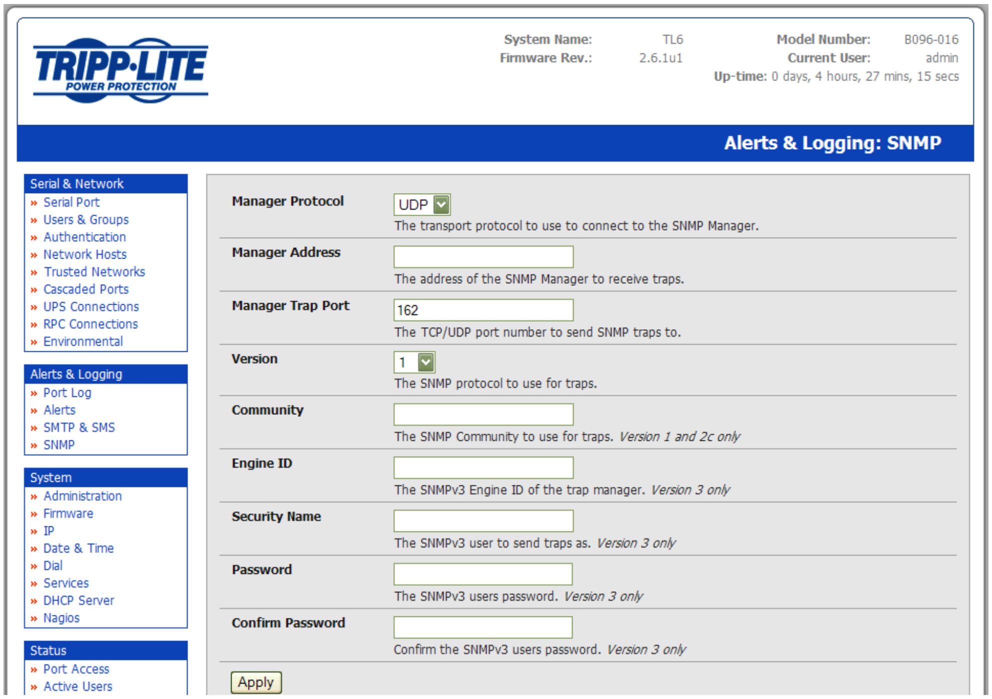
If this server requires a specific subject line, specify it here.

- In the **SMTP SMS Server** field in the **Alerts & Logging: SMTP &SMS** menu, enter the IP address of the outgoing mail **Server**
- You may enter a **Sender** email address which will appear as the *"from"* address in all email notifications sent from this Console Server. Some SMS gateway service providers only forward email to SMS when the email has been received from authorized senders. So you may need to assign a specific authorized email address for the Console Server
- You may also enter a **Username** and **Password** as some SMS gateway service providers use SMTP servers which require authentication
- Similarly, you can specify the **Subject Line** that will be sent with the email. Generally the email subject will contain a truncated version of the alert notification message (which is contained in full in the body of the email). However, some SMS gateway service providers require blank subjects or require specific authentication headers to be included in the subject line
- Click **Apply** to activate SMTP

7.1.3 SNMP alerts

The Administrator can configure the Simple Network Management Protocol (SNMP) agent that resides on the Console Server to send Alerts to an SNMP management application:

- Select **Alerts & Logging: SNMP**
- Enter the SNMP transport protocol. SNMP is generally a **UDP**-based protocol though it infrequently uses **TCP** instead.
- Enter the IP address of the **SNMP Manager** and the Port to be used for connecting
- Select the version being used. The Console Server SNMP agent supports SNMP v1, v2 and v3
- Enter the **Community** name for SNMP v1 or 2c
- To configure for SNMP v3 you will need to enter an ID and authentication password and contact information for the local Administrator (in the **Security Name**)
- Click **Apply** to activate SNMP



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 4 hours, 27 mins, 15 secs

Alerts & Logging: SNMP

Manager Protocol	UDP The transport protocol to use to connect to the SNMP Manager.
Manager Address	The address of the SNMP Manager to receive traps.
Manager Trap Port	162 The TCP/UDP port number to send SNMP traps to.
Version	1 The SNMP protocol to use for traps.
Community	The SNMP Community to use for traps. *Version 1 and 2c only*
Engine ID	The SNMPv3 Engine ID of the trap manager. *Version 3 only*
Security Name	The SNMPv3 user to send traps as. *Version 3 only*
Password	The SNMPv3 users password. *Version 3 only*
Confirm Password	Confirm the SNMPv3 users password. *Version 3 only*

Note The Console Servers have an *snmptrap* daemon to send traps/notifications to remote SNMP servers on defined trigger events, as detailed above. The Console Servers also embed the *net-snmpd* daemon which accept SNMP requests from remote SNMP management servers and provides information on network interface, running processes, disk usage, etc. (refer to *Chapter 15.5 Modifying SNMP Configuration* for more details)

7.1.4 Nagios Alerts

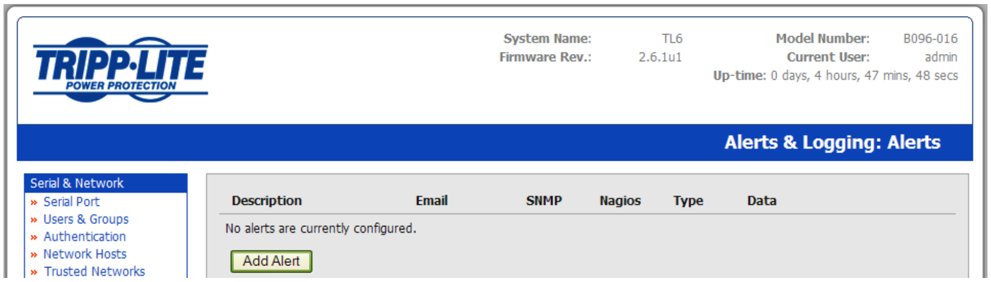
To notify the central Nagios server of Alerts, NSCA must be enabled under **System: Nagios** and Nagios must be enabled for each applicable host or port under **Serial & Network: Network Hosts** or **Serial & Network: Serial Ports** *(refer to Chapter 10)*

7.2 Activate Alert Events and Notifications

The Alert facility monitors the status of the Console Server and connected devices. When an alert event is triggered, a notification is emailed to a nominated email address or SMS gateway, or the configured SNMP or Nagios server is notified.

A wide selection of events can be used as the trigger for an alert. These events include:

- a user establishing a remote Telnet connecting to a serial port or Host
- reaching a nominated low-battery level on a particular UPS or current load levels on a PDU power outlet
- exceeding a specified temperature or humidity level on an environmental sensor
- sensing a particular data pattern on a serial port (e.g. the data stream on a particular serial console may be monitored for nominated messages coming from the device such as "warning" or "IO error" and send out an alarm when they occur)



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 4 hours, 47 mins, 48 secs

Alerts & Logging: Alerts

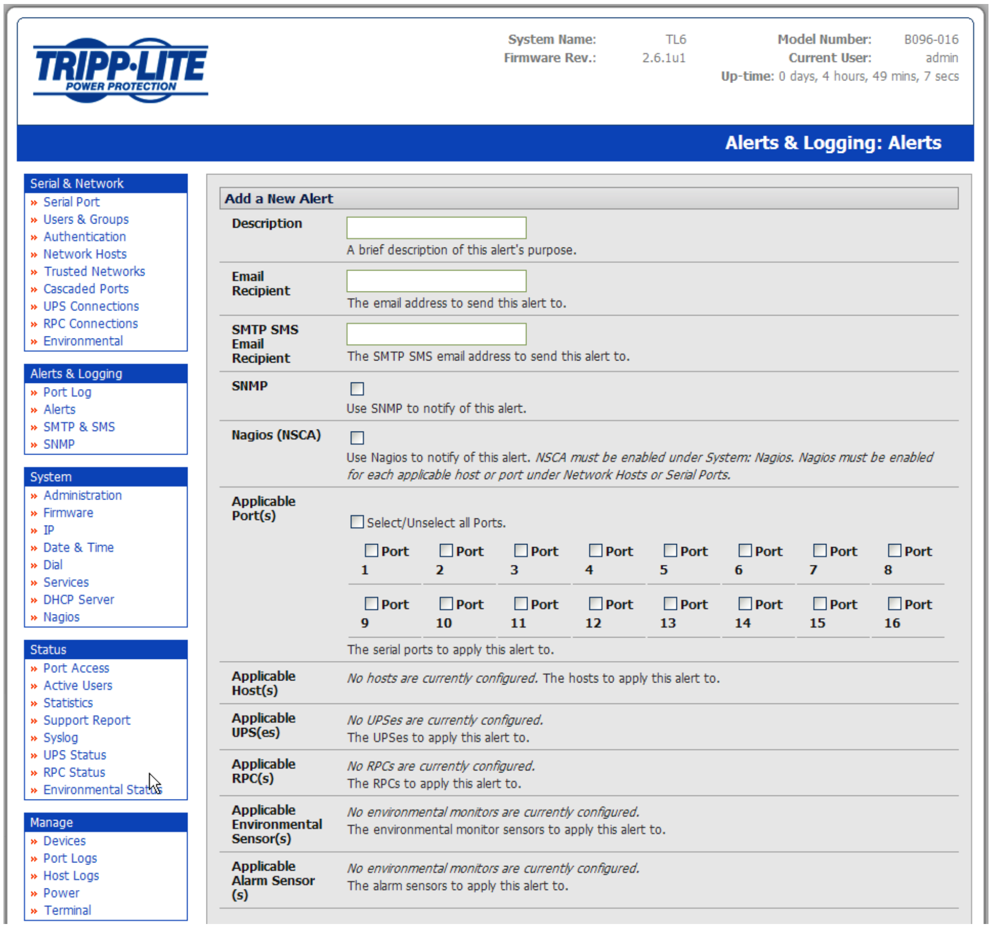
Description	Email	SNMP	Nagios	Type	Data

No alerts are currently configured.

- ➢ Select **Alerts & Logging: Alerts** which will display all the alerts currently configured. Click **Add Alert**

7.2.1 Add a new alert

The first step is to specify the alert service that will be used to send notification for this event, who to notify, and what port/host/device is to be monitored:



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 4 hours, 49 mins, 7 secs

Alerts & Logging: Alerts

Add a New Alert

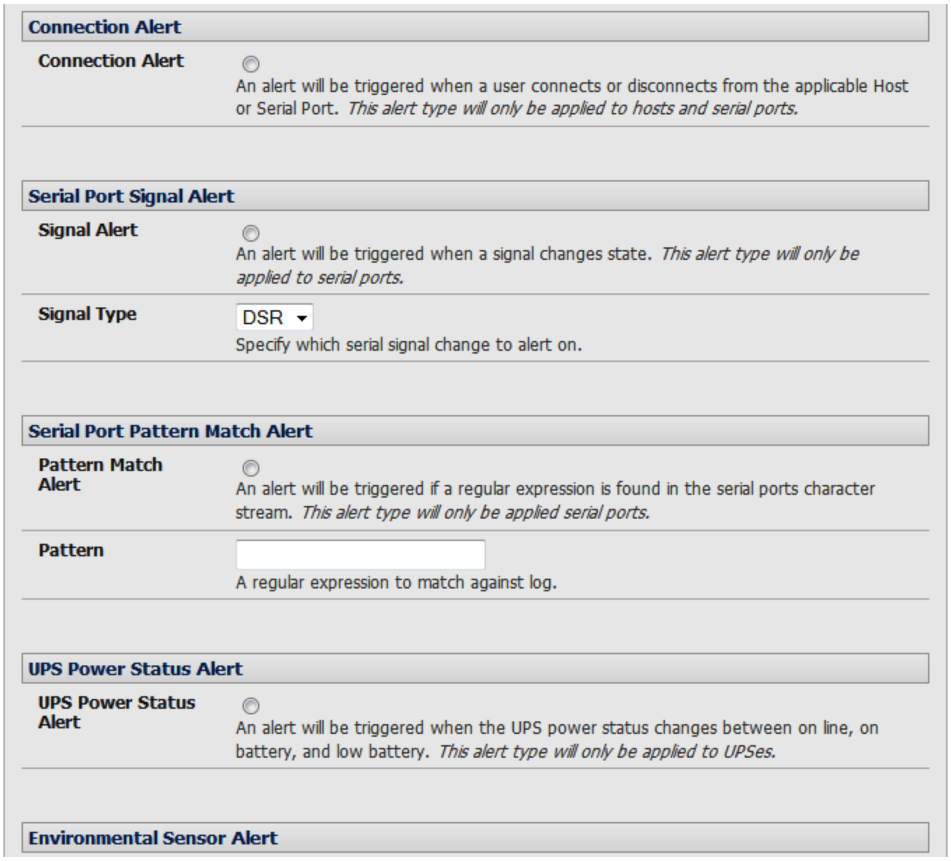
Description	A brief description of this alert's purpose.
Email Recipient	The email address to send this alert to.
SMTP SMS Email Recipient	The SMTP SMS email address to send this alert to.
SNMP	□ Use SNMP to notify of this alert.
Nagios (NSCA)	□ Use Nagios to notify of this alert. *NSCA must be enabled under System: Nagios. Nagios must be enabled for each applicable host or port under Network Hosts or Serial Ports.*
Applicable Port(s)	□ Select/Unselect all Ports. □ Port 1 □ Port 2 □ Port 3 □ Port 4 □ Port 5 □ Port 6 □ Port 7 □ Port 8 □ Port 9 □ Port 10 □ Port 11 □ Port 12 □ Port 13 □ Port 14 □ Port 15 □ Port 16 The serial ports to apply this alert to.
Applicable Host(s)	*No hosts are currently configured.* The hosts to apply this alert to.
Applicable UPS(es)	*No UPSes are currently configured.* The UPSes to apply this alert to.
Applicable RPC(s)	*No RPCs are currently configured.* The RPCs to apply this alert to.
Applicable Environmental Sensor(s)	*No environmental monitors are currently configured.* The environmental monitor sensors to apply this alert to.
Applicable Alarm Sensor (s)	*No environmental monitors are currently configured.* The alarm sensors to apply this alert to.

- ➢ At **Add a New Alert.** enter a **Description** for this new alert
- ➢ Nominate the email address for the **Email Recipient** and/or the **SMS Recipient** to be notified of the alert
- ➢ Activate **SNMP** notification if it is to used for this event

- Activate **Nagios** notification if it is to be used for this event. In an SDT Nagios centrally managed environment, you can check the Nagios alert option. On the trigger condition (for matched patterns, logins, power events and signal changes), an NSCA check "warning" result will be sent to the central Nagios server. This condition is displayed on the Nagios status screen and triggers a notification. This can cause the Nagios central server itself to send out an email or an SMS, page, etc.
- Select from the list of all configured serial ports, hosts, power units, monitors and probes which devices this new alert is to be applied to. Select **Applicable Port(s)** (serial) and/or **Applicable Host(s)** and/or **Applicable UPS(es)** and/or **Applicable RPC(s)** and/or **Applicable EMD(s)** and/or **Applicable Alarm Sensor(s)** that are to be monitored for this alert trigger

7.2.2 Select general alert type

Select the Alert Type (**Connection**, **Signal**, **Pattern Match**, **UPS Status** or **Environment and Power**) that is to be monitored. You can configure a selection of different Alert types and any number of specific triggers



Connection Alert

Connection Alert ○
An alert will be triggered when a user connects or disconnects from the applicable Host or Serial Port. *This alert type will only be applied to hosts and serial ports.*

Serial Port Signal Alert

Signal Alert ○
An alert will be triggered when a signal changes state. *This alert type will only be applied to serial ports.*

Signal Type: DSR
Specify which serial signal change to alert on.

Serial Port Pattern Match Alert

Pattern Match Alert ○
An alert will be triggered if a regular expression is found in the serial ports character stream. *This alert type will only be applied serial ports.*

Pattern
A regular expression to match against log.

UPS Power Status Alert

UPS Power Status Alert ○
An alert will be triggered when the UPS power status changes between on line, on battery, and low battery. *This alert type will only be applied to UPSes.*

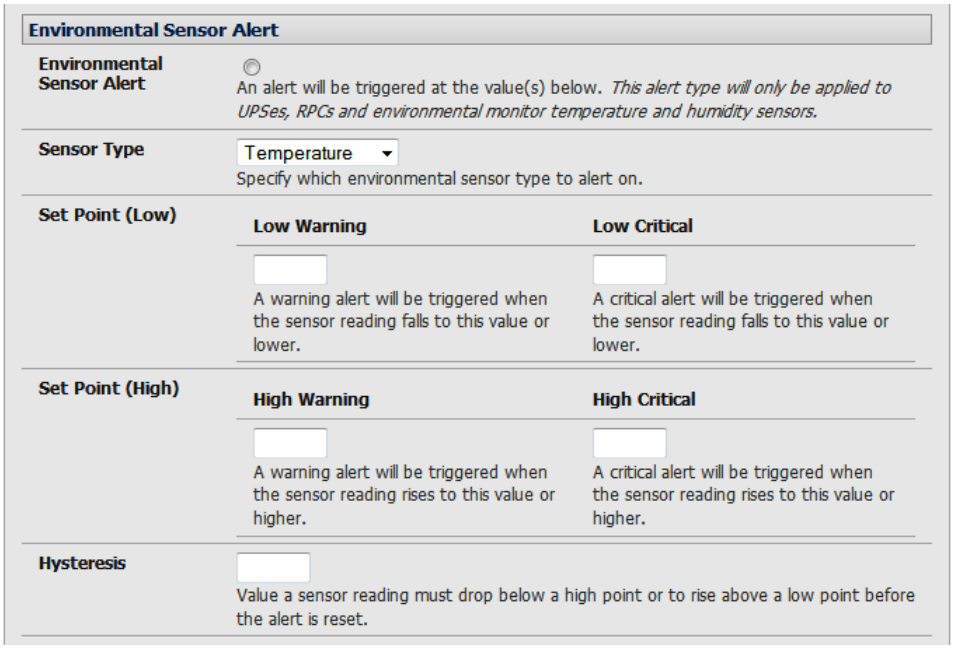
Environmental Sensor Alert

- **Connection Alert** - This alert will be triggered when a user connects or disconnects from the applicable Host or Serial Port, or when a Slave connects or disconnects from the applicable UPS
- **Serial Port Signal Alert** - This alert will be triggered when the specified signal changes state and is applicable to serial ports only. You must specify the particular **Signal Type** (DSR, DCD or CTS) trigger condition that will send a new alert

- **Serial Port Pattern Match Alert** – This alert will be triggered if a regular expression is found in the serial ports character stream that matches the regular expression you enter in the **Pattern** field. This alert type will only be applied serial ports
- **UPS Power Status Alert** - This alert will be triggered when the UPS power status changes between On Line, On Battery, and Low Battery. This alert type will only be applied to UPS's.
- **Environment and power alert** - Refer to next section for details on selecting and configuring this alert type

7.2.3 Configuring environment and power alert type

This alert type will be applied to any UPS's, RPC's and EMD temperature and humidity sensors you have nominated.



Environmental Sensor Alert

Environmental Sensor Alert ○ An alert will be triggered at the value(s) below. *This alert type will only be applied to UPSes, RPCs and environmental monitor temperature and humidity sensors.*

Sensor Type Temperature ▾
Specify which environmental sensor type to alert on.

Set Point (Low)

Low Warning
A warning alert will be triggered when the sensor reading falls to this value or lower.

Low Critical
A critical alert will be triggered when the sensor reading falls to this value or lower.

Set Point (High)

High Warning
A warning alert will be triggered when the sensor reading rises to this value or higher.

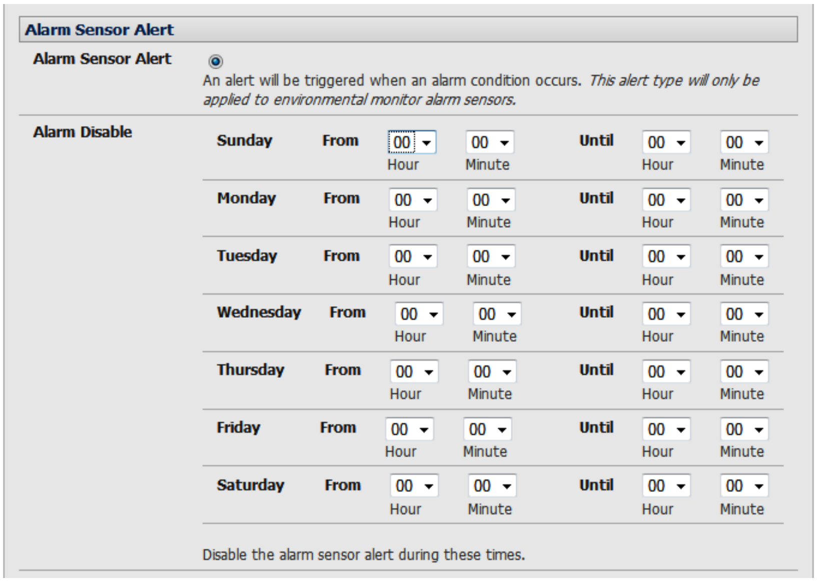
High Critical
A critical alert will be triggered when the sensor reading rises to this value or higher.

Hysteresis
Value a sensor reading must drop below a high point or to rise above a low point before the alert is reset.

- Select **Sensor Alert** to activate
- Specify which **Sensor Type** to alert on (Temperature, Humidity, Power Load and Battery Charge)
- Set the levels at which **Critical** and/or **Warning** alerts are to be sent. You can also specify **High** and/or **Low Set Points** for sending alerts and the Hysteresis to be applied before resetting off the alerts

Note Specify the **Set Point** values are in:
Degrees Centigrade for Temperature
Amps (Current) for Power Load
% (Percentage) for Humidity and Battery Charge

If you have selected **Applicable Alarm Sensor(s)** that are to be monitored for this alert event, then you can also set time windows when these sensors will not be monitored (e.g. for a door-open sensor, you may not wish to activate the sensor alert monitoring during the working day)



Alarm Sensor Alert

Alarm Sensor Alert ● An alert will be triggered when an alarm condition occurs. *This alert type will only be applied to environmental monitor alarm sensors.*

Alarm Disable

		Hour	Minute		Hour	Minute
Sunday	**From**	00	00	**Until**	00	00
Monday	**From**	00	00	**Until**	00	00
Tuesday	**From**	00	00	**Until**	00	00
Wednesday	**From**	00	00	**Until**	00	00
Thursday	**From**	00	00	**Until**	00	00
Friday	**From**	00	00	**Until**	00	00
Saturday	**From**	00	00	**Until**	00	00

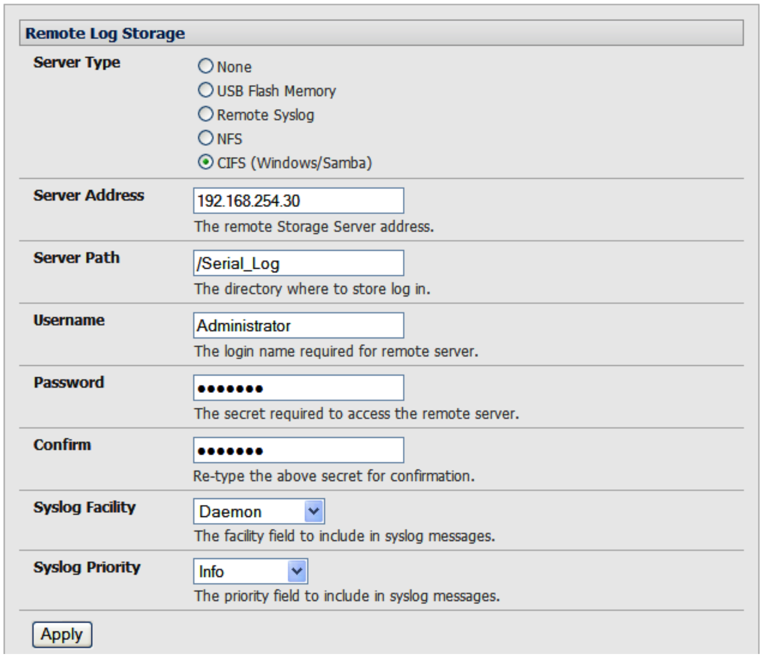
Disable the alarm sensor alert during these times.

- ➢ Click **Apply**

7.3 Remote Log Storage

Before activating Serial or Network Port Logging on any port or UPS logging, you must specify where those logs are to be saved:

- ➢ Select the **Alerts & Logging: Port Log** menu option and specify the **Server Type** to be used, and the details to enable log server access

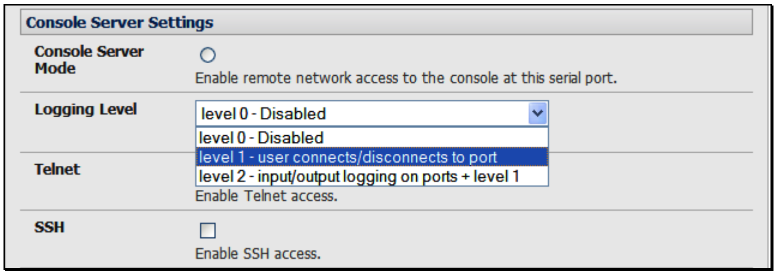


Remote Log Storage

Server Type	○ None ○ USB Flash Memory ○ Remote Syslog ○ NFS ● CIFS (Windows/Samba)
Server Address	192.168.254.30 The remote Storage Server address.
Server Path	/Serial_Log The directory where to store log in.
Username	Administrator The login name required for remote server.
Password	••••••• The secret required to access the remote server.
Confirm	••••••• Re-type the above secret for confirmation.
Syslog Facility	Daemon The facility field to include in syslog messages.
Syslog Priority	Info The priority field to include in syslog messages.

7.4 Serial Port Logging

In Console Server mode, activity logs of all serial port activity can be maintained. These records are stored on an off-server, or in the Console Server flash memory. Specify which serial ports are to have activities recorded and to what level data is to be logged:



Console Server Settings

Console Server Mode	○ Enable remote network access to the console at this serial port.
Logging Level	level 0 - Disabled level 0 - Disabled level 1 - user connects/disconnects to port level 2 - input/output logging on ports + level 1
Telnet	Enable Telnet access.
SSH	□ Enable SSH access.

- ➢ Select **Serial & Network: Serial Port** and **Edit** the port to be logged
- ➢ Specify the **Logging Level** of for each port as:

Level 0	Turns off logging for the selected port
Level 1	Logs all connection events to the port
Level 2	Logs all data transferred to and from the port and all changes in hardware flow control status and all User connection events

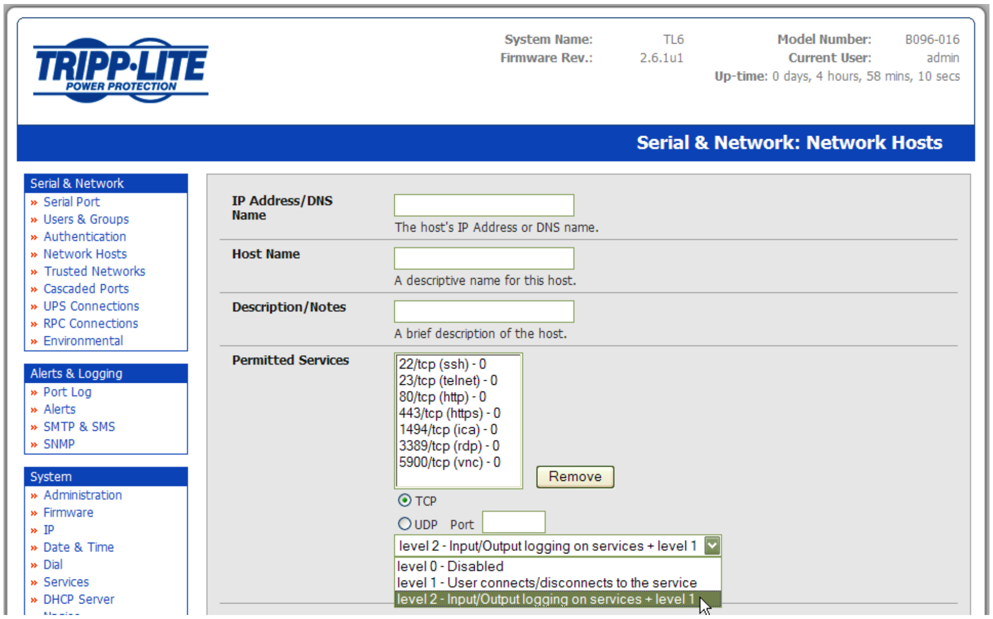
- ➢ Click **Apply**

Note A cache of the most recent 8K of logged data per serial port is maintained locally (in addition to the Logs which are transmitted for remote/USB flash storage). To view the local cache of logged serial port data, select **Manage: Port Logs**

7.5 Network TCP or UDP Port Logging

The Console Servers can also log any access to and communications with network attached Hosts.

➢ For each Host, when you set up the Permitted Services which are authorized to be used, you also must set up the level of logging that is to be maintained for each service



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: admin
Up-time: 0 days, 4 hours, 58 mins, 10 secs

Serial & Network: Network Hosts

IP Address/DNS Name: The host's IP Address or DNS name.

Host Name: A descriptive name for this host.

Description/Notes: A brief description of the host.

Permitted Services:
22/tcp (ssh) - 0
23/tcp (telnet) - 0
80/tcp (http) - 0
443/tcp (https) - 0
1494/tcp (ica) - 0
3389/tcp (rdp) - 0
5900/tcp (vnc) - 0

● TCP
○ UDP Port

level 2 - Input/Output logging on services + level 1
level 0 - Disabled
level 1 - User connects/disconnects to the service
level 2 - Input/Output logging on services + level 1

➢ Specify the logging level that is to be maintained for that particular TDC/UDP port/service on that particular Host:

Level 0	Turns off logging for the selected TDC/UDP port to the selected Host
Level 1	Logs all connection events to the port
Level 2	Logs all data transferred to and from the port

➢ Click **Add** then click **Apply**

POWER & ENVIRONMENTAL MANAGEMENT

Introduction

The B092-016 Console Server and B096-048/016 Console Server Management Switch products embed software that can be used to manage connected Power Distribution Systems (PDU's), IPMI devices and Uninterruptible Power Supplies (UPS's) supplied by a number of vendors, and some the environmental monitoring devices. B092-016 Console Server with PowerAlert also embeds Tripp Lite's PowerAlert software.

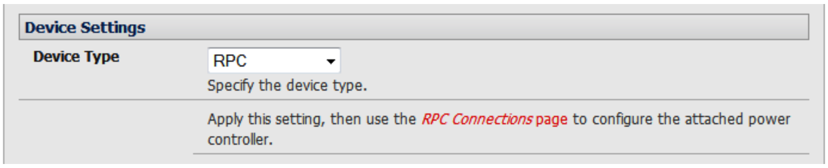
8.1 Remote Power Control (RPC)

The Console Server Management Console monitors and controls Remote Power Control (RPC) devices using the embedded PowerMan and NUT open source management tool. RPC's include power distribution units (PDU's) and IPMI power devices.

8.1.1 RPC connection

Serial and network connected RPC's must first be connected to, and configured to communicate with, the Console Server:

- For serial RPC's, connect the PDU to the selected serial port on the Console Server. From the **Serial and Network: Serial Port** menu, configure the **Common Settings** of that port with the RS232 properties required by the PDU (refer to *Chapter 4.1.1 Common Settings*). Then select **RPC** as the **Device Type**
- Similarly for each network connected RPC, go to **Serial & Network: Network Hosts** menu and configure the RPC as a connected Host



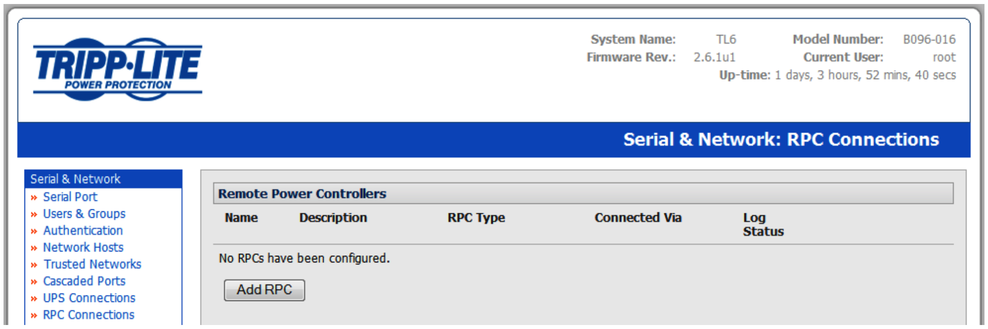
Device Settings

Device Type: RPC

Specify the device type.

Apply this setting, then use the RPC Connections page to configure the attached power controller.

- Select the **Serial & Network: RPC Connections** menu. This will display all the RPC connections that have already been configured



System Name: TL6   Model Number: B096-016

Firmware Rev.: 2.6.1u1   Current User: root

Up-time: 1 days, 3 hours, 52 mins, 40 secs

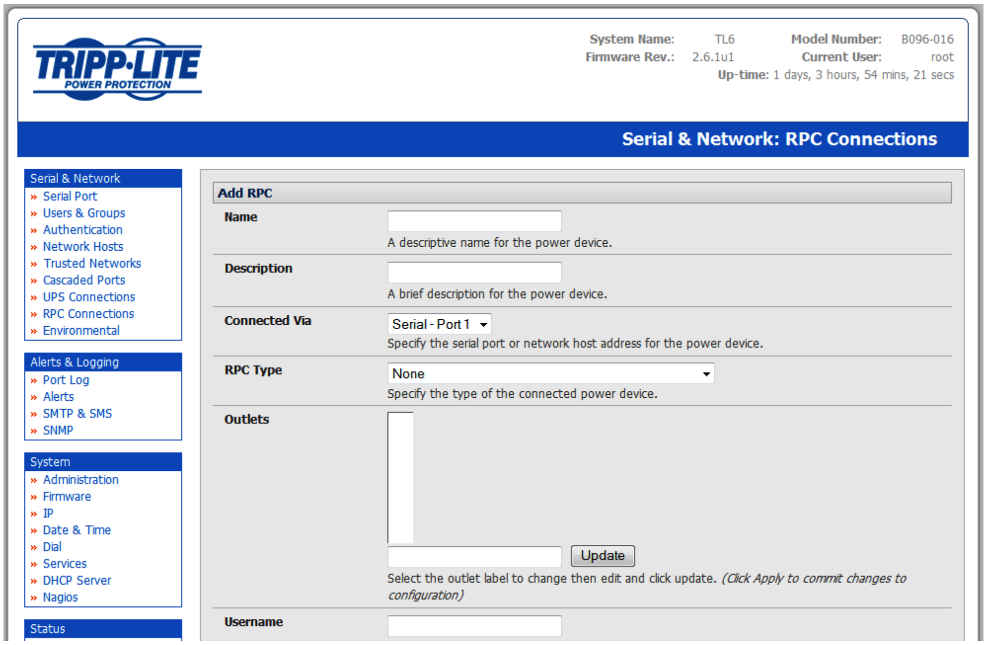
Serial & Network: RPC Connections

Remote Power Controllers

Name	Description	RPC Type	Connected Via	Log Status

No RPCs have been configured.

- Click **Add RPC**



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 3 hours, 54 mins, 21 secs

Add RPC

Name
A descriptive name for the power device.

Description
A brief description for the power device.

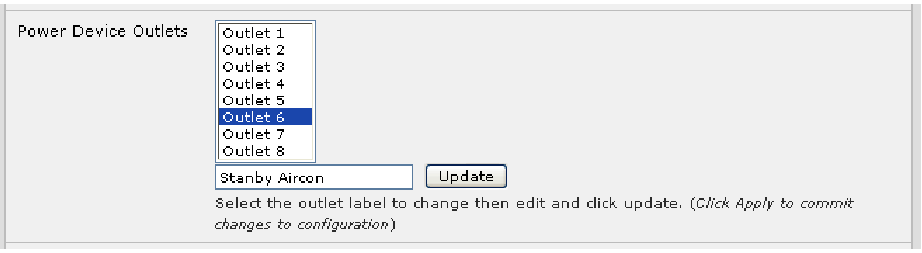
Connected Via Serial - Port 1
Specify the serial port or network host address for the power device.

RPC Type None
Specify the type of the connected power device.

Outlets
Select the outlet label to change then edit and click update. *(Click Apply to commit changes to configuration)*

Username

- Enter a **RPC Name** and **Description** for the RPC
- In **Connected Via**, select the pre-configured serial port or the network host address that connects to the RPC
- Select any specific labels you wish to apply to specific RPC **Outlets** (e.g. the PDU may have 20 outlets connected to 20 powered devices you may wish to identify by name)



Power Device Outlets
Stanby Aircon
Select the outlet label to change then edit and click update. (*Click Apply to commit changes to configuration*)

- Enter the **Username** and **Password** used to login into the RPC. Note that these login credentials are not related the Users and access privileges you will have configured in *Serial & Networks: Users & Groups*
- Check **Log Status** and specify the **Log Rate** (minutes between samples) if you wish the status from this RPC to be logged. These logs can be views from the **Status: RPC Status** screen
- Click **Apply**

Note The Management Console has support for a number of network and serial PDU's. If your PDU is not on the default list, it is simple to add support for more devices. This is covered in Chapter 14: Advanced Configurations

IPMI service processors and BMCs can be configured so all authorized users can use the Management Console to remotely cycle power and reboot computers, even when their operating system is unresponsive. To set up IPMI power control, the Administrator first enters the IP address/domain name of the BMC or service processor (e.g. a Dell DRAC) in **Serial & Network: Network Hosts.** Then in **Serial & Network: RPC Connections,** the Administrator specifies the **RPC Type** to be IPMI1.5 or 2.0

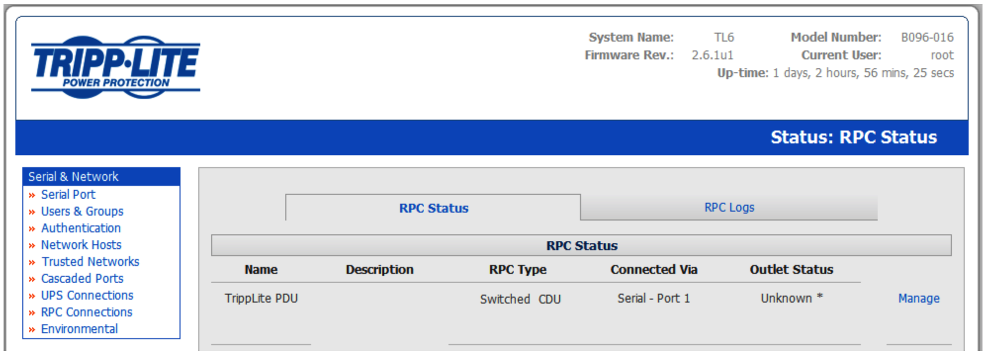
8.1.2 RPC alerts

You can now set PDU and IPMI alerts using **Alerts & Logging: Alerts** (refer to *Chapter 7*)

8.1.3 RPC status

You can monitor the current status of your network and serially connected PDU's and IPMI RPC's

- Select the **Status: RPC Status** menu. A table with the summary status of all connected RPC hardware will be displayed



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 56 mins, 25 secs

Status: RPC Status

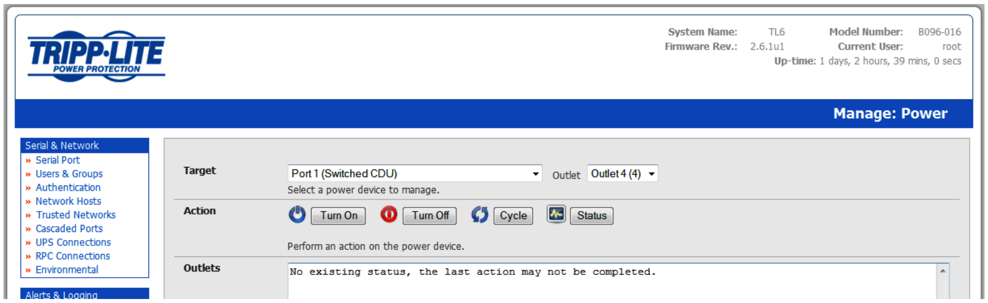
RPC Status

Name	Description	RPC Type	Connected Via	Outlet Status	
TrippLite PDU		Switched CDU	Serial - Port 1	Unknown *	Manage

- Click on **View Log** or select the **RPC Logs** menu. You will be presented with a table of the history and detailed graphical information on the select RPC
- Click **Manage** to query or control the individual power outlet. This will take you to the **Manage: Power** screen

8.1.4 User power management

The Power Manager enables both Users and Administrators to access and control the configured serial and network attached PDU power strips, and servers with embedded IPMI service processors or BMC's:



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 39 mins, 0 secs

Manage: Power

Target: Port 1 (Switched CDU) Outlet: Outlet 4 (4)
Select a power device to manage.

Action
Perform an action on the power device.

Outlets

```
No existing status, the last action may not be completed.
```

- Select the **Manage: Power** and the particular **Target** power device to be controlled (or click **Manage** on the **Status: RPC Status** menu)

- The outlet status is displayed. You can initiate the desired **Action** to be taken by selecting the appropriate icon:

  ⏻ **Power ON**

  ⏻ **Power OFF**

  🔄 **Power Cycle**

  📈 **Power Status**

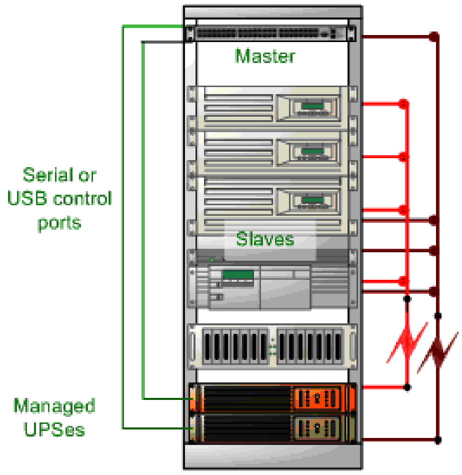
  You will only be presented with icons for those operations that are supported by the **Target** you have selected

8.2 Uninterruptible Power Supply Control (UPS)

The Console Servers manage UPS hardware using Network UPS Tools (refer Section 8.2.6 for an overview of embedded open source Network UPS Tools - NUT software)

8.2.1 Managed UPS connections

A **Managed UPS** is a UPS that is connected by serial or USB cable or by the network to the Console Server. The Console Server becomes the Master of this UPS, and runs a *upsd* server to allow other computers that are drawing power through the UPS (Slaves) to monitor its status and take appropriate action (such as shutdown in event of low battery).

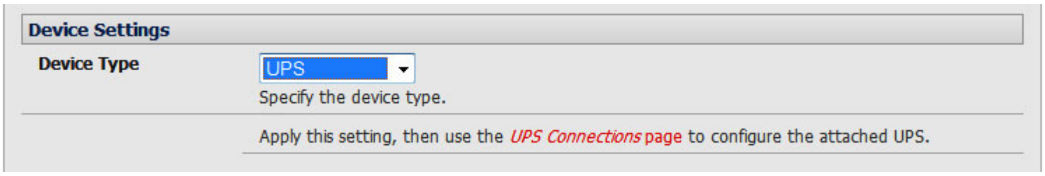


The Console Server may or may not be drawing power through the Managed UPS (see the *Configure UPS powering the Console Server* section below).

When the UPS's battery power reaches critical, the Console Server signals and waits for Slaves to shutdown, then powers off the UPS.

Serial and network connected UPS's must first be configured on the Console Server with the relevant serial control ports reserved for UPS usage, or with the UPS allocated as a connected Host:

- Select **UPS** as the Device Type in the **Serial & Network: Serial Port** menu for each port which has Master control over a UPS and in the **Serial & Network: Network Hosts** menu for each network connected UPS (refer to *Chapter 4)*



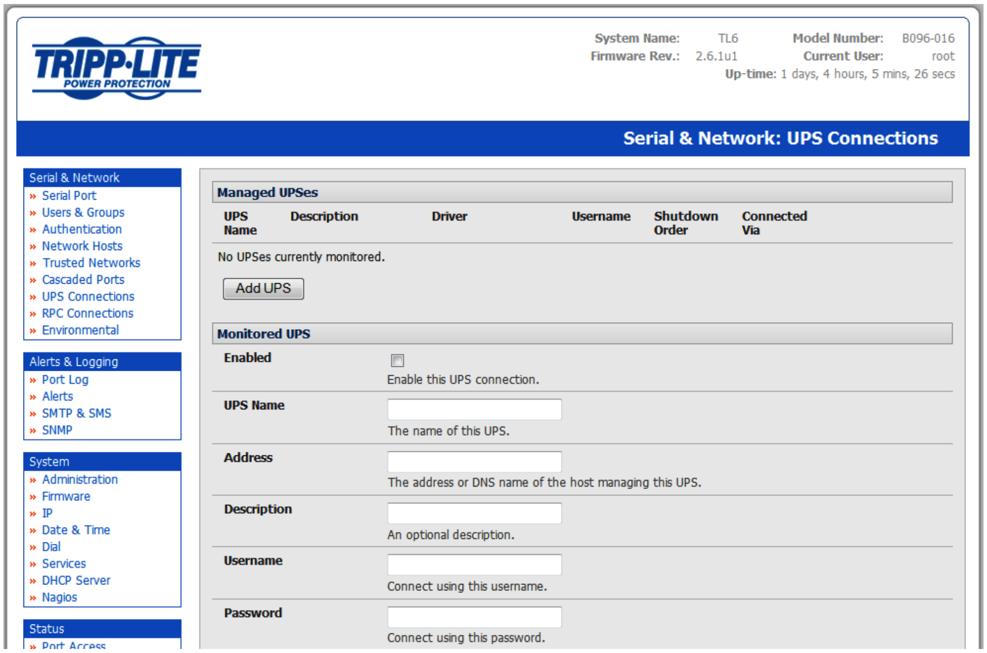
Device Settings

Device Type: UPS

Specify the device type.

Apply this setting, then use the *UPS Connections* page to configure the attached UPS.

No such configuration is required for USB-connected UPS hardware.



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 4 hours, 5 mins, 26 secs

Serial & Network: UPS Connections

Managed UPSes

UPS Name	Description	Driver	Username	Shutdown Order	Connected Via

No UPSes currently monitored.

Monitored UPS

Enabled □ Enable this UPS connection.

UPS Name: The name of this UPS.

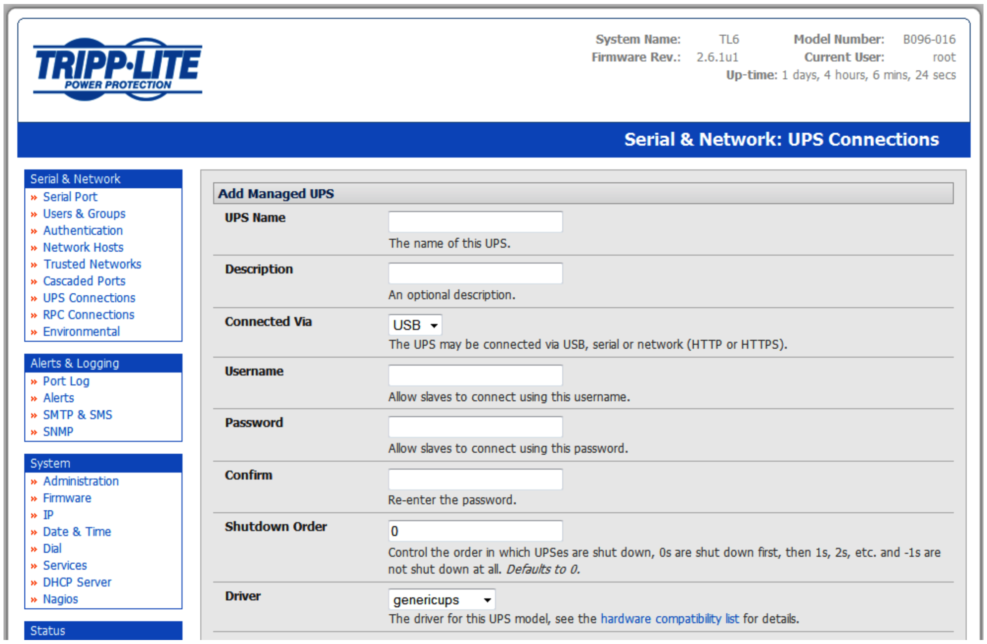
Address: The address or DNS name of the host managing this UPS.

Description: An optional description.

Username: Connect using this username.

Password: Connect using this password.

- Select the **Serial & Network: UPS Connections** menu. The **Managed UPSes** section will display all the UPS connections that have already been configured.
- Click **Add UPS**



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 4 hours, 6 mins, 24 secs

Serial & Network: UPS Connections

Add Managed UPS

UPS Name	The name of this UPS.
Description	An optional description.
Connected Via	USB The UPS may be connected via USB, serial or network (HTTP or HTTPS).
Username	Allow slaves to connect using this username.
Password	Allow slaves to connect using this password.
Confirm	Re-enter the password.
Shutdown Order	0 Control the order in which UPSes are shut down, 0s are shut down first, then 1s, 2s, etc. and -1s are not shut down at all. *Defaults to 0.*
Driver	genericups The driver for this UPS model, see the hardware compatibility list for details.

- ➢ Enter a **UPS Name** and **Description** (optional) and identify if the UPS will be **Connected Via** USB or over pre-configured serial port or via HTTP/HTTPS over the preconfigured network Host connection

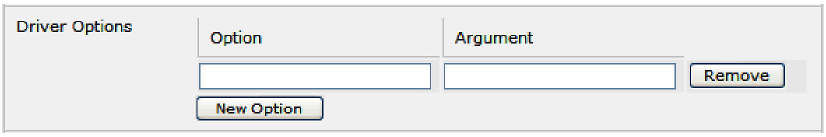
- ➢ Enter the UPS login details. This **Username** and **Password** is used by Slaves of this UPS (i.e. other computers that are drawing power through this UPS) to connect to the Console Server for monitoring of the UPS status and shutdown when battery power is low. Monitoring will typically be performed using the *upsmon* client running on the Slave server. See *section 8.5.4* for details on setting up *upsmon* on Slave servers powered by the UPS

Note: These login credentials are not related to the Users and access privileges you will have configured in *Serial & Networks: Users & Groups*

- ➢ If you have multiple UPS's and require them to be shut down in a specific order, specify the **Shutdown Order** for this UPS. This is a positive whole number, or *-1. 0s* are shut down first, then *1s*, *2s*, etc. *-1s* are not shut down at all. Defaults to *0*

- ➢ Select the **Driver** that will be used to communicate with the UPS. The drop-down menu presents a full selection of drivers from the latest Network UPS Tools (NUT version 2.2.0) and additional information on compatible UPS hardware can be found at http://www.networkupstools.org/compat/stable.html

- ➢ Click **New Options** in **Driver Options** if you need to set driver-specific options for your selected NUT driver and hardware combination (more details at http://www.networkupstools.org/doc



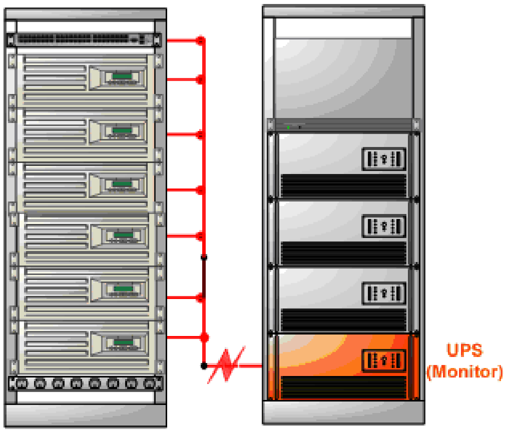
- Check **Log Status** and specify the **Log Rate** (i.e. minutes between samples) if you wish the status from this UPS to be logged. These logs can be views from the **Status: UPS Status** screen
- Check **Enable Nagios** to enable this UPS to be monitored using Nagios central management
- Click **Apply**

You can also customize the *upsmon*, *upsd* and *upsc* settings for this UPS hardware directly from the command line

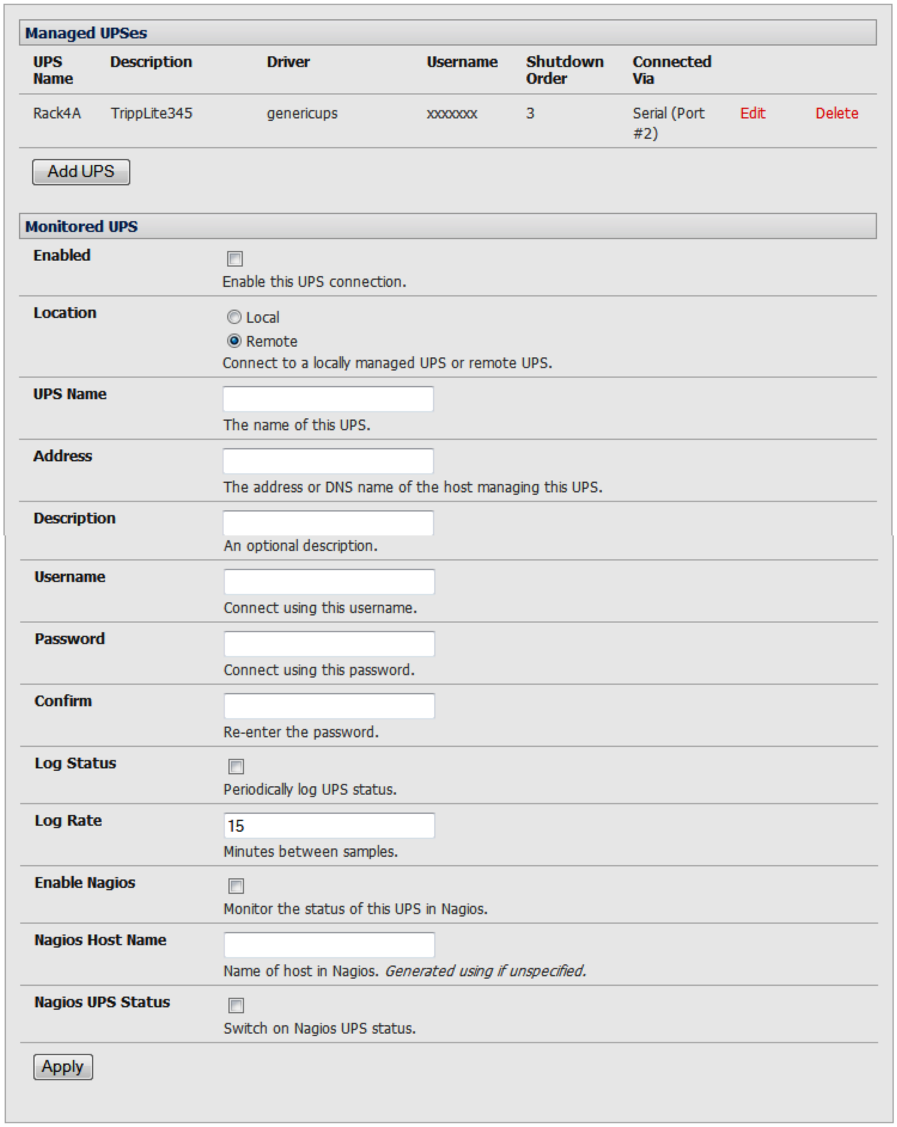
8.2.2 Configure UPS powering the Console Server

A **Monitored UPS** is a UPS that is providing the power to the Console Server. The purpose of configuring a Monitored UPS is to provide an opportunity to perform any "last gasp" actions before power is lost during a power failure. This is achieved by placing a script in */etc/config/scripts/ups-shutdown*. You may use the */etc/scripts/ups-shutdown* as a template. This script is run when then UPS reaches critical battery status.

- If the Console Server is drawing power through a Managed UPS that has already been configured, select **Local**, enter the Managed **UPS Name** and check **Enabled**. The Console Server continues to be the master of this UPS



- If the UPS that powers the Console Server is not a Managed UPS for that Console Server, then the Console Server can still connect to a remote NUT server (*upsd*) to monitor its status as a Slave. In this case, select **Remote**, and enter the address, username and password to connect.



Managed UPSes

UPS Name	Description	Driver	Username	Shutdown Order	Connected Via		
Rack4A	TrippLite345	genericups	xxxxxxx	3	Serial (Port #2)	Edit	Delete

Monitored UPS

Enabled	□ Enable this UPS connection.
Location	○ Local ● Remote Connect to a locally managed UPS or remote UPS.
UPS Name	The name of this UPS.
Address	The address or DNS name of the host managing this UPS.
Description	An optional description.
Username	Connect using this username.
Password	Connect using this password.
Confirm	Re-enter the password.
Log Status	□ Periodically log UPS status.
Log Rate	15 Minutes between samples.
Enable Nagios	□ Monitor the status of this UPS in Nagios.
Nagios Host Name	Name of host in Nagios. *Generated using if unspecified.*
Nagios UPS Status	□ Switch on Nagios UPS status.

8.2.3 Configuring powered computers to monitor a Managed UPS

Once you have added a Managed UPS, each server that is drawing power through the UPS should be setup to monitor the UPS status as a Slave. This is done by installing the NUT package on each server, and setting up *upsmon* to connect to the Console Server.

Refer to the NUT documentation for details on how this is done, specifically sections 13.5 to 13.10. http://eu1.networkupstools.org/doc/2.2.0/INSTALL.html

An example upsmon.conf entry might look like:

MONITOR managedups@192.168.0.1 1 username password Slave

- *managedups* is the UPS Name of the Managed UPS

- *192.168.0.1* is the IP address of the Console Server

- *1* indicates the server has a single power supply attached to this UPS

- *username* is the Username of the Managed UPS

- *password* is the Password of the Manager UPS

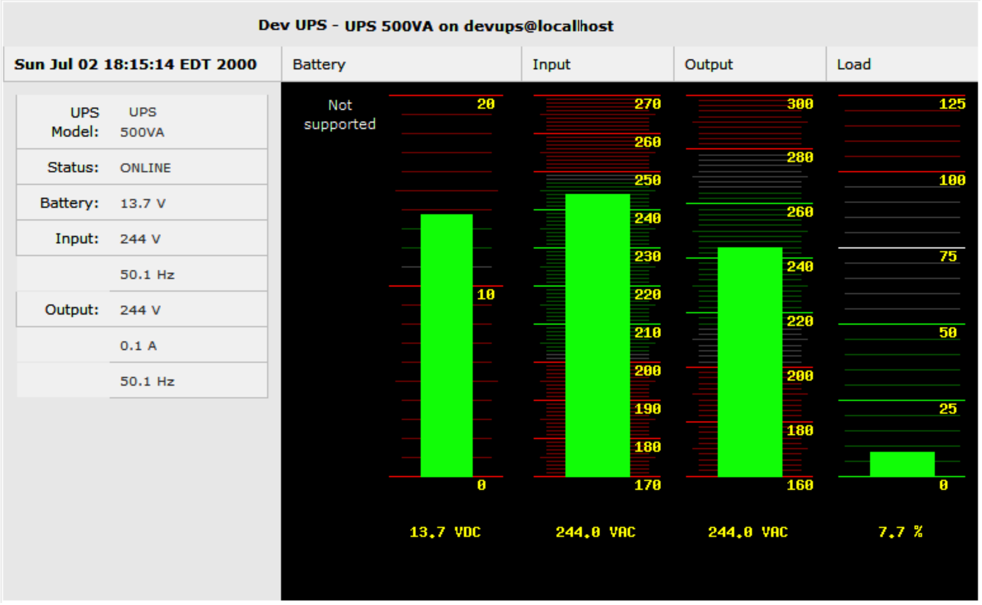
8.2.4 UPS alerts

You can now set UPS alerts using **Alerts & Logging: Alerts** (refer to *Chapter 7*)

8.2.5 UPS status

You can monitor the current status of all your Managed or Monitored UPS's, whether they are on the network or connected serially or via USB:

- Select the **Status: UPS Status** menu and a table with the summary status of all connected UPS hardware will be displayed
- Click on any particular UPS **System** name in the table and you will be presented with a more detailed graphical information on the select UPS System



Dev UPS - UPS 500VA on devups@localhost

Sun Jul 02 18:15:14 EDT 2000

UPS Model:	UPS 500VA
Status:	ONLINE
Battery:	13.7 V
Input:	244 V
	50.1 Hz
Output:	244 V
	0.1 A
	50.1 Hz

- Click on any particular **All Data** for any UPS System in the table for more status and configuration information on the select UPS System
- Select **UPS Logs** and you will be presented with the log table of the load, battery charge level, temperature and other status information from all the Managed and Monitored UPS systems. This information will be logged for all UPS's which were configured with **Log Status** checked. The information is also presented graphically

8.2.6 Overview of Network UPS Tools (NUT)

Network UPS Tools (NUT) is a group of open source programs that provide a common interface for monitoring and administering UPS hardware; and ensuring safe shutdowns of the systems which are connected.

NUT can be configured using the Management Console as described above, or you can configure the tools and manage the UPS's directly from the command line. This section provides an overview of NUT. You can find full documentation at http://www.networkupstools.org/doc.

NUT is built on a networked model with a layered scheme of drivers, server and clients.

1. The **driver** programs talk directly to the UPS equipment and run on the same host as the NUT network server *upsd*. Drivers are provided for a wide assortment of equipment from most of the popular UPS vendors and they understand the specific language of each UPS and map it back to a compatibility layer. This means both an expensive "smart" protocol UPS and a simple "power strip" model can be handled transparently.

2. The NUT network **server** program ***upsd*** is responsible for passing status data from the drivers to the client programs via the network. *upsd* can cache the status from multiple UPS's and can then serve this status data to many clients. *upsd* also contains access control features to limit the abilities of the clients (so only authorized hosts may monitor or control the UPS hardware).

3. There are a number of NUT **clients** that connect to *upsd* to check on the status of the UPS hardware and do things based on the status. These clients can run on the same host as the NUT server or they can communicate with the NUT server over the network (enabling them to monitor any UPS anywhere).

   The ***upsmon*** client enables servers that draw power through the UPS (i.e. Slaves of the UPS) to shutdown gracefully when the battery power reaches critical. Additionally, one server is designated the Master of the UPS, and is responsible for shutting down the UPS itself when all Slaves have shut down. Typically, the Master of the UPS is the one connected to the UPS via serial or USB cable.

   upsmon can monitor multiple UPS's, so high-end servers which receive power from multiple UPS's simultaneously won't initiate a shutdown until the total power situation across all source UPS's becomes critical.

   There also the two status/logging clients, ***upsc*** and ***upslog***. The *upsc* client provides a quick way to poll the status of a UPS. It can be used inside shell scripts and other programs that need UPS status information. *upslog* is a background service that periodically polls the status of a UPS, writing it to a file.

   All these clients run on the Console Server (for Management Console presentations) but they also are run remotely (on locally powered servers and remote monitoring systems).

This layered NUT architecture enables:

- Multiple architecture support: NUT can manage serial and USB-connected models with the same common interface. SNMP equipment can also be monitored (although at this stage this is still pre-release with experimental drivers and this feature will be added to the embedded UPS tools in future release).

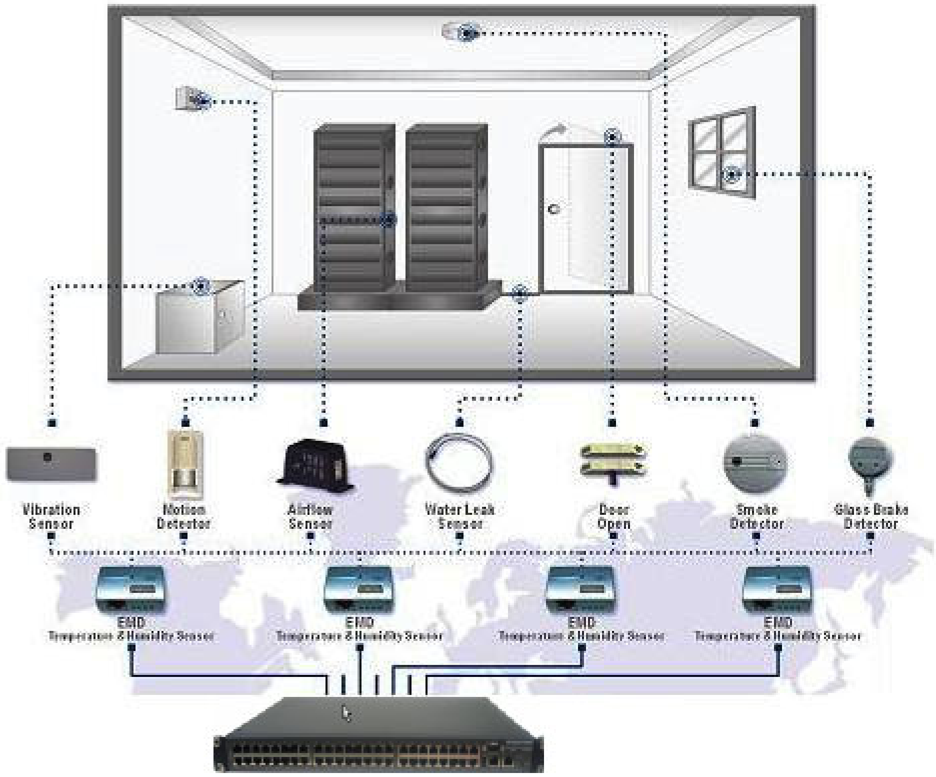
- Multiple clients monitoring one UPS: Multiple systems may monitor a single UPS using only their network connections. There's a wide selection of client programs which support monitoring UPS hardware via NUT (Big Sister, Cacti, Nagios, Windows and more). Refer to *www.networkupstools.org/client-projects*.)

So NUT supports the more complex power architectures found in data centers, computer rooms and NOCs where many UPS's from many vendors power many systems with many clients and each of the larger UPS's power multiple devices and many of these devices are themselves dual powered.

8.3 Environmental Monitoring

The Environmental Monitoring Device (EMD), model B090-EMD, can be connected to any Console Server serial port and each Console Server can support multiple EMD's. Each EMD has one temperature and one humidity sensor and one general purpose status sensor which can be connected to a smoke detector, water detector, vibration or open-door sensor.

Using the Management Console, Administrators can view the ambient temperature and humidity and set the EMD to automatically send alarms progressively from warning levels to critical alerts.



8.3.1 Connecting the EMD

The Environmental Monitoring Sensor (EMD) connects to any serial port on the Console Server via a special EMD Adapter and standard CAT5 cable. The EMD is powered over this serial connection and communicates using a custom handshake protocol. It is not an RS232 device and should not be connected without the adapter:

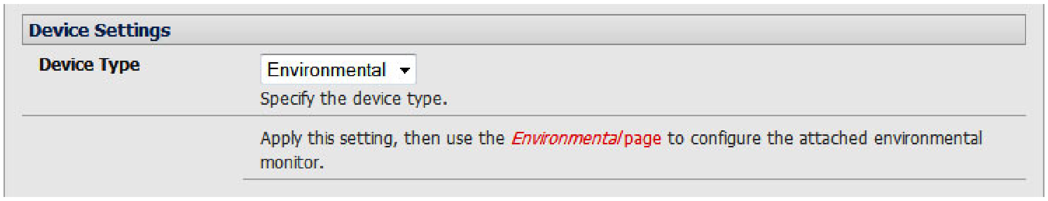
- Plug the RJ plug on the EMD Adapter (model B090-EMD-ADP) into RJ45 Port on the EMD (model B090-EMD). Then connect the Console Server serial port to the RJ45 port of the EMD Adapter using the provided UTP cable. If the 6 foot (2 meter) UTP cable provided with the EMD is not long enough it can be replaced with a standard Cat5 UTP cable up to 33 feet (10meters) in length (Tripp Lite N002 series cables)

- Screw the bare wires on any smoke detector, water detector, vibration sensor, open-door sensor or general purpose open/close status sensors into the terminals on the EMD:

○ B090-WLS	Console Server Water Leak Sensor
○ B090-DCS	Console Server Door Contact Sensor
○ B090-VS	Console Server Vibration Sensor
○ B090-SD-110	Console Server Smoke Detector - 110V
○ B090-SD-220	Console Server Smoke Detector - 220V

The EMD can be used only with a Console Server and cannot be connected to standard RS232 serial ports on other appliances.

- Select **Environmental** as the **Device Type** in the **Serial & Network: Serial Port** menu for the port to which the EMD is attached. No particular Common Settings are required.
- Click **Apply**

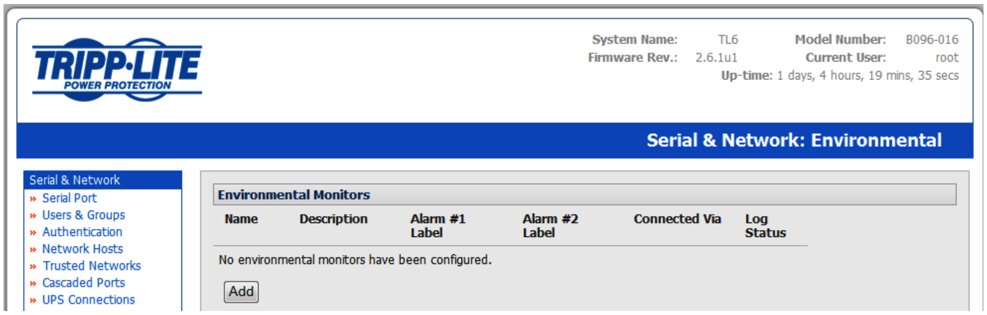


Device Settings

Device Type Environmental ▾
Specify the device type.

Apply this setting, then use the *Environmental* page to configure the attached environmental monitor.

- Select the **Serial & Network: Environmental** menu. This will display all the EMD connections that have already been configured



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 1 days, 4 hours, 19 mins, 35 secs

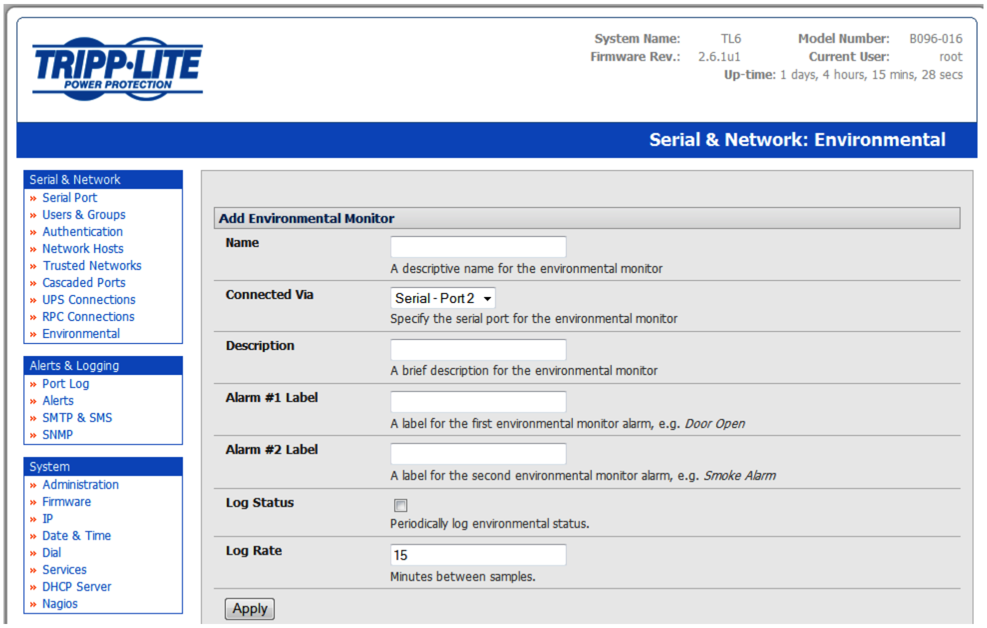
Serial & Network: Environmental

Environmental Monitors

Name	Description	Alarm #1 Label	Alarm #2 Label	Connected Via	Log Status

No environmental monitors have been configured.

- ➢ Click **Add**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 1 days, 4 hours, 15 mins, 28 secs

Serial & Network: Environmental

Add Environmental Monitor

Name	A descriptive name for the environmental monitor
Connected Via	Serial - Port 2 Specify the serial port for the environmental monitor
Description	A brief description for the environmental monitor
Alarm #1 Label	A label for the first environmental monitor alarm, e.g. *Door Open*
Alarm #2 Label	A label for the second environmental monitor alarm, e.g. *Smoke Alarm*
Log Status	☐ Periodically log environmental status.
Log Rate	15 Minutes between samples.

- ➢ Enter a **Name** and **Description** for the EMD and select pre-configured serial port that the EMD will be **Connected Via**
- ➢ Provide **Labels** for each of the two alarms
- ➢ Check **Log Status** and specify the **Log Rate** (minutes between samples) if you wish the status from this EMD to be logged. These logs can be views from the **Status: Environmental Status** screen
- ➢ Click **Apply**

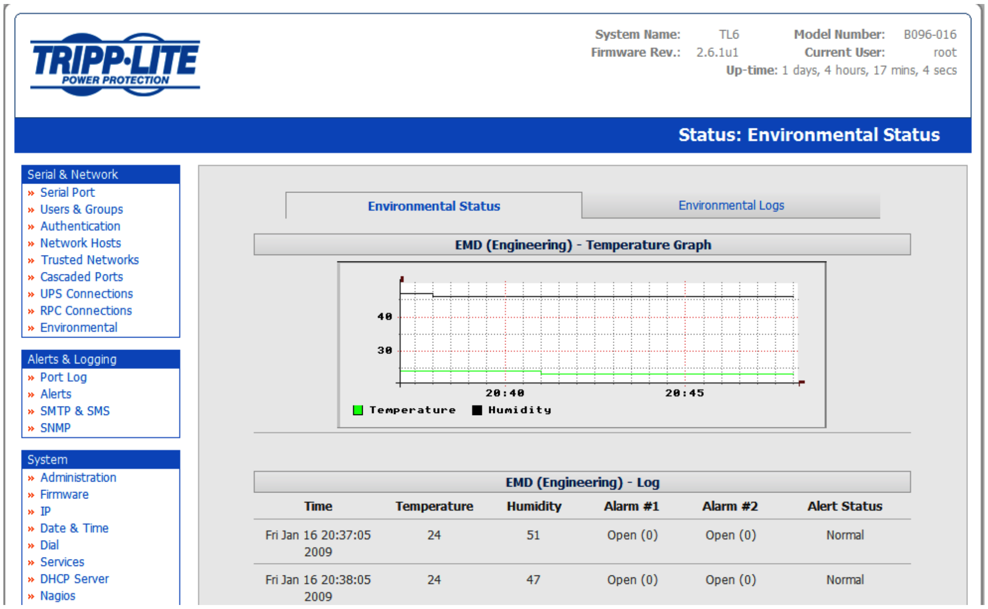
8.3.2 Environmental alerts

You can now set temperature, humidity and probe status alerts using **Alerts & Logging: Alerts** (refer to *Chapter 7*)

8.3.3 Environmental status

You can monitor the current status of all of EMDs and their probes

- Select the **Status: Environmental Status** menu and a table with the summary status of all connected EMD hardware will be displayed
- Click on **View Log** or select the **Environmental Logs** menu and you will be presented with a table and graphical plot of the log history of the select EMD



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 4 hours, 17 mins, 4 secs

Status: Environmental Status

EMD (Engineering) - Temperature Graph

EMD (Engineering) - Log

Time	Temperature	Humidity	Alarm #1	Alarm #2	Alert Status
Fri Jan 16 20:37:05 2009	24	51	Open (0)	Open (0)	Normal
Fri Jan 16 20:38:05 2009	24	47	Open (0)	Open (0)	Normal

AUTHENTICATION

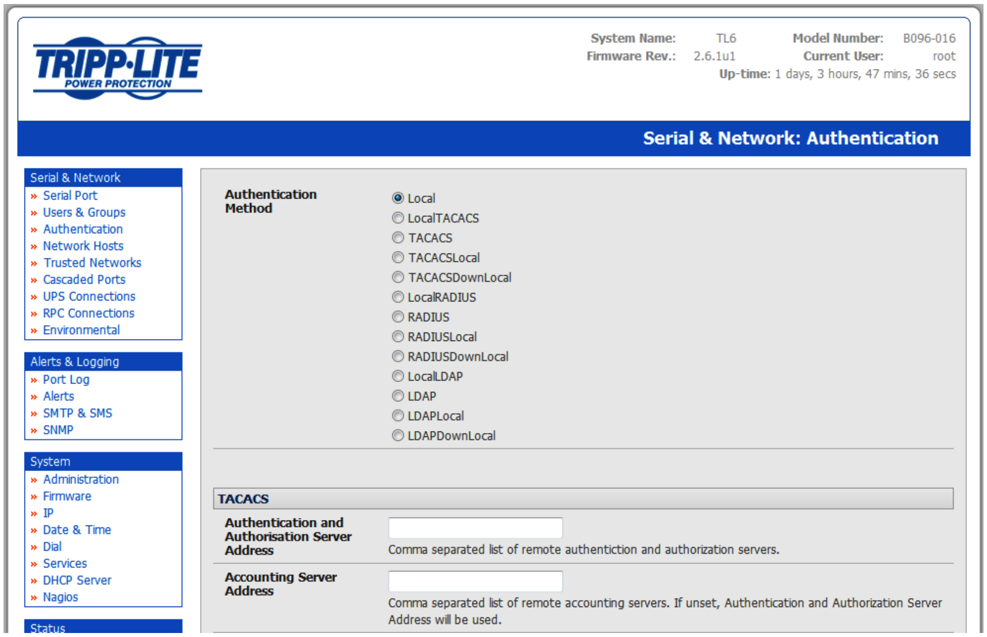
Introduction

The Tripp Lite Console Server is a dedicated Linux computer, and it embodies popular and proven Linux software modules for secure network access (OpenSSH) and communications (OpenSSL) and sophisticated user authentication (PAM, RADIUS, TACACS+ and LDAP).

- This chapter details how the Administrator can use the Management Console to establish remote AAA authentication for all connections to the Console Server and attached serial and network host devices
- This chapter also covers establishing a secure link to the Management Console using HTTPS and using OpenSSL and OpenSSH to establish a secure Administration connection to the Console Server

9.1 Authentication Configuration

Authentication can be performed locally, or remotely using an LDAP, Radius or TACACS+ authentication server. The default authentication method for the Console Server is Local.



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 3 hours, 47 mins, 36 secs

Serial & Network: Authentication

Authentication Method
● Local
○ LocalTACACS
○ TACACS
○ TACACSLocal
○ TACACSDownLocal
○ LocalRADIUS
○ RADIUS
○ RADIUSLocal
○ RADIUSDownLocal
○ LocalLDAP
○ LDAP
○ LDAPLocal
○ LDAPDownLocal

TACACS

Authentication and Authorisation Server Address
Comma separated list of remote authentiction and authorization servers.

Accounting Server Address
Comma separated list of remote accounting servers. If unset, Authentication and Authorization Server Address will be used.

Any authentication method that is configured will be used for authentication of any user attempting to log in through Telnet, SSH or the Web Manager to the Console Server and any connected serial port or network host devices.

The Console Server can be configured to the default (**Local**) or an alternate authentication method (**TACACS**, **RADIUS** or **LDAP**) with the option of a selected order in which local and remote authentication is to be used:

Local ***TACACS*** */RADIUS/LDAP*: Tries local authentication first, falling back to remote if local fails

*TACACS /RADIUS/****LDAP*** **Local**: Tries remote authentication first, falling back to local if remote fails

*TACACS /RADIUS/****LDAP*** **Down Local**: Tries remote authentication first, falling back to local if the remote authentication returns an error condition (e.g. the remote authentication server is down or inaccessible)

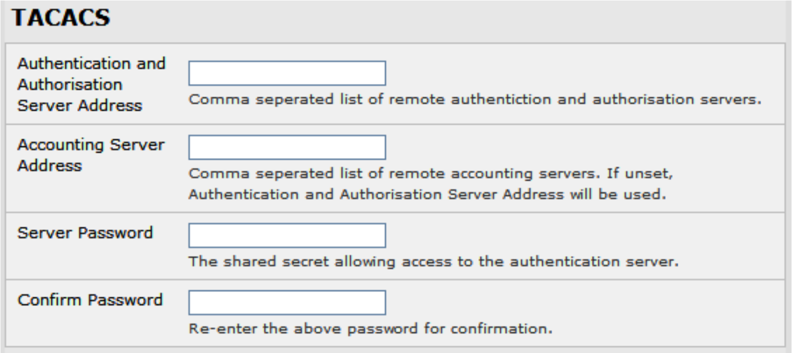
9.1.1 Local authentication

- Select **Serial and Network: Authentication** and check **Local**
- Click **Apply**

9.1.2 TACACS authentication

Perform the following procedure to configure the TACACS+ authentication method to be used whenever the Console Server or any of its serial ports or hosts is accessed:

- Select **Serial and Network: Authentication** and check **TACAS** or **LocalTACACS** or **TACACSLocal** or **TACACSDownLocal**



TACACS

Authentication and Authorisation Server Address	Comma seperated list of remote authentiction and authorisation servers.
Accounting Server Address	Comma seperated list of remote accounting servers. If unset, Authentication and Authorisation Server Address will be used.
Server Password	The shared secret allowing access to the authentication server.
Confirm Password	Re-enter the above password for confirmation.

- Enter the **Server Address** (IP or host name) of the remote Authentication/Authorization server. Multiple remote servers may be specified in a comma-separated list. Each server is tried in succession.
- In addition to multiple remote servers, you can also enter for separate lists of Authentication/Authorization servers and Accounting servers. If no Accounting servers are specified, the Authentication/Authorization servers are used instead.
- Enter the **Server Password**
- Click **Apply.** TACAS+ remote authentication will now be used for all user access to Console Server and serially or network attached devices

TACACS+ The Terminal Access Controller Access Control System (TACACS+) security protocol is a recent protocol developed by Cisco. It provides detailed accounting information and flexible administrative control over the authentication and authorization processes. TACACS+ allows for a single access control server (the TACACS+ daemon) to provide authentication, authorization, and accounting services independently. Each service can be tied into its own database to take advantage of other services available on that server or on the network, depending on the capabilities of the daemon. There is a draft RFC detailing this protocol. Further information on configuring remote TACACS+ servers can be found at the following sites:

http://www.cisco.com/en/US/tech/tk59/technologies_tech_note09186a0080094e99.shtml

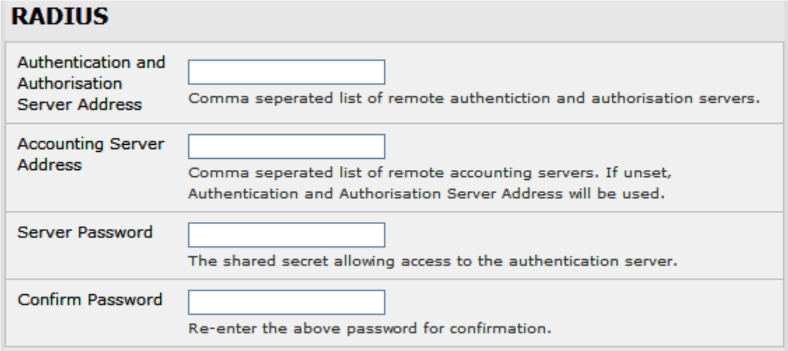
http://www.cisco.com/en/US/products/sw/secursw/ps4911/products_user_guide_chapter09186a00800eb6d6.html

http://cio.cisco.com/univercd/cc/td/doc/product/software/ios113ed/113ed_cr/secur_c/scprt2/sctplus.htm

9.1.3 RADIUS authentication

Perform the following procedure to configure the RADIUS authentication method to be used whenever the Console Server or any of its serial ports or hosts is accessed:

- Select **Serial and Network: Authentication** and check **RADIUS** or **LocalRADIUS** or **RADIUSLocal** or **RADIUSDownLocal**



RADIUS

Authentication and Authorisation Server Address	Comma seperated list of remote authentiction and authorisation servers.
Accounting Server Address	Comma seperated list of remote accounting servers. If unset, Authentication and Authorisation Server Address will be used.
Server Password	The shared secret allowing access to the authentication server.
Confirm Password	Re-enter the above password for confirmation.

- Enter the **Server Address** (IP or host name) of the remote Authentication/ Authorization server. Multiple remote servers may be specified in a comma-separated list. Each server is tried in succession
- In addition to multiple remote servers, you can also enter for separate lists of Authentication/Authorization servers and Accounting servers. If no Accounting servers are specified, the Authentication/Authorization servers are used instead
- Enter the **Server Password**
- Click **Apply.** RADIUS remote authentication will now be used for all user access to Console Server and serially or network attached devices

RADIUS The Remote Authentication Dial-In User Service (RADIUS) protocol was developed by Livingston Enterprises as an access server authentication and accounting protocol. The RADIUS server can support a variety of methods to authenticate a user. When it is provided with the username and original password given by the user, it can support PPP, PAP or CHAP, UNIX login, and other authentication mechanisms. Further information on configuring remote RADIUS servers can be found at the following sites:

http://www.microsoft.com/technet/prodtechnol/windowsserver2003/library/DepKit/d4fe8248-eecd-49e4-88f6-9e304f97fefc.mspx

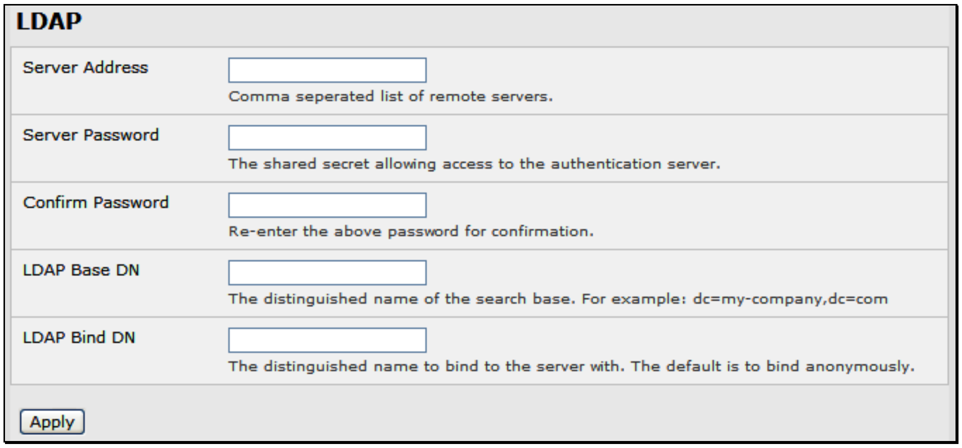
http://www.cisco.com/en/US/tech/tk59/technologies_tech_note09186a00800945cc.shtml

http://www.freeradius.org/

9.1.4 LDAP authentication

Perform the following procedure to configure the LDAP authentication method to be used whenever the Console Server or any of its serial ports or hosts is accessed:

- Select **Serial and Network: Authentication** and check **LDAP** or **LocalLDAP** or **LDAPLocal** or **LDAPDownLocal**



LDAP

Server Address
Comma seperated list of remote servers.

Server Password
The shared secret allowing access to the authentication server.

Confirm Password
Re-enter the above password for confirmation.

LDAP Base DN
The distinguished name of the search base. For example: dc=my-company,dc=com

LDAP Bind DN
The distinguished name to bind to the server with. The default is to bind anonymously.

- Enter the **Server Address** (IP or host name) of the remote Authentication server. Multiple remote servers may be specified in a comma-separated list. Each server is tried in succession.
- Enter the **Server Password**

Note To interact with LDAP requires that the user account exist on our Console Server to work with the remote server, i.e., you can't just create the user on your LDAP server and not tell the Console Server about it. You need to add the user account.

- Click **Apply.** LDAP remote authentication will now be used for all user access to Console Server and serially or network attached devices

LDAP The Lightweight Directory Access Protocol (LDAP) is based on the X.500 standard, but is significantly simpler and more readily adapted to meet custom needs. The core LDAP specifications are all defined in RFCs. LDAP is a protocol used to access information stored in an LDAP server. Further information on configuring remote RADIUS servers can be found at the following sites:

http://www.ldapman.org/articles/intro_to_ldap.html

http://www.ldapman.org/servers.html

http://www.linuxplanet.com/linuxplanet/tutorials/5050/1/

http://www.linuxplanet.com/linuxplanet/tutorials/5074/4/

9.1.5 RADIUS/TACACS user configuration

Users may be added to the local Console Server appliance. If they are not added and they log in via remote AAA, a user will be added for them. This user will not show up in the configurators unless they are specifically added, at which point they are transformed into a completely local user. The newly added user must authenticate via the remote AAA server, and will not have any access if it is down.

If a local user logs in, they may be authenticated/authorized from the remote AAA server, depending on the chosen priority of the remote AAA. A local user's authorization is the union of local and remote privileges.

Example 1:

> User A is locally added, and has access to ports 1 and 2. He is also defined on a remote TACACS server, which says he has access to ports 3 and 4. The user may log in with either his local or TACACS password, and will have access to ports 1 through 4. If TACACS is down, he will need to use his local password, and will only be able to access ports 1 and 2.

Example 2:

> User B is only defined on the TACACS server, which says he has access to ports 5 and 6. When he attempts to log in, a new user will be created for him, and he will be able to access ports 5 and 6. If the TACACS server is down, he will not have any access.

Example 3:

> User C is defined on a RADIUS server only. He has access to all serial ports and network hosts.

Example 4:

> User D is locally defined on an appliance using RADIUS for AAA. Even if the user is also defined on the RADIUS server, he will only have access to those serial ports and network hosts he has been authorized to use on the appliance.

If a “no local AAA” option is selected, then root will still be authenticated locally.

Remote users may be added to the admin group via either RADIUS or TACACS. Users may have a set of authorizations set on the remote TACACS server. Users automatically added by RADIUS will have authorization for all resources, whereas those added locally will still need their authorizations specified.

LDAP has not been modified, and will still need locally defined users.

9.2 PAM (Pluggable Authentication Modules)

The Console Server supports RADIUS, TACACS+ and LDAP for two-factor authentication via PAM (Pluggable Authentication Modules). PAM is a flexible mechanism for authenticating Users. Nowadays, a number of new ways of authenticating users have become popular. The challenge is that each time a new authentication scheme is developed, it requires all the necessary programs (login, ftpd, etc.) to be rewritten to support it.

PAM provides a way to develop programs that are independent of authentication schemes. These programs need "authentication modules" to be attached to them at run-time in order to work. Which authentication module is to be attached is dependent upon the local system setup and is at the discretion of the local Administrator.

The Console Server family supports PAM to which we have added the following modules for remote authentication:

RADIUS	- pam_radius_auth	(http://www.freeradius.org/pam_radius_auth/)
TACACS+	- pam_tacplus	(http://echelon.pl/pubs/pam_tacplus.html)
LDAP	- pam_ldap	(http://www.padl.com/OSS/pam_ldap.html)

Further modules can be added as required.

Changes may be made to files in /etc/config/pam.d/ which will persist, even if the authentication configurator is run.

- Users added on demand:

  When a user attempts to log in, but does not already have an account on the Console Server, a new user account will be created. This account will not have any rights, and no password set. They will not appear in the configuration tools.

  Automatically added accounts will not be able to log in if the remote servers are unavailable. RADIUS users are currently assumed to have access to all resources, so will only be authorized to log in to the Console Server. RADIUS users will be authorized each time they access a new resource.

- Admin rights granted over AAA:

  Users may be granted Administrator rights via networked AAA. For TACACS, a priv-lvl of 12 of above indicates an administrator. For RADIUS, administrators are indicated via the Framed Filter ID. (See the example configuration files below, for example.)

- Authorization via TACACS for both serial ports and host access:

  Permission to access resources may be granted via TACACS by indicating an appliance and a port or networked host the user may access. (See the example configuration files below, for example.)

TACACS Example:

```
user = tim {
  service = raccess {
     priv-lvl = 11
     port1 = xxxxx/port02
```

```
        port2 = 192.168.254.145/port05
    }
    global = cleartext mit
}
```

RADIUS Example:

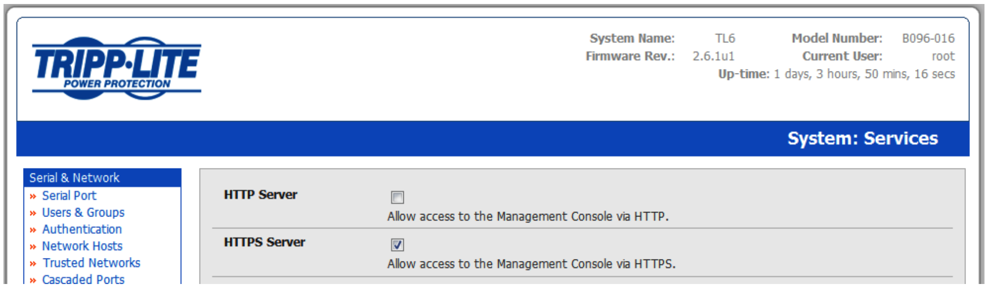
```
paul    Cleartext-Password := "luap"
        Service-Type = Framed-User,
        Fall-Through = No,
        Framed-Filter-Id=":group_name=admin"
```

The list of groups may include any number of entries separated by a comma. If the admin group is included, the user will be made an Administrator.

If there is already a Framed-Filter-Id, simply add the list of *group_names* after the existing entries, including the separating colon ":".

9.3 Secure Management Console Access

Selecting **HTTPS Server** in **System: Services** enables the Administrator to establish a secure browser connection Management Console:



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 3 hours, 50 mins, 16 secs

System: Services

HTTP Server ☐
Allow access to the Management Console via HTTP.

HTTPS Server ☑
Allow access to the Management Console via HTTPS.

- ➢ Activate your preferred browser and enter https:// *IP address*. For example, if the Console Server has been set up with an IP address of 200.122.0.12, you need to type https:// 200.122.0.12 in your address bar
- ➢ Your browser may respond with a message that verifies the security certificate is valid but notes that it is not necessarily verified by a certifying authority. To proceed you need to click *yes* if you are using Internet Explorer or select *accept this certificate permanently* (or *temporarily*) if you are using Mozilla Firefox.
- ➢ You will then be prompted for the Administrator account and password as normal.

When you have a secure HTTPS connection in place, the SSL secured icon will appear at the bottom of the browser screen. You can verify the level of encryption in place by clicking on this icon.

When you first enable and connect via HTTPS, it is normal that you may receive a certificate warning. The default SSL certificate in your Console Server is embedded during testing and is not signed by a recognized third party certificate authority. Rather, it is signed by our own signing authority. These warnings do not affect the encryption protection you have against eavesdroppers.

Note More detailed information on issuing certificates and configuring HTTPS can be found in Chapter 13 - Advanced

NAGIOS INTEGRATION

Introduction

Nagios is a powerful, highly extensible open source tool for monitoring network hosts and services. The core Nagios software package will typically be installed on a server or virtual server, the central Nagios server.

Tripp Lite Console Servers can operate in conjunction with a central/upstream Nagios server to provide distributing monitoring of attached network hosts and serial devices. The Console Servers can embed the NSCA (Nagios Service Checks Acceptor) and NRPE (Nagios Remote Plug-in Executor) add-ons. This allows them to communicate with the central Nagios server, eliminating the need for a dedicated Slave Nagios server at remote sites.

The Console Servers embed a basic set of distributed monitoring add-ons and can be uploaded with additional customizable distributed monitoring.

Note If you have an existing Nagios deployment, you may wish to use the Console Server in a distributed monitoring server capacity only. In this case and if you are already familiar with Nagios, skip ahead to section 10.3.

10.1 Nagios Overview

Nagios provides central monitoring of the hosts and services in your distributed network. Nagios is freely downloadable, open source software. This section offers a quick background of Nagios and its capabilities. A complete overview, FAQ and comprehensive documentation are available at: http://www.nagios.org

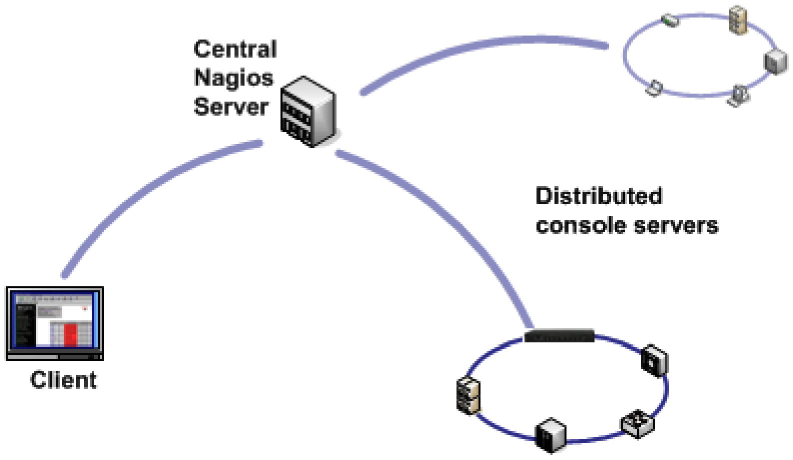
Nagios forms the core of many leading commercial system management solutions such as GroundWork: http://www.groundworkopensource.com

Nagios takes some time to install and configure, but once it is up and running, it provides an outstanding network monitoring system. With Nagios you can:

- Display tables showing the status of each monitored server and network service in real time
- Use a wide range of freely available plug-ins to make detailed checks of specific services, e.g., don't just check if a database is accepting network connections, check that it can actually validate requests and return real data
- Display warnings and send warning e-mails, pager or SMS alerts when a service failure or degradation is detected
- Assign contact groups who are responsible for specific services in specific time frames

10.2 Central management

The Nagios solution has three parts: the Central Nagios server, Distributed Console Servers and the SDT for Nagios software.



Central Nagios server

- A vanilla Nagios 2.x or 3.x installation (typically on a Linux server)
- Generally running on a blade, PC, virtual machine, etc. at a central location
- Runs a web server that displays the Nagios GUI
- Imports configuration from distributed Console Servers

Distributed Console Servers

- B096-016 / B096-048 or B092-016 Console Servers
- Serial and network hosts are attached to each Console Server
- Each runs Nagios plug-ins, NRPE and NSCA add-ons, but not a full Nagios server

Clients

- Typically a client PC, laptop, etc. running Windows, Linux or Mac OS X
- Runs Tripp Lite SDT Connector client software 1.5.0 or later
- Connect to the central Nagios server web UI to view status of monitored hosts and serial devices
- Then use SDT Connector to connect through the distributed Console Servers, to manage monitored hosts and serial devices

10.2.1 Set up central Nagios server

The Nagios server software is available for most major distributors of Linux using the standard package management tools. Your distributor will have documentation available on how to install Nagios. This is usually the quickest and simplest way to get up and running.

Note that you will need the core Nagios server package, and at least one of the NRPE or NSCA add-ons. NSCA is required to utilize the alerting features of the distributed hosts; installing both NRPE and NSCA is recommended.

You will also require a web server such as Apache to display the Nagios web UI (and this may be installed automatically as a dependency of the Nagios packages).

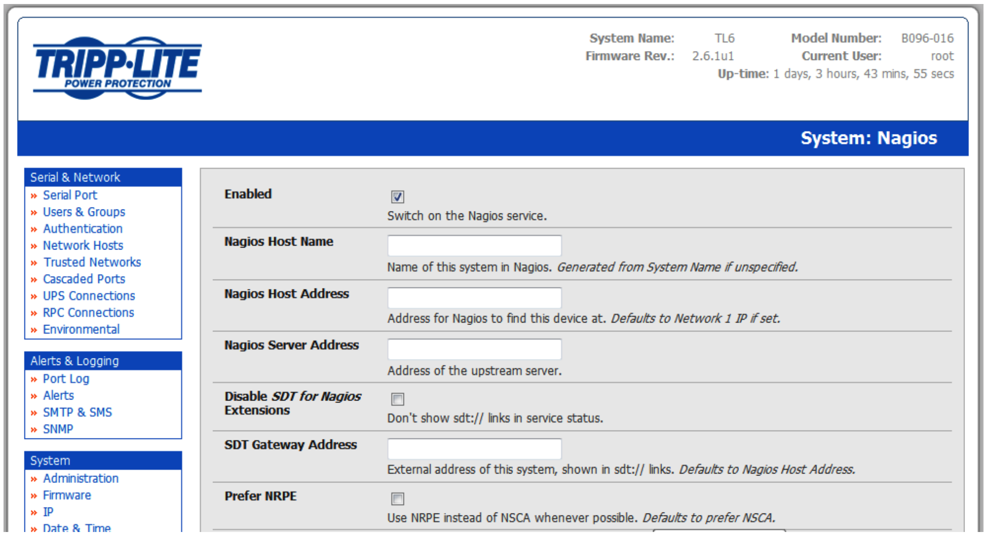
Alternatively, you may wish to download the Nagios source code directly from the Nagios website, and build and install the software from scratch. The Nagios website (http://www.nagios.org) has several Quick Start Guides that walk through this process.

Once you are able to browse to your Nagios server and see its web UI and the local services it monitors by default, you are ready to continue.

10.2.2 Set up distributed Console Servers

This section provides a brief walk-through on configuring a single Console Server to monitor the status of one attached network host (a Windows IIS server running HTTP and HTTPS services) and one serially attached device (the console port of a network router), and to send alerts back to the Nagios server when an administrator connects to the router or IIS server.

While this walk-through provides an example, details of the configuration options are described in the next section. This walk-through also assumes the network host and serial devices are already physically connected to the Console Server. First step is to set up the Nagios features on the Console Server:



System Name: TL6   Model Number: B096-016
Firmware Rev.: 2.6.1u1   Current User: root
Up-time: 1 days, 3 hours, 43 mins, 55 secs

System: Nagios

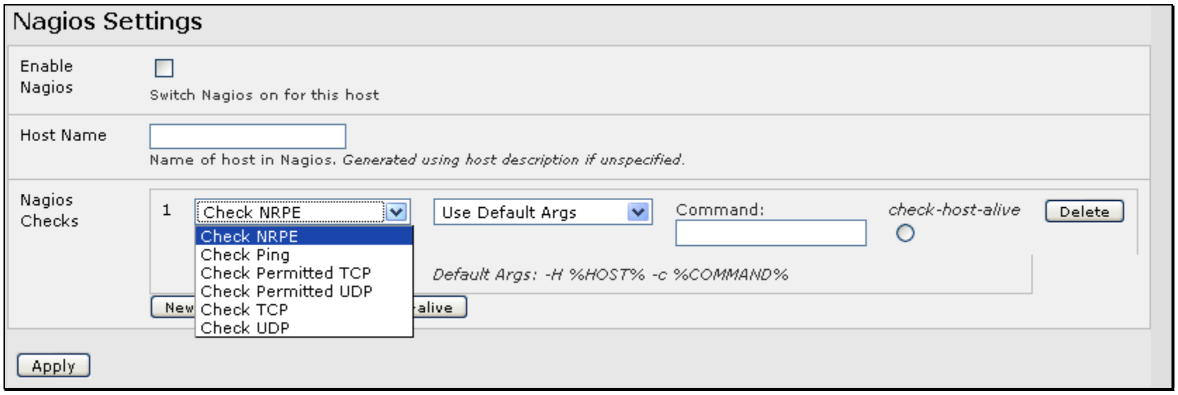
Enabled	☑ Switch on the Nagios service.
Nagios Host Name	 Name of this system in Nagios. *Generated from System Name if unspecified.*
Nagios Host Address	 Address for Nagios to find this device at. *Defaults to Network 1 IP if set.*
Nagios Server Address	 Address of the upstream server.
Disable *SDT for Nagios* Extensions	□ Don't show sdt:// links in service status.
SDT Gateway Address	 External address of this system, shown in sdt:// links. *Defaults to Nagios Host Address.*
Prefer NRPE	□ Use NRPE instead of NSCA whenever possible. *Defaults to prefer NSCA.*

- ➢ Browse the Console Server and select **System: Nagios** on the Console Server Management Console. Check Nagios service **Enabled**
- ➢ Enter the **Host Name** and the **Nagios Host Address** (i.e. IP address) that the central Nagios server will use to contact the distributed Console Server
- ➢ Enter the IP address that the distributed Console Server will use to contact the central Nagios server in **Nagios Server Address**
- ➢ Enter the IP address that the clients running SDT Connector will use to connect through the distributed Console Servers in **SDT Gateway address**
- ➢ Check **Prefer NRPE**, **NRPE Enabled** and **NRPE Command Arguments**

- Check **NSCA Enabled**, choose an **NSCA Encryption Method** and enter and confirm an **NSCA Secret**. Remember these details as you will need them later on. For **NSCA Interval**, enter *5*
- Click **Apply**.

Next, configure the attached Window network host and specify the services you will be checking with Nagios (HTTP and HTTPS):

- Select **Network Hosts** from the **Serial & Network** menu and click **Add Host**.
- Enter the **IP Address/DNS Name** of the network server, (e.g.: *192.168.1.10)* and enter a **Description**, (e.g.: *Windows 2003 IIS Server)*
- Remove all **Permitted Services**. This server will be accessible using Terminal Services, so check **TCP**, **Port 3389** and log **level 1** and click **Add**. It is important to remove and re-add the service to enable logging


Nagios Settings

Enable Nagios □ Switch Nagios on for this host

Host Name: Name of host in Nagios. *Generated using host description if unspecified.*

Nagios Checks: 1 | Check NRPE | Use Default Args | Command: | *check-host-alive* ○ | Delete

Default Args: -H %HOST% -c %COMMAND%

- Scroll down to **Nagios Settings** and check **Enable Nagios**
- Click **New Check** and select **Check Ping**. Click **check-host-alive**
- Click **New Check** and select **Check Permitted TCP**. Select **Port 3389**
- Click **New Check** and select **Check TCP**. Select **Port 80**
- Click **New Check** and select **Check TCP**. Select **Port 443**
- Click **Apply**

Similarly, configure the serial port to the router to be monitored by Nagios:

- Select **Serial Port** from the **Serial & Network** menu
- Locate the serial port that has the router console port attached and click **Edit**
- Ensure the serial port settings under *Common Settings* are correct and match the attached router's console port
- Click **Console Server Mode** and select **Logging Level 1**
- Check **Telnet** (SSH access is not required, as SDT Connector is used to secure the otherwise unsecured Telnet connection)
- Scroll down to **Nagios Settings** and check **Enable Nagios**
- Check **Port Log** and **Serial Status**

- Click **Apply**

Now set the Console Server to send alerts to the Nagios server

- Select **Alerts** from the **Alerts & Logging** menu and click **Add Alert**
- In **Description** enter: *Administrator connection*
- Check **Nagios (NSCA)**
- In **Applicable Ports** check the serial port that has the router console port attached. In **Applicable Hosts** check the IP address/DNS name of the IIS server
- Click **Connection Alert**
- Click **Apply**

Lastly, add a User for the client running SDT Connector:

- Select *Users & Groups* from the *Serial & Network* menu
- Click **Add User**
- In **Username**, enter: *sdtnagiosuser*, then enter and confirm a **Password**
- In **Accessible Hosts** click the IP address/DNS name of the IIS server. In **Accessible Ports** click the serial port that has the router console port attached
- Click **Apply**

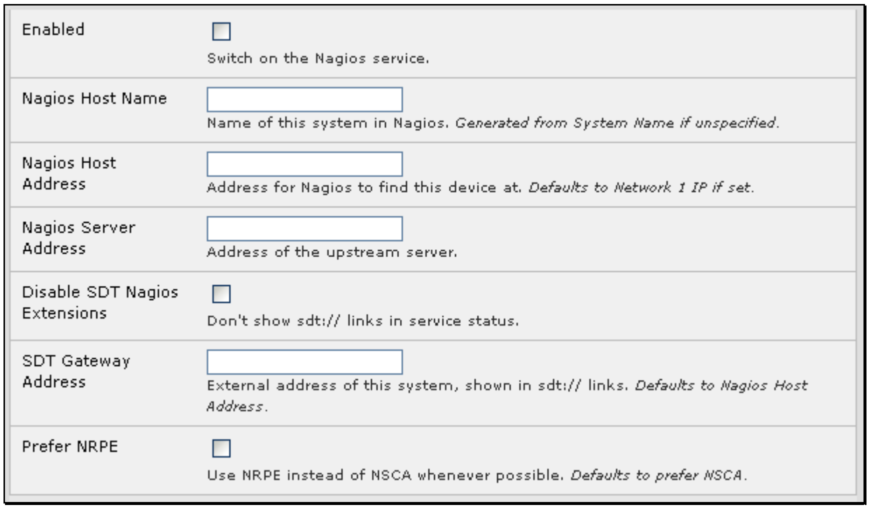
10.3 Configuring Nagios distributed monitoring

To activate the Console Server's Nagios distributed monitoring:

- Nagios integration must be enabled and a path established to the central/upstream Nagios server
- If the Console Server is to periodically report on Nagios-monitored services, then the NSCA client embedded in the Console Server must be configured: the NSCA program enables scheduled check-ins with the remote Nagios server and is used to send passive check results across the network to the remote server
- If the Nagios server is to actively request status updates from the Console Server, then the NRPE server embedded in the Console Server must be configured – the NRPE server is the Nagios daemon for executing plug-ins on remote hosts
- Each of the Serial Ports and each of the Hosts connected to the Console Server which are to be monitored must have Nagios enabled and any specific Nagios checks configured
- Lastly the central/upstream Nagios monitoring host must be configured

10.3.1 Enable Nagios on the Console Server

- Select **System: Nagios** on the Console Server Management Console and tick the Nagios service **Enabled**



Enabled	□ Switch on the Nagios service.
Nagios Host Name	Name of this system in Nagios. *Generated from System Name if unspecified.*
Nagios Host Address	Address for Nagios to find this device at. *Defaults to Network 1 IP if set.*
Nagios Server Address	Address of the upstream server.
Disable SDT Nagios Extensions	□ Don't show sdt:// links in service status.
SDT Gateway Address	External address of this system, shown in sdt:// links. *Defaults to Nagios Host Address.*
Prefer NRPE	□ Use NRPE instead of NSCA whenever possible. *Defaults to prefer NSCA.*

- Enter the **Nagios Host Name** that the Console Server will be referred to in the Nagios central server – this will be generated from local System Name (entered in **System: Administration**) if unspecified

- In **Nagios Host Address**, enter the IP address or DNS name that the upstream Nagios server will use to reach the Console Server – if unspecified this will default to the first network port's IP as entered in **System: IP**)

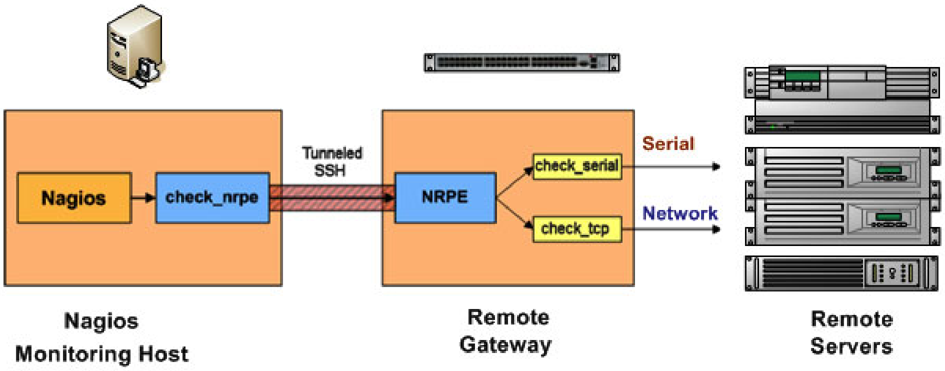
- In **Nagios Server Address**, enter the IP address or DNS name that the Console Server will use to reach the upstream Nagios monitoring server

- Check the **Disable SDT Nagios Extensions** option if you wish to disable the SDT Connector integration with your Nagios server at the head end – this would only be checked if you want to run a vanilla Nagios monitoring

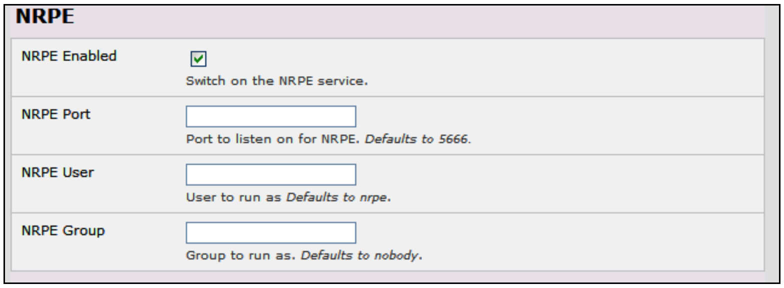
- If not, enter the IP address or DNS name the SDT Nagios clients will use to reach the Console Server in **SDT Gateway Address**

- When NRPE and NSCA are both enabled, NSCA is preferred method for communicating with the upstream Nagios server – check **Prefer NRPE** to use NRPE whenever possible (i.e. for all communication except for alerts)

10.3.2 Enable NRPE monitoring



Enabling NRPE allows you to execute plug-ins (such as *check_tcp* and *check_ping*) on the remote Console Server to monitor serial or network attached remote servers. This will offload CPU load from the upstream Nagios monitoring machine which is especially valuable if you are monitoring hundreds or thousands of hosts. To enable NRPE:



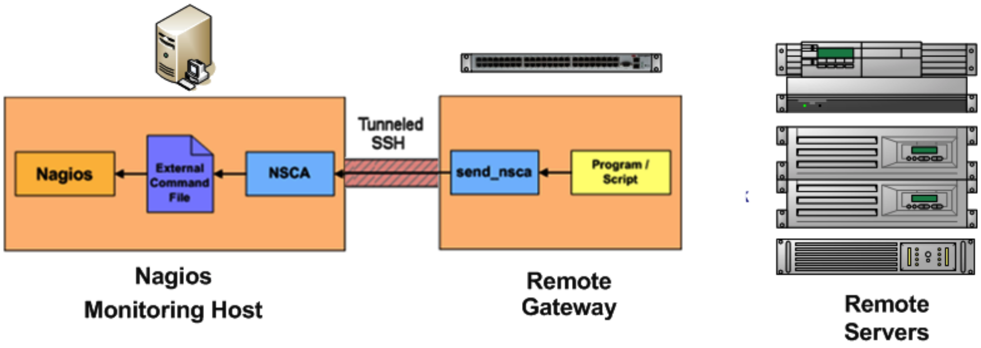
NRPE

NRPE Enabled	☑ Switch on the NRPE service.
NRPE Port	 Port to listen on for NRPE. *Defaults to 5666.*
NRPE User	 User to run as *Defaults to nrpe.*
NRPE Group	 Group to run as. *Defaults to nobody.*

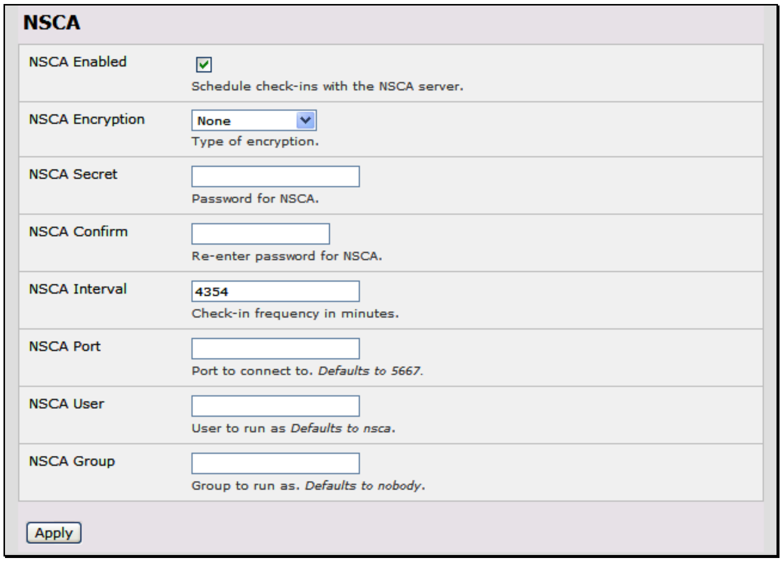
- Select **System: Nagios** and check **NRPE Enabled**
- Enter the details for the user connection to the upstream Nagios monitoring server. Again, refer to the sample Nagios configuration example below for details of configuring specific NRPE checks

By default, the Console Server will accept a connection between the upstream Nagios monitoring server and the NRPE server with SSL encryption, without SSL, or tunneled through SSH. The security for the connection is configured at the Nagios server.

10.3.3 Enable NSCA monitoring



NSCA is the mechanism that allows you to send passive check results from the remote Console Server to the Nagios daemon running on the monitoring server. To enable NSCA:



NSCA

NSCA Enabled	☑ Schedule check-ins with the NSCA server.
NSCA Encryption	None Type of encryption.
NSCA Secret	 Password for NSCA.
NSCA Confirm	 Re-enter password for NSCA.
NSCA Interval	4354 Check-in frequency in minutes.
NSCA Port	 Port to connect to. *Defaults to 5667.*
NSCA User	 User to run as *Defaults to nsca.*
NSCA Group	 Group to run as. *Defaults to nobody.*

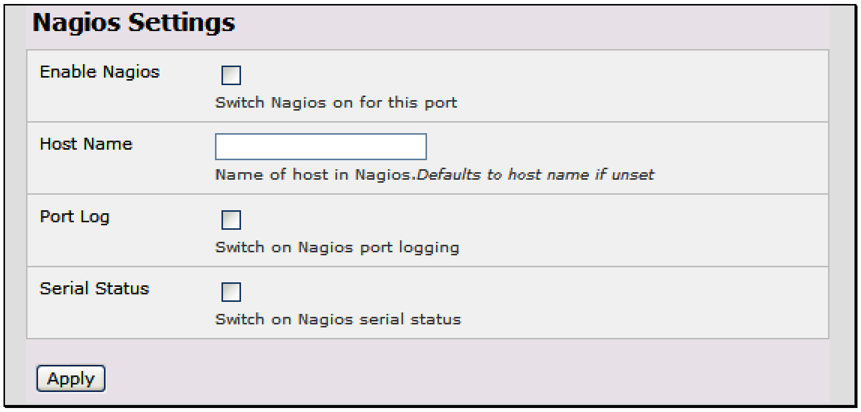
- Select **System: Nagios** and check **NSCA Enabled**
- Select the **Encryption** to be used from the drop-down menu, then enter a **Secret** password and specify a check **Interval**
- Refer the sample Nagios configuration section below for some examples of configuring specific NSCA checks

10.3.4 Configure selected Serial Ports for Nagios monitoring

The individual Serial Ports connected to the Console Server to be monitored must be configured for Nagios checks. Refer to *Chapter 4.4: Network Host Configuration* for details on enabling Nagios monitoring for Hosts that are network connected to the Console Server. To enable Nagios to monitor a device connected to the Console Server serial port:

- Select **Serial & Network: Serial Port** and click **Edit** on the serial Port # to be monitored

- Select **Enable Nagios**, specify the name of the device on the upstream server and determine the check to be run on this port. **Serial Status** monitors the handshaking lines on the serial port and **Check Port** monitors the data logged for the serial port



Nagios Settings

Enable Nagios □
Switch Nagios on for this port

Host Name
Name of host in Nagios.*Defaults to host name if unset*

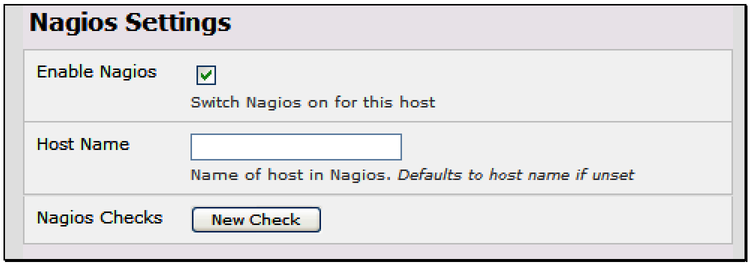
Port Log □
Switch on Nagios port logging

Serial Status □
Switch on Nagios serial status

10.3.5 Configure selected Network Hosts for Nagios monitoring

The individual Network Hosts connected to the Console Server that is to be monitored must also be configured for Nagios checks:

- Select **Serial & Network: Network Port** and click **Edit** on the Network Host to be monitored



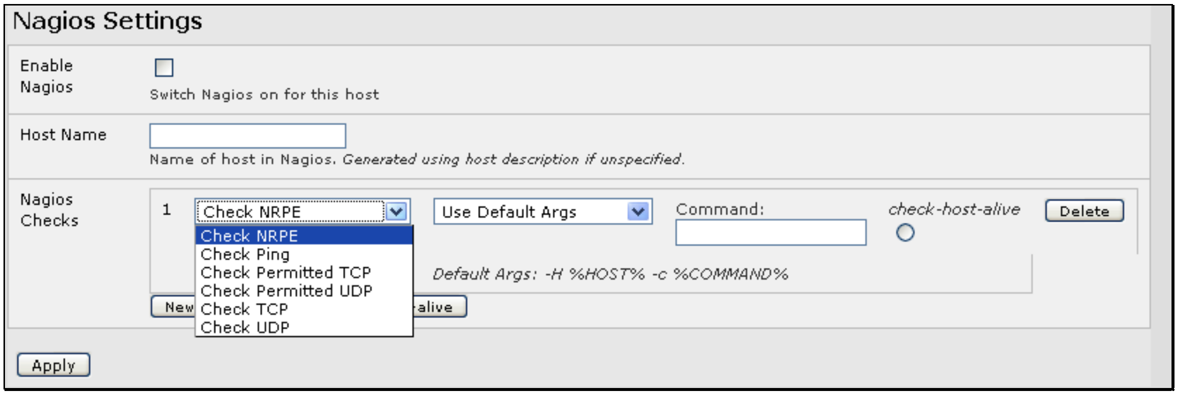
Nagios Settings

Enable Nagios ☑
Switch Nagios on for this host

Host Name
Name of host in Nagios. *Defaults to host name if unset*

Nagios Checks

- Select **Enable Nagios,** specify the name of the device as it will appear on the upstream Nagios server
- Click **New Check** to add a specific check which will be run on this host
- Select **Check Permitted TCP/UDP** to monitor a service that you have previously added as a **Permitted Service**
- Select **Check TCP/UDP** to specify a service port that you wish to monitor, but do not wish to allow external (SDT Connector) access
- Select **Check TCP** to monitor



Nagios Settings

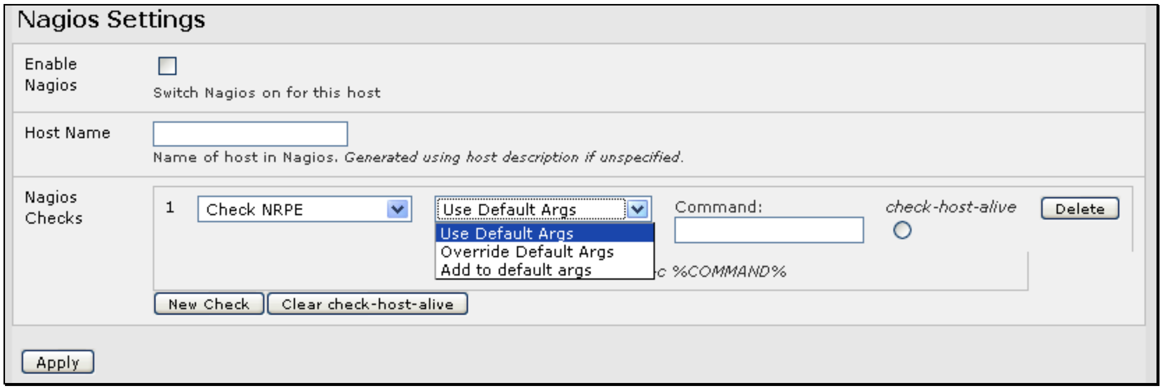
Enable Nagios □ Switch Nagios on for this host

Host Name: Name of host in Nagios. *Generated using host description if unspecified.*

Nagios Checks: 1 Check NRPE | Use Default Args | Command: | *check-host-alive* ○ | Delete

Default Args: -H %HOST% -c %COMMAND%

- ➢ The **Nagios Check** nominated as the ***check-host-alive*** check is used to determine whether the network host itself is up or down
- ➢ Typically this will be *Check Ping* – although in some cases the host will be configured not to respond to pings
- ➢ If no ***check-host-alive*** check is selected, the host will always be assumed to be up
- ➢ You may deselect ***check-host-alive*** by clicking **Clear *check-host-alive***
- ➢ If required, customize the selected **Nagios Checks** to use custom arguments
- ➢ Click **Apply**



Nagios Settings

Enable Nagios □ Switch Nagios on for this host

Host Name: Name of host in Nagios. *Generated using host description if unspecified.*

Nagios Checks: 1 Check NRPE | Use Default Args | Command: | *check-host-alive* ○ | Delete

c %COMMAND%

10.3.6 Configure the upstream Nagios monitoring host

Refer to the Nagios documentation (http://www.nagios.org/docs/) for configuring the upstream server:

- ➢ The section entitled *Distributed Monitoring* steps through what is needed to configure NSCA on the upstream server (under *Central Server Configuration*)
- ➢ *NRPE Documentation,* which has been recently added, steps through configuring NRPE on the upstream server http://nagios.sourceforge.net/docs/nrpe/NRPE.pdf

At this stage, Nagios at the upstream monitoring server is configured, and individual serial port and network host connections on the Console Server are configured for Nagios monitoring. If NSCA is enabled, each selected check will be executed once over the period of the check interval. If NRPE is enabled, then the upstream server will be able to request status updates under its own scheduling.

10.4 Advanced Distributed Monitoring Configuration

10.4.1 Sample Nagios configuration

An example configuration for Nagios is listed below. It shows how to set up a remote Console Server to monitor a single host, with both network and serial connections. Each check has two configurations, one for NRPE and one for NSCA. In practice, these would be combined into a single check which uses NSCA as a primary method and falling back to NRPE if a check were late. For details, see the Nagios documentation (http://www.nagios.org/docs/) on *Service and Host Freshness Checks.*

```
; Host definitions
;
; Console Server
define host{
    use             generic-host
    host_name           tripplite
    alias           Console Server
    address           192.168.254.147
    }

; Managed Host
define host{
    use             generic-host
    host_name           server
    alias           server
    address           192.168.254.227
    }

; NRPE daemon on gateway
define command {
        command_name          check_nrpe_daemon
        command_line  $USER1$/check_nrpe -H 192.168.254.147 -p 5666
        }

define service {
        service_description       NRPE Daemon
        host_name                 tripplite
        use                       generic-service
        check_command                         check_nrpe_daemon
        }

; Serial Status
define command {
        command_name          check_serial_status
        command_line  $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c check_serial_$HOSTNAME$
        }

define service {
        service_description     Serial Status
        host_name               server
        use                     generic-service
        check_command                   check_serial_status
        }

define service {
        service_description     serial-signals-server
        host_name               server
        use                     generic-service
        check_command                   check_serial_status
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   Serial Status
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }

; Port Log
define command{
        command_name    check_port_log
        command_line    $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c port_log_$HOSTNAME$
    }

define service {
        service_description     Port Log
        host_name               server
        use                     generic-service
        check_command                   check_port_log
        }

define service {
        service_description     port-log-server
        host_name               server
        use                     generic-service
        check_command                   check_port_log
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   Port Log
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }

; Ping
define command{
        command_name    check_ping_via_tripplite
        command_line    $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c host_ping_$HOSTNAME$
    }

define service {
        service_description     Host Ping
        host_name               server
        use                     generic-service
        check_command                   check_ping_via_tripplite
        }

define service {
        service_description     host-ping-server
        host_name               server
        use                     generic-service
        check_command                   check_ping_via_tripplite
        active_checks_enabled   0
        passive_checks_enabled          1
        }

define servicedependency{
        name                            tripplite_nrpe_daemon_dep
        host_name                       tripplite
        dependent_host_name             server
        dependent_service_description   Host Ping
        service_description             NRPE Daemon
        execution_failure_criteria      w,u,c
        }

; SSH Port
define command{
    command_name    check_conn_via_tripplite
    command_line    $USER1$/check_nrpe -H 192.168.254.147 -p 5666 -c
host_$HOSTNAME$_$ARG1$_$ARG2$
    }

define service {
        service_description     SSH Port
        host_name               server
```

```
          use                    generic-service
          check_command                   check_conn_via_tripplite!tcp!22
          }

define service {
          service_description    host-port-tcp-22-server
                                 ; host-port-<protocol>-<port>-<host>
          host_name              server
          use                    generic-service
          check_command                   check_conn_via_tripplite!tcp!22
          active_checks_enabled  0
          passive_checks_enabled          1
          }

define servicedependency{
          name                            tripplite_nrpe_daemon_dep
          host_name                       tripplite
          dependent_host_name             server
          dependent_service_description   SSH Port
          service_description             NRPE Daemon
          execution_failure_criteria      w,u,c
          }
```

10.4.2 Basic Nagios plug-ins

Plug-ins are compiled executables or scripts that can be scheduled to be run on the Console Server to check the status of a connected host or service. This status is then communicated to the upstream Nagios server which uses the results to monitor the current status of the distributed network. Each Console Server is preconfigured with a selection of the checks that are part of the Nagios plug-ins package:

check_tcp and *check_udp* are used to check open ports on network hosts

check_ping is used to check network host availability

check_nrpe is used to execute arbitrary plug-ins in other devices

Each Console Server is also preconfigured with two checks that are specific to the Console Server:

check_serial_signals is used to monitor the handshaking lines on the serial ports

check_port_log is used to monitor the data logged for a serial port.

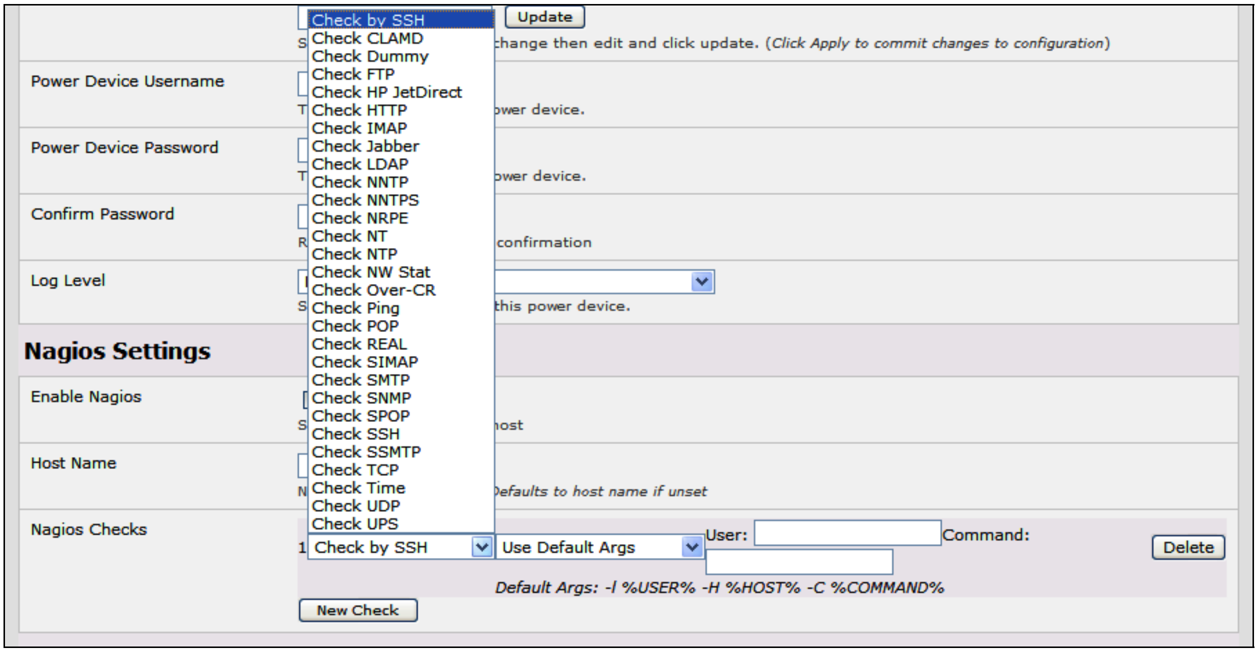
10.4.3 Additional plug-ins

Additional Nagios plug-ins (listed below) are available for all the Tripp Lite Console Servers:

check_apt
check_by_ssh
check_clamd
check_dig
check_dns
check_dummy
check_fping
check_ftp
check_game
check_hpjd
check_http
check_imap
check_jabber
check_ldap
check_load
check_mrtg
check_mrtgtraf
check_nagios
check_nntp
check_nntps
check_nt
check_ntp
check_nwstat
check_overcr
check_ping
check_pop
check_procs
check_real
check_simap
check_smtp
check_snmp
check_spop
check_ssh
check_ssmtp
check_swap
check_tcp
check_time
check_udp
check_ups
check_users

There also are *bash* scripts which can be downloaded and run (primarily *check_log.sh).*

- To configure additional checks, the downloaded plug-in program must be saved in the tftp *addins* directory on the USB flash and the downloaded text plug-in file saved in */etc/config*
- To enable these new additional checks, you select **Serial&Network: Network Port**, then you **Edit** the Network Host to be monitored, and select **New Checks**. The additional check option will have been included in the updated **Nagios Checks** list. You can again customize the arguments



hange then edit and click update. (*Click Apply to commit changes to configuration*)

Power Device Username — ower device.

Power Device Password — ower device.

Confirm Password — confirmation

Log Level — this power device.

Nagios Settings

Enable Nagios — ost

Host Name — *efaults to host name if unset*

Nagios Checks — 1 Check by SSH | Use Default Args | User: | Command:

Default Args: -l %USER% -H %HOST% -C %COMMAND%

11. SYSTEM MANAGEMENT

Introduction

This chapter describes how the Administrator can perform a range of general system administration and configuration tasks on the Console Server, such as:

- Applying *Soft* and *Hard* Resets to the gateway
- Re-flashing the firmware
- Configuring the Date, Time and NTP

System administration and configuration tasks covered elsewhere include:

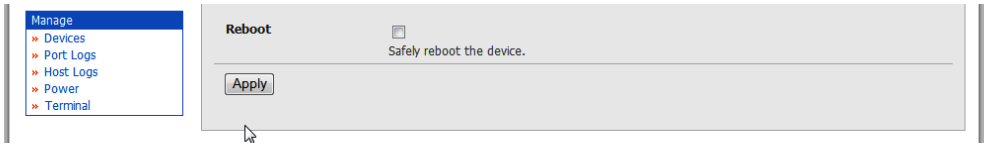
- Resetting the System Password and entering a new System Name and Description for the Console Server (*Chapter 3.2*)
- Setting the Console Server's System IP Address (*Chapter 3. 3)*
- Setting the permitted Services used to access the Console Server (*Chapter 3.4*)
- Setting up OoB Dial-in (*Chapter 5*)

11.1 System Administration and Reset

The Administrator can reboot or reset the Console Server to default settings.

A *soft* reset is performed by:

- ➢ Selecting **Reboot** in the **System: Administration** menu and clicking **Apply**



Reboot ☐ Safely reboot the device.

The Console Server reboots with all settings (e.g.*,* the assigned network IP address) preserved. However this *soft* reset does disconnect all Users and ends any SSH sessions that had been established.

A *soft* reset will also be performed when you switch OFF power to the Console Server, and then switch the power back ON. However, if you cycle the power while the unit is writing to flash, you could corrupt or lose data. Therefore, the software reboot is the safer option.

A *hard* erase (*hard reset*) is performed by:

- ➢ Pushing the *Erase* button on the rear panel **twice**. A ball point pen or bent paper clip is a suitable tool for performing this procedure. Do not use a graphite pencil. Depress the button gently **twice** (within a 5 second period) while the unit is powered ON.

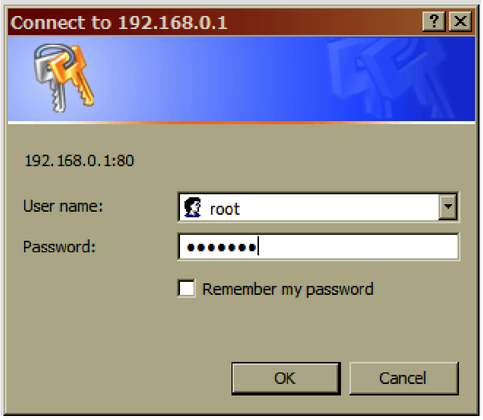
This will reset the Console Server back to its factory default settings and clear the Console Server's stored configuration information.

The *hard* erase will clear all custom settings and return the unit back to factory default settings (*i.e.* the IP address will be reset to 192.168.0.1).

You will be prompted to log in and must enter the default administration username and administration password:

Username: **root**

Password: **default**



Connect to 192.168.0.1

192.168.0.1:80

User name: root

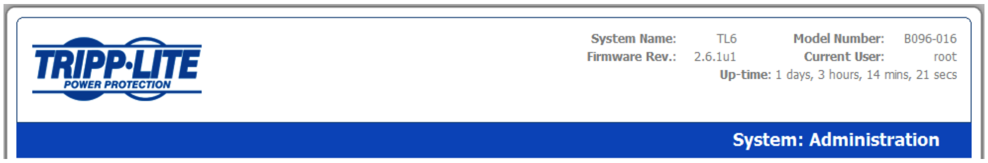
Password: •••••••

□ Remember my password

11.2 Upgrade Firmware

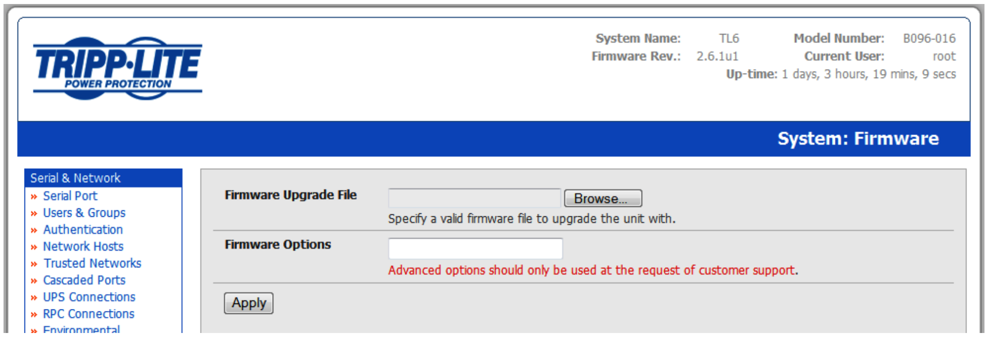
Before upgrading, check if you are already running the most current firmware in your Console Server. Your Console Server will not allow you to upgrade to the same or an earlier version.

- The **Firmware** version is displayed in the header of each page



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 1 days, 3 hours, 14 mins, 21 secs

- Or select **Status: Support Report** and note the **Firmware Version**
- To upgrade, you must first download the latest firmware image from http://www.tripplite.com/EN/support/downloads/driver-firmware-downloads.cfm
- Save this downloaded firmware image file on to a system on the same subnet as the Console Server
- Also download and read the *release_notes.txt* for the latest information
- To then upload the firmware image file to your Console Server, select **System: Firmware**



System Name: TL6
Firmware Rev.: 2.6.1u1
Model Number: B096-016
Current User: root
Up-time: 1 days, 3 hours, 19 mins, 9 secs

Firmware Upgrade File

Specify a valid firmware file to upgrade the unit with.

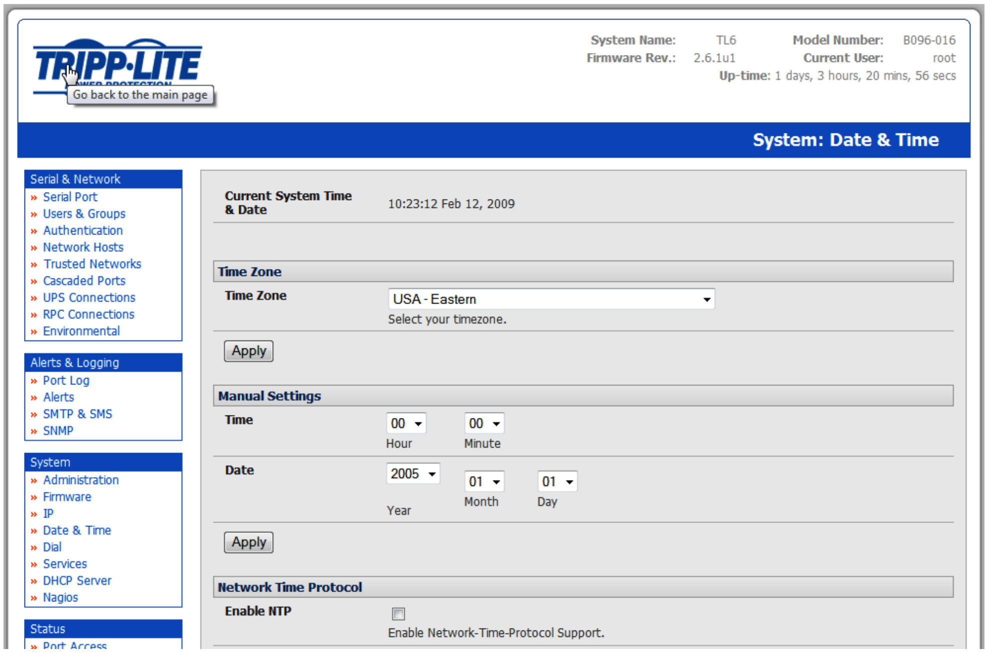
Firmware Options

Advanced options should only be used at the request of customer support.

- Specify the address and name of the downloaded Firmware Upgrade File, or **Browse** the local subnet and locate the downloaded file
- Click **Apply** and the Console Server appliance will undertake a soft reboot and commence upgrading the firmware. This process will take several minutes
- After the firmware upgrade has completed, click **here** to return to the Management Console. Your Console Server will have retained all its pre-upgrade configuration information

11.3 Configure Date and Time

It is recommended that you set the local Date and Time in the Console Server as soon as it is configured. Features like Syslog and NFS logging use the system time for time-stamping log entries, while certificate generation depends on a correct Timestamp to check the validity period of the certificate.



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 3 hours, 20 mins, 56 secs

Current System Time & Date: 10:23:12 Feb 12, 2009

Time Zone

Time Zone: USA - Eastern
Select your timezone.

Manual Settings

Time: 00 Hour, 00 Minute

Date: 2005 Year, 01 Month, 01 Day

Network Time Protocol

Enable NTP: □ Enable Network-Time-Protocol Support.

- Select the **System: Date & Time** menu option
- Manually set the **Year**, **Month**, **Day**, **Hour** and **Minute** using the **Date** and **Time** selection boxes, then click **Apply**

The Console Server can synchronize its system time with a remote time server using the Network Time Protocol (NTP). Configuring with the NTP time server ensures that the Console Server clock will be accurate soon after the Internet connection is established. Also, if NTP is not used, the system clock will be reset randomly every time the Console Server is powered up. To set the system time using NTP:

- Select the **Enable NTP** checkbox on the **Network Time Protocol** page
- Enter the IP address of the remote **NTP Server** and click **Apply**

Specify your local time zone so the system clock can show local time (and not UTP):

- Set your appropriate region/locality in the **Time Zone** selection box and click **Apply**

12. STATUS REPORTS

Introduction

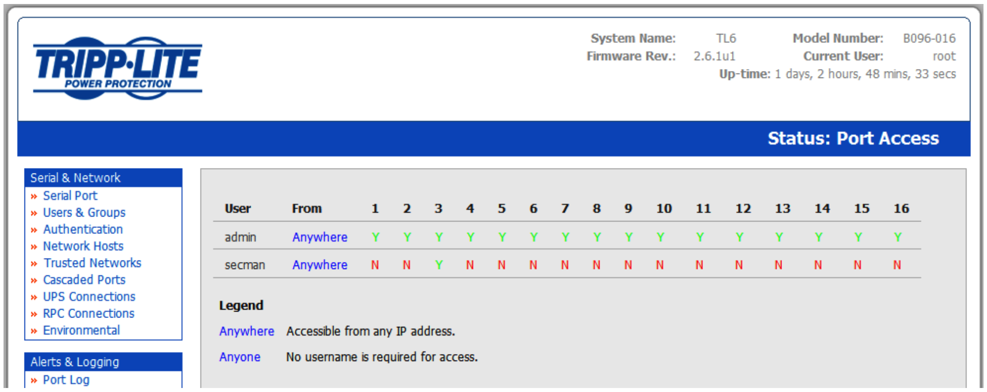
This chapter describes the selection of status reports that are available for review:

- Port Access and Active Users
- Statistics
- Support Reports
- Syslog
- UPS Status

12.1 Port Access and Active Users

The Administrator can see which Users have access privileges to each serial port:

- Select the **Status: Port Access**



System Name: TL6 **Model Number:** B096-016
Firmware Rev.: 2.6.1u1 **Current User:** root
Up-time: 1 days, 2 hours, 48 mins, 33 secs

Status: Port Access

User	From	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
admin	Anywhere	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
secman	Anywhere	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N

Legend

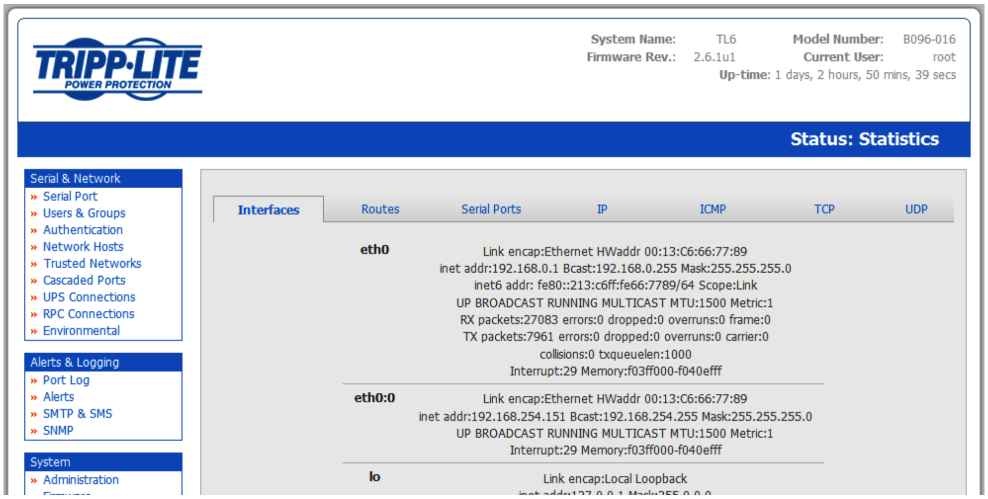
Anywhere	Accessible from any IP address.
Anyone	No username is required for access.

The Administrator can also see the current status to identify which Users have an active session on each port:

- Select the **Status: Active Users**

12.2 Statistics

The Statistics report provides a snapshot of the data traffic and other activities and operations of your Console Server



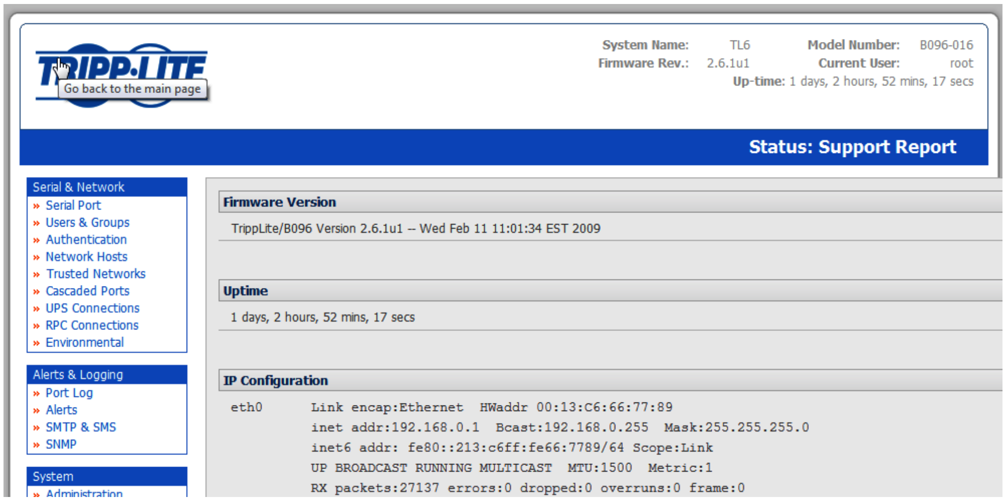
System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 50 mins, 39 secs

```
eth0    Link encap:Ethernet HWaddr 00:13:C6:66:77:89
        inet addr:192.168.0.1 Bcast:192.168.0.255 Mask:255.255.255.0
        inet6 addr: fe80::213:c6ff:fe66:7789/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:27083 errors:0 dropped:0 overruns:0 frame:0
        TX packets:7961 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        Interrupt:29 Memory:f03ff000-f040efff
eth0:0  Link encap:Ethernet HWaddr 00:13:C6:66:77:89
        inet addr:192.168.254.151 Bcast:192.168.254.255 Mask:255.255.255.0
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        Interrupt:29 Memory:f03ff000-f040efff
lo      Link encap:Local Loopback
```

12.3 Support Reports

The Support Report provides useful status information that will assist the Tripp Lite technical support team to resolve any issues you may experience with your Console Server.

If you do experience an issue and have to contact Support, ensure you include the Support Report with your email support request. The Support Report should be generated when the issue is occurring, and attached in plain text format.



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 52 mins, 17 secs

Firmware Version

TrippLite/B096 Version 2.6.1u1 -- Wed Feb 11 11:01:34 EST 2009

Uptime

1 days, 2 hours, 52 mins, 17 secs

IP Configuration

```
eth0      Link encap:Ethernet  HWaddr 00:13:C6:66:77:89
          inet addr:192.168.0.1  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::213:c6ff:fe66:7789/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:27137 errors:0 dropped:0 overruns:0 frame:0
```

- Select the **Status: Support Report** menu option and you will be presented with a snapshot of your Console Server's status
- Save the file as a text file and attach it to your support email

12.4 Syslog

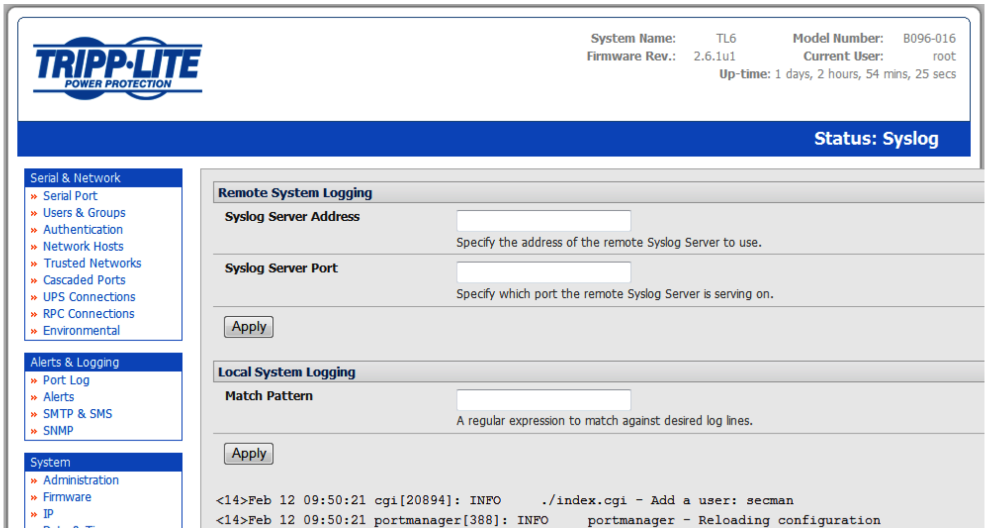
The Linux System Logger maintains a record of all system messages and errors:

- Select **Status: Syslog**

Remote System Logging

The syslog record can be redirected to a remote Syslog Server:

➢ Enter the remote Syslog Server address and port details and then click **Apply**



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 54 mins, 25 secs

Remote System Logging

Syslog Server Address
Specify the address of the remote Syslog Server to use.

Syslog Server Port
Specify which port the remote Syslog Server is serving on.

Local System Logging

Match Pattern
A regular expression to match against desired log lines.

```
<14>Feb 12 09:50:21 cgi[20894]: INFO     ./index.cgi - Add a user: secman
<14>Feb 12 09:50:21 portmanager[388]: INFO     portmanager - Reloading configuration
```

Local System Logging

To view the local Syslog file:

➢ Select **Alerts & Logging: Syslog**

To make it easier to find information in the local Syslog file, a pattern matching filter tool is provided.

➢ Specify the **Match Pattern** that is to be searched for (*e.g.* the search for *Mount* is shown below) and click **Apply.** The Syslog will then be represented with only those entries that actually include the specified pattern

13. MANAGEMENT

Introduction

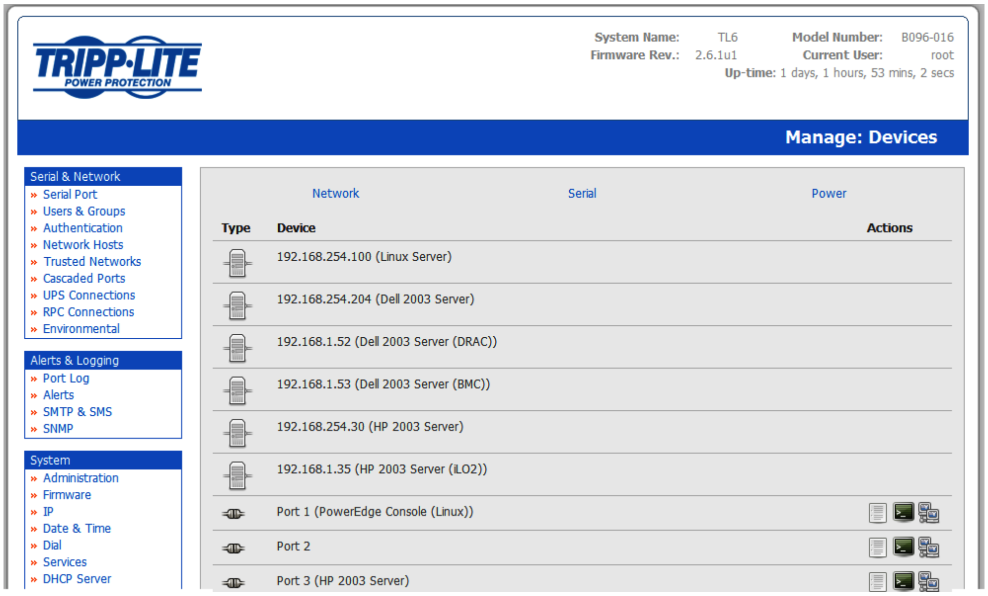
The Console Server Management Console has a number of reports and tools that can be accessed by both Administrators and Users:

- Access and control configured devices
- View serial port logs and host logs
- Use SDT Connector or the java terminal to access serially attached consoles
- Power control

13.1 Device Management

To display all the connected Serial devices, Network Hosts and Power devices:

- ➢ Select **Manage: Devices.** By selecting the **Serial/ Network/ Power** item, the display will be reduced to only those devices



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 1 hours, 53 mins, 2 secs

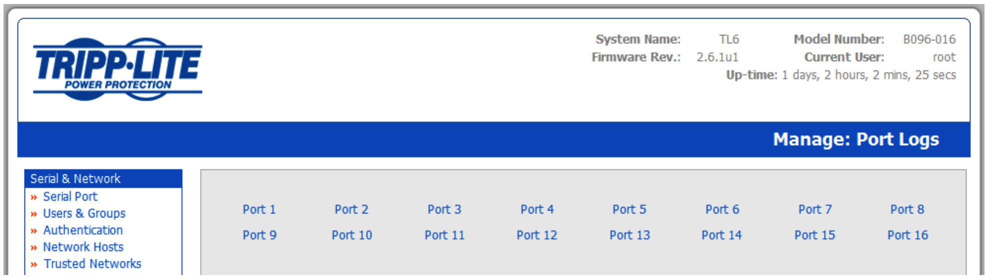
Type	Device	Actions
	192.168.254.100 (Linux Server)	
	192.168.254.204 (Dell 2003 Server)	
	192.168.1.52 (Dell 2003 Server (DRAC))	
	192.168.1.53 (Dell 2003 Server (BMC))	
	192.168.254.30 (HP 2003 Server)	
	192.168.1.35 (HP 2003 Server (iLO2))	
	Port 1 (PowerEdge Console (Linux))	
	Port 2	
	Port 3 (HP 2003 Server)	

The user can take a range of actions on each of these Serial/Network/Power devices by selecting the **Action** icon or the related Manage menu item. Selecting the Manager Power icon or the **Manage: Power** menu is covered in *Chapter 8.*

13.2 Port & Host Management

Administrator and Users can view logs of data transfers to connected devices.

- ➢ Select **Manage: Port Logs** and the serial Port # to be displayed



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 2 mins, 25 secs

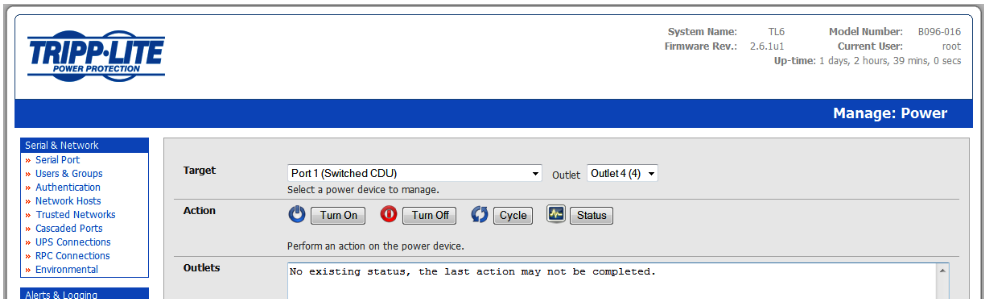
Manage: Port Logs

- ➢ To display Host logs select **Manage: Host Logs** and the Host to be displayed

13.3 Power Management

Administrator and Users can access and manage the connected power devices.

- ➢ Select **Manage: Power**



System Name: TL6 Model Number: B096-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 1 days, 2 hours, 39 mins, 0 secs

Manage: Power

Target: Port 1 (Switched CDU) Outlet: Outlet 4 (4)

Select a power device to manage.

Action

Perform an action on the power device.

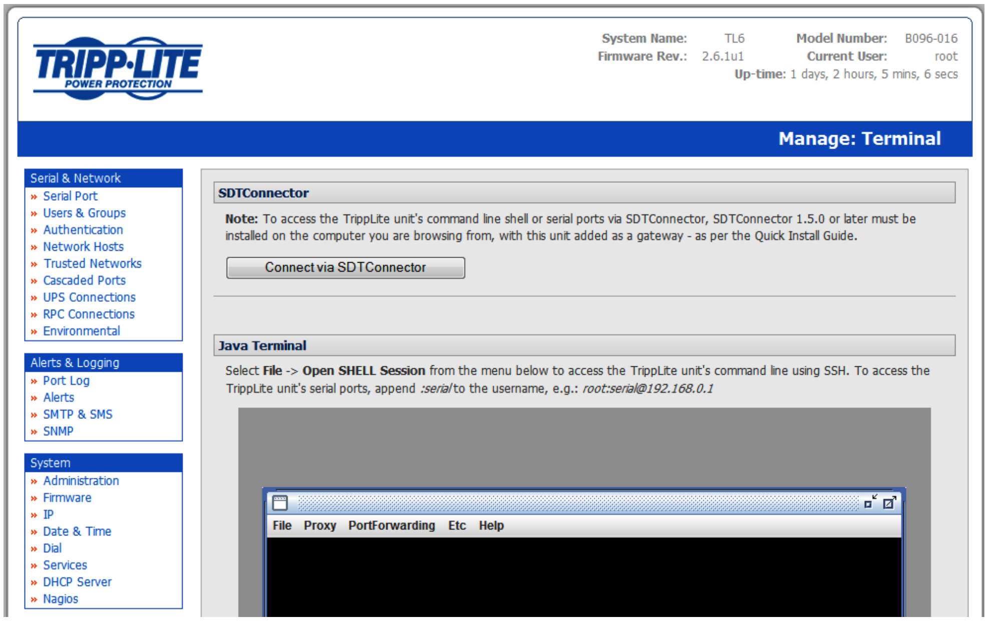
Outlets

```
No existing status, the last action may not be completed.
```

13.4 Serial Port Terminal Connection

Administrator and Users can communicate directly with the Console Server command line and with devices attached to the Console Server serial ports using SDT Connector and their local Telnet client, or using a java terminal in their browser

- ➢ Select **Manage: Terminal**



System Name: TL6 **Model Number:** B096-016
Firmware Rev.: 2.6.1u1 **Current User:** root
Up-time: 1 days, 2 hours, 5 mins, 6 secs

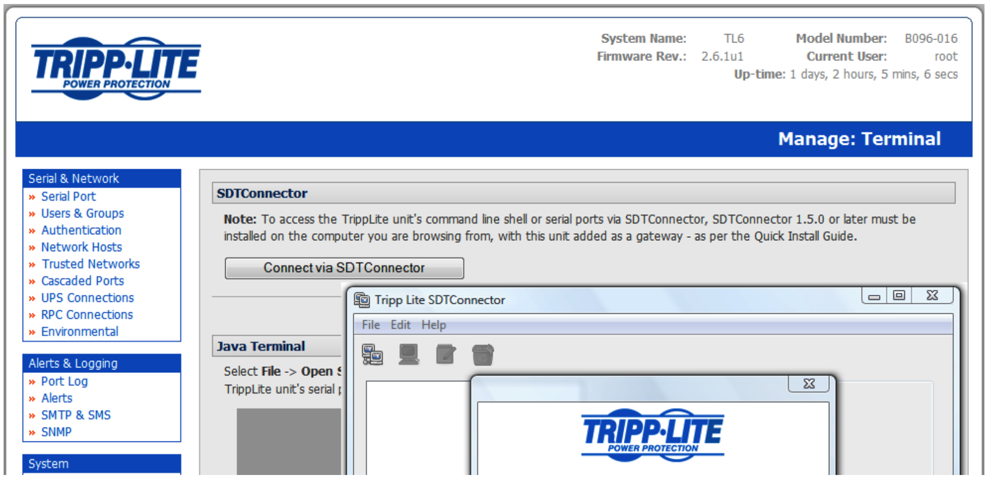
SDTConnector

Note: To access the TrippLite unit's command line shell or serial ports via SDTConnector, SDTConnector 1.5.0 or later must be installed on the computer you are browsing from, with this unit added as a gateway - as per the Quick Install Guide.

Java Terminal

Select **File** -> **Open SHELL Session** from the menu below to access the TrippLite unit's command line using SSH. To access the TrippLite unit's serial ports, append *:serial* to the username, e.g.: *root:serial@192.168.0.1*

- Click **Connect to SDT Connector** to access the Console Server command line shell or the serial ports via SDT Connector. This will activate the SDT Connector client on the computer you are browsing and load your local Telnet client to connect to the command line or serial port using SSH



System Name: TL6 **Model Number:** B096-016
Firmware Rev.: 2.6.1u1 **Current User:** root
Up-time: 1 days, 2 hours, 5 mins, 6 secs

SDTConnector

Note: To access the TrippLite unit's command line shell or serial ports via SDTConnector, SDTConnector 1.5.0 or later must be installed on the computer you are browsing from, with this unit added as a gateway - as per the Quick Install Guide.

Java Terminal

Select **File** -> **Open** S
TrippLite unit's serial p

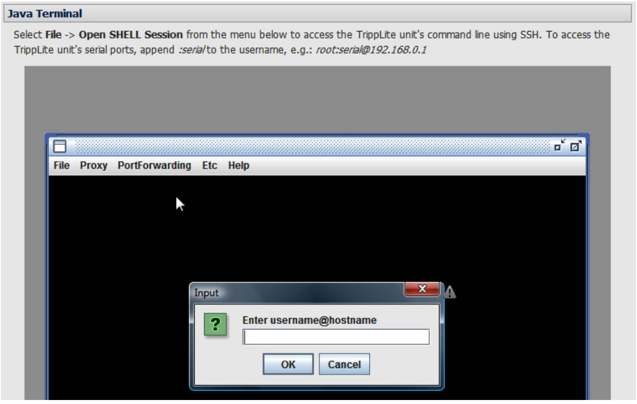
Note Tripp Lite SDT Connector must be installed on the computer from which you are browsing and the Console Server must be added as a gateway, as detailed in Chapter 6

The alternative to using SDT Connector and your local Telnet client is to download the open source *jcterm* java terminal applet into your browser in order to connect to the Console Server and attached serial port devices. However *jcterm* does have some JRE compatibility issues which may prevent it from loading.

- Select **Manage: Terminal.** The *jcterm* java applet is downloaded from the Console Server to your browser and the virtual terminal will be displayed

- Select **File** -> **Open SHELL Session** from the *jcterm* menu to access the command line using SSH

- ➢ To access the Console Server command line, enter the gateway’s TCP address (e.g. *192.168.254.198*) as **hostname** and the Username (e.g. *root@192.168.254.198).* Then enter the Password
- ➢ To access the Console Server's serial ports, append *:serial* to the username. For example, with the gateway’s TCP address of *192.168.254.198*, and the Username of *root*, enter *root:serial@192.168.254.198.* Then enter Password and select the TCP Port address for the serial port to be accessed. By default *3001* is selected (i.e. Port 1). To access Port 4, this must be changed to *3004* for the Username



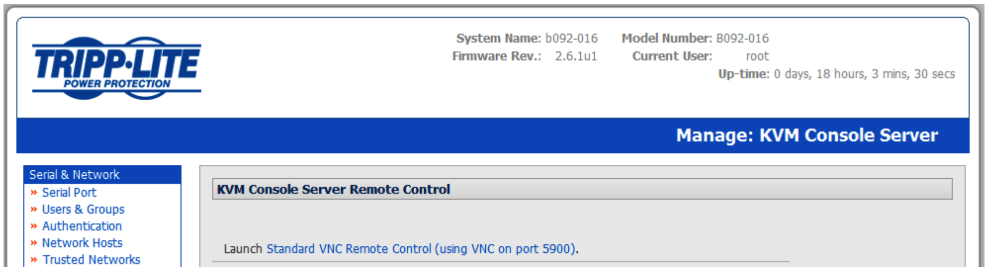
Java Terminal

Select **File** -> **Open SHELL Session** from the menu below to access the TrippLite unit's command line using SSH. To access the TrippLite unit's serial ports, append *:serial* to the username, e.g.: *root:serial@192.168.0.1*

13.5 Remote Console Access (B092-016 only)

Administrator and Users can also connect to the B092-016 Console Server with PowerAlert remotely (as if they were plugged in locally to the KVM connectors on the B092-016). This connection will enable the remote users to run the PowerAlert software and the other thin client programs (refer to Chapter 16) embedded in the Console Server:

- Select **Manage: KVM Console Server**



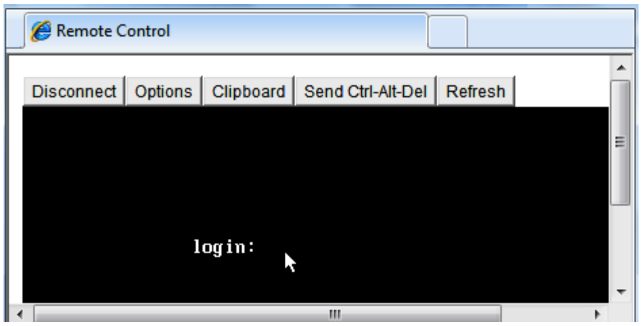
System Name: b092-016 Model Number: B092-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 0 days, 18 hours, 3 mins, 30 secs

Manage: KVM Console Server

KVM Console Server Remote Control

Launch Standard VNC Remote Control (using VNC on port 5900).

- Click **Standard VNC Remote control** and a VNC Java applet will be loaded into your browser to connect to the B092-016 Console Server. Then log in to the VNC applet and the Console Server (refer to Chapte*r* 16.3 for more details)


Remote Control
Disconnect
Options
Clipboard
Send Ctrl-Alt-Del
Refresh

```
login:
```

14. BASIC CONFIGURATION - LINUX COMMANDS

Introduction

For those who prefer to configure their Console Server at the Linux command line level (rather than use a browser and the Management Console), this chapter describes how to get command line access and use the ***config*** tool to manage the system and configure the ports, etc. from the command line:

- Administration Configuration (System Settings and Authentication Configuration)
- Date and Time Configuration (Manually Change Clock Settings and Network Time Protocol Time Zone)
- Network Configuration (Static and DHCP IP Configuration, Dial-in Configuration and Services Configuration)
- Serial Port Configuration (Serial Port Settings, Supported Protocol Configuration, Users and Trusted Networks)
- Event Logging Configuration (Remote Serial Port Log Storage and Alert Configuration)

The *config* documentation in this chapter walks through the basic configuration (similar to what can be done with the Management Console). For advanced and custom configurations using other standard commands, refer to the next chapter, *Advanced Configuration.*

Since the Console Server runs a standard Linux kernel, it is also possible to configure it using other standard Linux and Busybox commands and applications as described in the last section of this chapter. However, doing this will not always guarantee these changes are permanent.

⚠ ***This chapter is not intended to teach you Linux. We assume you already have a certain level of understanding before you execute Linux kernel-level commands.***

14.1 The Linux Command line

- Power up the Console Server and connect the “terminal” device:
  - If you are connecting using the serial line, plug a serial cable between the Console Server local DB-9 port and terminal device. Configure the serial connection of the “terminal” device/program you are using to 115200bps, 8 data bits, no parity and one stop bit. If you are using a program running on a Windows computer as the terminal device, then the cable is made up from a Cat5 UTP cable and two DB-9 to RJ-45 adapters
  - If you are connecting over the LAN, you will need to interconnect the Ethernet ports and direct your terminal emulator program to the IP address of the Console Server (192.168.0.1 by default)
- Log on to the Console Server by pressing ‘return’ a few times. The Console Server will request a username and password. Enter the username *root* and the password *default*. You should now see the command line prompt which is a hash (#)

The config Tool

Syntax

```
config [ -ahv ] [ -d id ] [ -g id ] [ -p path ] [ -r configurator ] [ -s id=value ]
```

Description

The config tool allows manipulation and querying of the system configuration from the command line. Using config, the new configuration can be activated by running the relevant *configurator* which performs the action necessary to make the configuration changes live.

Configuration elements which can be changed are specified by a unique '.' separated name. For example, the configuration file version is identified as '*config.version*'.

The config tool is designed to perform multiple actions from one command if needed, so if necessary, options can be chained together.

Options

-a –run-all Run all registered configurators. This performs every configuration synchronization action pushing all changes to the live system

-h –help Display a brief usage message.

-v –verbose Log extra debug information

-d –del=id Remove the given configuration element specified by a '.' separated identifier.

-g –get=id Display the value of a configuration element.

-p –path=file Specify an alternate configuration file to use. The default file is located at */etc/config/config.xml*

-r –run=configurator Run the specified registered configurator. Registered configurators are listed below.

-s --set=id=value Change the value of configuration element specified by a '.' separated identifier

-e --export=file Save active configuration to file.

-i --import=file Load configuration from file.

-t --test-import=file Pretend to load configuration from file.

-S --separator=char The pattern to separate fields with, default is '.'.

The registered configurators are:

alerts
auth
cascade
console
dhcp
dialin
eventlog
hosts
ipaccess
ipconfig
nagios
power
serialconfig
services
Slave
systemsettings
time
ups
users

14.2 Administration Configuration

System Settings

To change system settings to the following values:

System Name	og.mydomain.com
System Password (root account)	secret
System SMTP Server	192.168.0.124
System SMTP Sender	og@mydomain.com

The following commands must be issued:

```
# /bin/config –-set=config.system.name=og.mydomain.com
# /bin/config –-set=config.system.password= #secret
# /bin/config –-set=config.system.smtp.server=192.168.0.124
# /bin/config –-set=config.system.smtp.sender=og@mydomain.com
```

The following command will synchronize the live system with the new configuration:

```
# /bin/config –-run=systemsettings
```

The Console Server does not store user passwords in plain text so when manually setting the passwords using *config -set* you need to hash the "secret" and enter the hashed password (#secret). (One easy way to generate a hashed password is to run *perl -e 'print crypt("", "")'* on a Perl enabled box)

Authentication Configuration

You can configure the system remote authentication with the following settings:

Remote Authentication Method	LDAP
Server IP Address	192.168.0.32
Server Password	Secret
LDAP Base Node	Some base node

By issuing the following commands:

```
        # /bin/config –-set=config.auth.type=LDAP
```

```
# /bin/config –-set=config.auth.server=192.168.0.32
# /bin/config –-set=config.auth.password=Secret
# /bin/config –-set=”config.auth.ldap.basenode=some base node”
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=auth
```

14.3 Date and Time Configuration

Manually Change Clock Settings

To change the running system time, you need to issue the following commands:

```
#  date 092216452005.05                    Format is MMDDhhmm[[CC]YY][.ss]
```

Then the following command will save this new system time to the hardware clock:

```
# /bin/hwclock –systohc
```

Alternately, to change the hardware clock time, you need to issue the following commands:

```
# /bin/hwclock --set --date=092216452005.05
```

Where the format is MMDDhhmm[[CC]YY][.ss]

Then the following command will save this new hardware clock time as the system time:

```
# /bin/hwclock –hctosys
```

Network Time Protocol

To enable NTP using a server at pool.ntp.org, issue the following commands:

```
# /bin/config –-set=config.ntp.enabled=on
# /bin/config –-set=config.ntp.server=pool.ntp.org
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=time
```

Time Zone

To change the system time zone USA to Eastern Standard Time, you need to issue the following commands:

```
# /bin/config –-set=config.system.timezone=US/Eastern
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=time
```

14.4 Network Configuration

IP Configuration

Please note that supported interface modes are 'dhcp' and 'static':

DHCP

To enable a DHCP client on the primary Network interface (eth0) from the Console Server command line:

```
# /bin/config --set=config.interfaces.wan.mode=dhcp
```

The following command will then synchronize the live system with the new configuration.

```
# /bin/config –-run=ipconfig
```

Note: “/bin/config” commands can be combined into one command, for convenience.

Please note that supported interface modes are 'dhcp' and 'static'.

Static

To set static configuration on the primary Network interface with the following attributes:

IP Address:	192.168.1.100
Network Mask:	255.255.255.0
Default Gateway:	192.168.1.1

IP Address:	192.168.1.100
Primary DNS:	192.168.1.254
Secondary DNS:	10.1.0.254

You would need to issue the following commands from the command line:

```
# /bin/config --set=config.interfaces.wan.mode=static
# /bin/config --set=config.interfaces.wan.address=192.168.1.100
# /bin/config --set=config.interfaces.wan.netmask=255.255.255.0
# /bin/config --set=config.interfaces.wan.gateway=192.168.1.1
# /bin/config --set=config.interfaces.wan.dns1=192.168.1.254
# /bin/config --set=config.interfaces.wan.dns2=10.1.0.254
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=ipconfig
```

Dial-in Configuration

To enable dial-in access on the DB9 serial port from the command line with the following attributes:

Local IP Address	172.24.1.1
Remote IP Address	172.24.1.2
Authentication Type:	MSCHAPv2
Serial Port Baud Rate:	115200
Serial Port Flow Control:	Hardware
Custom Modem Initialization:	ATQ0V1H0

You would need to issue the following commands from the command line to set system configuration:

```
# /bin/config –-set=config.console.ppp.localip=172.24.1.1

# /bin/config –-set=config.console.ppp.remoteip=172.24.1.2

# /bin/config –-set=config.console.ppp.auth=MSCHAPv2

# /bin/config –-set=config.console.ppp.enabled=on

# /bin/config –-set=config.console.speed=115200
# /bin/config –-set=config.console.flow=Hardware
# /bin/config –-set=config.console.initstring=ATQ0V1H0
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=dialin
```

Please note that supported authentication types are 'None', 'PAP', 'CHAP' and 'MSCHAPv2'.

Supported serial port baud-rates are '9600', '19200', '38400', '57600', '115200', and '230400'.

Supported parity values are 'None', 'Odd', 'Even', 'Mark' and 'Space'.

Supported data-bits values are '8', '7', '6' and '5'.

Supported stop-bits values are '1', '1.5' and '2'.

Supported flow-control values are 'Hardware', 'Software' and 'None'.

If you do not wish to use out-of-band dial-in access, please note that the procedure for enabling start-up messages on the console port is covered in *Chapter 15: Accessing the Console Port.*

Services Configuration

You can manually enable or disable network servers from the command line. For example, if you wanted to guarantee the following server configuration:

HTTP Server	Enabled
HTTPS Server	Disabled
Telnet Server	Disabled
SSH Server	Enabled
SNMP Server	Disabled
Ping Replies (Respond to ICMP echo requests)	Disabled

You would need to issue the following commands from the command line to set system configuration:

```
# /bin/config –-set=config.services.http.enabled=on
# /bin/config –-del=config.services.https.enabled
# /bin/config –-del=config.services.Telnet.enabled
# /bin/config –-set=config.services.ssh.enabled=on
# /bin/config –-del=config.services.snmp.enabled
# /bin/config –-del=config.services.pingreply.enabled
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=services
```

Note: “/bin/config” commands can be combined into one command for convenience.

14.5 Serial Port Configuration

Serial Port Settings

To setup serial port 5 to use the following properties:

Baud Rate	115200
Parity	None
Data Bits	8
Stop Bits	1
Flow Control	Software

You would need to issue the following commands from the command line to set the port configuration:

```
# /bin/config –-set=config.ports.port5.speed=115200
# /bin/config –-set=config.ports.port5.parity=None
# /bin/config –-set=config.ports.port5.charsize=8
# /bin/config –-set=config.ports.port5.stop=1
# /bin/config –-set=config.ports.port5.flow=Software
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=serialconfig
```

Note that supported serial port baud-rates are ‘50’, ‘75’, ‘110’, ‘134’, ‘150’, ‘200’, ‘300’, ‘600’, ‘1200’, ‘1800’, ‘2400’, ‘4800’, ‘9600’, '19200', '38400', '57600', '115200', and '230400'.

Supported parity values are 'None', 'Odd', 'Even', 'Mark' and 'Space'.

Supported data-bits values are '8', '7', '6' and '5'.

Supported stop-bits values are '1', '1.5' and '2'.

Supported flow-control values are 'Hardware', 'Software' and 'None'.

Supported Protocol Configuration

To ensure remote access to serial port 5 is configured as follows:

Telnet Access LAN	Disabled
SSH Access LAN	Enabled
Raw TCP *via* LAN	Disabled

You would need to issue the following commands from the command line to set system configuration:

```
        # /bin/config –-set=config.ports.port5.ssh=on
        # /bin/config –-del=config.ports.port5.Telnet
        # /bin/config –-del=config.ports.port5.tcp
```

The following command will synchronize the live system with the new configuration.

```
        # /bin/config –-run=serialconfig
```

Note: “/bin/config” commands can be combined into one command for convenience.

Users

You can add a User to the system from the command line by performing the following instructions:

Determine the total number of existing Users. If you have no existing Users, you can assume this is 0.

```
        # /bin/config –-get=config.users.total
```

This command should display:

```
config.users.total 1
```

Note that if you see:

```
config.users.total
```

This means you have 0 Users configured.

So your new User will be the existing total plus 1, so if the previous command gave you 0, then you start with user number 1. If you already have 1 user, your new user will be number 2, etc.

If you want a user named “user1” with a password of “secret” who will have access to serial port 5 from the network, you need to issue the these commands (assuming you have a previous user in place):

```
# /bin/config –-set=config.users.user2.username=user1
# /bin/config –-set=config.users.user2.password=secret
# /bin/config –-set=”config.users.user2.description=The Second User”
# /bin/config –-set=config.users.user2.port5=on
# /bin/config –-set=config.users.total=2
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=users
```

Trusted Networks

You can further restrict remote access to serial ports based on the source IP address. To configure this via the command line, you need to do the following:

Determine the total number of existing trusted network rules. If you have no existing rules, you can assume this is 0.

```
# /bin/config –-get=config.portaccess.total
```

This command should display:

```
config.portaccess.total 1
```

Note that if you see:

```
config.portaccess.total
```

This means you have 0 rules configured.

Your new rule will be the existing total plus 1. So if the previous command gave you 0, then you start with rule number 1. If you already have 1 rule, your new rule will be number 2, etc.

If you want to restrict access to serial port 5 to computers from a single C class network 192.168.5.0, you need to issue the following commands (assuming you have a previous rule in place):

```
# /bin/config –-set=config.portaccess.rule2.address=192.168.5.0
# /bin/config –-set=config.portaccess.rule2.netmask=255.255.255.0
# /bin/config –-set=”config.portaccess.rule2.description=foo bar.”
# /bin/config –-set=config.portaccess.rule2.port5=on
# /bin/config –-set=config.portaccess.total=2
```

Please note that this rule becomes live straight away.

14.6 Event Logging Configuration

Remote Serial Port Log Storage

To setup remote storage of serial port 5 log to a remote Windows share with the following properties:

IP Address	192.168.0.254
Directory	C:\\tripplite\logs\
Username	cifs_user
Password	secret
Logging level	2 (input/output logging as well as user connections & disconnections)

The following commands must be issued:

```
# /bin/config –-set=config.eventlog.server.type=cifs
# /bin/config –-set=config.eventlog.server.address=192.168.0.254
# /bin/config –-set=config.eventlog.server.path=/tripplite/logs
# /bin/config –-set=config.eventlog.server.username=cifs_user
# /bin/config –-set=config.eventlog.server.password=secret
# /bin/config –-set=config.ports.port5.loglevel=2
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=eventlog
```

Note that supported remote storage server types are 'None', 'cifs', 'nfs' and 'syslog'.

Supported port logging levels are '0', '1' and '2'.

Alert Configuration

You can add an email alert to the system from the command line by following these instructions:

Determine the total number of existing alerts (if you have no existing alerts) you can assume this is 0.

```
# /bin/config –-get=config.alerts.total
```

This command should display output similar to:

```
config.alerts.total 1
```

Note that if you see:

```
config.alerts.total
```

This means you have 0 alerts configured.

Your new alert will be the existing total plus 1. So if the previous command gave you 0, then you start with user number 1. If you already have 1 alert, your new alert will be number 2, etc.

To configure an email alert to be sent to alert1@domain.org when the regular expression "Cpu.*0.0% id," matches logging on serial port 5, you would need to issue the following commands (Assuming you have 1 previous alert in place):

```
# /bin/config –-set=config.alerts.alert2.email=alert1@domain.com

# /bin/config –-set="config.alerts.alert2.pattern=.*0.0% id,"

# /bin/config –-set=config.alerts.alert2.port5=on

# /bin/config –-del=config.alerts.total=2
```

The following command will synchronize the live system with the new configuration.

```
# /bin/config –-run=alerts
```

14.7 SDT Host Configuration

SDT host TCP Ports

To setup the list of TCP ports for a host, you use the config command:

```
# config -s config.sdt.hosts.host3.tcpports.tcport1 = 23

# config -s config.sdt.hosts.host3.tcpports.tcport2 = 5900
```

```
        # config -s config.sdt.hosts.host3.tcpports.tcport3 = 3389
```

The above assumes the config below:

```
 # vi /etc/config/config.xml ~
          </users>
        </host1>
        <total>3</total>
        <host2>
          <address>accounts.intranet.myco.com</address>
          <description>Accounts server</description>
          <users>
            <total>1</total>
            <user1>John</user1>
          </users>
        </host2>
        <host3>
          <address>192.168.254.191</address>
          <description>Tonys Win2000 Box</description>
          <users>
            <total>1</total>
            <user1>John</user1>
          </users>
          <tcpports><tcpport1>23</tcpport1></tcpports>
        </host3>
      </hosts>
    </sdt>
 </config>
```

14.8 Configuration backup and restore

Before backing up the configuration, you need to arrange a way to transfer the backup off-box. This could be via an NFS share, a Samba (Windows) share to USB storage, or copied off-box via the network. If backing up directly to off-box storage, make sure it is mounted.

/tmp is not a good location for the backup except as a temporary location before transferring it off-box. The */tmp* directory will not survive a reboot. The */etc/config* directory is not a good place either, as it will not survive a restore.

Backup and restore should be done by the root user to ensure correct file permissions are set. The config command is used to create a backup tarball:

```
config -e <Output File>
```

The tarball will be saved to the indicated location. It will contain the contents of the */etc/config/* directory in an uncompressed and unencrypted form.

Example nfs storage:

```
# mount -t nfs 192.168.0.2:/backups /mnt # config -e /mnt/xxxxx.config # umount/mnt/
```

Example transfer off-box via scp:

```
# config -e /tmp/xxxxx.config
# scp /tmp/xxxxx.config 192.168.0.2:/backups
```

The config command is also used to restore a backup:

```
config -i <Input File>
```

This will extract the contents of the previously created backup to */tmp*, and then synchronize the */etc/config* directory with the copy in */tmp*.

One possible problem that can occur here is that there is not enough room in */tmp* to extract files to. The following command will temporarily increase the size of */tmp*:

```
mount -t tmpfs -o remount,size=2048k tmpfs /var
```

If restoring to either a new unit or one that has been factory defaulted, it is important to make sure that the process generating SSH keys is either stopped or completed before restoring configuration. If this is not done, then a mix of old and new keys may be put in place.

As SSH uses these keys to avoid man-in-the-middle attacks, logging in may be disrupted.

14.9 General Linux command usage

The Console Server platform is a dedicated Linux computer, optimized to provide access to serial consoles of critical server systems and control network connected hosts. Being based around uClinux (a small footprint but extensible Linux), it embodies a myriad of popular and proven Linux software modules for networking (NetFilter, IPTables), secure access (OpenSSH) and communications (OpenSSL) and sophisticated user authentication (PAM, RADIUS, TACACS+ and LDAP).

Many components of the Console Server software are licensed under the GNU General Public License (version 2). You may obtain a copy of the GNU General Public License at http://www.fsf.org/copyleft/gpl.html and source code will provided for any of the components of the Software licensed under the GNU General Public License upon request. The Console Servers are built on the 2.4 uClinux kernel as developed by the uClinux project. This is GPL code and source can be found: http://cvs.uclinux.org.

Supported commands that have config files that can be altered include:

portmanager
inetd
init
ssh/sshd/scp/sshkeygen
ucd-snmpd http://www.ece.ucdavis.edu/ucd-snmp/
samba
fnord (web server)
sslwrap

Commands you can run from the command line on the Console Server include::

loopback
bash (shell)
busybox http://www.busybox.net/downloads/BusyBox.html
(has lots of unix shell commands and tools)
chat
dhcpcd
ftp
hd
hwclock
iproute
iptables
netcat
ifconfig
mii-tool
netstat

route
openntpd
ping
portmap
pppd
routed
setserial
smtpclient
stty
stunel
tcpdump
tftp
tip
traceroute

More details on the above Linux commands can found online at:

http://en.tldp.org/HOWTO/HOWTO-INDEX/howtos.html

http://www.faqs.org/docs/Linux-HOWTO/Remote-Serial-Console-HOWTO.html

http://www.stokely.com/unix.serial.port.resources/serial.switch.html

15. ADVANCED CONFIGURATION

Introduction

This chapter documents the embedded ***portmanager*** application which manages the serial ports on the Console Server and gives examples of its use:

- *portmanager* documentation
- Scripts and alerts
- Raw data access to the ports and modems

This chapter also describes details how to perform advanced and custom management tasks using Linux commands and script:

- *iptables* modifications and updating IP Filtering rules
- modifying SNMP with *net-snmpd*
- public key authenticated SSH communications
- SSL, configuring HTTPS and issuing certificates
- using the ***pmpower*** application and **powerman** for power device management
- using IPMI tools

15.1 Advanced Portmanager

pmshell

The *pmshell* command acts similarly to the standard *tip* or *cu* commands, but all serial port access is directed via the portmanager.

Example:

To connect to port 8 *via* the portmanager:

```
# pmshell -l port08
```

pmshell Commands:

Once connected, the pmshell command supports a subset of the '~' escape commands that tip/cu support. For SSH, you must prefix the escape with an additional '~' command (i.e. use the '~~' escape)

Send Break:

Typing the character sequence '~b' will generate a BREAK on the serial port.

History:

Typing the character sequence '~h' will generate a history on the serial port.

Quit pmshell:

Typing the character sequence '~.' will exit from pmshell.

Set RTS to 1 run the command:

```
# pmshell --rts=1
```

Show all signa

```
# pmshell –signals

DSR=1 DTR=1 CTS=1 RTS=1 DCD=0
```

Read a line of text from the serial port:

```
# pmshell –getline
```

pmchat

The *pmchat* command acts similarly to the standard *chat* command, but all serial port access is directed via the portmanager.

Example:

To run a chat script *via* the portmanager:

```
# pmchat -v -f /etc/config/scripts/port08.chat < /dev/port08
```

For more information on using *chat* (and *pmchat*), you should consult the UNIX man pages:

http://techpubs.sgi.com/library/tpl/cgi-bin/getdoc.cgi?coll=linux&db=man&fname=/usr/share/catman/man8/chat.8.html

pmusers

The *pmusers* command is used to query the portmanager for active user sessions.

Example:

To detect which users are currently active on which serial ports:

```
# pmusers
```

This command will not output anything if there are no active users currently connected to any ports, otherwise, it will respond with a sorted list of usernames per active port:

```
Port 1:
        user1
        user2
Port 2:
        user1
Port 8:
        user2
```

The above output indicates that a user named "*user1*" is actively connected to ports 1 and 2, while "*user2*" is connected to both ports 1 and 8.

Portmanager Daemon

Command line options

There is normally no need to stop and restart the daemon. To restart the daemon, just run the command:

```
# portmanager
```

Supported command line options are:

Force portmanager to run in the foreground:

```
--nodaemon
```

Set the level of debug logging:

```
--loglevel={debug,info,warn,error,alert}
```

Change which configuration file it uses:

```
-c /etc/config/portmanager.conf
```

Signals

Sending a SIGHUP signal to the portmanager will cause it to reread its configuration file

15.2 External Scripts and Alerts

The portmanager has the ability to execute external scripts on certain events. These events are:

I. When a port is opened by the portmanager:

When the portmanager opens a port, it attempts to execute */etc/config/scripts/portXX.init* (where XX is the number of the port, *e.g.* 08). The script is run with STDIN and STDOUT both connected to the serial port.

If the script cannot be executed, then portmanager will execute */etc/config/scripts/portXX.chat via* the chat command on the serial port.

II. When an alert occurs on a port:

When an alert occurs on a port, the portmanager will attempt to execute */etc/config/scripts/portXX.alert* (where XX is the port number, e.g. 08)

The script is run with STDIN containing the data which triggered the alert, and STDOUT redirected to /dev/null, NOT to the serial port. If you wish to communicate with the port, use *pmshell* or *pmchat* from within the script.

If the script cannot be executed, then the alert will be mailed to the address configured in the system administration section.

III. When a user connects to any port:

If a file called */etc/config/pmshell-start.sh* exists, it is run when a user connects to a port. It is provided with 2 arguments, the "Port number" and the "Username". Here is a simple example:

```
</etc/config/pmshell-start.sh >

#!/bin/sh

PORT="$1"
USER="$2"

echo "Welcome to port $PORT $USER"

< /etc/config/pmshell-start.sh>
```

The return value from the script controls whether the user is accepted or not. If 0 is returned (or nothing is done on exit as in the above script), then the user is permitted, otherwise, the user is denied access.

Here is a more complex script which reads from configuration to display the port label if available and denies access to the root user:

```
</etc/config/pmshell-start.sh>
#!/bin/sh

PORT="$1"
USER="$2"
LABEL=$(config -g config.ports.port$PORT.label | cut -f2- -d' ')

if [ "$USER" == "root" ]; then
    echo "Permission denied for Super User"
    exit 1
```

```
fi

if [  -z  "$LABEL" ]; then
   echo "Welcome $USER, you are connected to Port $PORT"
else
   echo "Welcome $USER, you are connected to Port $PORT ($LABEL)"
fi
</etc/config/pmshell-start.sh>
```

15.3 Raw Access to Serial Ports

Access to Serial Ports

You can *tip* and *stty* to completely bypass the portmanager and have raw access to the serial ports.

When you run *tip* on a portmanager controlled port, portmanager closes that port, and stops monitoring it until tip releases control of it.

With *stty*, the changes made to the port only "stick" until that port is closed and opened again, so it is doubtful that people will want to use *stty* for more than initial debugging of the serial connection.

If you want to use stty to configure the port, you can put *stty* commands in */etc/config/scripts/portXX.init*, which gets run whenever portmanager opens the port.

Otherwise, any setup you do with *stty* will get lost when the portmanager opens the port. The reason that portmanager sets things back to its *config,* rather than using whatever is on the port, is so the port is in a known good state, and will work, no matter what things are done to the serial port outside of portmanager.

Accessing the Console Port

The console dial-in is handled by *mgetty*, with automatic PPP login extensions. *mgetty* is a smart *getty* replacement, designed to be used with hayes compatible data and data/fax modems. *mgetty* knows about modem initialization, manual modem answering (so your modem doesn’t answer if the machine isn’t ready), UUCP locking (so you can use the same device for dial-in and dial-out). *mgetty* provides very extensive logging facilities. All standard *mgetty* options are supported.

- Modem initialization strings

To override the standard modem initialization string, either use the Management Console (refer to *Chapter 5*) or the command line config tool (refer to *Dial-In Configuration Chapter 14*).

- Enabling Boot Messages on the Console

  If you are not using a modem on the DB9 console port and instead wish to connect to it directly via a Null Modem cable, you may want to enable verbose mode, allowing you to see the standard linux start-up messages. This can be achieved with the following commands:

  # /bin/config --set=config.console.debug=on # /bin/config --run=console # reboot

  If at some point in the future you chose to connect a modem for dial-in out-of-band access, the procedure can be reversed with the following commands.

  # /bin/config --del=config.console.debug # /bin/config --run=console # reboot

15.4 IP- Filtering

Standard IP-Filter configuration:

The system uses the *iptables* utility to provide a stateful firewall of LAN traffic. By default, rules are automatically inserted to allow access to enabled services, and serial port access via enabled protocols. The commands which add these rules are contained in configuration files.

/etc/config/ipfilter

This is an executable shell script which is run whenever the LAN interface is brought up and whenever modifications are made to the *iptables* configuration as a result of CGI actions or the *config* command line tool.

The basic steps performed are as follows:

a) The current *iptables* configuration is erased.

b) If a customized IP-Filter script exists, it is executed and no other actions are performed.

c) Standard policies are inserted which will drop all traffic not explicitly allowed to and through the system.

d) Rules are added which explicitly allow network traffic to access enabled services *e.g.* HTTP, SNMP *etc.*

e) Rules are added which explicitly allow traffic network traffic access to serial ports over enabled protocols *e.g.* Telnet, SSH and raw TCP.

Customizing the IP-Filter:

/etc/config/filter-custom

If the standard system firewall configuration is not adequate for your needs, it can be bypassed safely by creating a file at /etc/config/filter, custom- containing commands to build a specialized firewall. This firewall script will be run whenever the LAN interface is brought up (including initially) and will override any automated system firewall settings.

Below is a simple example of a custom script which creates a firewall using the *iptables* command. Only incoming connections from computers on a C-class network 192.168.10.0 will be accepted when this script is installed at */etc/config/filter-custom* (Note that when this script is called, any preexisting chains and rules have been flushed from *iptables*):

```
#/bin/sh
# Set default policies to drop any incoming or routable traffic
# and blindly accept anything from the 192.168.10.0 network.
iptables –-policy FORWARD DROP
iptables –-policy INPUT DROP
iptables –-policy OUTPUT ACCEPT

# Allow responses to outbound connections back in.
iptables –-append INPUT \
        –-match state –-state ESTABLISHED,RELATED –-jump ACCEPT

# Explicitly accept any connections from computers on
# 192.168.10.0/24
iptables –-append INPUT –-source 192.168.10.0/24 –-jump ACCEPT
```

Good documentation about using the *iptables* command can be found at the linux *netfilter* website http://netfilter.org/documentation/index.html

Resources

There are many high-quality tutorials and HOWTOs available via the *netfilter* website; in particular, peruse the tutorials listed on the *netfilter* HOWTO page. A list of useful web locations has been compiled for your convenience below:

Netfilter Homepage	http://netfilter.org
Netfilter/iptables Tutorials	http://netfilter.org/documentation/index.html#documentation-tutorials

15.5 Modifying SNMP Configuration

/etc/config/snmpd.conf

The *net-snmpd* is an extensible SNMP agent which responds to SNMP queries for management information from SNMP management software. Upon receiving a request, it processes the request(s), collects the requested information and/or performs the requested operation(s) and returns the information to the sender.

This includes built-in support for a wide range of MIB information modules, and can be extended using dynamically loaded modules, external scripts and commands. *Snmpd,* when enabled, should run with a default configuration. Its behavior can be customized via the options in */etc/config/snmpd.conf.*

Changing standard system information such as system contact, name and location can be achieved by editing */etc/config/snmpd.conf* file and locating the following lines:

sysdescr	*"tripplite"*
syscontact	*root <root@localhost>(configure /etc/default/snmpd.conf)*
sysname	*Not defined (edit /etc/default/snmpd.conf)*
syslocation	*Not defined (edit /etc/default/snmpd.conf)*

Simply change the values of *sysdescr, syscontact, sysname* and *syslocation* to the desired settings and restart *snmpd*.

The *snmpd.conf* is extremely powerful and too flexible to cover completely here. The configuration file itself is commented extensively and good documentation is available at the *net-snmp* website http://www.net-snmp.org, specifically:

Man Page:	http://www.net-snmp.org/docs/man/snmpd.conf.html
FAQ:	http://www.net-snmp.org/docs/FAQ.html
Net-SNMPD Tutorial:	http://www.net-snmp.org/tutorial/tutorial-5/demon/snmpd.html

Adding more than one SNMP server

To add more than one SNMP server for alert traps, add the first SNMP server using the Management Console (refer to Chapter 7) or the command line *config* tool. Secondary and any further SNMP servers are added manually using *config.*

Log in to the Console Server's command line shell as root or an admin user. Refer back to the Management Console UI or user documentation for descriptions of each field.

To set the Manager Protocol field:

```
  config --set config.system.snmp.protocol2=UDP or
  config --set config.system.snmp.protocol2=TCP
```

To set the Manager Address field

```
  config --set config.system.snmp.address2=w.x.y.z
```

.. replacing *w.x.y.z* with the IP address or DNS name.

To set the Manager Trap Port field

```
  config --set config.system.snmp.trapport2=162
```

.. replacing 162 with the TCP/UDP port number

To set the Version field

```
  config --set config.system.snmp.version2=1 or
  config --set config.system.snmp.version2=2c or
  config --set config.system.snmp.version2=3
```

To set the Community field (SNMP version 1 and 2c only)

```
  config --set config.system.snmp.community2=yourcommunityname
```

.. replacing *yourcommunityname* with the community name

To set the Engine ID field (SNMP version 3 only)

```
  config --set config.system.snmp.engineid2=800000020109840301
```

.. replacing *800000020109840301* with the engine ID

To set the Username field (SNMP version 3 only)

```
  config --set config.system.snmp.username2=yourusername
```

.. replacing *yourusername* with the username
config.system.snmp.username2 (3 only)

To set the Engine ID field (SNMP version 3 only)

```
  config --set config.system.snmp.password2=yourpassword
```

.. replacing *yourpassword* with the password

Once the fields are set, apply the configuration with the following command:

```
config --run snmp
```

You can add a third or more SNMP servers by incrementing the "2" in the above commands, e.g. config.system.snmp.protocol3, config.system.snmp.address3, etc.

15.6 Secure Shell (SSH) Public Key Authentication

This section covers the generation of public and private keys in a Linux and Windows environment and configuring SSH for public key authentication. The steps to use in a Clustering environment are:

- Generate a new public and private key pair
- Upload the keys to the Master and to each Slave Console Server
- Fingerprint each connection to validate

SSH Overview

Popular TCP/IP applications such as Telnet, rlogin, ftp, and others transmit their passwords unencrypted. Doing this across public networks like the Internet can have catastrophic consequences. It leaves the door open for eavesdropping, connection hijacking, and other network-level attacks.

Secure Shell (SSH) is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another. It provides strong authentication and secure communications over unsecure channels.

OpenSSH, the de facto open source SSH application, encrypts all traffic (including passwords) to effectively eliminate these risks. Additionally, OpenSSH provides a myriad of secure tunneling capabilities, as well as a variety of authentication methods.

OpenSSH is the port of OpenBSD's excellent OpenSSH[0] to Linux and other versions of Unix. OpenSSH is based on the last free version of Tatu Ylonen's sample implementation with all patent-encumbered algorithms removed (to external libraries), all known security bugs fixed, new features reintroduced and many other clean-ups. http://www.openssh.com/ The only changes in the SSH implementation are:

- PAM support
- EGD[1]/PRNGD[2] support and replacements for OpenBSD library functions that are absent from other versions of UNIX
- The config files are now in */etc/config. e.g.*
    - */etc/config/sshd_config* instead of */etc/sshd_config*
    - */etc/config/ssh_config* instead of */etc/ssh_config*
    - */etc/config/users/<username>/.ssh/* instead of */home/<username>/.ssh/*

Generating Public Keys (Linux)

To generate new SSH key pairs, use the Linux *ssh-keygen* command. This will produce an RSA or DSA public/private key pair and you will be prompted for a path to store the two key files e.g. *id_dsa.pub* (the public key) and *id_dsa* (the private key). For example:

```
$ ssh-keygen -t [rsa|dsa]
Generating public/private [rsa|dsa] key pair.
Enter file in which to save the key (/home/user/.ssh/id_[rsa|dsa]):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_[rsa|dsa].
Your public key has been saved in /home/user/.ssh/id_[rsa|dsa].pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

It is advisable to create a new directory to store your generated keys. It is also possible to name the files after the device they will be used for. For example:

```
$ mkdir keys
$ ssh-keygen -t rsa
```

```
Generating public/private rsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_rsa):
/home/user/keys/control_room
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/keys/control_room
Your public key has been saved in /home/user/keys/control_room.pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

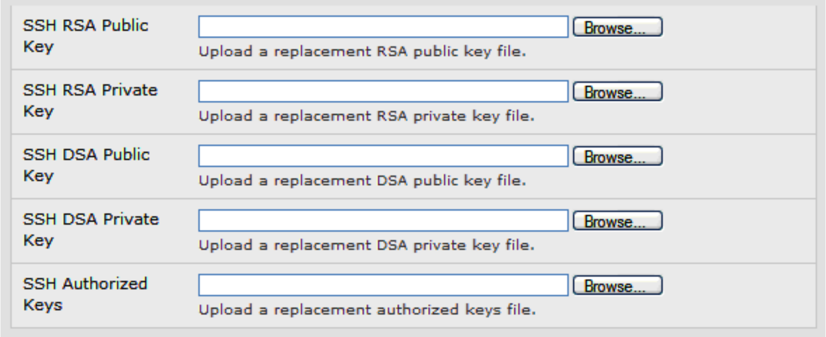
You must ensure there is no password associated with the keys. If there is a password, then the devices will have no way to supply it as runtime.

Full documentation for the *ssh-keygen* command can be found at:

http://www.openbsd.org/cgi-bin/man.cgi?query=ssh-keygen

Installing the SSH Public/Private Keys (Clustering)

For Console Servers, the keys can be simply uploaded through the web interface on the **System: Administration** page. This enables you to upload stored RSA or DSA Public Key pairs to the Master and apply the Authorized key to the Slave as is described in Chapter 4.6. Once complete, proceed to Fingerprinting as described below.



SSH RSA Public Key
Upload a replacement RSA public key file.

SSH RSA Private Key
Upload a replacement RSA private key file.

SSH DSA Public Key
Upload a replacement DSA public key file.

SSH DSA Private Key
Upload a replacement DSA private key file.

SSH Authorized Keys
Upload a replacement authorized keys file.

Installing SSH Public Key Authentication (Linux)

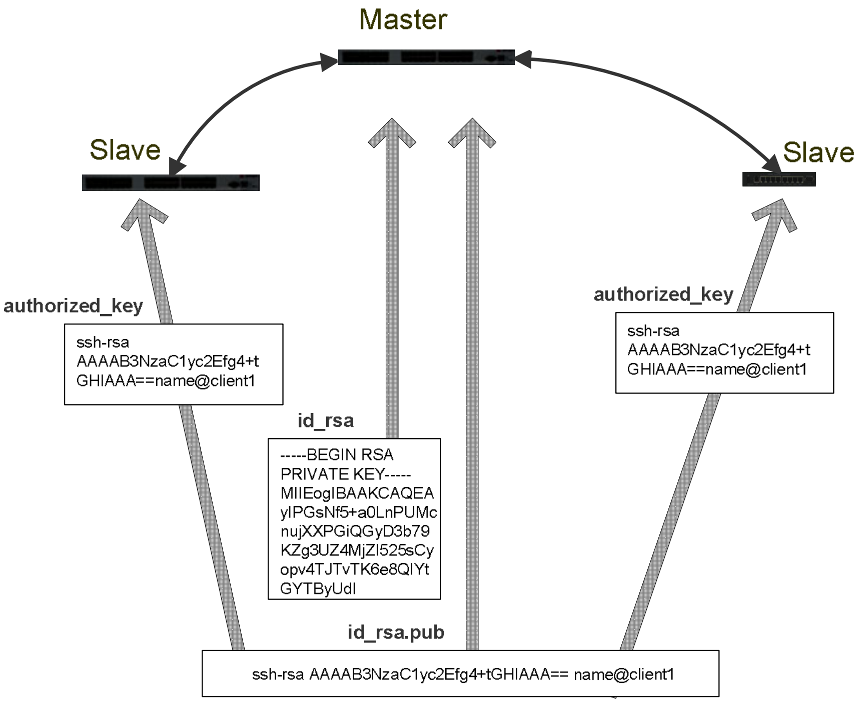
Alternately, the public key can be installed on the unit remotely from the Linux host with the scp utility as follows:

Assuming the user on the Management Console is called "fred"; the IP address of the Console Server is 192.168.0.1 (default); and the public key is on the *linux/unix* computer in *~/.ssh/id_dsa.pub*. Execute the following command on the *linux/unix* computer:

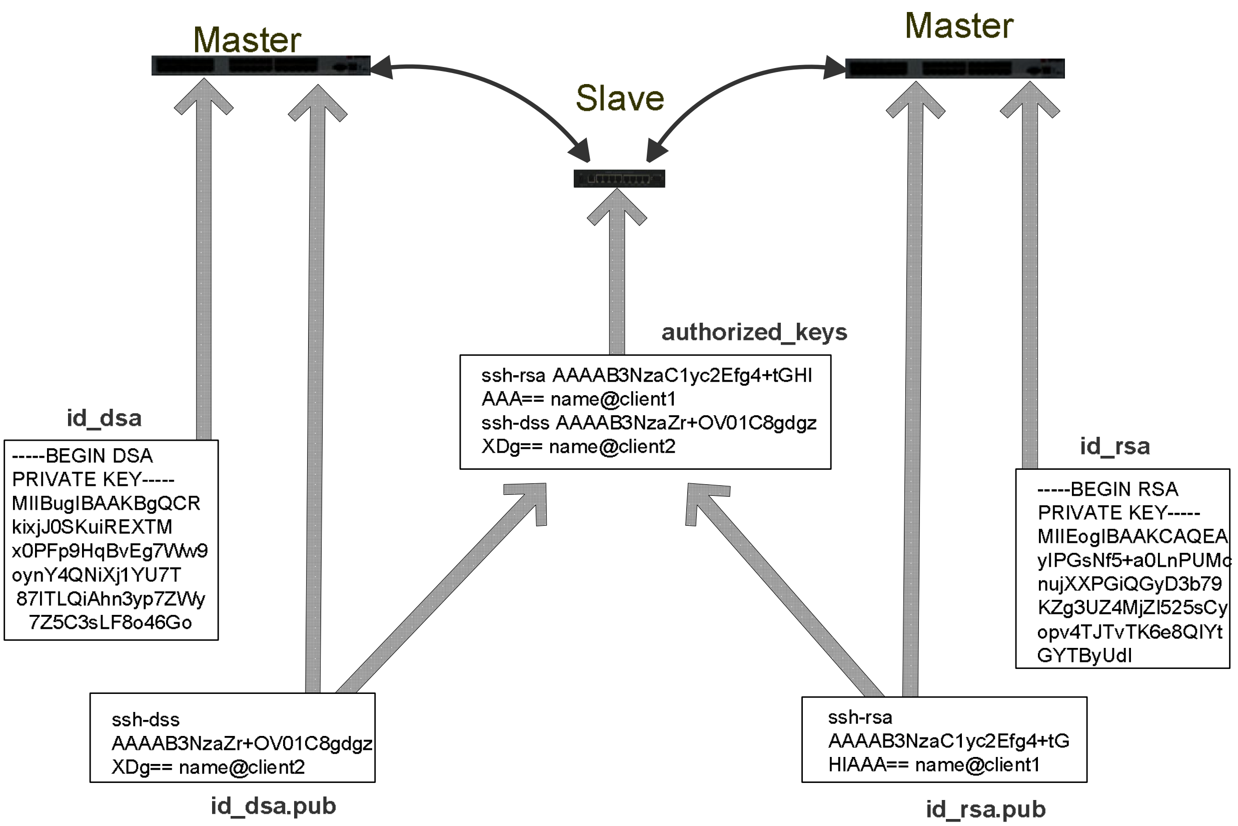
```
scp ~/.ssh/id_dsa.pub \
root@192.168.0.1:/etc/config/users/fred/.ssh/authorized_keys
```

The authorized_keys file on the Console Server needs to be owned by "fred", so login to the Management Console as **root** and type:

```
chown fred /etc/config/users/fred/.ssh/authorized_keys
```



If the Console Server device selected to be the server will only have one client device, then the authorized_keys file is simply a copy of the public key for that device. If one or more devices will be clients of the server, then the authorized_keys file will contain a copy of all of the public keys. RSA and DSA keys may be freely mixed in the authorized_keys file. For example, assume we already have one server, called bridge_server, and two sets of keys, for the control_room and the plant_entrance: $ ls /home/user/keys control_room control_room.pub plant_entrance plant_entrance.pub $ cat /home/user/keys/control_room.pub /home/user/keys/plant_entrance.pub > /home/user/keys/authorized_keys_bridge_server



```
ssh-rsa AAAAB3NzaC1yc2Efg4+tGHI
AAA== name@client1
ssh-dss AAAAB3NzaZr+OV01C8gdgz
XDg== name@client2
```

```
-----BEGIN DSA
PRIVATE KEY-----
MIIBugIBAAKBgQCR
kixjJ0SKuiREXTM
x0PFp9HqBvEg7Ww9
oynY4QNiXj1YU7T
 87ITLQiAhn3yp7ZWy
  7Z5C3sLF8o46Go
```

```
-----BEGIN RSA
PRIVATE KEY-----
MIIEogIBAAKCAQEA
yIPGsNf5+a0LnPUMc
nujXXPGiQGyD3b79
KZg3UZ4MjZI525sCy
opv4TJTvTK6e8QIYt
GYTByUdI
```

```
ssh-dss
AAAAB3NzaZr+OV01C8gdgz
XDg== name@client2
```

```
ssh-rsa
AAAAB3NzaC1yc2Efg4+tG
HIAAA== name@client1
```

More documentation on OpenSSH can be found at:

http://openssh.org/portable.html
http://www.openbsd.org/cgi-bin/man.cgi?query=ssh&sektion=1
http://www.openbsd.org/cgi-bin/man.cgi?query=sshd

Generating public/private keys for SSH (Windows)

This section describes how to generate and configure SSH keys using Windows.

First create a new user from the Management Console on the Console Server (the following example users a user called "testuser") making sure it is a member of the "users" group.

If you do not already have a public/private key pair you can generate them now using *ssh-keygen*, *PuTTYgen* or a similar tool:

PuTTYgen:
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

OpenSSH:

http://www.openssh.org/

OpenSSH (Windows):

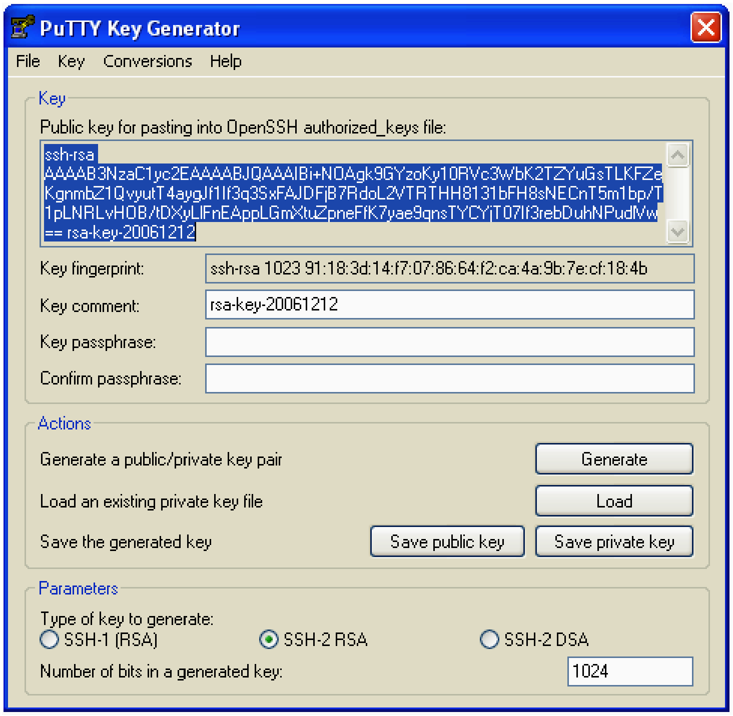
http://sshwindows.sourceforge.net/download/

For example, using PuTTYgen, make sure you have a recent version of the *puttygen.exe* (available from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html). Make sure you have a recent version of WinSCP (available from http://winscp.net/eng/download.php)

To generate a SSH key using PuTTY http://sourceforge.net/docs/F02/#clients:

- Execute the PUTTYGEN.EXE program
- Select the desired key type *SSH2 DSA* (you may use RSA or DSA) within the *Parameters* section
- It is important that you leave the passphrase field blank
- Click on the *Generate* button
- Follow the instruction to move the mouse over the blank area of the program in order to create random data used by PUTTYGEN to generate secure keys. Key generation will occur once PUTTYGEN has collected sufficient random data

.



Public key for pasting into OpenSSH authorized_keys file:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAABJQAAAIBi+NOAgk9GYzoKy10RVc3WbK2TZYuGsTLKFZe
KgnmbZ1QvyutT4aygJf1If3q3SxFAJDFjB7RdoL2VTRTHH8131bFH8sNECnT5m1bp/T
1pLNRLvHOB/tDXyLIFnEAppLGmXtuZpneFfK7yae9qnsTYCYjT07If3rebDuhNPudMw
== rsa-key-20061212
```

Key fingerprint: ssh-rsa 1023 91:18:3d:14:f7:07:86:64:f2:ca:4a:9b:7e:cf:18:4b

Key comment: rsa-key-20061212

Key passphrase:

Confirm passphrase:

Generate a public/private key pair

Load an existing private key file

Save the generated key

Type of key to generate:

○ SSH-1 (RSA) ● SSH-2 RSA ○ SSH-2 DSA

Number of bits in a generated key: 1024

- Create a new file " *authorized_keys* " (with notepad) and copy your public key data from the "Public key for pasting into OpenSSH authorized_keys file" section of the PuTTY Key Generator, and paste the key data to the "authorized_keys" file. Make sure there is only one line of text in this file.

- Use WinSCP to copy this "authorized_keys" file into the users home directory: eg. */etc/config/users/testuser/.ssh/authorized_keys* of the Console Server which will be the SSH server. You will need to make sure this file is in the correct format with the correct permissions with the following commands:

```
# dos2unix  \
/etc/config/users/testuser/.ssh/authorized_keys && chown testuser \
/etc/config/users/testuser/.ssh/authorized_keys
```

- Using WinSCP copy the attached sshd_config over */etc/config/sshd_config* on the server (Makes sure public key authentication is enabled)

- Test the Public Key by logging in as "testuser". Test the Public Key by logging in as "testuser" to the client device and typing (you should not need to enter anything): # ssh -o StrictHostKeyChecking=no <server-ip>

To automate connection of the SSH tunnel from the client on every power-up, you need to make the clients /etc/config/rc.local look like the following:

```
#!/bin/sh
ssh -L9001:127.0.0.1:4001 -N -o StrictHostKeyChecking=no testuser@<server-ip> &
```

This will run the tunnel redirecting local port 9001 to the server port 4001.

Fingerprinting

Fingerprints are used to ensure you are establishing an SSH session to who you think you are. On the first connection to a remote server, you will receive a fingerprint which you can use on future connections.

This fingerprint is related to the host key of the remote server. Fingerprints are stored in *~/.ssh/known_hosts*.

To receive the fingerprint from the remote server, log in to the client as the required user (usually root) and establish a connection to the remote host:

```
# ssh remhost
```

```
The authenticity of host 'remhost (192.168.0.1)' can't be established.
RSA key fingerprint is 8d:11:e0:7e:8a:6f:ad:f1:94:0f:93:fc:7c:e6:ef:56.
Are you sure you want to continue connecting (yes/no)?
```

At this stage, answer yes to accept the key. You should get the following message:

```
Warning: Permanently added 'remhost,192.168.0.1' (RSA) to the list of known hosts.
```

You may be prompted for a password, but there is no need to log in: you have received the fingerprint and can Ctrl-C to cancel the connection.

If the host key changes, you will receive the following warning, and not be allowed to connect to the remote host:

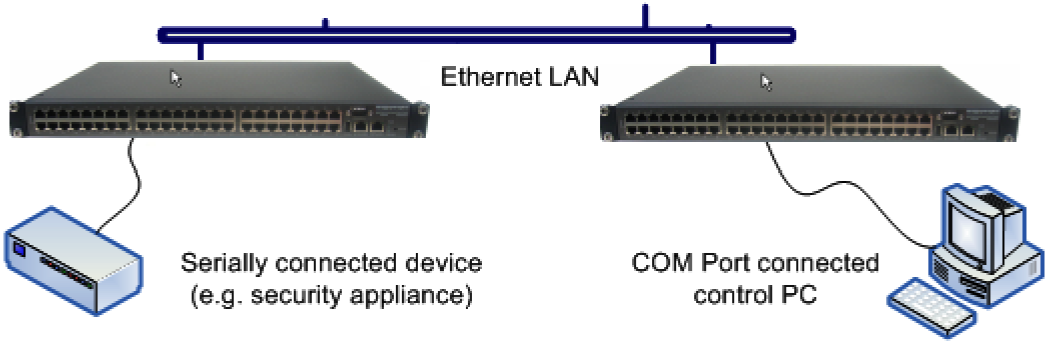
```
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@     WARNING: REMOTE HOST IDENTIFICATION HAS CHANGED!           @
@    IT IS POSSIBLE THAT SOMEONE IS DOING SOMETHING NASTY!       @
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@

Someone could be eavesdropping on you right now (man-in-the-middle attack)!
It is also possible that the RSA host key has just been changed.
The fingerprint for the RSA key sent by the remote host is
ab:7e:33:bd:85:50:5a:43:0b:e0:bd:43:3f:1c:a5:f8.
Please contact your system administrator.
Add correct host key in /.ssh/known_hosts to get rid of this message.
Offending key in /.ssh/known_hosts:1
RSA host key for remhost has changed and you have requested strict checking.
Host key verification failed.
```

If the host key has been legitimately changed, it can be removed from the *~/.ssh/known_hosts* file and the new fingerprint added. If it has not changed, this indicates a serious problem that should be investigated immediately.

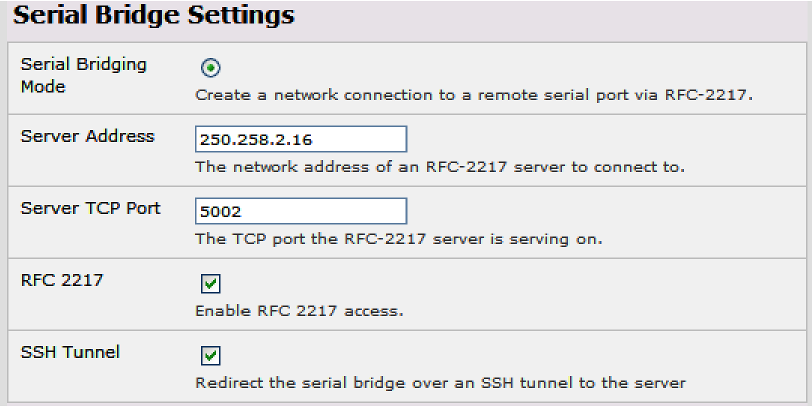
SSH tunneled serial bridging

You have the option to apply SSH tunneling when two Console Servers are configured for serial bridging.



As detailed in Chapter 4, the *Server* gateway is set up in Console Server mode with either RAW or RFC2217 enabled and the *Client* gateway is set up in Serial Bridging Mode with the Server Address, and Server TCP Port (4000 + port for RAW or 5000 + port # for RFC2217) specified:

- Select **SSH Tunnel** when configuring the **Serial Bridging Setting**



Serial Bridge Settings

Serial Bridging Mode	● Create a network connection to a remote serial port via RFC-2217.
Server Address	250.258.2.16 The network address of an RFC-2217 server to connect to.
Server TCP Port	5002 The TCP port the RFC-2217 server is serving on.
RFC 2217	☑ Enable RFC 2217 access.
SSH Tunnel	☑ Redirect the serial bridge over an SSH tunnel to the server

Next you will need to set up SSH keys for each end of the tunnel and upload these keys to the *Server* and *Client* gateways.

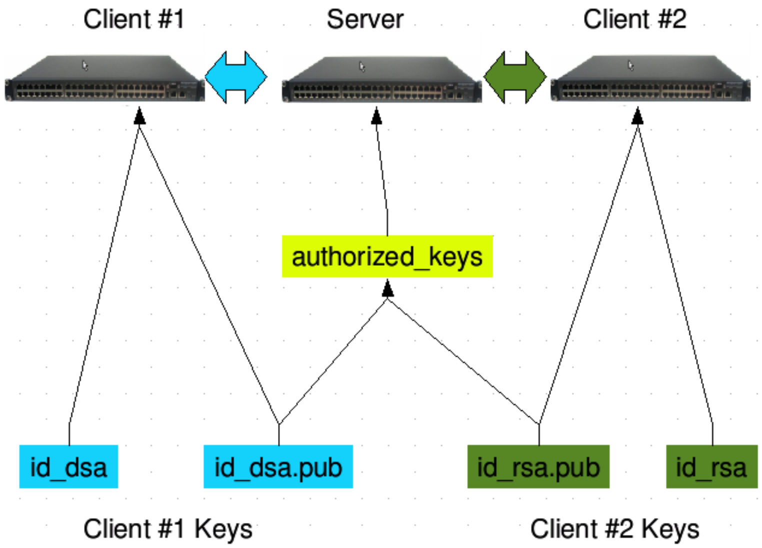
Client Keys

The first step in setting up SSH tunnels is to generate keys. Ideally, you will use a separate, secure machine to generate and store all keys to be used on the devices. However, if this is not ideal to your situation, keys may be generated on the Console Servers themselves.

It is possible to generate only one set of keys, and reuse them for every SSH session. While this is not recommended, each organization will need to balance the security of separate keys against the additional administration they bring.

Generated keys may be one of two types - RSA or DSA (and it is beyond the scope of this document to recommend one over the other). RSA keys will go into the files *id_rsa* and *id_rsa.pub*. DSA keys will be stored in the files *id_dsa* and *id_dsa.pub*.

For simplicity going forward, the term *private key* will be used to refer to either *id_rsa* or *id_dsa* and *public key* to refer to either *id_rsa.pub* or *id_dsa.pub.*



To generate the keys using OpenBSD's OpenSSH suite, we use the *ssh-keygen* program:

```
$ ssh-keygen -t [rsa|dsa]
Generating public/private [rsa|dsa] key pair.
Enter file in which to save the key (/home/user/.ssh/id_[rsa|dsa]):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_[rsa|dsa].
Your public key has been saved in /home/user/.ssh/id_[rsa|dsa].pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

It is advisable to create a new directory to store your generated keys. It is also possible to name the files after the device they will be used for. For example:

```
$ mkdir keys
$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_rsa):
/home/user/keys/control_room
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
```

```
Your identification has been saved in /home/user/keys/control_room
Your public key has been saved in /home/user/keys/control_room.pub.
The key fingerprint is:
28:aa:29:38:ba:40:f4:11:5e:3f:d4:fa:e5:36:14:d6 user@server
$
```

You should ensure there is no password associated with the keys. If there is a password, then the Console Server devices will have no way to supply it as runtime.

Authorized Keys

If the Console Server device selected to be the server will only have one client device, then the *authorized_keys* file is simply a copy of the public key for that device. If one or more devices will be clients of the server, then the *authorized_keys* file will contain a copy of all of the public keys. RSA and DSA keys may be freely mixed in the *authorized_keys* file.

For example, assume we already have one server, called *bridge_server*, and two sets of keys, for the *control_room* and the *plant_entrance*:

```
$ ls /home/user/keys
control_room control_room.pub plant_entrance plant_entrance.pub
$ cat /home/user/keys/control_room.pub
 /home/user/keys/plant_entrance.pub >
 /home/user/keys/authorized_keys_bridge_server
```

Uploading Keys

The keys for the server can be uploaded through the web interface, on the **System: Administration** page as detailed earlier. If only one client will be connecting, then simply upload the appropriate public key as the authorized keys file. Otherwise, upload the authorized keys file constructed in the previous step.

Each client will then need its own set of keys uploaded through the same page. Take care to ensure that the correct type of keys (DSA or RSA) go in the correct spots, and that the public and private keys are in the correct spot.

SDT Connector Public Key Authentication

SDT Connector can authenticate against a Console Server using your SSH key pair rather than requiring your to enter your password (i.e. public key authentication).

- To use public key authentication with SDT Connector, first you must first create an RSA or DSA key pair (using *ssh-keygen, PuTTYgen* or a similar tool) and add the public part of your SSH key pair to the Console Server – as described in the earlier section.

- Next, add the private part of your SSH key pair (this file is typically named *id_rsa* or *id_dsa*) to SDT Connector client. Click **Edit -> Preferences -> Private Keys -> Add**, locate the private key file and click **OK**. You do not have to add the public part of your SSH key pair, it is calculated using the private key.

SDT Connector will now use public key authentication when SSH connecting through the Console Server. You may have to restart SDT Connector to shut down any existing tunnels that were established using password authentication.

If you have a host behind the Console Server that you connect to by clicking the SSH button in SDT Connector, you can also configure it for public key authentication. Essentially, what you are using is SSH over SSH, and the two SSH connections are entirely separate, and the host configuration is entirely independent of SDT Connector and the Console Server. You must configure the SSH client that SDT Connector launches (e.g. Putty, OpenSSH) and the host's SSH server for public key authentication.

15.7 Secure Sockets Layer (SSL) Support

Secure Sockets Layer (SSL) is a protocol developed by Netscape for transmitting private documents *via* the Internet. SSL works by using a private key to encrypt data that's transferred over the SSL connection.

The Console Server includes OpenSSL. The OpenSSL Project is a collaborative effort to develop a robust, commercial-grade, full-featured, and Open Source toolkit implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) protocols as well as a full-strength general purpose cryptography library. The project is managed by a worldwide community of volunteers that use the Internet to communicate, plan, and develop the OpenSSL toolkit and its related documentation.

OpenSSL is based on the excellent SSLeay library developed by Eric A. Young and Tim J. Hudson. The OpenSSL toolkit is licensed under an Apache-style license, which basically means that you are free to get and use it for commercial and non-commercial purposes, subject to some simple license conditions. In the Console Server, OpenSSL is used primarily in conjunction with ‘http’ in order to have secure browser access to the GUI management console across insecure networks.

More documentation on OpenSSL is available from:

http://www.openssl.org/docs/apps/openssl.html

http://www.openssl.org/docs/HOWTO/certificates.txt

15.8 HTTPS

The Management Console can be served using HTTPS by running the webserver *via sslwrap*. The server can be launched on request using *inetd*.

The HTTP server provided is a slightly modified version of the *fnord-httpd* from http://www.fefe.de/fnord/

The SSL implementation is provided by the *sslwrap* application compiled with OpenSSL support. More detailed documentation can be found at http://www.rickk.com/sslwrap/

If your default network address is changed or the unit is to be accessed via a known Domain Name, you can use the following steps to replace the default SSL Certificate and Private Key with ones tailored for your new address.

1. Generating an encryption key

To create a 1024 bit RSA key with a password, issue the following command on the command line of a Linux host with the *openssl* utility installed:

```
openssl genrsa -des3 -out ssl_key.pem 1024
```

2. Generating a self-signed certificate with OpenSSL

This example shows how to use OpenSSL to create a self-signed certificate. OpenSSL is available for most Linux distributions via the default package management mechanism. (Windows users can check http://www.openssl.org/related/binaries.html)

To create a 1024 bit RSA key and a self-signed certificate, send the following *openssl* command from the host you have *openssl* installed on:

```
openssl req -x509 -nodes -days 1000 \
                              -newkey rsa:1024 -keyout ssl_key.pem -out ssl_cert.pem
```

You will be prompted to enter a lot of information. Most of it doesn't matter, but the "Common Name" should be the domain name of your computer (*e.g.* test.tripplite.com). When you have entered everything, the certificate will be created in a file called *ssl_cert.pem*.

3. Installing the key and certificate

The recommended method for copying files securely to the Console Server unit is with an SCP (Secure Copying Protocol) client. The *scp* utility is distributed with OpenSSH for most Unices, while Windows users can use something like the PSCP command line utility available with PuTTY.

The files created in steps 1 and 2 can be installed remotely with the *scp* utility as follows:

```
scp ssl_key.pem root@<address of unit>:/etc/config/
scp ssl_cert.pem root@<address of unit>:/etc/config/
```

or using PSCP:

```
pscp -scp ssl_key.pem root@<address of unit>:/etc/config/
pscp -scp ssl_cert.pem root@<address of unit>:/etc/config/
```

PuTTY and the PSCP utility can be downloaded from
http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

More detailed documentation on the PSCP can be found:
http://the.earth.li/~sgtatham/putty/0.58/htmldoc/Chapter5.html#pscp

4. Launching the HTTPS Server

Note that the easiest way to enable the HTTPS server is from the Management Console. Simply click the appropriate checkbox in **Network -> Services -> HTTPS Server** and the HTTPS server will be activated (assuming the *ssl_key.pem* & *ssl_cert.pem* files exist in the */etc/config* directory).

Alternatively, *inetd* can be configured to launch the secure fnord server from the command line of the unit as follows.

Edit the *inetd* configuration file. From the unit command line:

```
vi /etc/config/inetd.conf
```

Append a line:

443 stream tcp nowait root sslwrap -cert /etc/config/ssl_cert.pem -key /etc/config/ssl_key.pem -exec /bin/httpd /home/httpd"

Save the file and signal *inetd* of the configuration change.

kill -HUP `cat /var/run/inetd.pid`

The HTTPS server should be accessible from a web client at a URL similar to this:
https://<common name of unit>

More detailed documentation about the *openssl* utility can be found at the website:
http://www.openssl.org/

15.9 Power Strip Control

The Console Server supports a growing list of remote power-control devices (RPCs) which can be configured using the Management Console as described in Chapter 8. These RPCs are controlled using the open source *NUT* and *PowerMan* tools and the *pmpower* utility.

PowerMan

PowerMan provides power management in a data center or compute cluster environment. It performs operations such as power on, power off, and power cycle via remote power controller (RPC) devices. Target hostnames are mapped to plugs on RPC devices in powerman.conf
powerman - power on/off nodes

Synopsis
powerman [-option] [targets]
pm [-option] [targets]

Options
-1, --on Power ON targets.
-0, --off Power OFF targets.
-c, --cycle Power cycle targets.
-r, --reset Assert hardware reset for targets (if implemented by RPC).
-f, --flash Turn beacon ON for targets (if implemented by RPC).
-u, --unflash Turn beacon OFF for targets (if implemented by RPC).
-l, --list List available targets. If possible, output will be compressed into a host range (see TARGET SPECIFICATION below).
-q, --query Query plug status of targets. If none specified, query all targets. Status is not cached; each time this option is used, powermand queries the appropriate RPC's.

Targets connected to RPC's that could not be contacted (e.g. due to network failure) are reported as status "unknown". If possible, output will be compressed into host ranges.

-n, --node Query node power status of targets (if implemented by RPC). If no targets are specified, query all targets. In this context, a node in the OFF state could be ON at the plug but operating in standby power mode.

-b, --beacon Query beacon status (if implemented by RPC). If no targets are specified, query all targets.

-t, --temp Query node temperature (if implemented by RPC). If no targets are specified, query all targets. Temperature information is not interpreted by powerman and is reported as received from the RPC on one line per target, prefixed by target name.

-h, --help Display option summary.

-L, --license Show powerman license information.

-d, --destination host[:port] Connect to a powerman daemon on non-default host and optionally port.

-V, --version Display the powerman version number and exit.

-D, --device Displays RPC status information. If targets are specified, only RPC's matching the target list are displayed.

-T, --telemetry Causes RPC telemetry information to be displayed as commands are processed. Useful for debugging device scripts.

-x, --exprange Expand host ranges in query responses.

For more details refer *http://linux.die.net/man/1/powerman*. Also refer powermand (*http://linux.die.net/man/1/powermand*) documentation and powerman.conf (*http://linux.die.net/man/5/powerman.conf*)

Target Specification

powerman target hostnames may be specified as comma-separated or space-separated hostnames or host ranges. Host ranges are of the general form: prefix[n-m,l-k,...], where n < m and l < k, etc., This form should not be confused with regular expression character classes (also denoted by ''[]''). For example, foo[19] does not represent foo1 or foo9, but rather represents a degenerate range: foo19.

This range syntax is meant only as a convenience on clusters with a prefix NN naming convention and specification of ranges should not be considered necessary -- the list foo1,foo9 could be specified as such, or by the range foo[1,9].

Some examples of powerman targets follows.

Power on hosts bar,baz,foo01,foo02,...,foo05: *powerman --on bar baz foo[01-05]*

Power on hosts bar,foo7,foo9,foo10: *powerman --on bar,foo[7,9-10]*

Power on foo0,foo4,foo5: *powerman --on foo[0,4-5]*

As a reminder to the reader, some shells will interpret brackets ([and]) for pattern matching. Depending on your shell, it may be necessary to enclose ranged lists within quotes. For example, in tcsh, the last example above should be executed as:

```
powerman --on "foo[0,4-5]"
```

pmpower

The *pmpower* command is a high-level tool for manipulating remote, preconfigured power devices connected to the Console Servers either via a serial or network connection.

```
pmpower [-?h] [-l device | -r host] [-o outlet] [-u username] [-p password] action
```

-?/-h	This help message.
-l	The serial port to use.
-o	The outlet on the power target to apply to
-r	The remote host address for the power target
-u	Override the configured username
-p	Override the configured password
on	This *action* switches the specified device or outlet(s) ON
off	This *action* switches the specified device or outlet(s) OFF
cycle	This *action* switches the specified device or outlet(s) OFF and ON again
status	This *action* retrieves the current status of the device or outlet

Examples:

To turn outlet 4 of the power device connected to serial port 2 on:

```
# pmpower -l port02 -o 4 on
```

To turn an IPMI device located at IP address 192.168.1.100 to OFF (where username is 'root' and password is 'calvin':

```
# pmpower -r 192.168.1.100 -u root -p calvin off
```

Default system Power Device actions are specified in */etc/powerstrips.xml*. Custom Power Devices can be added in */etc/config/powerstrips.xml*. If an action is attempted which has not been configured for a specific Power Device, *pmpower* will exit with an error.

Adding new RPC devices

There are two simple paths to adding support for new RPC devices.

The first is to have scripts to support the particular RPC included in the open source *PowerMan* project *(http://sourceforge.net/projects/powerman)*. The *PowerMan* device specifications are unusual and it is suggested that you leave the actual writing of these scripts to the PowerMan authors. However documentation on how they work can be found at *http://linux.die.net/man/5/powerman.dev*. Once the new RPC support has been built into the *PowerMan,* we will include the updated *PowerMan* build in a subsequent firmware release.

The second path is to directly add support for the new RPC devices (or to customize the existing RPC device support) on your particular Console Server. The **Manage: Power** page uses information contained in */etc/powerstrips.xml* to configure and control devices attached to a serial port. The configuration also looks for (and loads) */etc/config/powerstrips.xml* if it exists.

The user can add their own support for more devices by putting definitions for them into */etc/config/powerstrips.xml*. This file can be created on a host system and copied to the Management Console device using *scp*. Alternatively, login to the Management Console and use *ftp* or *wget* to transfer files.

Here is a brief description of the elements of the XML entries in */etc/config/powerstrips.xml*.

```
<powerstrip>
        <id>Name or ID of the device support</id>
        <outlet port="port-id-1">Display Port 1 in menu</outlet>
        <outlet port="port-id-2">Display Port 2 in menu</outlet>
        ...
        <on>script to turn power on</on>
        <off>script to power off</off>
        <cycle>script to cycle power</cycle>
        <status>script to write power status to /var/run/power-status</status>
        <speed>baud rate</speed>
        <charsize>character size</charsize>
        <stop>stop bits</stop>
        <parity>parity setting</parity>
</powerstrip>
```

The *id* appears on the web page in the list of available devices types to configure.

The outlets describe targets that the scripts can control. For example, a power control board may control several different outlets. The port-id is the native name for identifying the outlet.

This value will be passed to the scripts in the environment variable *outlet*, allowing the script to address the correct outlet.

There are four possible scripts: *on, off, cycle* and *status*

When a script is run, its standard input and output is redirected to the appropriate serial port. The script receives the outlet and port in the *outlet* and *port* environment variables respectively.

The script can be anything that can be executed within the shell.

All of the existing scripts in */etc/powerstrips.xml* use the *pmchat* utility.

pmchat works just like the standard unix "chat" program, only it ensures interoperation with the port manager.

The final options, *speed, charsize, stop* and *parity* define the recommended or default settings for the attached device.

15.10 IPMItool

The Console Server includes the *ipmitool* utility for managing and configuring devices that support the Intelligent Platform Management Interface (IPMI) version 1.5 and version 2.0 specifications.

IPMI is an open standard for monitoring, logging, recovery, inventory, and control of hardware that is implemented independent of the main CPU, BIOS, and OS. The service processor (or Baseboard Management Controller, BMC) is the brain behind platform management and its primary purpose is to handle the autonomous sensor monitoring and event logging features.

The *ipmitool* program provides a simple command-line interface to this BMC. It features the ability to read the sensor data repository (SDR) and print sensor values, display the contents of the System Event Log (SEL), print Field Replaceable Unit (FRU) inventory information, read and set LAN configuration parameters, and perform remote chassis power control.

SYNOPSIS

ipmitool [**-c**|**-h**|**-v**|**-V**] **-I** *open <command>*

ipmitool [**-c**|**-h**|**-v**|**-V**] **-I** *lan* **-H** <*hostname*>
    [**-p** <*port*>]

[**-U** <*username*>]
[**-A** <*authtype*>]
[**-L** <*privlvl*>]
[**-a**|**-E**|**-P**|**-f** <*password*>]
[**-o** <*oemtype*>]
<*command*>

ipmitool [**-c**|**-h**|**-v**|**-V**] **-I** *lanplus* **-H** <*hostname*>
[**-p** <*port*>]
[**-U** <*username*>]
[**-L** <*privlvl*>]
[**-a**|**-E**|**-P**|**-f** <*password*>]
[**-o** <*oemtype*>]
[**-C** <*ciphersuite*>]
<*command*>

DESCRIPTION

This program lets you manage Intelligent Platform Management Interface (IPMI) functions of either the local system, via a kernel device driver, or a remote system, using IPMI V1.5 and IPMI v2.0. These functions include printing FRU information, LAN configuration, sensor readings, and remote chassis power control.

IPMI management of a local system interface requires a compatible IPMI kernel driver to be installed and configured. On Linux, this driver is called *OpenIPMI* and it is included in standard distributions. On Solaris, this driver is called *BMC* and is included in Solaris 10. Management of a remote station requires the IPMI-over-LAN interface to be enabled and configured. Depending on the particular requirements of each system, it may be possible to enable the LAN interface using *ipmitool* over the system interface.

OPTIONS

-a Prompt for the remote server password.

-A <*authtype*>
Specify an authentication type to use during IPMIv1.5 *lan* session activation. Supported types are NONE, PASSWORD, MD5, or OEM.

-c Present output in CSV (comma separated variable) format. This is not available with all commands.

-C <*ciphersuite*>
The remote server authentication, integrity, and encryption algorithms to use for IPMIv2 *lanplus* connections. See table 22-19 in the IPMIv2 specification. The default is 3 which specifies RAKP-HMAC-SHA1 authentication, HMAC-SHA1-96 integrity, and AES-CBC-128 encryption algorightms.

-E The remote server password is specified by the environment variable *IPMI_PASSWORD*.

-f <*password_file*>
Specifies a file containing the remote server password. If this option is absent, or if password_file is empty, the password will default to NULL.

-h Get basic usage help from the command line.

-H <*address*>
Remote server address can be an IP address or hostname. This option is required for *lan* and *lanplus* interfaces.

-I <*interface*>
Selects IPMI interface to use. Supported interfaces that are compiled in and visible in the usage help output.

-L <*privlvl*>
Force session privilege level. Can be CALLBACK, USER, OPERATOR, ADMIN. Default is ADMIN.

-m <*local_address*>
Set the local IPMB address. The default is 0x20 and there should be no need to change it for normal operation.

-o <*oemtype*>
Select OEM type to support. This usually involves minor hacks in place in the code to work around quirks in various BMCs from various manufacturers. Use *-o list* to see a list of current supported OEM types.

-p <*port*>
Remote server UDP port to connect to. Default is 623.

-P <*password*>
Remote server password is specified on the command line. If supported, it will be obscured in the process list. **Note!** Specifying the password as a command line option is not recommended.

-t <*target_address*>
Bridge IPMI requests to the remote target address.

-U <*username*>
Remote server username, default is NULL user.

-v Increase verbose output level. This option may be specified multiple times to increase the level of debug output. If given three times, you will get hexdumps of all incoming and outgoing packets.

-V Display version information.

If no password method is specified, then *ipmitool* will prompt the user for a password. If no password is entered at the prompt, the remote server password will default to NULL.

SECURITY

The *ipmitool* documentation highlights that there are several security issues to be considered before enabling the IPMI LAN interface. A remote station has the ability to control a system's power state as well as being able to gather certain platform information. To reduce vulnerability, it is strongly advised that the IPMI LAN interface only be enabled in 'trusted' environments where system security is not an issue or where there is a dedicated secure 'management network' or access has been provided through an Console Server.

Further, it is strongly advised that you should not enable IPMI for remote access without setting a password, and that the password should not be the same as any other password on that system.

When an IPMI password is changed on a remote machine with the IPMIv1.5 *lan* interface, the new password is sent across the network as clear text. This could be observed and then used to attack the remote system. It is thus recommended that IPMI password management only be done over IPMIv2.0 *lanplus* interface or the system interface on the local station.

For IPMI v1.5, the maximum password length is 16 characters. Passwords longer than 16 characters will be truncated.

For IPMI v2.0, the maximum password length is 20 characters; longer passwords are truncated.

COMMANDS

help

This can be used to get command-line help on *ipmitool* commands. It may also be placed at the end of commands to get option usage help.

ipmitool help

```
Commands:
    raw       Send a RAW IPMI request and print response
    lan       Configure LAN Channels
    chassis   Get chassis status and set power state
    event     Send pre-defined events to MC
    mc        Management Controller status and global enables
    sdr       Print Sensor Data Repository entries and readings
    sensor    Print detailed sensor information
    fru       Print built-in FRU and scan SDR for FRU locators
    sel       Print System Event Log (SEL)
    pef       Configure Platform Event Filtering (PEF)
    sol       Configure IPMIv2.0 Serial-over-LAN
    isol      Configure IPMIv1.5 Serial-over-LAN
    user      Configure Management Controller users
    channel   Configure Management Controller channels
    session   Print session information
    exec      Run list of commands from file
    set       Set runtime variable for shell and exec
```

ipmitool chassis help

Chassis Commands: status, power, identify, policy, restart_cause, poh, bootdev

ipmitool chassis power help

chassis power Commands: status, on, off, cycle, reset, diag, soft

You will find more details on *ipmitools* at [http://*ipmitool*.sourceforge.net/manpage.html](http://ipmitool.sourceforge.net/manpage.html)

15.11 Scripts for Managing Slaves

When the Console Servers are cascaded, the Master is in control of the serial ports on the Slaves, and the Master's Management Console provides a consolidated view of the settings for its own and all the Slave's serial ports. However, the Master does not provide a fully consolidated view, e.g. *Status: Active Users.* It only displays those users active on the Master's ports. You will need to write a custom bash script that parses the port logs if you want to find out who's logged in to cascaded serial ports from the master.

You will probably also want to enable remote or USB logging, as local logs only buffer 8K of data and don't persist between reboots.

This script would parse each port log file line by line. Each time it sees *'LOGIN: username'*, it adds the username to the list of connected users for that port, each time it sees *'LOGOUT: username'* it removes it from the list. The list can then be nicely formatted and displayed. It is also possible to run this as a CGI script on the B092-016. In this case, the remote/USB logged port logs files are in: */var/run/portmanager/logdir* (or they are in */var/log).* Otherwise you can run the script on the remote log server.

To enable log storage and connection logging:
- Select *Alerts & Logging: Port Log*
- *Configure* log storage
- Select *Serial & Network: Serial Port*, *Edit* the serial port(s)
- Under *Console Server*, select *Logging Level 1* and click Apply

To run the CGI script on the Console Server:
- Login to the B092-016
- Run: *mount -o remount,rw /dev/hda1 /*
- Copy the script to */home/httpd/cgi-bin/*
- Run: *mount -o remount,ro /dev/hda1 /*
- Browse to: http://192.168.0.1/cgi-bin/yourscript.cgi where 192.168.0.1 is the IP address of the Console Server and *yourscript.cgi* is the name of the script

There is a useful tutorial on creating a bash script CGI at
http://www.yolinux.com/TUTORIALS/LinuxTutorialCgiShellScript.html

Similarly the Master maintains a view of the status of the Slaves:

- Select *Status: Support Report*
- Scroll down to *Processes*
- Look for: */bin/ssh -MN -o ControlPath=/var/run/cascade/%h Slavename*
- These are the Slaves that are connected
- Note: The end of the Slaves' names will be truncated, so the first 5 characters must be unique

Alternatively, you can write a custom CGI script as described above. The currently connected Slaves can be determined by running: *ls /var/run/cascade* and the configured Slaves can be displayed by running: *config -g config.cascade.Slaves*

16. THIN CLIENT (B092-016)

Introduction

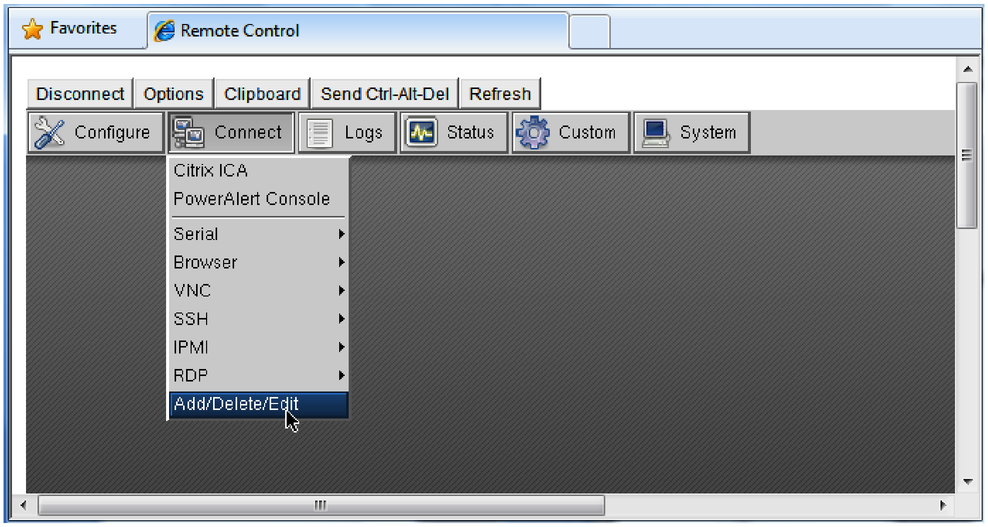
The B092-016 has a selection of management clients (Firefox browser, SSH, Telnet, VNC viewer, ICA, RDP) embedded as well as the Tripp Lite PowerAlert software. With these, the B092-016 provides rackside control of computers, networking, telecom, power and other managed devices via serial, USB or IP over the LAN.

This chapter provides instructions on configuring the thin clients and using them locally and remotely. The thin clients can be controlled from the rack side using a direct monitor/keyboard/mouse connected to the B092-016 or remotely using a VNC connection from the remote user to the B092-016.

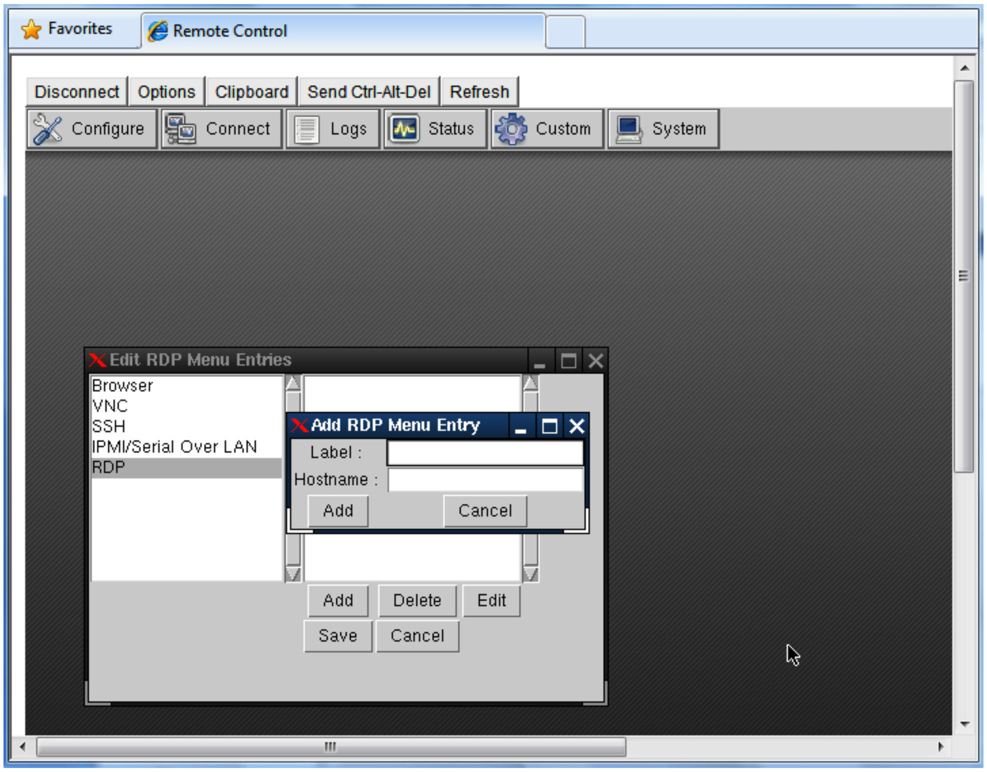
16.1 Local Client Service Connections

These client connections first need to be configured:

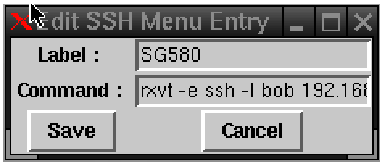
- Select **Connect: Add/Delete/Edit** on the control panel



- Then select a *Connect* client (such as RDP) and click **Add** to configure the Host connection for that client service



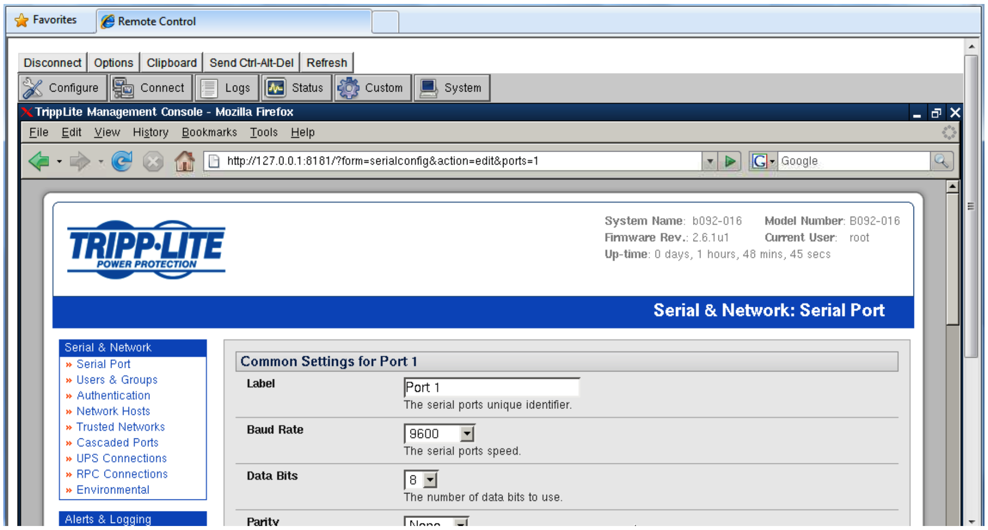
- For each new Host you add, you will be asked to enter a **Label** (enter a descriptive name) and a **Hostname** (enter the **IP Address** or **DNS Name** of the new network connected Host) and possibly a **Username** (enter the name you will use to log in to the Host)
- Once a Host has been added, you can select **Edit** and update the commands that will be executed in connecting the service to the existing Host



Label : SG580

Command : rxvt -e ssh -l bob 192.16(

- The sixteen serial ports are pre-configured by default in *Console Server* mode for the B096-016 / B096-048 Console Server Management Switch or in *UPS (PowerAlert)* mode for the B092-016 Console Server with PowerAlert product. To change these settings, select **Configure,** which will load the local Firefox browser and run the Management Console. You can then reconfigure the serial ports as detailed in *Chapter 4*



System Name: b092-016 Model Number: B092-016
Firmware Rev.: 2.6.1u1 Current User: root
Up-time: 0 days, 1 hours, 48 mins, 45 secs

Serial & Network: Serial Port

Common Settings for Port 1

Label: Port 1
The serial ports unique identifier.

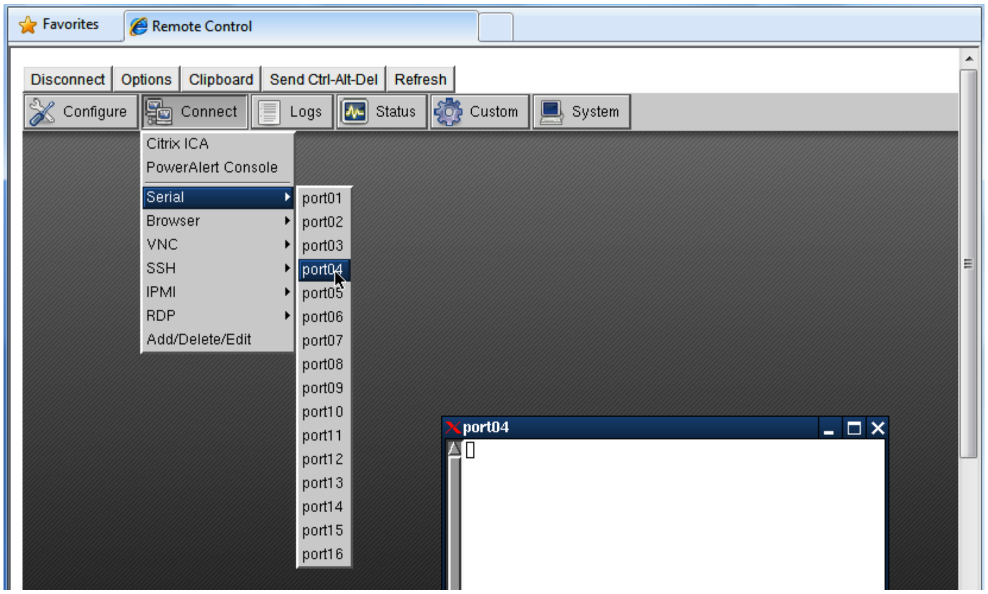
Baud Rate: 9600
The serial ports speed.

Data Bits: 8
The number of data bits to use.

Parity: None

16.1.1 Connect- serial terminal

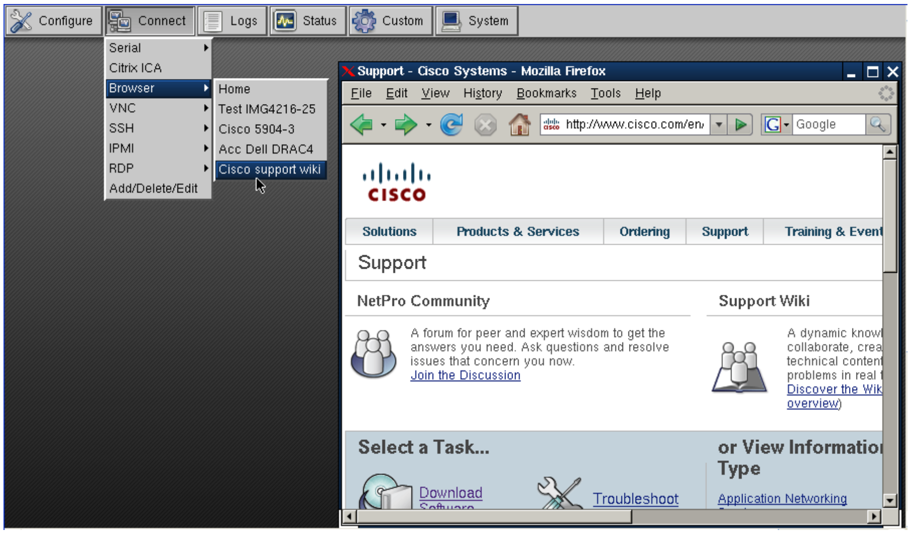
- Select **Connect: Serial** on the control panel and click on the desired serial port. A window will be created with a connection to the device on the selected serial port:



The embedded terminal emulator uses *rxvt* (a color vt102 terminal emulator). You can find more details on configuration options in http://www.rxvt.org/manual.html

16.1.2 Connect- browser

- Select **Connect: Browser** on the control panel and click on the Host/web site you have configured to be accessed using the browser. Sites can be internal or external.



A forum for peer and expert wisdom to get the answers you need. Ask questions and resolve issues that concern you now.

A dynamic knowl collaborate, crea technical content problems in real t

The B092-016 provides a powerful Mozilla Firefox browser with a licensed Sun Java JRE

Firefox

version 2.0.0.11

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Mozilla/5.0 (X11; U; Linux i586; en-US; rv:1.8.1.11) Gecko/20080730 Firefox/2.0.0.11

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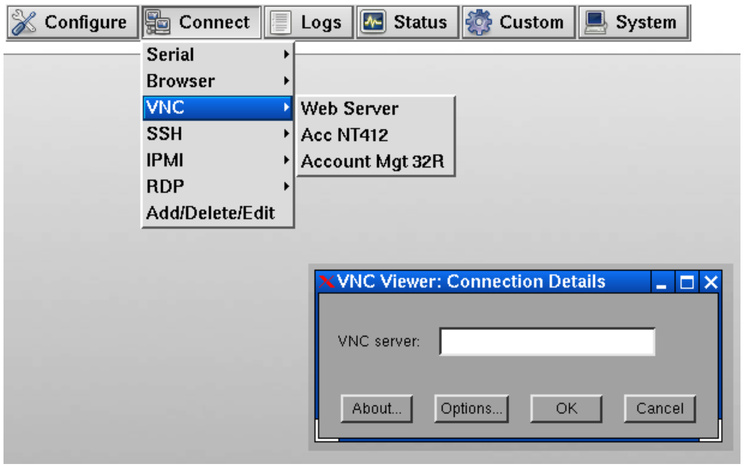
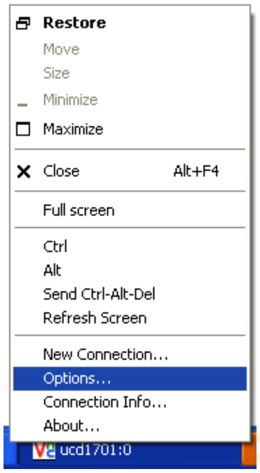
16.1.3 Connect- VNC

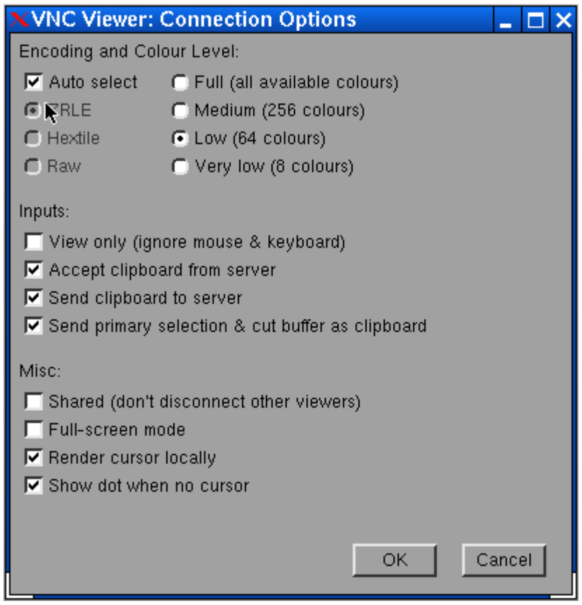
- Select **Connect: VNC** on the control panel and click on the VNC server Host to be accessed
- The VNC Viewer client in your B092-016 will be started and a VNC connection window to the selected server will be opened



VNC server:

- ➢ If the *HostName* was left blank when the VNC server connection was configured, then the VNC Viewer will start with a request for the VNC server.
- ➢ Selecting **Options** at this stage enables you to configure the VNC Viewer
- ➢ Alternately, you can select *Options* by right-clicking on the VNC Viewer task Bar icon





Encoding and Colour Level:

☑ Auto select
● ZRLE
○ Hextile
○ Raw
○ Full (all available colours)
○ Medium (256 colours)
● Low (64 colours)
○ Very low (8 colours)

Inputs:

☐ View only (ignore mouse & keyboard)
☑ Accept clipboard from server
☑ Send clipboard to server
☑ Send primary selection & cut buffer as clipboard

Misc:

☐ Shared (don't disconnect other viewers)
☐ Full-screen mode
☑ Render cursor locally
☑ Show dot when no cursor

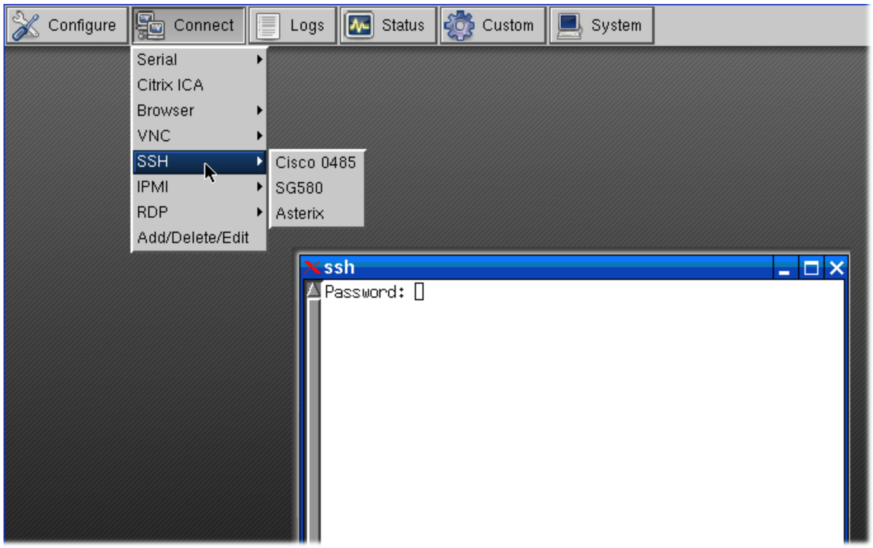
You can find more details on configuration options in

http://www.realvnc.com/products/free/4.1/man/vncviewer.html

16.1.4 Connect- SSH

SSH is typically used to log into a remote machine and execute commands.

- ➢ Select **Connect: SSH** on the control panel and click on the Host to be accessed
- ➢ An SSH connection window will be opened. Enter the SSH login password and you will be securely connected to the selected Host



```
Password: []
```

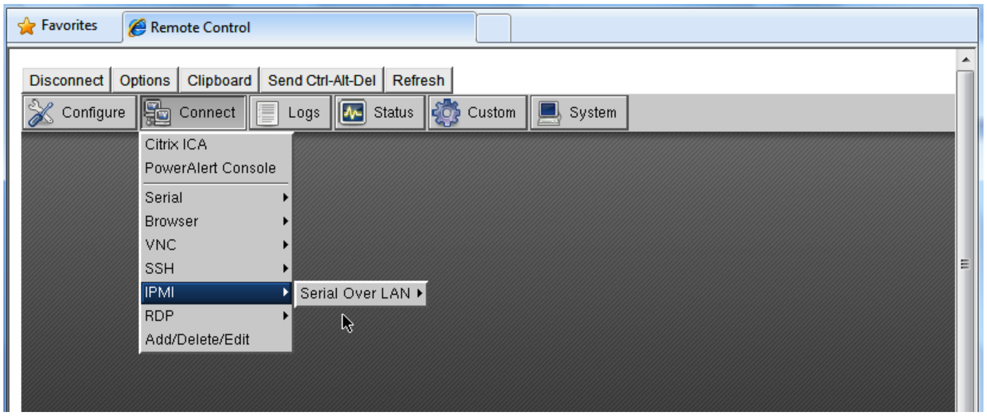
The B092-016 SSH connection uses OpenSSH (http://www.openssh.com/) and the terminal connection is presented using rxvt (*ouR XVT*). You can find more details on configuration options in http://www.rxvt.org/manual.html

16.1.5 Connect- IPMI

The B092-016 control panel provides a number of IPMI tools for managing service processors or Baseboard Management Controllers (BMCs). These IPMI controls are built on the *ipmitools* program. Find more details on configuration options in http://ipmitool.sourceforge.net/manpage.html

The ipmitool program provides a simple command-line interface to the BMCs and features the ability to read the sensor data repository (SDR), display the contents of the System Event Log (SEL), read and set LAN configuration parameters, and perform remote chassis power control. The B092-016 Management Console also has additional tools for controlling power units with IPMI interfaces (refer to *Chapter 8*).

- Select **Connect: IPMI** on the control panel and select the **Serial over LAN** connection to be accessed

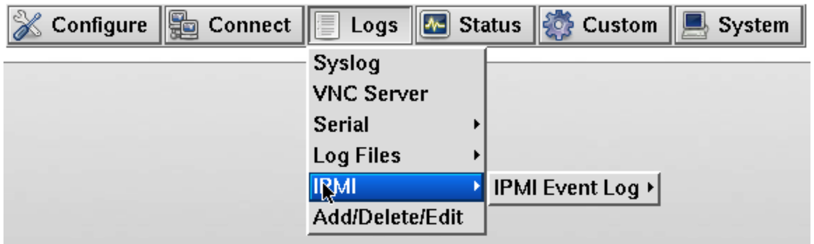


This will launch a Serial-Over-LAN session by running:

# ipmitool -I lanplus -H hostname -U username -P password sol activate

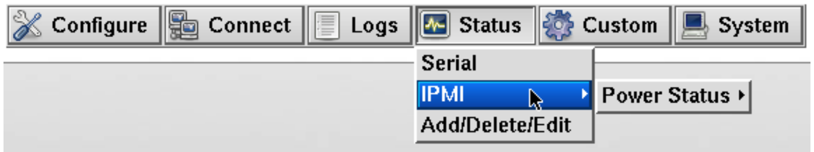
The resulting serial character connection is presented in an *rxvt (ouR XVT*) window. Also the Serial-Over-LAN feature is only applicable to IPMI2.0 devices.

- ➢ Select **Logs: IPMI** on the control panel and select the IPMI Event Log to be viewed



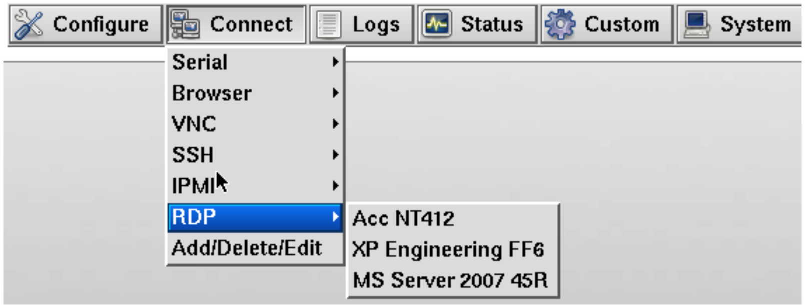
This will retrieve the selected IPMI event log by running:

# ipmitool -I lanplus -H hostname -U username -P password sel info

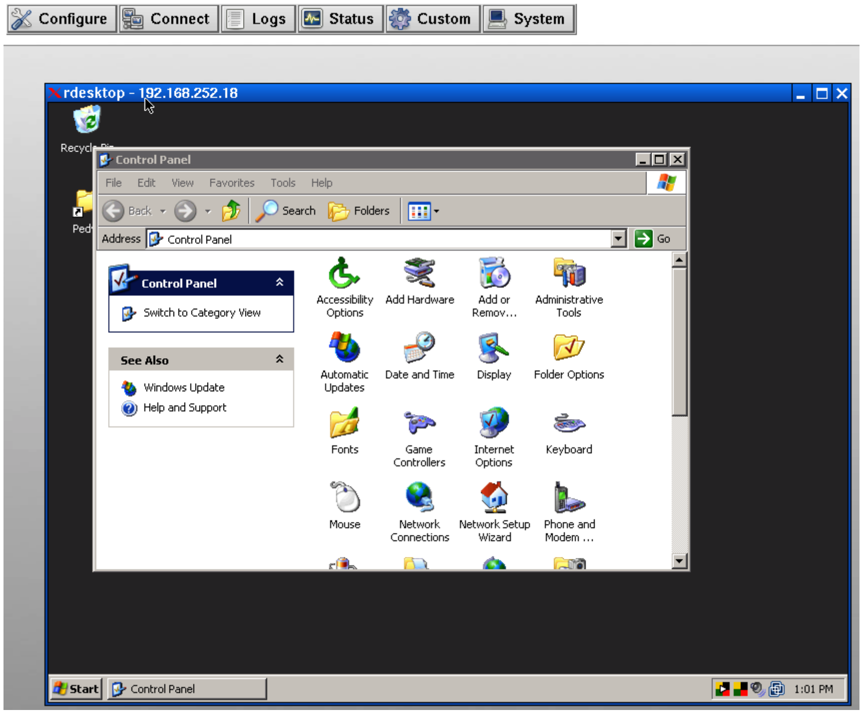


16.1.6 Connect- Remote Desktop (RDP)

- ➢ Select **Connect: RDP** on the control panel and click on the Windows computer to be accessed



- ➢ The *rdesktop* program in your B092-016 will be started, an RDP connection to the Remote Desktop server in the selected computer will be opened, the *rdesktop* window will appear on your B092-016 screen and you will be prompted for a password. (If the selected computer does not have RDP access enabled, then the *rdesktop* window will not appear.)



You can use Add/Delete/Edit to customize the *rdesktop* client (e.g. to include login username passwords). The command line protocol is:

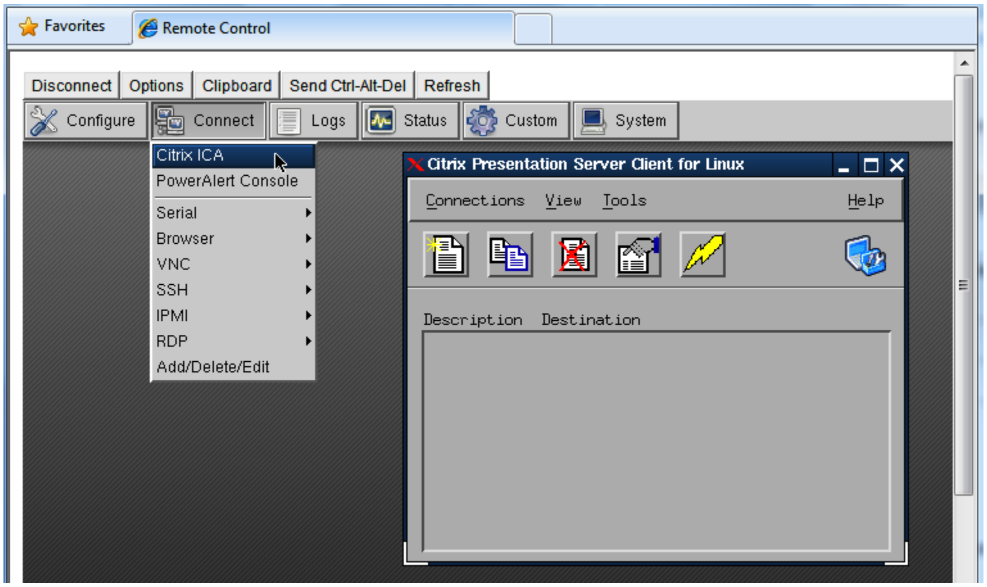
rdesktop -u windows-user-id -p windows-password -g 1200x950 ms-windows-terminal-server-host-name

option	Description
-a	Color depth: 8, 16, 24
-r	Device redirection. i.e. Redirect sound on remote machine to local device i.e. -0 -r sound (MS/Windows 2003)
-g	Geometry: *widthxheight* or 70% screen percentage.
-p	Use -p - to receive password prompt.

Further information on *rdesktop* can be found at http://www.rdesktop.org/

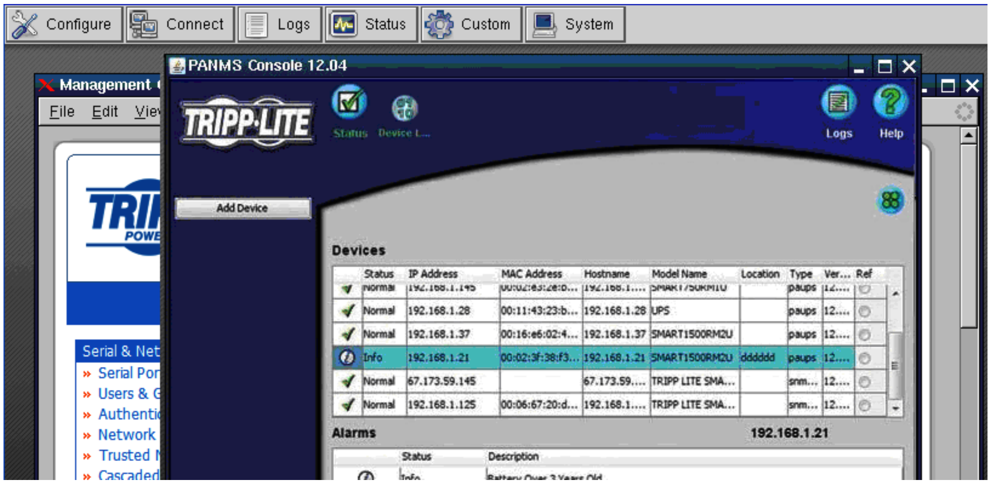
16.1.7 Connect- Citrix ICA

- Select **Connect: Citrix ICA** on the control panel and click on the Citrix server to be accessed



16.1.8 Connect- PowerAlert

➢ Select **Connect: PowerAlert** on the control panel. The PowerAlert software will be launched.



Devices

	Status	IP Address	MAC Address	Hostname	Model Name	Location	Type	Ver...	Ref
✓	Normal	192.168.1.145	00:02:e3:2e:b...	192.168.1....	SMART750RM1U		paups	12....	○
✓	Normal	192.168.1.28	00:11:43:23:b...	192.168.1.28	UPS		paups	12....	○
✓	Normal	192.168.1.37	00:16:e6:02:4...	192.168.1.37	SMART1500RM2U		paups	12....	○
ⓘ	Info	192.168.1.21	00:02:3f:38:f3...	192.168.1.21	SMART1500RM2U	dddddd	paups	12....	○
✓	Normal	67.173.59.145		67.173.59....	TRIPP LITE SMA...		snm...	12....	○
✓	Normal	192.168.1.125	00:06:67:20:d...	192.168.1....	TRIPP LITE SMA...		snm...	12....	○

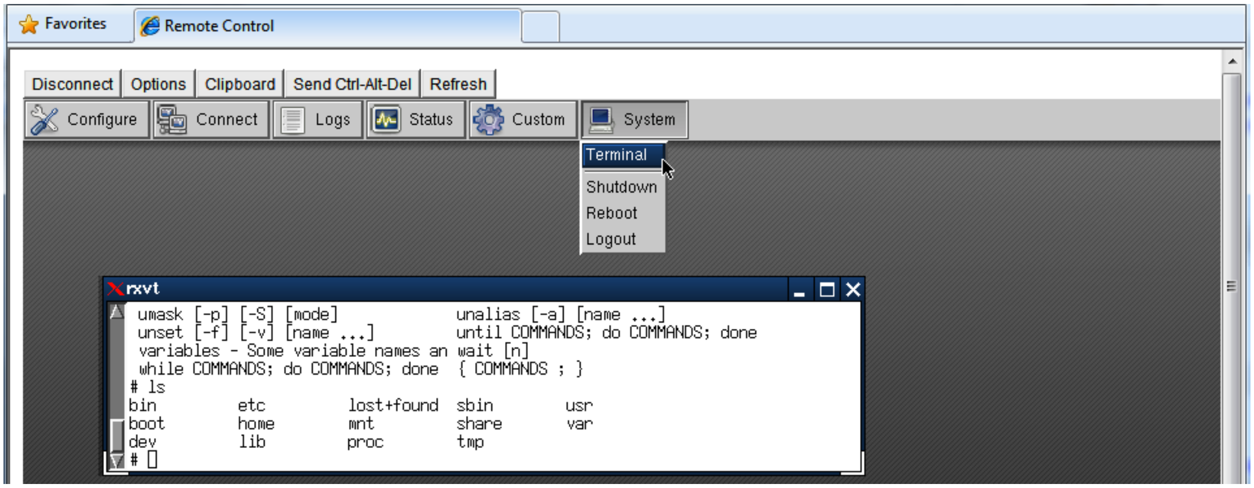
Alarms 192.168.1.21

	Status	Description
ⓘ	Info	Battery Over 3 Years Old

16.2 Advanced Control Panel

16.2.1 System: Terminal

Selecting **System: Terminal** on the control panel logs you in at the command line to the B092-016 Linux kernel. As detailed in Chapters 14 and 15, this enables you to configure and customize your B092-016 using the *config* and *portmanager* commands or general Linux commands.



```
 umask [-p] [-S] [mode]           unalias [-a] [name ...]
 unset [-f] [-v] [name ...]       until COMMANDS; do COMMANDS; done
 variables - Some variable names an wait [n]
 while COMMANDS; do COMMANDS; done  { COMMANDS ; }
# ls
bin        etc        lost+found  sbin       usr
boot       home       mnt         share      var
dev        lib        proc        tmp
# 
```

16.2.2 System: Shutdown / Reboot

Clicking **System: Shutdown** on the control panel will shut down the B092-016 system. You will need to cycle the power to reactivate the B092-016 with a *soft* reset.

Similarly, by clicking **System: Reboot,** you will initiate a *soft* reset. With a *soft* reset, the B092-016 reboots with all settings such as the assigned network IP address, preserved. However a *soft* reset disconnects all Users and ends any SSH sessions that had been established.

A *soft* reset will also occur when you switch OFF power from the B092-016, and then switch the power back ON. However, if you cycle the power while the unit is writing to flash, you could corrupt or lose data, so the software **Shutdown** or **Reboot** from the control panel is the safer option.

16.2.3 System: Logout

Clicking **System: Logout** closes the local user log in session (and removes the control panel). However, this does not logout remote users who may be logged into the B092-016 Console Server, or accessing attached devices using SSH tunneling.

16.2.4 Custom

The Custom button on the control panel enables you to customize your B092-016 by adding buttons to the control panel that execute bash and other Linux commands you specify.

16.2.5 Status

These menu items give the user a snapshot of the serial port and IPMI device status.

16.2.6 Logs

These menu items give the user an audit log of B092-016 activity.

16.3 Remote control

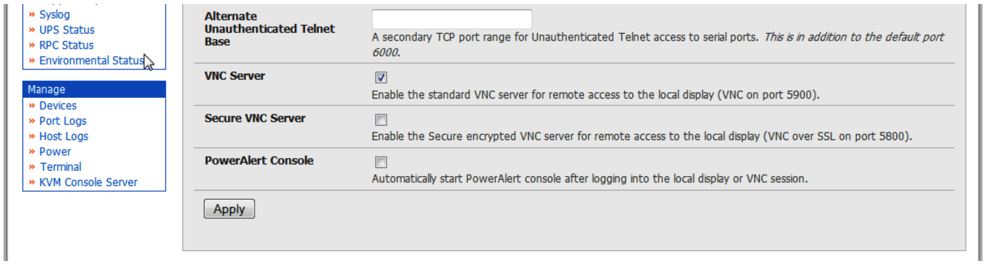
You can access the B092-016 locally via a directly connected keyboard, monitor and mouse (or KVM switch). If the B092-016 is connected to a KVMoIP infrastructure, then this may also provide you with some remote access to the B092-016 local consoles (RDP, Telnet, VNC, ICA, JRE etc).

The B092-016 also hosts an embedded VNC server that enables you to remotely monitor and control the thin client software (RDP, Telnet, VNC, ICA etc) that is running in the B092-016 itself.

Note You can still run management client software (RDP etc) on the remote computer and use SDT to securely connect the client directly to the managed devices that are serially or network attached to the B092-016. This is useful when running proprietary applications (such as Dell OpenManage) or Windows applications (such as VMware VDI client) on a remote management computer which is be used to manage a DRAC service processor or VMware virtual device on a remote server.

Each B092-016 gateway has an internal VNC server enabling remote administrators to oversee local activity, and giving them the option to access and control all the devices themselves. To activate the VNC server in the B092-016:

- Select the **System: Services** option in the *Management Console* menu then check **VNC Server** or **Secure VNC Server**



Alternate Unauthenticated Telnet Base
A secondary TCP port range for Unauthenticated Telnet access to serial ports. *This is in addition to the default port 6000.*

VNC Server ☑
Enable the standard VNC server for remote access to the local display (VNC on port 5900).

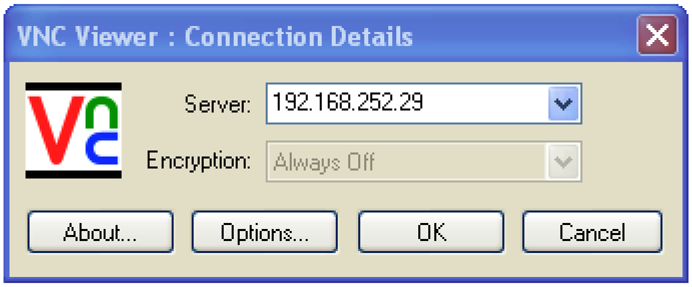
Secure VNC Server □
Enable the Secure encrypted VNC server for remote access to the local display (VNC over SSL on port 5800).

PowerAlert Console □
Automatically start PowerAlert console after logging into the local display or VNC session.

- Click **Manage: KVM Console Server** then **Launch Standard VNC Remote Control** and your browser will automatically download and run a Java VNC applet client
- Log in as *root* (or some other configured B092-016 username) and as a remote Administrator you can then connect to the VNC server in the B092-016 and gain remote access to (and monitor and take control of) the B092-016 local display

You can find more details on configuration options for the B092-016 *realvnc* server in http://www.realvnc.com/products/free/4.1/man/vncserver.html

Note You can also run a VNC client application such as RealVNC, TightVNC or UltraVNC directly on a remote computer and configure it with the B092-016's IP address to connect to the B092-016 VNC server



Server: 192.168.252.29
Encryption: Always Off

Appendix A Hardware Specification

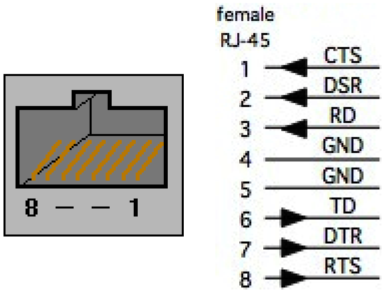
FEATURE	VALUE
Dimensions	B096-016 / B096-048: 17 x 12 x 1.75 in (43.2 x 31.3. x 4.5 cm) B092-016: 17 x 6.7 x 1.75 in (44 x 17 x 4.5 cm)
Weight	B096-016 / B096-048: 11.8 lbs (5.4 kg) B092-016: 8.5 lb (3.9 kg)
Ambient operating temperature	41°F to 122°F (5°C to 50°C)
Non-operating storage temperature	-20°F to +140°F (-30°C to +60°C)
Humidity	5% to 90%
Power	Refer to Chapter 2

Appendix B Serial Port Connectivity

Pinout standards exist for both DB9 and DB25 connectors, however, there are not pinout standards for serial connectivity using RJ45 connectors. Many Console Servers and serially managed servers/ router/ switches/ PSUs have adopted their own unique pinout; so custom connectors and cables may be required to interconnect your Console Server. In an endeavor to create some move to standardization, Tripp Lite Console Server products all use the same RJ45 pinout convention as adopted by Cisco, SUN and others.

Serial Port Pinout

The 16/48 RJ45 connectors on the B092-016 Console Server with PowerAlert, and the B096-048/016 Console Server Management Switch have the following pinout:

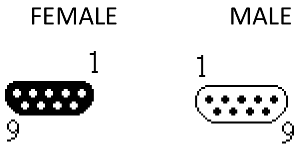


PIN	SIGNAL	DEFINITION	DIRECTION
1	CTS	Clear To Send	Input
2	DSR	Data Set Ready	Input
3	RXD	Receive Data	Input
4	GND	Signal Ground	NA
5	GND	Signal Ground	NA
6	TXD	Transmit Data	Output
7	DTR	Data Terminal Ready	Output
8	RTS	Request To Send	Output

The LOCAL (console/modem) port on the Console Server uses a standard DB9 connector as tabled below:

SIGNAL	DB9 Pin	DEFINITION
TXD	3	Transmitted Data
RXD	2	Received Data
RTS	7	Request To Send
CTS	8	Clear To Send
DSR	6	Data Set Ready
GND	5	Signal Ground
CD	1	Received Line Signal Detector
DTR	4	Data Terminal Ready
RI	9	Ring Indicator

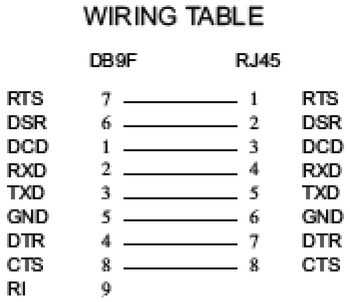
9 pin DB9



Connectors included in Console Server

The B092-016 Console Server with PowerAlert, and the B096-048/016 Console Server Management Switch ship with a “cross-over” and a “straight” RJ45-DB9 connector for connecting to other vendor’s products:

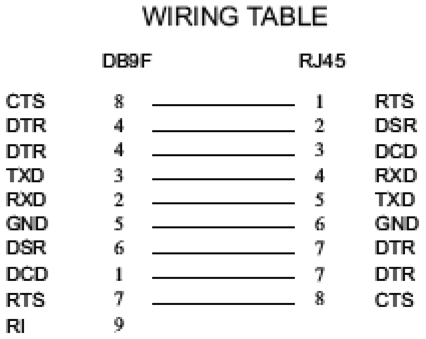
DB9F-RJ45S straight connector



WIRING TABLE

	DB9F	RJ45	
RTS	7	1	RTS
DSR	6	2	DSR
DCD	1	3	DCD
RXD	2	4	RXD
TXD	3	5	TXD
GND	5	6	GND
DTR	4	7	DTR
CTS	8	8	CTS
RI	9		

DB9F-RJ45S cross-over connector



WIRING TABLE

	DB9F	RJ45	
CTS	8	1	RTS
DTR	4	2	DSR
DTR	4	3	DCD
TXD	3	4	RXD
RXD	2	5	TXD
GND	5	6	GND
DSR	6	7	DTR
DCD	1	7	DTR
RTS	7	8	CTS
RI	9		

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