ES 500 Switch Router Getting Started Guide

Release 1.0

36-062-01 Rev. 0A

River STONE NETWORKS™

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Santa Clara, CA 95054

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This product complies with the following:

SAFETY

UL 1950; CSA C22.2, No. 950; 73/23/EEC; EN 60950; IEC 950; GOST-R

ELECTROMAGNETIC

FCC Part 15; CSA C108.8; 89/336/EEC; EN 55022; EN 61000-3-2; EN 55024; CISPER 22; GB4943-1995; CNS13438

COMPATIBILITY (EMC)

EN 61000-3-3; EN 50082-1, AS/NZS 3548; VCCI V-3

REGULATORY COMPLIANCE STATEMENTS

Note Complies with Part 68, FCC rules.
FCC Registration Number 6TGUSA-46505-DE-N
Riverstone Networks, Inc.
Model WICT1-12
Made in U.S.A.

FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

Warning Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational, and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

VCCI COMPLIANCE STATEMENT

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

この装置は，情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

UNDERWRITERS LABORATORIES COMPLIANCE STATEMENT

Important! Before making connections, make sure you have the correct cord set. Check it (read the label on the cable) against the following:

Operating Voltage	Cord Set Specifications
120 Volts	UL Listed/CSA Certified Cord Set
	Minimum 18 AWG
	Type SVT or SJT three conductor cord
	Maximum length of 15 feet
	Parallel blade, grounding type attachment plug rated 15A, 125V
240 Volts (Europe only)	Cord Set with H05VV-F cord having three conductors with minimum diameter of 0.75 mm^2
	IEC-320 receptacle
	Male plug rated 10A, 250V

WICHTIGE SICHERHEITSHINWEISE (GERMANY)

1. Bitte lesen Sie diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie keine Flüssigoder Aerosolreiniger. Am besten eignet sich ein angefeuchtetes Tuch zur Reinigung.
4. Die Netzanschlu ßsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Beschädigungen hervorrufen.
7. Die Belüftungsöffnungen dienen der Luftzirkulation, die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, daß diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim Anschluß an das Stromnetz die Anschlußwerte.
9. Verlegen Sie die Netzanschlußleitung so, daß niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
10. Alle Hinweise und Warnungen, die sich am Gerät befinden, sind zu beachten.

11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
    a. Netzkabel oder Netzstecker sind beschädigt.
    b. Flüssigkeit ist in das Gerät eingedrungen.
    c. Das Gerät war Feuchtigkeit ausgesetzt.
    d. Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
    e. Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
    f. Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
15. Zum Netzanschluß dieses Gerätes ist eine geprüfte Leitung zu verwenden. Für einen Nennstrom bis 6 A und einem Gerätegewicht größer 3 kg ist eine Leitung nicht leichter als H05VV-F, 3G, 0.75 mm^2 einzusetzen.

Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70 dB(A) oder weniger.

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(c) The refund of the purchase price.

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Application of Council Directive(s)	89/336/EEC 73/23/EEC
Manufacturer's Name	Riverstone Networks, Inc.
Manufacturer's Address	5200 Great America Parkway Santa Clara, CA 95054
Conformance to Directive(s)/Product Standards	EC Directive 89/336/EEC EC Directive 73/23/EEC EN 55022 EN 50082-1 EN 60950
Equipment Type/Environment	Networking equipment for use in a commercial or light-industrial environment

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This guide provides a general overview of the hardware and software features, and provides procedures for initial installation and set up of the ES 500.

1.1 HOW TO USE THIS GUIDE

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Get an overview of the ES 500 software and hardware features and specifications	Chapter 2, *"Introduction"*
Install the ES 500 hardware	Chapter 3, *"Hardware Installation"*
Install the ES 500 software, boot the software, and set up the unit	Chapter 4, *"Initial Configuration"*
Upgrade system software	Chapter 5, *"Managing Software"*
Troubleshoot installation problems	Appendix A, *"Troubleshooting"*

1.2 RELATED DOCUMENTATION

The Riverstone documentation set includes the following items. Refer to these other documents to learn more about this product.

For Information About...	See the...
How to configure and manage the ES 500	*Riverstone ES 500 Switch Router User Guide*
The complete syntax for all Command Line Interface (CLI) commands	*Riverstone ES 500 Switch Router Command Line Interface Reference Manual*

2 INTRODUCTION

The Riverstone ES 500 provides non-blocking, wire-speed Layer-2 (switching), and Layer-3 (routing). This chapter provides a basic overview of the ES 500 software and hardware feature set.

Note For the latest operating software and user documentation, check the Riverstone Networks web site at www.riverstonenet.com.

2.1 FUNCTIONAL LAYER TERMINOLOGY

This guide, and other ES 500 documentation, refers to layer-2 (L2), and layer-3 (L3) switching and routing. These layers are based on the International Standards Organization (ISO) 7-layer reference model. Here is an example of that model. The ES 500 operates within the layers that are not shaded. Notice that layer 2 is divided into a MAC layer, an LLC layer, and an LLC2 layer. The ES 500 operates at the MAC and LLC layers.

Table 2-1 ISO 7-layer model and ES 500 capabilities

Layer 7	Application	
Layer 6	Presentation	
Layer 5	Session	
Layer 4	Transport	TCP/UDP - application
Layer 3	Network	IP/IPX - routing
	LLC2	
Layer 2	LLC	
	MAC	Bridging
Layer 1	Physical	Physical Interfaces

2.2 SPECIFICATIONS

The ES 500's hardware provides high-speed performance regardless of any performance monitoring, filtering, Quality of Service (QoS), or Access Control Lists (ACLs) enabled through the software. Performance is not compromised. The following table lists the ES 500's technical specifications.

Table 2-2 Technical specifications

Feature	Specification
Throughput	• 8.8 Gbps non-blocking switching fabric • Up to 6.5 million packets-per-second routing throughput
Capacity	• Up to 2,000 routes • Up to 8,000 Layer-2 MAC addresses • 256 Virtual LANs • 16 MB input/output buffering
Routing protocols	• IP: RIP v1/v2 • OSPF v2
Multicast	• IGMP
Bridging and VLAN protocols	• 802.1d Spanning Tree • 802.1Q (VLAN trunking) • GARP/GVRP • Rapid Spanning Tree Protocol (RSTP)
Media Interface protocols	• 802.3 (10Base-T) • 802.3u (100Base-TX) • 802.3x (1000Base-SX, 1000Base-LX) • 802.3z (1000Base-SX, 1000Base-LX)
Quality of Service (QoS)	• Layer-2 prioritization (802.1p) • Layer-3 source-destination flows
Load Balancing policies	• Strict priority • Weighted-fair queing
Port mirroring	• Traffic from specific ports
RMON	• RMON v1/v2 for each port
Management	• SNMP v1/v2c • Emacs-like Command Line Interface (CLI)

2.3 SOFTWARE OVERVIEW

This section describes the features and capabilities of the ES 500 in greater detail. For full information regarding the use of these features and capabilities, see the *Riverstone ES 500 Switch Router User Guide*.

2.3.1 Bridging

The ES 500 provides the following type of wire-speed bridging:

Address-based bridging – The ES 500 performs this type of bridging by looking up a packet's destination address in an L2 lookup table on the line card that received the packet from the network. The L2 lookup table indicates the exit port(s) for the bridged packet. If the packet is addressed to the ES 500's own MAC address, the packet is routed rather than bridged.

2.3.2 Port and Protocol VLANs

The ES 500 supports the following types of Virtual LANs (VLANs):

Port-based VLANs – A port-based VLAN is a set of ports that comprises a layer-2 broadcast domain. The ES 500 confines MAC-layer broadcasts to the ports in the VLAN on which the broadcast originates. ES 500 ports outside the VLAN do not receive the broadcast.

Protocol-based VLANs – A protocol-based VLAN is a named set of ports that comprises an IP or L2 broadcast domain. The ES 500 confines protocol-specific broadcasts to the ports within the protocol-based VLAN. Protocol-based VLANs sometimes are called subnet VLANs or layer-3 VLANs.

You can include the same port in more than one VLAN, even in both port-based and protocol-based VLANs. Moreover, you can define VLANs that span across multiple ES 500 switches. To simplify VLAN administration, the ES 500 supports 802.1Q trunk ports, which allow you to use a single port to "trunk" traffic from multiple VLANs to another ES 500 or to a switch that supports 802.1Q.

2.3.3 Routing

The ES 500 provides wire-speed routing for the following protocol:

IP – protocol that switching and routing devices use for moving traffic within the Internet and within many corporate intranets

Note All other protocols that require routing must be tunneled using IP.

By default, the ES 500 uses one MAC address for all interfaces. The ES 500 can be configured to have a separate MAC address for each IP interface. When the ES 500 receives a packet whose destination MAC address is one of the ES 500's IP interface MAC addresses, the line card that received the packet from the network uses information in the switch's L3 lookup table (or information supplied by the CPU) to route the packet to its IP destination(s).

You can add secondary IP addresses to the same IP interface, however, you can create only one IP interface on a single port or VLAN. When you add an interface to a set of ports, you are adding a VLAN to those ports. Ports that contain IP interfaces can still perform layer-2 bridging.

IP Routing

The ES 500 supports the following IP unicast routing protocols:

- RIP v1 and RIP v2
- OSPF v2

IP interfaces do not use a specific routing protocol by default. When you configure an interface for routing, you also specify the routing protocol that the interface will use.

IP Multicast Routing

The ES 500 supports the following IP multicast routing protocols:

- IGMP

The ES 500 does not use a specific IP multicast routing protocol by default. When you configure an interface for IP multicast, you also specify the routing protocol you want the interface to use.

2.3.4 Security

The bridging, routing, and application (layer-2 and layer-3) support described in previous sections enables you to implement security strategies that meet specific needs. For layer-2, a wide range of bridging filters are available. Additionally, all layers can be protected using Access Control Lists (ACLs) filters. You can implement the following types of filters and ACLs to secure traffic on the ES 500:

- Layer-2 source filters (block bridge traffic based on source MAC address)
- Layer-2 destination filters (block bridge traffic based on destination MAC address)
- Layer-2 flow filters (block bridge traffic based on specific source-destination pairs)

2.3.5 Quality of Service

Although the ES 500 supplies non-blocking, wire-speed throughput, you can configure the ES 500 to apply Quality of Service (QoS) policies during peak periods to guarantee service to specific hosts and flows (source-destination pairs). This is especially useful in networks where the traffic level can exceed the network capacity.

QoS policies can be configured for the following types of traffic:

- Layer-2 prioritization (802.1p)
- Layer-3 source-destination flows

QoS mechanisms supported on the ES 500 include the following:

- Weighted-fair queuing
- Strict priority queuing
- QoS traffic control queues
- ToS octet rewrites

Note Traffic control queuing is based on assigning traffic to one of four queues: control, high, medium, and low. Control traffic (routing protocols, and so on) has the highest priority, high the second highest, and so on. The default priority for all traffic is low.

2.3.6 Statistics

The ES 500 can provide extensive statistical data on demand. You can access the following types of statistics:

Layer-2 RMON and MIB II Statistics – Port statistics for normal packets and for errors (packets in, packets out, CRC errors, and so on)

Layer-3 RMON v2 Statistics – Statistics for ICMP, IP, IP-interface, IP routing, IP multicast, VLAN

2.3.7 Management Platforms

You can manage the ES 500 using the following management platforms:

Command Line Interface (CLI) – An Emacs editor-like interface that accepts typed commands and responds when applicable with messages or tables. Use the CLI to perform the basic setup procedures described in Chapter 4, *"Initial Configuration."*

SNMP MIBs and traps – The ES 500 supports SNMP v1/v2 and many standard networking MIBs. The ES 500's SNMP agent is accessed using integration software such as HP OpenView 5.x on Windows NT or Solaris 2.x, or Aprisma SPECTRUM on Windows NT or Solaris 2.x. Setting up SNMP on the ES 500 is described in Chapter 4, *"Initial Configuration."*

2.4 HARDWARE FEATURES

This section describes the ES 500's hardware specifications. For information about installing the chassis and optional line cards, see Chapter 3, *"Hardware Installation."* This section describes the following hardware:

- Chassis and external controls
- Motherboard features
- Power supplies
- Line Cards

2.4.1 Chassis

The ES 500 chassis contains 24 10BASE-T/100BASE-TX ports plus two expansion slots for optional line cards, labeled M1 and M2. Figure 2-1 shows the front view of a ES 500.

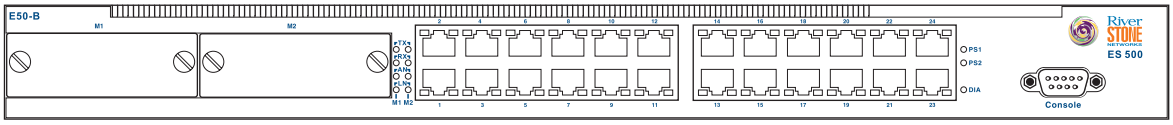

Figure 2-1 Front panel of a ES 500

For a complete list of line cards available for your ES 500 see Section 2.4.5, *"Line Cards."*

External Controls and Connections

The ES 500 has the following external controls and ports used for managing the ES 500:

- Male DB-9 Data Communications Equipment (DCE) port for serial connection to a terminal or PC running terminal emulation software. Use this port to establish a direct CLI connection to the ES 500. The default baud rate is 9600.
- 24 10BASE-T/100BASE-TX ports for network connections.
- Status LEDs. Table 2-3 describes the LEDs.

Table 2-3 ES 500 Status LEDs

LED Label	Description
PWR	When this LED is on, the ES 500 is receiving power.
RPU	When this LED is on, the redundant power connection is receiving power.
DIA	When this LED is on, the ES 500 is in diagnostic mode. (While in the diagnostic mode, you will notice several other LEDs on the ES 500 are active, as well.)

2.4.2 Motherboard

The motherboard contains system-wide bridging and routing tables. After processing traffic, the motherboard updates the lookup tables to indicate the port that initially received the traffic.

Boot and Image Flash

The motherboard has a boot flash containing the ES 500's boot software and configuration files. The system software image file resides on an internal flash chip and can be upgraded from the console during boot up or from a TFTP or BootP/TFTP server.

RAM Memory

The motherboard uses 256MB of RAM to hold routing and other tables. This RAM can be upgraded in 128MB increments.

2.4.3 Power Supplies

The ES 500 supports dual AC power supplies. When two power cords are connected on the rear panel, the power load is shared equally between the two power supplies. This allows the system to continue running uninterrupted even if one AC power supply fails.

AC Power Supply

A single AC power supply provides enough current to operate a fully configured chassis. On the rear of the chassis are the AC power cord sockets. See Figure 2-2. On the rear of the chassis there are also three internal fans.

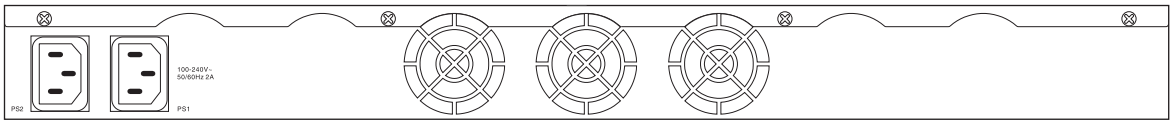

Figure 2-2 AC power cord sockets

Table 2-4 AC power supply specifications

Input
100-240 VAC at 2A, 50-60 Hz

Note The ES 500 does not have an on-off switch. When you plug the AC power supply into a power source, the ES 500 is on.

Warning When using an AC power supply, be sure to plug the ES 500 into a single-phase grounded power source located within 6 feet of the installation site.

Warning To ensure that the fans provide adequate cooling, Riverstone recommends that you allow a minimum of 3 inches of clearance on each side of the chassis.

2.4.4 10/100Base-TX Ports

The chassis includes 24 10/100Base-TX independent Ethernet ports. Each port senses whether it is connected to a 10-Mbps or 100-Mbps segment and configures itself automatically as a 10Base-T or 100Base-TX port. Figure 2-3 shows the 10/100Base-TX ports on the front of the chassis.

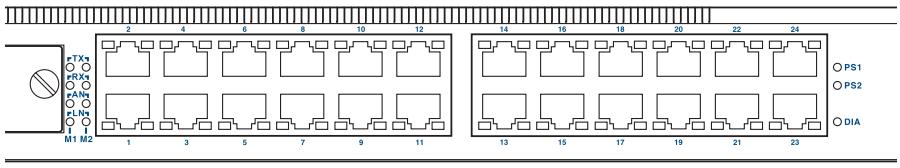

Figure 2-3 10/100Base-TX ports on the front of the chassis

The following tables list the media specifications and LEDs for the 10/100Base-TX ports.

Table 2-5 10/100Base-TX port specifications

Port type	Specification
10Base-T	• 802.3 standard • RJ-45 connector wired as Media Data Interface Crossed (MDIX) • EIA Category 3, 4, or 5 unshielded twisted pair cabling • Maximum of 100 meters (328 feet) for segment length
100Base-TX	• 802.3u standard • RJ-45 connector wired as Media Data Interface Crossed (MDIX) • EIA Category 5 unshielded twisted pair cabling • Maximum of 100 meters (328 feet) for segment length

Table 2-6 10/100Base-TX port LEDs

LED	Description
Link	**Green** – The LED on the left side of each port indicates link status. When this LED is lit, the port has detected that a cable is plugged into it, and the port has established communication with the device at the other end. **Green (intermittent) –** The port is operating at 10-Mbps. **Green (solid) –** The port is operating at 100-Mbps **Off** – No cable is plugged in, or there is no connection.
Activity	**Amber** – The LED on the right side of each port flashes each time the port sends or receives packets.

2.4.5 Line Cards

The following section describes the various line cards that can be installed in the ES 500:

GBIC Line Card

The GBIC line card contains one independent Gigabit (1000-Mbps) Ethernet GBIC transceiver slot. The slot supports 1000Base-SX, 1000Base-LX, and 1000Base-LH GBIC transceivers to connect to multi-mode fiber (MMF) and single-mode fiber (SMF) cables. Figure 2-4 shows the front panel of the GBIC line card.

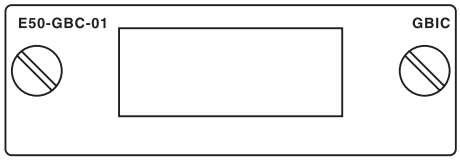

Figure 2-4 GBIC line card

The following tables list the media specifications and LEDs for the GBIC line card.

Table 2-7 GBIC line card specifications

Port type	Specification
1000Base-SX	• 802.3z standard and 802.3x for flow control • SC-style Media Interface Connector (MIC) • 62.5 micron or 50 micron multimode fiber-optic cable • Maximum of 275 meters (902 feet) segment length for 62.5 micron fiber-optic cable, based on installed fiber bandwidth • Maximum of 550 meters (1804 feet) segment length for 50 micron fiber-optic cable, based on installed fiber bandwidth
1000Base-LX	• 802.3z standard and 802.3x for flow control • SC-style Media Interface Connector (MIC) • 62.5 micron or 50 micron multi-mode fiber-optic cable • 10 micron single-mode fiber-optic cable • Maximum of 550 meters (1804 feet) segment length for 62.5 micron multi-mode fiber-optic cable, based on installed fiber bandwidth[a] • Maximum of 550 meters (1804 feet) segment length for 50 micron multi-mode fiber-optic cable, based on installed fiber bandwidth[a] • Maximum of 5 kilometers (229,659 feet) segment length for 10 micron single-mode fiber-optic cable
1000Base-LH	• 802.3z standard (also uses 802.3x for flow control) • SC-style Media Interface Connector (MIC); either connection pin in the MIC can be used for transmit or receive • 10 micron single-mode fiber-optic cable • Maximum 70 kilometers (229,659 feet) segment length for 10 micron SMF fiber-optic cable

a. A mode-conditioning patch cord is required, one at each end of the connection.

Table 2-8 GBIC line card LEDs

LED	Description
Link	**Green** – The port has detected that a cable is plugged in and a good connection is established. **Red (intermittent)** – The port has detected an error. **Red (solid)** – The port has detected that a cable is plugged in, but there is no connection. **Off** – There is no cable plugged into the port.
Rx	**Green** – The port has received packets. **Orange** – The port has received flow-control packets.
Tx	**Green** – Indicates when the port transmits packets. **Orange** – Indicates when the port transmits flow-control packets.

3 HARDWARE INSTALLATION

This chapter provides hardware installation instructions and information on safety considerations, environmental considerations, and regulatory standards.

3.1 SAFETY CONSIDERATIONS

Read the following safety warnings and product cautions to avoid personal injury or product damage.

3.1.1 Preventing Injury

Warning Observe the following safety warnings to prevent accidental injury when working with the ES 500 hardware

- Be careful when lifting the ES 500 out of the shipping box.
- Never attempt to rack mount the ES 500 unaided. Ask an assistant to help you with the ES 500.
- Before performing any mechanical upgrade or installation procedures, make sure that the ES 500 is powered off.
- Never operate the ES 500 with exposed expansion slots.
- Never operate the ES 500 if it becomes wet or the area where it has been installed is wet.

3.1.2 Preventing Equipment Damage

To prevent damage to the ES 500 components, observe the following warnings.

Warning Always use proper electrostatic discharge (ESD) gear when handling line cards or other internal parts of the ES 500.

Warning Make sure you allow at least three inches of room for air flow around the ES 500 chassis.

3.2 HARDWARE SPECIFICATIONS

The following table lists the physical and environmental specifications for the RS 1000.

Table 3-1 ES 500 specifications

Specification	Measurement
Height	8.4 cm (3.3 in)
Width	43 cm (16.9 in)
Depth	46.6 cm (18.3 in)
Weight	7.9 Kgs (17.5 lbs)
Power	AC: 100 - 240 VAC, 2A, 50-60 Hz
Operating Temperature	0^{o}C to 40^{o}C (32^{o}F to 104^{o}F)
Non-Operating Temperature	-40^{o}C to 70^{o}C (-38^{o}F to 158^{o}F)
Operating Humidity	10% to 95% (non-condensing)
Non-operating Humidity	10% to 95% (non-condensing)

3.3 INSTALLING THE HARDWARE

Hardware installation of the ES 500 is accomplished by the following basic steps:

- Unpacking your shipment and verifying its contents
- Installing expansion line cards (if any)
- Mounting the unit into an equipment rack
- Connecting the serial management cable

This section provides detailed information regarding these procedures.

3.3.1 Verifying Your Shipment

Before you begin installing your ES 500, check your shipment to ensure that everything you ordered arrived securely. Open the shipping box(es) and verify that you received the following equipment:

- ES 500 power cord(s)
- Console (serial) cable
- *Riverstone Networks ES 500 Switch Router Getting Started Guide*
- *Riverstone Networks Documentation CD*
- Release Notes
- Rack mount kit
- Depending on your order, your shipment may also contain line cards

3.3.2 Installing Line Cards

Before installing the ES 500 into an equipment rack, it is recommended that you first install any expansion line cards that you may have ordered with the unit. Installing expansion line cards before rack mounting will prevent the need to remove the ES 500 from its rack and remove the mounting hardware from the ES 500 chassis.

Installing Line Cards

The following procedure explains how to install line cards.

Warning Always use proper electrostatic discharge (ESD) gear when handling line cards or other internal parts of the ES 500.

1. Make sure that the ES 500 is powered off.
2. If rack mounted, remove the ES 500 from the equipment rack.
3. Use a flat-head screwdriver to remove the two mounting screws that secure the cover plate (or a previously installed line card) to the expansion slot (see Figure 3-1).

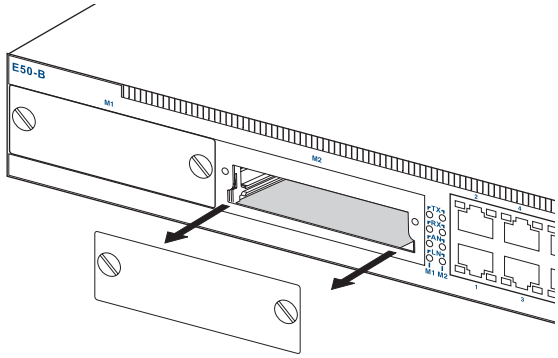

Figure 3-1 Removing the cover plate

4. Holding the line card level, guide it into the carrier rails on each side of the slot and gently push it all the way into the slot, ensuring that it firmly engages with the connector (see Figure 3-2).

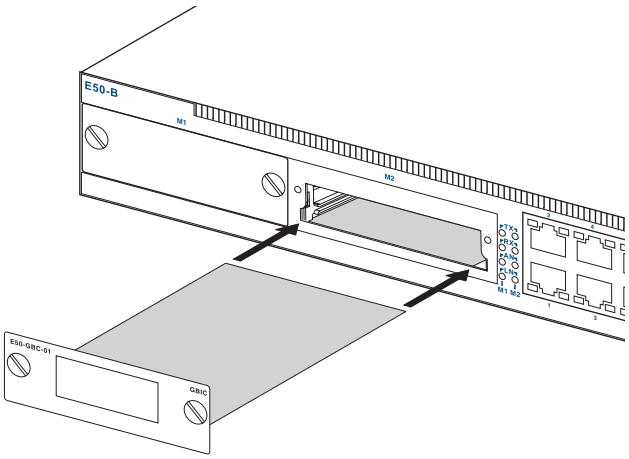

Figure 3-2 Installing a line card

5. If you are sure the line card is properly mated with the connector, tighten the retainer screws to secure it in the slot.

3.3.3 Installing the ES 500 into an Equipment Rack

The ES 500 is designed to be installed in a standard 19” equipment rack. To install the ES 500 in an equipment rack, use the following procedure. You will need a #2 Phillips-head screwdriver to perform this procedure.

Note Riverstone recommends that only qualified personnel conduct installation of any chassis.

Warning Before performing any mechanical upgrade or installation procedures, make sure that the ES 500 is powered off.

1. Align one of the mounting brackets over the corresponding holes in the side of the ES 500. The mounting bracket is correctly positioned when the side with two open mounting holes is flush with the front of the ES 500.
2. Use the #2 Phillips-head screwdriver and the eight supplied screws to attach the rack mounting flanges to each side of the chassis.

Warning Be sure to use the Phillips-head screws supplied by Riverstone Networks. If you use screws that are longer than the ones included with your shipment, there is a danger of damaging the ES 500's internal components.

3. Along with an assistant, lift the ES 500 into place in the mounting rack.
4. While your assistant holds the chassis in place, attach the mounting flanges of the ES 500 to the equipment rack using appropriate mounting hardware.

Figure 3-3 shows an example of how to install the ES 500 in an equipment rack.

Warning Make sure the screws are tight before your assistant releases the chassis. If you accidentally leave the screws loose, the chassis can slip and fall, possibly becoming damaged.

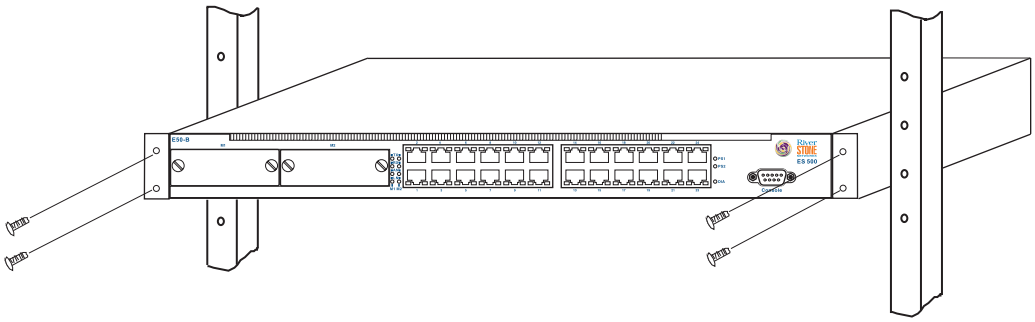

Figure 3-3 Installing the ES 500 chassis in an equipment rack

3.3.4 Management Port

The ES 500 has two options for attaching management devices:

Male DB-9 DCE port – This serial port is used for direct connection to a terminal or PC running terminal emulation software. Use this port to perform basic setup using the Command Line Interface (CLI).

RJ-45 10/100Base-T port – Any RJ-45 port on the front panel can used for in-band management of the ES 500 through a Telnet session to the CLI, or through SNMP.

Connecting the Serial Management Cable

Use the serial cable to connect the ES 500 to a terminal (or to a PC running terminal emulation software) to perform initial setup and configuration. The ES 500's serial cable is a female to female DB-9 straight-through cable. Figure 3-4 shows the serial port on the front of the ES 500, and Figure 3-5 shows the serial port's pin-out. Table 3-2 maps the wiring of the serial cable.

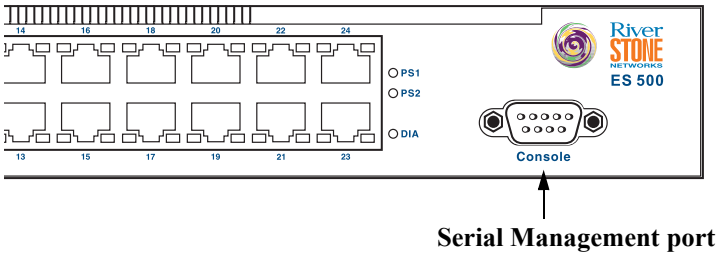

Figure 3-4 ES 500's serial (DB-9 DCE) management port

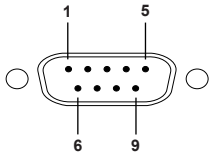

Figure 3-5 Serial port (DB-9 DCE) pin-out

Table 3-2 Wiring map for serial cable

Signal (ES 500 serial port)	Pin	Signal (management console port)
Unused	1	Unused
TXD (transmit data)	2	RXD (receive data)[a]
RXD (receive data)	3	TXD (transmit data)
Unused	4	Unused
GND (ground)	5	GND (ground)
Unused	6	Unused
CTS (clear to send)	7	RTS (request to send)
RTS (request to send)	8	CTS (clear to send)
Unused	9	Unused

a. The left hand column pin assignments are for the male DB-9 connector on the ES 500. Pin 2 (TXD or "transmit data") must emerge on the management console's end of the connection as RXD ("receive data").

The serial port's configuration requirements are as follows:

- Default Baud rate—9,600 Bps.
- Parity—None.
- Stop bit—One.
- Data bits—8.

4 INITIAL CONFIGURATION

This chapter provides the following information on powering up the ES 500 for the first time, and performing basic setup procedures. Basic setup includes:

- Powering on the ES 500 and booting the software
- Starting the Command Line Interface (CLI)
- Activating and saving configuration changes
- Assigning passwords
- Using the CLI to add an IP interface, subnet mask, and default gateway
- Setting up SNMP
- Assigning a DNS server(s) to the ES 500
- Configuring the SYSLOG server and server message levels

4.1 POWERING ON THE ES 500

To power on the ES 500 perform the following steps:

1. Make sure all exposed line card slots are free of foreign objects such as tools and are covered with blanks.
2. Make sure that the ES 500's DB-9 console port is connected to an active terminal or a PC running terminal emulation software.

Note The ES 500 does not have a power ON/OFF switch. The ES 500 is turned on by plugging in its AC power cords and connecting them to the AC source.

3. Plug the AC power cords into the ES 500 chassis, then connect the ES 500 to the AC power source.

   If this is the first time you have powered on the ES 500, it boots automatically using the software image on the internal flash memory. While the software is booting, the DIA LED on the front of the ES 500 is lit. When the software finishes booting, the DIA LED goes off, indicating that the Edge Operating System (EOS) software is online.

   In addition, as the software boots, the management terminal or PC attached to the ES 500's DB-9 DCE port displays messages related to the phases of the boot sequence.

Here is an example:

```
------ Performing the Power-On Self Test (POST) ------

UART Channel Loopback Test.....................PASS

Testing the System SDRAM.......................PASS

EPROM Checksum Test............................PASS

Flash Image Validation Test....................PASS

Testing CPU PCI Bus Device Configuration..........PASS


BOOT Software Version Prom-1.00.00.00-C01 Built  14-Apr-2002  15:41:55
Processor: MPC8245 Rev 0.12, 266 MHz (Bus: 133MHz), 64 MByte SDRAM.
I-Cache 16 KB, linesize 32.D-Cache 16 KB, linesize 32.
Cache Enabled.

Autoboot in 2 seconds - press RETURN or Esc. to abort and enter prom.


Loading Kernel.
543600
100% - Image checksum validated

.
************************************************************
*** Running  SW  Ver. 1.0.0.0-C01 Date 14-Apr-2002  Time 15:07:42 ***
************************************************************

HW version is
Dram size is: 64MBytes
Dram max free block size is: 55MBytes
Flash size is: 16 MBytes
Nvram size is: 240 Bytes
Base Mac address is: 00:00:00:00:00:20
GBIC port gi.1.2: not present
GBIC port gi.1.1: not present
No customization table
bcm_init: bcm_drv ver 3.0.1
The BCM5615_A1 initiate successfully
Init task is completed
```

```
>rs
%SYS-W-NOPASSWD, no password for login, use 'system set password' in Config mode
rs> 17-Apr-2002 10:23:06 WARNING Port     et.2.1 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.2 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.3 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.4 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.5 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.6 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.7 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.8 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.9 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.10 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.11 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.12 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.13 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.14 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.15 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.16 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.17 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.18 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.19 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.20 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.21 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.22 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.23 Down
17-Apr-2002 10:23:06 WARNING Port     et.2.24 Down

rs>
```

4. When the software is fully booted, the Command Line Interface (CLI) prompt **rs>** appears on the console.

4.2 STARTING THE COMMAND LINE INTERFACE

To start the Command Line Interface (CLI), power on the system as described in Section 4.1, *"Powering on the ES 500."* The first time you power on the ES 500, and after the software is fully booted, the CLI is already activated. The factory default passwords for all access levels are blank.

The following prompt appears on the management console:

```
rs>
```

Note You can use **`system set password`** command to specify passwords for each of the command modes. Refer to *Riverstone ES 500 Switch Router Command Line Interface Reference Manual* for more information.

4.2.1 CLI Access Modes

The CLI has three levels of access, each of which provides the ability to perform specific operations on the ES 500 (see Table 4-1).

Table 4-1 CLI access modes

Access Mode	Description
User	Allows you to display basic information and use basic utilities such as ping but does not allow you to display SNMP, filter, and access control list information or make other configuration changes. You are in User mode when the command prompt ends with the "**`>`**"character.
Enable	Allows you to display SNMP, filter, and access control information, as well as all the information you can display in User mode. To enter Enable mode, enter the **`enable`** command, then supply the password when prompted. When you are in Enable mode, the command prompt ends with the "**`#`**" character.
Configure	Allows you to make configuration changes. To enter Configure mode, first enter Enable mode (**`enable`** command), then enter the **`configure`** command. When you are in Configure mode, the command prompt ends with "**`(config)#`**."

Note The command prompt will show the name of the ES 500 in front of the mode character(s). The default name is "**`rs`**." The procedure in Section 4.4, *"Setting the Basic System Information"* describes how to change the system name.

When you are in Configure or Enable mode, use the **`exit`** command or press Ctrl+z to exit to the previous access mode.

4.2.2 Basic Line Editing Commands

The CLI supports Emacs-like line editing commands. The following table lists some commonly used commands. For a complete set of commands, see the *Riverstone ES 500 Switch Router Command Line Interface Reference Manual*.

Table 4-2 Common CLI line editing commands

Key sequence	Command
Ctrl+a	Move the cursor to the beginning of the line.
Ctrl+e	Move the cursor to the end of the line.
Ctrl+h	Delete the character to the left of the cursor.
Ctrl+j	Carriage return (executes the command).
Ctrl+m	Carriage return (executes the command).
Ctrl+z	If in a facility, exit back to the next top level. If in the enable mode, exit back to the user mode. If in the configure mode, exit back to the enable mode.
Tab	Completes the command keyword. If the word is not a keyword, a space character is inserted.

4.3 CONFIGURATION CHANGES AND SAVING THE CONFIGURATION FILE

The ES 500 uses three special configuration files:

Table 4-3 Configuration file contents

File	Descriptions
Scratchpad	The configuration commands you have entered during a management session. These commands do not become active until you explicitly activate them. Because some commands depend on other commands for successful execution, the ES 500 scratchpad simplifies system configuration by allowing you to enter configuration commands in any order, even when dependencies exist. When you activate the commands in the scratchpad, the ES 500 sorts out the dependencies and executes the commands in their proper sequence.
Active	The commands from the Startup configuration file and any configuration commands that you have made active from the scratchpad.
Startup	The configuration file that the ES 500 uses to configure itself when the system is powered on.

Caution The active configuration remains in effect only during the current power cycle. If you power off or reboot the ES 500 without saving the active configuration changes to the Startup configuration file, the changes are lost.

4.3.1 Activating the Configuration Commands in the Scratchpad

Use the following procedure to activate the configuration commands in the scratchpad.

1. Ensure that you are in Enable mode by entering the **`enable`** command in the CLI.
2. Ensure that you are in Configure mode by entering the **`configure`** command in the CLI.
3. Enter the following command:

```
save active
```

The CLI displays the following message:

```
Do you want to make the changes Active? [y]
```

4. Enter **`y`** to activate the changes.

Note If you exit the Configure mode (by entering the **exit** command or pressing Ctrl+z), the CLI will ask you whether you want to make active the changes in the scratchpad. If you do not make the changes in the scratchpad active, the changes will be lost when you log out.

4.3.2 Saving the Active Configuration to the Startup Configuration File

Use the following procedure to save Active configuration changes into the Startup configuration file so that the ES 500 remembers and uses the changes when you reboot the software.

1. Enter the following command from Configure mode:

```
rs(config)# save startup
```

2. When the CLI displays the following message, enter **y** to save the changes:

```
Are you sure you want to overwrite the Startup configuration [no]? y
%CONFIG-I-SAVED, configuration saved to Startup configuration.
rs(config)#
```

Alternately, to save the Active configuration to the Startup configuration from Enable mode, perform the following steps.

1. Ensure that you are in Enable mode by entering the **enable** command in the CLI.
2. Enter the following command to copy the Active configuration to the Startup configuration:

```
copy active to startup
```

3. When the CLI displays the following message, enter **yes** to save the changes.

```
Are you sure you want to overwrite the Startup configuration? [n]
```

The new configuration changes are added to the Startup configuration file located in the ES 500's boot flash.

4.3.3 Viewing the Current Configuration

To view the current configuration:

1. Ensure that you are in Enable mode by entering the **`enable`** command.
2. Enter the following command to display the status of each command in the Active file:

```
system show active-config
```

Note Remember that the Active configuration contains both the Startup configuration and any configuration changes that you've made active in the current configuration session.

The CLI displays the Active configuration file with the following possible annotations:

- Commands without errors are displayed without any annotation.
- Commands with errors are annotated with an "**`E:`**."

A command like **`stp enable et.*.*`** would be displayed as follows:

```
1E: stp enable port et.3.1
```

4.4 SETTING THE BASIC SYSTEM INFORMATION

Follow the procedures in this section to set the following system information:

- System time and date
- System name
- System location
- Contact name (the person to contact regarding this ES 500)
- IP address for the management port on the ES 500

Note Some of the commands in this procedure accept a string value. String values can be up to a maximum of 255 characters in length including blank spaces. Surround strings that contain blanks with quotation marks (for example: **`"string with internal blanks"`**).

1. Enter the **`enable`** command to get to Enable mode in the CLI.
2. Enter the following commands to set the system time and date and to verify your settings.

```
system set date year <number> month <month-number> day <day> hour <hour> min <minute> second <second>

system show date
```

Here is an example:

```
rs# system set date year 2002 month 3 day 27 hour 11 min 54 second 0
Time changed to: Mon Mar 27 11:54:00 2002
rs# system show date
Current time: Mon Mar 27 11:54:04 2002
```

3. Enter the **`configure`** command to get to Configure mode in the CLI. The following commands can be entered only from Configure mode.
4. Enter the following commands to set the system name, location, and contact information:

```
system set name <string>
system set location <string>
system set contact <string>
```

Here is an example:

```
rs(config)# system set name "rs"
rs(config)# system set location "Houston, TX"
rs(config)# system set contact "John Smith"
```

5. Use the **interface create ip** command to set the IP address and netmask for an Ethernet interface.

   Here is an example:

```
rs(config)# interface create ip one address-netmask 14.1.1.1 port et.2.1
```

6. To activate the system commands entered in the previous steps, use the following command:

```
save active
```

   The CLI displays the following message:

```
Do you want to make the changes Active? [y]
```

7. Enter "**y**" to activate the changes.
8. To display the Active configuration, exit the Configuration mode, then enter the following command:

```
system show active-config
```

   Here is an example:

```
rs# system show active-config
Running system configuration:
     !
     ! Last modified from Console on Mon Mar 27 11:55:35 2002
     !
 1 : system set name "rs"
 2 : system set location "Houston, TX"
 3 : system set contact "John Smith"
```

9. Save the Active configuration to the Startup configuration file using the following command:

```
copy active to startup
```

10. When the CLI displays the following message, enter **y** to save the changes to the Startup configuration file:

```
Are you sure you want to overwrite the Startup configuration [no]? y
%CONFIG-I-WRITTEN, file copied successfully
rs#
```

4.5 SETTING UP PASSWORDS

You can password-protect CLI access to the ES 500 by setting up passwords for User mode access, Enable mode access, and Configure mode access.

To add password protection to the CLI, use the following procedure.

1. Ensure that you are in Enable mode by entering the **enable** command in the CLI.
2. Ensure that you are in Configure mode by entering the **configure** command in the CLI.
3. Type the following command for each password you want to set:

```
system set password login|enable|config <string>|none
```

4. Use the **show** command to examine the commands you just entered.
5. Use the **save active** command to activate the commands.
6. Exit the Configuration mode, then use the **system show active-config** command to verify the active changes.

Here is an example of the commands in the previous steps:

```
rs(config)# system set password login demo
rs(config)# system set password enable killer
rs(config)# system set password config trouble
rs(config)# exit
rs# system show active-config

Running system configuration:
!
! Last modified from Console on Mon Mar 27 12:12:19 2002
!
 1 : system set name "rs"
 2 : system set location "Houston, TX"
 3 : system set contact "John Smith"
 4 : system set hashed-password login jNIssH c976b667e681d03ccd5fc527f219351a
 5 : system set hashed-password enable zcGzbO 5d1f73d2d478ceaa062a0b5e0168f46a
 6 : system set hashed-password diag jdfbyp 67e681d3d2d478cf21935a0b5e016f2193
```

Notice that the passwords are shown in the Active configuration in an encrypted format. Passwords also appear this way in the Startup configuration. To keep your passwords secure, the ES 500 does not have a command for displaying passwords in an unencrypted format.

Caution Test all new passwords before saving the Active configuration to the Startup configuration file.

4.5.1 If You Forget Your Passwords

If you forget your passwords follow this procedure to erase the Startup file from the system Flash memory to regain access to your ES 500.

Note To perform this procedure, you must use a terminal or PC running terminal emulation software that is connected directly to the ES 500 through its DB-9 console port.

If the configuration is erased, all IP host parameters, and parameters configured via SNMP must be reconfigured. To erase the ES 500 configuration:

1. Verify that the terminal is connected to the ES 500 unit.
2. Power cycle the ES 500 unit.
3. When the message "Autoboot in 2 seconds - press RETURN or Esc. to abort and enter prom." appears, press the **`Enter`** or **`Esc`** key.
4. Within three seconds, select option 2 "Erase from flash". The following message is displayed:

```
Warning! About to erase a Flash file.
Are you sure (Y/N)?
```

5. Confirm by pressing **`Y`**. The following message is displayed.

```
? Flash file name (8 characters, Enter for none.)
```

6. Enter **`startup`** as the name of the flash file. The configuration is erased and the ES 500 reboots.
7. The User, Enable, and Configure access mode passwords are now reset to the default values (null).
8. Enter new passwords for the User, Enable, and Configure access modes.

4.6 SETTING UP SNMP

To use SNMP to manage the ES 500, you need to set up an SNMP community and specifying the IP address of the target host for SNMP traps.

For additional information about configuring and using SNMP, see the *Riverstone ES 500 Switch Router User Guide.*

4.6.1 Setting the Community string

Use the following procedure to add the SNMP community string, specify the target host for traps, and the trap interface.

1. Ensure that you are in Enable mode by entering the **enable** command in the CLI.
2. Ensure that you are in Configure mode by entering the **configure** command in the CLI.
3. Use the following commands to add an SNMP community string and set a target host IP address for the traps:

```
rs(config)#snmp set community <community-name> privilege read|read-write
rs(config)#snmp set target <IP-addr> community <community-name> [owner <name>]
[port <number>] [status enable|disable]
```

Note If the IP address of the trap target is more than one hop away from the ES 500, configure it with a static route to the target. If the ES 500 is rebooted, the static route allows a cold start trap to be sent to the trap target. Without a static route, the cold-start trap is lost while the routing protocols are converging.

Here is an example of the commands and output for configuring SNMP and saving the changes.

```
rs# config
rs(config)# snmp set community public privilege read-write
rs(config)# snmp set target 16.50.11.12 community public status enable
rs(config)#
```

4.6.2 Supported MIBs

The following lists the MIBs that are supported by the ES 500 SNMP agent.

Table 4-4 Supported MIBs

MIB II	Layer 1	Layer 2	Layer 3	Enterprise
IP-MIB RFC 2011	EtherLike-MIB RFC 2665	BRIDGE-MIB RFC 1493	RIPv2-MIB RFC 1724	RIVERSTONE-STP-MIB 7/11/00
TCP-MIB RFC 2012	MAU MIB RFC 2668	Q-BRIDGE-MIB RFC 2674	RMON2-MIB RFC 2021	RIVERSTONE-RS-AGENT-CAP-MIB
UDP-MIB RFC 2013		P-BRIDGE-MIB RFC 2674	IGMP-MIB Draft #5	
IP-FORWARD-MIB RFC 2096		RMON-MIB RFC 1757		
IF-MIB RFC 2233		IEEE LAG MIB 8/17/00		
SNMPv2-MIB RFC 1907				

5 MANAGING SOFTWARE

This chapter describes how to perform operations regarding ES 500 operating software and bootPROM images software. The following topics are covered:

- Upgrading the system image software
- Upgrading the Boot PROM image software

5.1 UPGRADING SYSTEM IMAGE SOFTWARE

To upgrade the system software using the upgraded image, perform the following procedure.

1. Display the current software version by using the **`system show version`** command.

   Here is an example:

```
rs# system show version

Software Information

  Software Version   : 1.0.0.0-C01
  Copyright          : Copyright (c) 2000-2002 Riverstone Networks, Inc.
  Image Information  : Version 1.0.0.0-C01, built on 14-Apr-2002 15:07:42
```

2. Copy the upgrade system software onto a TFTP server that the ES 500 can access. (Use the **`ping`** command to verify that the ES 500 can reach the TFTP server.)

Note If the TFTP server is one or more hops away from the ES 500, add a route to the TFTP server's network using the **`ip add route`** command.

3. Enter the following command to copy the software upgrade onto the ES 500's internal flash memory:

```
system image add <IPaddr-of-TFTP-host> <image-file-name>
```

Note The <*image-file-name*> is the full directory path and filename to the image software file on the TFTP server.

Here is an example:

```
rs# system image add 134.152.178.5 tftpboot/ros8100
Downloading image 'tftpboot/ros8100' from host '134.152.178.5'
 to local image ros8100 (takes a while) . . .
 download: done
 save:
kernel: 100%
done
Image checksum validated.
%SYS-I-BOOTADDED, Image 'ros8100' added.
```

4. Enter the **`system image list`** command to list the images on the internal flash memory and verify that the new image is present.

   Here is an example:

```
rs# system image list
Images (banks) currently available on the FLASH
bank number   bank status
bank0      -  non active
bank1      -  active    [selected for next boot]
```

5. Use the **`system image choose`** command to select the image file that the ES 500 will use when rebooted.

   Here is an example:

```
rs# system image choose bank0
Bank0 will run next time after reboot.
rs#
```

6. Use the **`system image list`** command to verify the change.

Note You do not need to activate this change.

7. Reboot the ES 500 to load and run the new system software image.

5.2 UPGRADING BOOT PROM SOFTWARE

The ES 500 boots using the boot PROM image software installed on the motherboard's internal memory. To upgrade the boot PROM image, use the following procedure.

1. Copy the upgrade boot PROM image software onto a TFTP server that the ES 500 can access. (Use the **`ping`** command to verify that the ES 500 can reach the TFTP server.)

Note If the TFTP server is one or more hops away from the ES 500, add a route to the TFTP server's network using the **`ip add route`** command.

2. Enter the following command to copy the bootPROM upgrade onto the ES 500's internal memory:

```
system promimage upgrade <IPaddr-of-TFTP-host> <image-file-name>
```

Note The <*image-file-name*> is the full directory path and filename to the bootPROM image file on the TFTP server.

Here is an example:

```
rs# system promimage upgrade 134.152.178.5 tftpboot/prom-211
04-Feb-2002 20:36:32 INFO    Program Download completed
BOOT upgrade was successfully completed
rs#
```

3. Reboot the ES 500.
4. During the boot process, check after the POST results to verify that the new boot PROM software is in the internal memory of the ES 500's motherboard.

```
------ Performing the Power-On Self Test (POST) ------

UART Channel Loopback Test.....................PASS

Testing the System SDRAM.......................PASS

EPROM Checksum Test............................PASS

Flash Image Validation Test....................PASS

Testing CPU PCI Bus Device Configuration.......PASS


BOOT Software Version Prom-1.00.00.00-C01 Built  14-Apr-2002  15:41:55
Processor: MPC8245 Rev 0.12, 266 MHz (Bus: 133MHz), 64 MByte SDRAM.
I-Cache 16 KB, linesize 32.D-Cache 16 KB, linesize 32.
Cache Enabled.

Autoboot in 2 seconds - press RETURN or Esc. to abort and enter prom.
```

APPENDIX A TROUBLESHOOTING

If you experience difficulty with the basic hardware or software setup procedures in this guide, check the following table to see whether the difficulty you are experiencing is described. If you find a description of the difficulty you are experiencing, try the remedy recommended for the difficulty. If the remedy does not remove the difficulty or the difficulty is not listed in this appendix, contact:

Riverstone Technical Assistance Center - RTAC

- Telephone: (408) 844-0010
- FAX: 408.878.6920
- Internet address: www.riverstonenet.com/support
- Email: support@riverstonenet.com

Table A-1 Troubleshooting

If you experience this difficulty...	Try this remedy...
The switch exhibits no activity. No LEDs are on and the fan module is not operating.	Ensure that the power supply is installed and plugged into a power source and the power source is active.
The power supply is installed but is not operating.	Check the power cable and the circuit to which the power supply is connected.
The fan is not operating.	Check the power cable and the circuit to which the power supply is connected.
No expansion modules are active.	Check the power cable and the circuit to which the power supply is connected.
A specific expansion module is inactive.	Ensure that the expansion module has been properly installed in its expansion slot. For more detailed information, see Section 3.3.2, *"Installing Line Cards."*
An older software version continues to boot instead of the newer version on a TFTP server.	Reconfigure the switch to boot using newer software using the procedure in Section 5.1, *"Upgrading System Image Software."*
You are unable to access the configuration commands in the CLI.	From the CLI, type **`enable`** to access the Enable mode, then type **`config`** to access the Configure mode.

Table A-1 Troubleshooting (Continued)

If you experience this difficulty...	Try this remedy...
Configuration changes are not reinstated after a reboot.	Save the configuration changes to the startup configuration file using the procedure in Section 4.3.2, *"Saving the Active Configuration to the Startup Configuration File."*
An SNMP manager cannot access the switch.	Set up an SNMP community string and specify a target for SNMP traps using the procedure in Section 4.6, *"Setting Up SNMP."* Type the **`snmp show all`** in the CLI to check the SNMP settings. Use the **`traceroute`** and **`ping`** commands to verify that the switch can reach the SNMP management station.
You are unable to ping a certain host.	Create and add an IP interface for the host. See the *Riverstone ES 500 Switch Router User Guide* for information.

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