RAD
data communications

Installation and Operation Manual

RIC-155

10/100BaseT to STM-1/OC-3 Converter

Version 1.12

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Notice

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Limited Warranty

RAD warrants to DISTRIBUTOR that the hardware in the RIC-155 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

RAD shall be released from all obligations under its warranty in the event that the equipment has been subjected to misuse, neglect, accident or improper installation, or if repairs or modifications were made by persons other than RAD's own authorized service personnel, unless such repairs by others were made with the written consent of RAD.

The above warranty is in lieu of all other warranties, expressed or implied. There are no warranties which extend beyond the face hereof, including, but not limited to, warranties of merchantability and fitness for a particular purpose, and in no event shall RAD be liable for consequential damages.

RAD shall not be liable to any person for any special or indirect damages, including, but not limited to, lost profits from any cause whatsoever arising from or in any way connected with the manufacture, sale, handling, repair, maintenance or use of the RIC-155, and in no event shall RAD's liability exceed the purchase price of the RIC-155.

DISTRIBUTOR shall be responsible to its customers for any and all warranties which it makes relating to RIC-155 and for ensuring that replacements and other adjustments required in connection with the said warranties are satisfactory.

Software components in the RIC-155 are provided "as is" and without warranty of any kind. RAD disclaims all warranties including the implied warranties of merchantability and fitness for a particular purpose. RAD shall not be liable for any loss of use, interruption of business or indirect, special, incidental or consequential damages of any kind. In spite of the above RAD shall do its best to provide error-free software products and shall offer free Software updates during the warranty period under this Agreement.

RAD's cumulative liability to you or any other party for any loss or damages resulting from any claims, demands, or actions arising out of or relating to this Agreement and the RIC-155 shall not exceed the sum paid to RAD for the purchase of the RIC-155. In no event shall RAD be liable for any indirect, incidental, consequential, special, or exemplary damages or lost profits, even if RAD has been advised of the possibility of such damages.

This Agreement shall be construed and governed in accordance with the laws of the State of Israel.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

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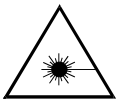
Protective earth: the marked lug or terminal should be connected to the building protective earth bus.



Warning

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions:

- **Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.**
- **Do not attempt to adjust the laser drive current.**
- **Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.**
- **The use of optical devices with the equipment will increase eye hazard.**
- **Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.**

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

Connection of Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution

To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention

Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the 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 Installation and Operation manual, may cause harmful interference to the 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.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkströrungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Conventions

Note	*A note draws attention to a general rule for a procedure, or to exceptions to a rule.*
Caution	A caution warns of possible damage to the equipment if a procedure is not followed correctly.
 ***Warning***	**A warning alerts to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment. If these instructions are not followed exactly, possible bodily injury may occur.**

Declaration of Conformity

Manufacturer's Name: RAD Data Communications Ltd.

Manufacturer's Address: 24 Raoul Wallenberg St.
Tel Aviv 69719
Israel

declares that the product:

Product Name: RIC-155

conforms to the following standard(s) or other normative document(s):

EMC:	EN 55022:1998	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.
	EN 50024: 1998	Information technology equipment – Immunity characteristics – Limits and methods of measurement.
Safety:	EN 60950: 2000	Safety of information technology equipment.

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC and the R&TTE Directive 1999/5/EC for wired equipment. The product was tested in a typical configuration.

Tel Aviv, 10 July 2004

Haim Karshen
VP Quality

European Contact: RAD Data Communications GmbH, Otto-Hahn-Str. 28-30, 85521 Ottobrunn-Riemerling, Germany

Quick Start Guide

Installation of RIC-155 should be carried out only by an experienced technician. If you are familiar with RIC-155, use this guide to prepare the units for operation.

1. Installing RIC-155

Connecting the Interfaces

1. Connect the STM-1/OC-3c equipment to the fiber optic or BNC rear panel connectors.
2. Connect the 10/100BT LAN to the DATA rear panel connector.
3. Use a cross cable to connect the control terminal to the rear panel CONTROL connector.

   or

   Connect a Telnet host, a PC running a Web browsing application or a RADview management station to the MNG port.

Connecting the Power

- Connect the power cable to the power connector on the RIC-155 rear panel.

  The unit has no power switch. Operation starts when the power is applied to the rear panel power connector(s).

2. Configuring RIC-155

Configure RIC-155 to the desired operation mode via an ASCII terminal connected to the rear panel CONTROL port. Alternatively, you can manage RIC-155 over Telnet, a PC running a Web browsing application or RADview application via the MNG port.

Starting Terminal Session for a First Time

➤ **To start a terminal session:**

1. Connect a terminal cross-cable to the CONTROL connector of RIC-155.
2. Start a terminal application and configure the terminal link as follows:
   - Terminal emulation – VT100
   - Screen width – more than 80 characters.
3. Power RIC-155 up.

   The SIG LED (green) blinks during software extraction and hardware initialization.

4. When the ALM LED (red) starts blinking, press **<Enter>** several times.

   RIC-155 automatically adjusts itself to the current terminal baud rate and responds with a string of dots.

5. Type several dots.

   When the hardware initialization is completed, the SIG and ALM LEDs flash rapidly six times.

6. Press <Enter> to display the user name and password entry form.

7. Enter your user name and password and proceed with the management session.

Note *The RIC-155 default user names are **SU** and **USER**, default password is **1234**.*

Configuring RIC-155

The management software provides a Quick Setup menu, which includes the most basic parameters necessary for configuration.

➤ **To configure RIC-155:**

- From the Quick Setup menu (**Main** > **Configuration** > **Quick Setup**), configure the following parameters:
  - Master Clock
  - Host IP address
  - Host IP mask
  - Default Gateway
  - Host Tagging
  - Host VLAN ID
  - Host VLAN Priority
  - Forwarding Mode
  - Physical Port Management Access
  - SDH/SONET frame type.

Contents

Chapter 1
Introduction

1.1 Overview

RIC-155 is a converter that enables simple and efficient connection of Fast Ethernet traffic over STM-1/OC-3c lines. Equipped with a 10/100BaseT and fiber optic or coaxial STM-1 interface, RIC-155 serves as cost-effective alternative to ATM devices and routers. The RIC-155's packet-over-SONET encapsulation protocol enables virtually total utilization of SDH/SONET payload traffic, since only a small header is required. RIC-155 supports VLAN bridging, flow control and backpressure, according to IEEE 802.3x requirements.

Versions

STM-1/OC-3c Interface Options

- Fiber optic interface
- Electrical interface.

Power Supply Options

The following power supply versions are available:

- 100–240 VAC
- 24 VDC or -48 VDC.

Application

Figure 1-1 illustrates a typical application, where RIC-155 transports 10/100BaseT traffic over SDH/SONET infrastructure.

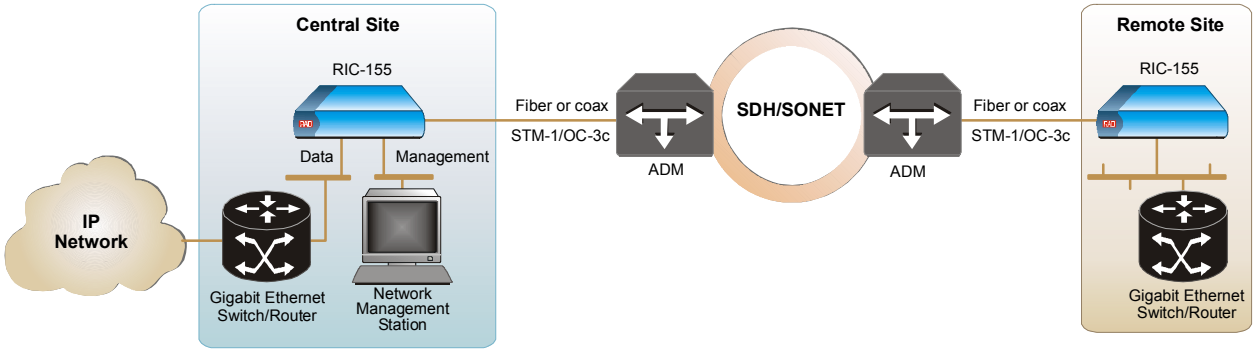


Figure 1-1. Typical Application

Features

10/100BaseT Interface

RIC-155 Fast Ethernet interface operation conforms to the IEEE 802.3u, 802.3x and 802.1p standards, including VLAN applications. The Fast Ethernet interface supports the following functions:

- Four levels of QoS, according to ToS or 802.3p
- High performance lookup engine with support for up to 1024 MAC address entries with automatic learning and aging
- Autonegotiation
- Backpressure
- Half duplex and full duplex operation
- FDX flow control
- Automatic MDI/MDIX crossover.

STM-1/OC-3c Interface

RIC-155 converts Ethernet/Fast Ethernet signals into POS and vice. The STM-1/OC-3c interface terminates into fiber optic or 75Ω BNC coaxial connectors. Single mode fiber optic interface of the unit uses a 1310 nm LED or 1310/1550 laser diode transmitters (see *Table 1-1*).

The STM-1/OC-3c interface of RIC-155 operates with internal or receive clock.

Table 1-1. Fiber Optic Interface Options

Wavelength [nm]	Fiber Type [μm]	Transmitter Type	Power [dBm]	Receiver Sensitivity [dBm]	Typical Max. Range [km/miles]	Connector
1310	62.5/125, multimode	LED	-18	-31	2/1.2	SC
1310	9/125 single mode	Laser	-12	-31	20/12.4	ST, SC, FC
1310	9/125 single mode	Laser, long haul	-2	-34	40/25	ST, SC, FC
1550	9/125 single mode	Laser, long haul	-2	-34	80/49.7	SC
SF1 (WDM)	9/125 single mode	Laser Tx – 1310 Rx – 1550	-12	-29	20/12.4	SC
SF2 (WDM)	9/125 single mode	Laser Tx – 1550 Rx – 1310	-12	-29	20/12.4	SC
SF3 (single fiber)	9/125 single mode	Laser, 1310 Tx and Rx	-12	-27	20/12.4	SC/APC

Management

Setup, control and monitoring of status and diagnostics information can be performed using one of the following methods:

- ASCII terminal connected to the V.24/RS-232 DTE control port
- Telnet host via dedicated Ethernet management port
- PC running a Web browsing application (ConfiguRAD)
- Network management station running RADview, RAD's SNMP network management application.

ConfiguRAD is user-friendly Web-based terminal management system serving for remote device configuration and maintenance. It is embedded in RIC-155 and provided at no extra cost. ConfiguRAD can be run from any standard Web browser.

Internal Bridge

The RIC-155 internal bridge uses four ports for connection to the Ethernet management port, Ethernet data port, STM-1/OC-3c interface and the host. The bridge provides separation of the management traffic from the user traffic by assigning different VLANs to the different ports.

The bridge operates in the following modes:

- **Filter** – frames are received with VLAN tag or untagged, the bridge learns the source address of the incoming frames, performs the bridging according to the MAC address only.
- **Filter Tagging** – the bridge separates management traffic from the user traffic by the tags assigned to the frames. The bridge operation complies with the relevant parts of IEEE 802.1Q.

Alarm Relay

Real time alarms provide information on the system status, indicating management failure, status of the STM-1/OC-3c and Ethernet links, and other faulty conditions. Major and minor alarms can be reported to a remote alarm device via dedicated DB-9 rear panel connector.

Alarms severity can be configured by the user. In addition, the RIC-155 alarms can be masked to prevent them from being reported.

Status Reporting

RIC-155 includes LED indicators that display the status of power, fiber optic signal, and Ethernet traffic.

RIC-155 supports Ethernet and STM-1/OC-3c statistics collection for up 96 15-minute intervals.

1.2 Physical Description

RIC-155 is a non-modular standalone unit, intended for tabletop or 19″ rack installation. *Figure 1-2* illustrates a 3D view of the RIC-155 unit.

Figure 1-2. RIC-155 3D View

The front panel includes seven LEDs, which display the status of power, alarm, 10/100BaseT traffic and fiber optic signal. For details, refer to *Chapter 3*.

The back panel includes a power connector (AC or DC), a 10/100BaseT port connectors (primary and management), and STM-1/OC-3c connector (fiber optic or coaxial). The RIC-155 rear panel is described in greater detail, in *Chapter 2*.

1.3 Functional Description

This section contains functional descriptions of the RIC-155 circuit blocks, shown in *Figure 1-3*.

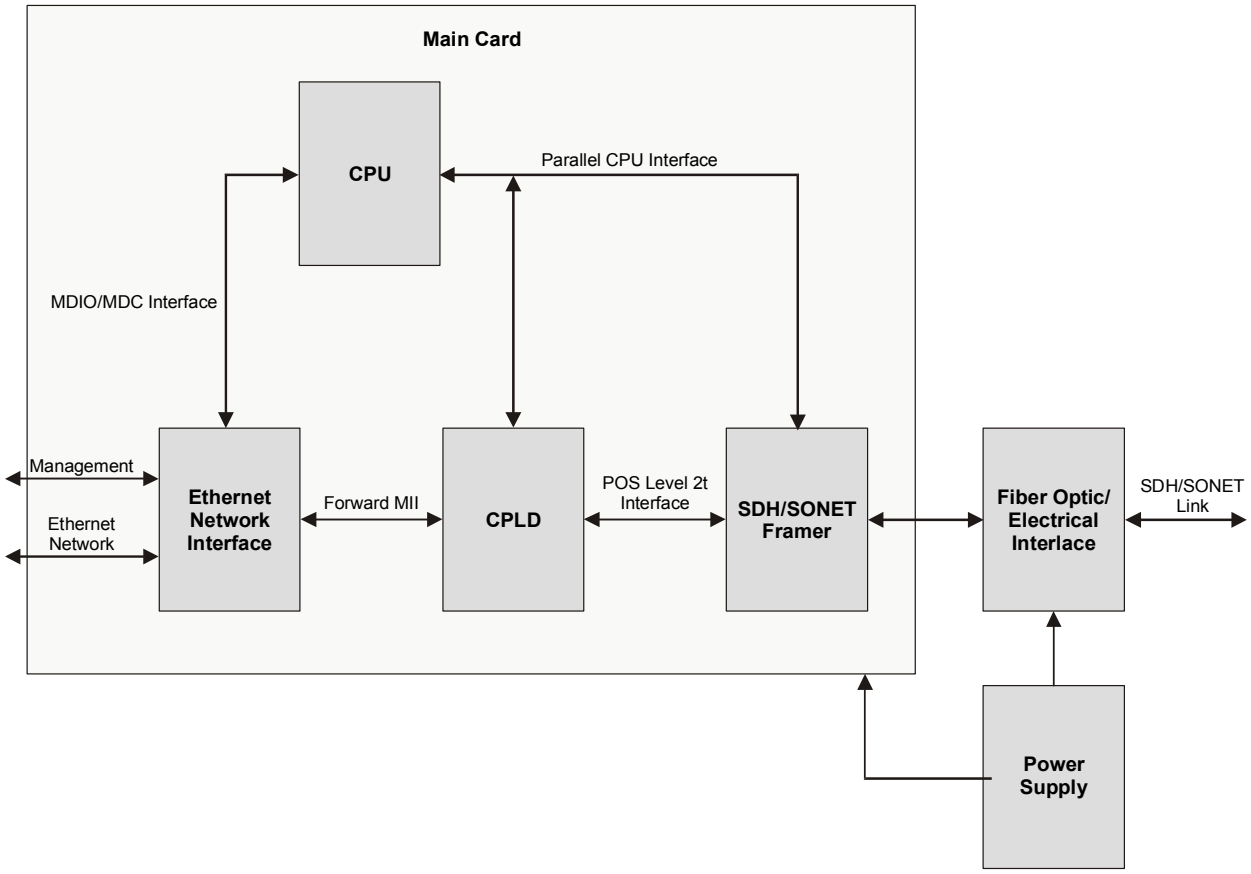


Figure 1-3. RIC-155 Block Diagram

- **Ethernet network interface** supports interfacing with Ethernet network. The Ethernet interface is based on a multiport Fast Ethernet bridge with quality of service support. The ports of the Fast Ethernet bridge perform the following functions:
  - Data transmission over SDH/SONET link
  - Management from the local terminal
  - Interconnection between bridge and CPU
  - MAC MII configuration.
- **CPLD** is a high performance lattice programming device responsible for:
  - Interfacing between MII port of the Fast Ethernet bridge and Level 2 POS interface of the SDH/SONET framer
  - Providing MUX functions of SNI CPU interface
  - Providing parallel CPU interface
  - Managing front panel LEDs.

- **Fiber optic/electrical interface** provides connection to the fiber optic or coaxial cables.
- **CPU** controls the RIC-155 operation. It includes a microprocessor, flash memory, and SRAM.
- **Power supply** provides 5V and +3.3V voltage to the RIC-155 internal elements.

1.4 Technical Specifications

10/100BaseT Interface	*Number of Ports*	1
	Compatibility	Relevant sections of IEEE 802.3u, 802.3x, 802.1p and 802.3q
	Data Rate	10BaseT: 10 Mbps 100BaseT: 100 Mbps
	Line Code	10BaseT: Manchester 100BaseT: MLT3
	LAN Table	1,024 MAC addresses with automatic learning and aging
	Filter Mode	64 bytes: 148,810 pps 1518 bytes: 8,127 pps
	Filter TAG Mode	64 bytes: 142,000 pps 1518 bytes: 8,110 pps
	Buffer	1 MB
	Maximum Frame Size	1536 bytes
	Cable Type	Unshielded twisted pair (UTP), 19–26 AWG
	Connector	RJ-45
STM-1/OC-3c Interface	*Fiber Optic Interface*	See *Table 1-1*
	Electrical Interface Line Attenuation	Not greater than 12.7 dB at 78 MHz
	Coax Cable Length	135m (442 feet), when using RG-59 B/U (at 78 MHz, in accordance with the square root of frequency law).
	Impedance	75Ω
	Connector	BNC coaxial
	Timing	• Internal, from internal oscillator • Loopback, from received signal

Management	*V.24/RS-232*	ASCII terminal via V.24/RS-232 serial DTE port
	Ethernet	Telnet, Web browser or RADview via a MNG port (out-of-band) or DATA port (inband)
Monitoring	*STM-1/OC-3c*	Optical input signal
		Input signal monitoring based on received B2 error counting
		Frame signal
		Alarm indication signal (AIS)
		Remote detect indication (RDI)
	10/100BaseT	Received valid frames
		Transmitted valid frames
Alarm Relay	*Alarm Types*	Major and minor
	Connector	DB-9, female
Indicators	*PWR (green)*	Power
	SPEED (green)	LAN speed
	LINK/ACT (yellow)	Ethernet link integrity and activity
	ALM (red)	Alarm
	SIG (green)	Fiber optic or coaxial signal
Power	*AC Source*	100 to 240 VAC (±10%), 50 to 60 Hz
	DC Source	-48 VDC (±10%) or 24 VDC (±10%)
	Power Consumption	8.8W
Physical	*Height*	43 mm / 1.7 in
	Width	215 mm / 8.4 in
	Depth	206 mm / 8.1 in
	Weight	1.7 kg / 3.7 lb
Environment	*Temperature*	0–50°C / 32–122°F
	Humidity	Up to 90%, non–condensing

Chapter 2
Installation and Setup

2.1 Introduction

This chapter describes installation and setup procedures for the standalone RIC-155 device.

After installing the unit:

- Refer to *Chapter 3* for the operating instructions.
- Refer to *Chapter 4* for the detailed system configuration procedures using an ASCII terminal connected to the RIC-155 control port.

If a problem is encountered, refer to *Chapter 5* for test and diagnostic instructions.

The RIC-155 standalone unit is designed for desktop or bench installation and is delivered as a fully assembled unit. No provisions are made for bolting the unit to a tabletop.

Warning

Always observe standard safety precautions during installation, operation, and maintenance of this product.

2.2 Site Requirements and Prerequisites

AC-powered RIC-155 units should be installed within 1.5m (5 ft) of an easily-accessible grounded AC outlet capable of furnishing the voltage in accordance with RIC-155 nominal supply voltage.

DC-powered RIC-155 unit requires a -48 VDC or 24 VDC power source, which must be adequately isolated from the main supply.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature of RIC-155 should be 0 to 50°C (32 to 122°F), at a relative of up to 90%, non-condensing. humidity

2.3 Package Contents

The RIC-155 package includes the following items:

- One RIC-155 unit
- Technical documentation CD
- AC power cord or DC power supply connector kit
- RM-35 rack mount kit (if ordered).

2.4 Connecting the Interface Cables

Figure 2-1 illustrates a typical rear panel of a RIC-155 unit.

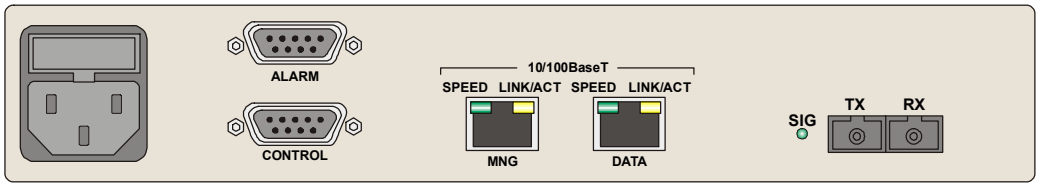


Figure 2-1. RIC-155 Rear Panel

Connecting the STM-1/OC-3c Interface

The RIC-155 STM-1/OC-3c interface terminates in fiber optic or BNC coaxial connectors, designated RX and TX.

➤ **To connect a fiber optic cable:**

1. Remove the protective caps from the connectors and store them in a safe place for later use.
2. Connect the transmit fiber to the connector marked TX and the receive fiber to the connector marked RX.
3. At the remote unit connect the transmit fiber to the connector marked RX and the receive fiber to the connector marked TX.

➤ **To connect a coaxial cable:**

1. Connect the transmit cable to the connector marked TX and the receive fiber to the connector marked RX.
2. At the remote unit connect the transmit cable to the connector marked RX and the receive cable to the connector marked TX.

Connecting the 10/100BaseT Interface

The 10/100BaseT interface of RIC-155 terminates in RJ-45 connector designated DATA.

➤ **To connect the 10/100BaseT interface:**

- Connect the LAN to the rear panel RJ-45 connector designated DATA.

2.5 Connecting the Power Cable

To connect RIC-155 to the power source, refer to the appropriate section below, depending on your version of the unit (AC or DC).

Warning

Before switching on this unit and connecting or disconnecting any other cable, the protective earth terminals of this unit must be connected to the protective ground conductor of the mains (AC or DC) power cord. If you are using an extension cord (power cable) make sure it is grounded as well.
Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

Connecting AC Power

AC power is supplied to the RIC-155 through a standard 3-prong plug

AC power should be supplied via a 1.5m (5 ft) standard power cable terminated by a standard 3-prong socket. A cable is provided with the unit.

➤ **To connect AC power:**

1. Connect the power cable to the power connector on the RIC-155 rear panel.
2. Connect the power cable to the mains outlet.

   The unit will be turned on automatically upon connection to the mains.

Connecting DC Power

A special IEC 60320 adapter for -48/-60 VDC power connection is supplied with the unit. 24 VDC RIC-155 units have a terminal block DC inlet and adapter supplied with the unit.

➤ **To connect DC power:**

- Refer to the DC power supply connection supplements for instructions how to wire the DC adapters, and to the *Handling Energized Products* section.

Chapter 3

Operation

This chapter provides the following information for the RIC-155 converter:

- RIC-155 indicators
- Turning-on and turning-off the RIC-155
- Default settings.

Installation procedures given in *Chapter 2* must be completed and checked before attempting to operate RIC-155.

3.1 Turning On RIC-155

➤ **To turn on RIC-155:**

- Connect the power cord to the mains.

  The PWR indicator on the front panel lights up and remains on as long as RIC-155 receives power.

RIC-155 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Intervention is only required when RIC-155 must be configured to its operational requirements.

3.2 Controls and Indicators

The front panel includes a series of LED indicators that show the current operating status of the unit. *Figure 3-1* illustrates front panel of the RIC-155 unit. *Table 3-1* lists and describes the indicator functions.

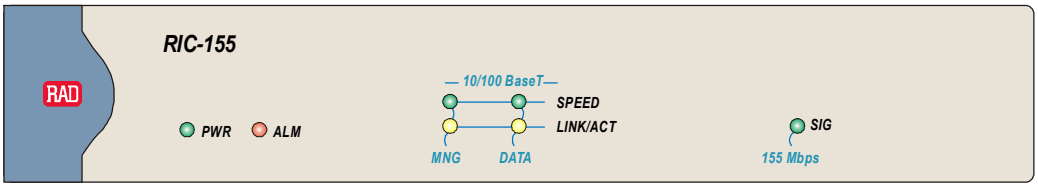


Figure 3-1. RIC-155 Front Panel

Table 3-1. RIC-155 LEDs

Name	Function	Location
PWR (green)	ON – Power supply is ON	Front panel
ALM (red)	ON – Alarm is present in the alarm buffer	Front panel
SPEED (green)	ON – LAN is operating at 100 Mbps OFF – LAN is operating at 10 Mbps	Front/rear panel
ACT/LINK (yellow)	ON – LAN is connected to the Ethernet interface OFF – LAN is not connected to the Ethernet interface Blinking – Ethernet interface is receiving/transmitting data	Front/rear panel
SIG (green)	ON – Link integrity signal is detected on the STM-1/OC-3 link	Front/rear panel

Upon turning RIC-155 on, the PWR LED in the front panel lights to indicate that RIC-155 is on. *Table 3-2* shows the correct status of the indicators after power-up and software decompression. RIC-155 initialization may take up to 3.5 minutes. For detailed description of the initialization sequence, refer to *Starting Terminal Session for a First Time* in Chapter 4.

Table 3-2. RIC-155 Normal Indicator Status

Indicator	Status
PWR	ON
ALM	OFF, if all ports are connected
SPEED	ON or OFF, according to the speed of connected LAN
LINK/ACT	Blinking, if port is connected and transferring data
SIG	ON, if port is connected

If the above LED indications do not appear following initial power turn-on, refer to *Chapter 5* for the diagnostic test instructions.

3.3 Default Settings

RIC-155 is managed by an ASCII terminal or PC running a terminal emulation program via menu-driven embedded software. *Table 3-3* lists the default settings of the RIC-155 configuration parameters.

Table 3-3. RIC-155 Default Settings

Parameter	Default Value
System	
Master clock	Lbt
Management	
System Contact	The contact person
System Name	RIC-155
System Location	The location of this device
Host IP address	0.0.0.0
Host IP mask	0.0.0.0
Host default gateway	0.0.0.0
Read community	Public
Write community	
Trap community	
Telnet access	Enable
SNMP access	Enable
Web access	Enable
Web Trace Refresh	10
Physical port access	MNG ONLY
Control Port	
Control port rate	9600 bps
POP alarm	OFF
Security timeout	10 min
DATA Port (Physical)	
Autonegotiation	Enable
Flow control	Enable
Ethernet mode	Full duplex
LAN speed	100 Mbps
MNG Port (Physical)	
Autonegotiation	Enable

Parameter	Default Value
Flow control	Enable
Ethernet mode	Full duplex
LAN speed	100 Mbps
Uplink	
Frame type	SONET
BER threshold	Disable
EED threshold	$10E^{-3}$
SD threshold	$10E^{-6}$
J1 Tx path trace enable	Disable
J1 path trace	
Physical Failure Forwarding	Disable
Bridge	
Aging Time	304
Forwarding Mode	Filter
Statistics Counted	OK only
Multicast & Broadcast Rate Limit	No Limit
DATA Port PVID	2
DATA Port PVID Priority	0
DATA Port Tag Stripping	No
MNG Port PVID	1
MNG Port PVID Priority	0
MNG Port Tag Stripping	No
POS Port Egress	Unmodified

3.4 Configuration Alternatives

Managing RIC-155 via Terminal Port

RIC-155 includes a V.24/RS-232 asynchronous DTE port, designated CONTROL and terminated in a 9-pin D-type female connector. The control port continuously monitors the incoming data stream and immediately responds to any input string received through this port. The port requires a cross-cable for the ASCII terminal connection.

The RIC-155 control port can be configured to communicate at the following rates: 9.6, 19.2, 38.4, 57.6 or 115.2 kbps. When running a terminal control

session for the first time or after changing a terminal data rate, RIC-155 must detect the data rate at boot-up and save it in the database. Once the terminal data rate is saved, it is detected automatically during each consecutive terminal session.

Preparing the Terminal

Any standard ASCII terminal (a "dumb" terminal or a personal computer running a terminal emulation application) equipped with a V.24/RS-232 communication interface can be used to configure RIC-155. *Appendix A* details the pin assignment and control signal directions of the RIC-155 control connector.

Starting Terminal Session for a First Time

➤ **To start a terminal session:**

1. Connect a terminal cross-cable to the CONTROL connector of RIC-155.
2. Start a terminal application and configure the terminal link as follows:
   - Terminal emulation – VT100
   - Screen width – more than 80 characters.
3. Power RIC-155 up.

   The SIG LED (green) blinks during software extraction and hardware initialization.
4. When the ALM LED (red) starts blinking, press **<Enter>** several times.

   RIC-155 automatically adjusts itself to the current terminal baud rate and responds with a string of dots.
5. Type several dots.

   When the hardware initialization is completed, the SIG and ALM LEDs flash rapidly six times.
6. Press **<Enter>** to display the user name and password entry form.
7. Enter your user name and password and proceed with the management session.

Note *The RIC-155 default user names are **SU** and **USER**, default password is **1234**.*

Managing RIC-155 via Ethernet Ports

RIC-155 is equipped with a management Ethernet port (MNG) which enables communication with RIC-155 management subsystem using the IP protocol. The Ethernet management port is configured for LAN cross-over connection.

➤ **To prepare RIC-155 for network management:**

1. Connect a LAN network management station to the RIC-155 Ethernet port designated MNG.
2. Configure IP host parameters of the RIC-155 units via an ASCII terminal.
3. Run an SNMP management application, such as RAD's RADview-Lite, open Telnet session, or manage RIC-155 via a Web browser (ConfiguRAD).

Cautions

- Make sure the Ethernet management ports of the local and remote devices are connected to different LANs.
- Do not run diagnostic loopbacks on RIC-155 or insert loopback plugs into its Ethernet ports.

Notes

- *When RIC-155 is managed over Telnet or ConfiguRAD, only two simultaneous management sessions are allowed. An additional management session can be opened from the supervisory terminal.*
- *If no user input is detected for 10 minutes during Telnet or ConfiguRAD session, RIC-155 automatically disconnects from the management station.*
- *ConfiguRAD management utility is compatible with Internet Explorer 6.0 and above.*

➤ **To start a ConfiguRAD session:**

1. Start a Web browser.
2. Disable any pop-up blocking software, such as Google Popup Blocker.
3. In the address bar, enter an IP address of RIC-155, and press **<Enter>**.
   The Login screen appears.
4. In the Login screen, click **Login** to start the ConfiguRAD management session.

Note

Disable the proxy server connection for the Web browser to ensure stable ConfiguRAD session.

3.5 Navigating the Management Menus

This section provides a general description of the software menu operation and conventions for navigating the menus.

Menu Map

Figure 3-2 lists all RIC-155 menus.

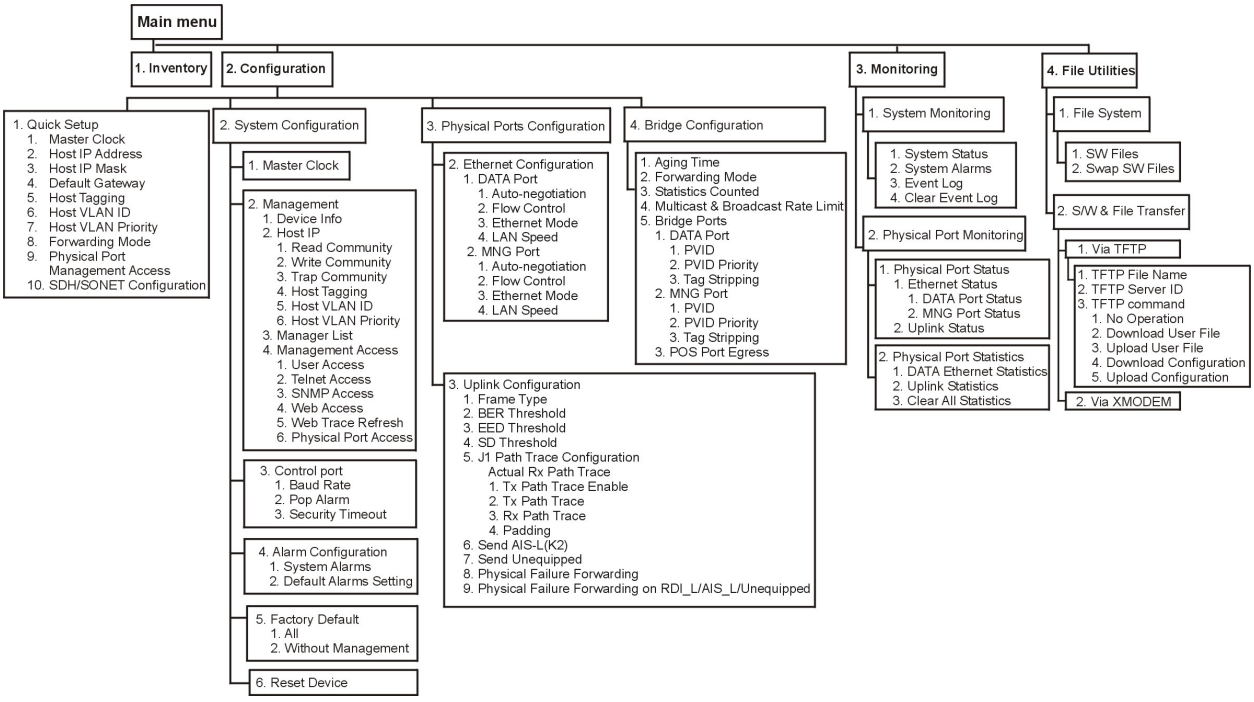


Figure 3-2. Menu Map

Note *ConfiguRAD menus differ in appearance from the terminal screens, but have the same functionality.*

Loging on

Enter a user name and password in order to start the RIC-155 management software.

➤ **To enter the user name and password:**

1. Type in **USER** or **SU** and press **<Enter>**.
2. Type the password (Default **1234**).

   RIC-155 responds to your entry with asterisks.

Note *It is recommended to change the default password to prevent unauthorized access to RIC-155.*

3. Press **<Enter>**.

   The Main menu is displayed (see *Figure 3-3*).

```
                              RIC-155
Main Menu
1. Inventory
2. Configuration
3. Monitoring
4. File Utilities

ESC-prev.menu; !-main menu; &-exit
```

Figure 3-3. Main Menu (Terminal Session)

ConfiguRAD provides auxiliary management tools in the lower left-hand corner:

- Status – shows the number of users currently managing RIC-155
- Trace – opens an additional pane for system messages, progress indicators (ping, software and configuration file downloads) and alarms. It is recommended to keep the trace pane open all the time. Refresh rate of the Trace pane is user-configurable.
- Refresh All – refreshes performance registers.

Choosing Options

➤ **To choose an option (terminal session):**

- Type the number corresponding to the option, and press **<Enter>**.

  RIC-155 immediately updates its database with a new value or displays a new menu for the selected option.

Note *When a menu option has only two values, typing the option number and pressing **<Enter>** toggles between the available values.*

➤ **To choose an option (ConfiguRAD session):**

1. Click a link in the ConfiguRAD screen to display the next menu.
2. Once the target screen is displayed, select a value from the drop-down box or enter it in a text box.

Correcting Entries

➤ **To correct an erroneous entry:**

- Press **<Backspace>** to clear the error, then enter the correct characters.
  or
  Press **<Esc>** to exit the current menu, and then return to the menu to re-enter the required value.

Navigating Tables

Some of the RIC-155 management software screens are tables, which are bigger than regular menus and require scrolling to navigate between parameters. For example, the Inventory screen or Manager List menu are considered tables.

Use the following keys (case-sensitive) for tables navigation:

- **Ctrl L** – scroll left, **Left Arrow** – move left,
- **Ctrl R** – scroll right, **Right Arrow** – move right
- **Ctrl U** – scroll up, **Up Arrow** – move up
- **Ctrl D** – scroll down, **Down Arrow** – move down
- **<Tab>** – select next changeable cell
- **G<row number>, <col number>** - go to cell.

Note *You can display these navigation keys by typing <**?**> from a table.*

Logging Out

➤ **To end the current session:**

- In the Main menu, click **Logout**.

Note *RIC-155 allows up to three management sessions to be active at a time. If a Web-based management session was not ended properly, (for example, by closing the Web browser window instead of logging out), you have to wait five minutes before attempting the next log-in. If you try to log in during the five-minute security timeout, RIC-155 does not allow you to proceed to the Main menu, displaying 'Too Many Users' warning.*

3.6 Turning Off RIC-155

➤ **To turn off RIC-155:**

- Remove the power cord from the power source.

Chapter 4
Configuration

4.1 Configuring RIC-155 for Management

Configuration of RIC-155 is performed via menu-driven embedded software, using a standard ASCII terminal or PC running a terminal emulation application, connected to the rear panel CONTROL port. Alternatively, you can manage RIC-155 over Telnet, a PC running a Web browsing application such as ConfiguRAD or the RADview-Lite application via the MNG port.This section describes the configuration procedures for the RIC-155 converter.

➤ **To access the Configuration menu:**

- From the Main menu, select **Configuration**.

  The Configuration menu appears (see *Figure 4-1*).

```
                              RIC-155
Configuration
1. Quick Setup                                >
2. System Configuration                       >
3. Physical Ports Configuration               >
4. Bridge Configuration                       >

>

Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-1. Configuration Menu

Note *The Quick Setup menu is described in the Quick Start Guide.*

Define the RIC-155 internal SNMP agent parameters in order to enable SNMP, Telnet or Web-based management (see *Figure 4-2*). Also you can enter additional information about your RIC-155, such as contact person, unit location etc.

➤ **To access the Management menu:**

- Follow the path: Configuration > System Configuration >**Management**.

  The Management menu appears (see *Figure 4-2*).

```
                              RIC-155
Management
1. Device Info                              >
2. Host IP                                  >
3. Manager List                             >
4. Management Access                        >
>
Please select item <1 to 4>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-2. Management Menu

Entering Device Information

The Device Info menu allows you to assign a name to RIC-155, give description for the unit, define its location, and contact person. These entries may include up to 20 characters.

➤ **To enter device information:**

1. Follow the path: Configuration > System Configuration > **Device Info**.

   The Device Info menu appears (see *Figure 4-3*).

2. From the Device Info menu, select **System Contact** and enter name of a contact person; select **System Name** and enter a name of the unit; select **System Location** and enter description of the RIC-155 location.

```
                              RIC-155
Device Info

System description (RIC-155 HW Version:xxxxx  SW Version:xxxxx)
1. System contact       (Contact Person)
2. System name          (RIC-155)
3. System location      (Location of this device)
>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-3. Device Info Menu

Configuring the Host Parameters

RIC-155 can be managed by a network management station, which is located on the LAN connected to the unit's MNG port. In order to establish a proper connection, it is necessary to configure the following: host IP address, subnet mask, default gateway, its trap, read and write communities.

Note *The following parameters are masked during Telnet, ConfigureRAD, RADview sessions:*

- *Host IP address*
- *Host IP mask*
- *Host default gateway*
- *Host Tagging*
- *VLAN ID*
- *Host VLAN priority*.

They can be configured from a supervisory terminal only.

➤ **To define the IP parameters:**

1. Follow the path: Configuration > System Configuration > Management > **Host IP**.

   The Host IP menu appears (see *Figure 4-4*).

2. From the Host IP menu, perform the following:
   - Select **Host IP List** to define the host IP address and IP mask in the Host IP List menu (see *Figure 4-5*).
   - Select **Host Default Gateway** to set the default gateway IP address.
   - Select **Read Community** to enter the name of a community with read-only authorization.
   - Select **Write Community** to enter the name of a community with write authorization.
   - Select **Trap Community** to enter the name of a community to which RIC-155 sends traps.
   - Select **Host Tagging** and set it to **Tagged** or **Untagged** to enable or disable VLAN tagging performed by the host.
   - If the host tagging is enabled, select **VLAN ID** to enter the ID of the host VLAN (**0**–**4094**).
   - If the host tagging is enabled, select **Host VLAN priority** to specify priority of the host VLAN (**0**–**7**)**.**

Note *Host IP addresses of both RIC-155 (local and remote) should be set to the same subnet*.

```
                              RIC-155
Host IP
1. Host IP List                        >
2. Host default gateway                (0.0.0.0)
3. Read community                      (public)
4. Write community                     (public)
5. Trap community                      (public)
6. Host Tagging                        (Tagged)
7. VLAN ID [1-4094]                    (1)
8. Host VLAN priority                  (1)
>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-4. Host IP Menu

```
                              RIC-155
Host IP List
1. IP Address                    (0.0.0.0)
2. IP Mask                       (0.0.0.0)>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-5. Host IP List Menu

Configuring the Network Managers

Define or modify the network management stations to which the SNMP agent of RIC-155 sends traps. Up to ten managers can be defined. Entering the IP address and corresponding subnet mask defines each management station. In addition, you can temporarily prevent a manager station from receiving traps by masking them.

➤ **To configure the network managers:**

1. Follow the path: Configuration > System Configuration > Management > **Manager List**.

   The Manager List menu appears (see *Figure 4-6*).

2. From the Manager List menu, select a management station by moving the cursor up/down or left/right.
3. Enter a new IP address for the selected management station.
4. Move to the Trap Mask field and toggle between **YES** and **NO** to mask or unmask traps for the selected management station.
5. Repeat step 2 and step 3 to define additional management stations.

```
                              RIC-155


Manager List
 Manager ID    IP address     Trap Mask
    1.         0.0.0.0        NO
    2.         0.0.0.0        NO
    3.         0.0.0.0        NO
    4.         0.0.0.0        NO
    5.         0.0.0.0        YES


ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-6. Manager List Menu

Controlling the Management Access

You can enable or disable access to the RIC-155 management system via SNMP, Telnet or Web-based applications. By disabling SNMP, Telnet or Web, you prevent unauthorized access to the system when security of the RIC-155 IP address has been compromised. When SNMP, Telnet and Web access is disabled, RIC-155 can be managed via an ASCII terminal only. In addition, you can enable or disable an inband management (via uplink or DATA port) or out-of-band (via MNG port).

➤ **To define the management access method:**

1. Follow the path: Configuration > System Configuration > Management > **Management Access**.

   The Management Access menu appears.

2. From the Management Access menu, select **TELNET Access** to configure Telnet access, select **SNMP Access** to configure SNMP access, or select **WEB Access** to configure Web access.

   A TELNET Access, SNMP Access or WEB Access menu appears (see *Figure 4-7*).

Note *During a Telnet session, **Telnet Access** is masked.*
*During a SNMP session, **SNMP Access** is masked.*
*During a Web session, **Web Access** is masked.*

3. From the TELNET Access, SNMP Access or WEB Access menu, select **ENABLE** to allow selected management type, **DISABLE** to restrict it, or **Managers Only** to allow access only for the management stations defined in the Manager List menu (see *Figure 4-6*).

4. If the Web management (ConfiguRAD) is enabled, you can select **WEB Trace Refresh** from the Management Access menu, and define refresh rate of the Trace pane in seconds (**1**–**255**).

```
                              RIC-155

TELNET Access (Enable)
1. Enable
2. Disable
3. Managers only
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-7. TELNET Access Menu

➤ **To enable or disable management ports:**

1. From the Management Access menu, select **Physical Ports Access**.

   The Physical Ports Access menu appears (see *Figure 4-8*).

2. From the Physical Ports Access menu, select **None** to disable both inband and out-of-band management, **MNG only** to enable out-of-band management only (via MNG port), or **All** to enable management via Ethernet management and data ports.

   Appendix B illustrates connections between the management port, data port, STM-1/OC-3c port and the CPU within internal bridge.

Note *Whenever the Physical Ports Access mode is changed, the POS Port Egress (STM-1/OC-3c) and Tag Stripping (data and management Ethernet ports) are set to their default values as explained in Appendix B.*

```
                              RIC-155
Physical Ports Access (All)
1. None
2. MNG only
3. All
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-8. Physical Ports Access Menu

4.2 Configuring the RIC-155 for Operation

The RIC-155 management software allows you to perform the following:

- Setting source clock
- Defining control port parameters
- Defining alarm severity and masking alarms
- Resetting RIC-155 to the default values
- Performing the overall reset of the device.

➤ **To display the System Configuration menu:**

- From the Configuration menu, select **System Configuration**.

  The System Configuration menu appears (see *Figure 4-9*).

Note *Procedures for alarm configuration and masking are detailed in Chapter 5.*

```
                              RIC-155
System
1. Master clock                              >
2. Management                                >
3. Control port                              >
4. Alarm Configuration                       >
5. Factory default                           >
6. Reset Device                              >
>
Please select item <1 to 5>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-9. System Configuration Menu

Configuring the Clock Source

RIC-155 supports internal and loopback clock modes.

➤ **To configure the clock source:**

- From the System Configuration menu, select **Master Clock**.

  Display is refreshed and a new master clock value appears: **Internal** or **Loopback**.

Configuring Control Port Parameters

RIC-155 embedded software enables you to configure the serial port parameters, which include specifying terminal baud rate, defining user name, password and log-off time, and enabling or disabling pop-up alarms.

➤ **To access the Control port menu:**

- From the System Configuration menu, select **Control Port**.

  The Control Port menu appears (see *Figure 4-10*).

```
                              RIC-155
Control Port
1. Baud Rate                                 >(9600)
2. Pop Alarm                                 (OFF)
3. Security Timeout                          (10 min)
4. Save All
>
Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-10. Control Port Menu

Changing the Control Port Data Rate

➤ **To configure the control port data rate:**

1. From the Control Port menu, select **Baud Rate**.

   The Baud Rate menu appears (see *Figure 4-11*).

2. Select the terminal rate by typing the number corresponding to the desired value, and pressing **<Enter>**.
3. From the Control Port menu, select **Save All** to save the new baud rate.

```
                              RIC-155
Baud Rate (9600)
1. 9600 bps
2. 19200 bps
3. 38400 bps
4. 57600 bps
5. 115200 bps

Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-11. Baud Rate Menu

Configuring the Security Timeout

The timeout specifies a time interval after which RIC-155 automatically disconnects from the supervisory terminal if no input from the user is detected. The timeout can be set to 10 minutes or disabled.

➤ **To configure the security timeout:**

- From the Control Port menu, select **Security Timeout** to disable it (**OFF**) or set to 10 minutes (**10min**).

  The display is refreshed and a new value appears.

Note *Security timeout value is not valid for the Telnet or ConfiguRAD management, which are permanently set to 10 minutes.*

Enabling and Disabling Pop-up Alarms

When the pop-up function is enabled, RIC-155 displays alarms as they are generated by the system or received by the interfaces. The alarms are displayed at the bottom of the terminal screen.

➤ **To enable or disable pop-up alarms:**

- From the Control Port menu, select **Pop Alarm** to choose the pop-up alarms mode: **ON** (pop-up alarms are enabled) or **OFF** (pop-up alarms are disabled).

  The display is refreshed and a new value appears.

4.3 Configuring the Physical Ports

Physical ports of RIC-155 include the following configurable subsystems:

- Data 10/100BaseT port
- Management 10/100BaseT port
- STM-1/OC-3c port.

Configuring the Ethernet Interface

➤ **To configure the Ethernet interface:**

1. Follow the path: Physical Ports Configuration > Ethernet Configuration > **DATA Port** or **MNG Port**.

   DATA Port or MNG Port menu appears (see *Figure 4-12*).

2. From the DATA Port or MNG Port menu, configure the following parameters:
   - **Autonegotiation** (**Enable** or **Disable**)
   - **Flow Control** (**Enable** or **Disable**)
   - **Ethernet Mode** (**Full Duplex** or **Half Duplex**)
   - **LAN Speed** (**10 Mbps** or **100 Mbps**).

```
                              RIC-155
DATA Port
1. Auto-negotiation:                          (Disable)
2. Flow Control:                              (Enable)
3. Ethernet Mode:                             (Full Duplex)
4. LAN Speed:  (100 Mbps)

Please select item <1 to 4>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-12. DATA Port Menu

Note *If autonegotiation is enabled, the Ethernet Mode and LAN speed options are masked.*

Configuring the STM-1/OC-3c Interface

The STM-1/OC-3c interface of RIC-155 is based on the SDH/SONET framer that implements mapping functions of a channel for SDH/SONET processing at 155.52 Mbps.

➤ **To configure STM-1/OC-3c interface:**

1. Follow the path: Configuration > Physical Ports Configuration > **Uplink Configuration**.

   The Uplink Configuration menu appears (see *Figure 4-13*).

2. From the Uplink Configuration menu, configure the following parameters

- **Uplink Mode,** uplink operation mode
  - **SDH**
  - **SONET**
- **BER Threshold,** controls activation of the Line BER SD and EED
  - **Enable,** the EED and SD statistics data is collected
  - **Disable,** the EED and SD statistics data is not collected
- **EED Threshold,** Excessive Error Defect threshold in 1E-N, where N = 3, 4 or 5. The Excessive Error Defect is detected if an equivalent BER exceeds selected EED threshold. The Excessive Error Defect is cleared if the equivalent BER is better then 1E-(EED + 1).
  - **10E-3**, **10E-4**, **10E-5**
- **SD Threshold,** Degraded Signal Defect threshold in 1E-N, where N = 5, 6, 7, 8 or 9. The Degraded Signal Defect is detected if an equivalent BER exceeds selected SD threshold. The Degraded Signal Defect is cleared if the equivalent BER is better then 1E-(SD + 1).
  - **10E-5**, **10E-6**, **10E-7**, **10E-8**, **10E-9**
- **J1 Path Trace Configuration** controls the insertion of a user-defined test string (trace) into the transmit path (J1 byte). A second menu opens to define the following:
  - **Enable/Disable,** transmit path trace insertion is enabled or disabled
  - **Actual Rx Path Trace,** specifies the format of the path trace (up to 62 characters for SONET and up to 15 characters for SDH)
  - **Tx Path Trace**, transmit test string
  - **Rx Path Trace**, receive test string
  - **Padding,** select spaces or nulls.

Note *Both sites must be configured the in the same manner.*

- **J1 Path Trace**.
- **Physical Failure Forwarding** specifies whether the Ethernet traffic is interrupted if an STM-1/OC-3c uplink failure is detected.
  - **Enable** the Ethernet traffic is interrupted if an STM-1/OC-3c uplink failure is detected
  - **Disable** the Ethernet traffic is not interrupted if an STM-1/OC-3c uplink failure is detected.

Note

The following alarms trigger an uplink failure:

- *Uplink Port Signal Loss*
- *Line Excessive Error Defect*
- *Line Signal Degraded Error*
- *Uplink Port Loss of Signal*
- *Uplink Port Loss of Frame*
- *Path Rx Facility Pointer Loss*
- *Path Excessive Error Defect*
- *Path Signal Degraded Error*
- *Path Trace J1 string mismatch.*

With Physical Failure Forwarding enabled, three additional alarms trigger an uplink failure:

- *Line Alarm Indication Signal (AIS-L)*
- *Remote Line Defect Indication (RDI-L)*
- *Unequipped.*

It is possible to mask errors in the Alarm Setup menu, so that the uplink will not be interrupted. (See Chapter 5)

```
                                RIC-155
                          Uplink Configuration
1. Uplink Mode:                                                  (SDH)
2. BER Threshold:                                                (Enabled)
3. EED Threshold (10E-):                                  >      (10E-3)
4. SD Threshold (10E-):                                   >      (10E-6)
5. J1 Path Trace Configuration:                           >
6. Send AIS-L (K2)...                                            (Enabled)
7. Send Unequipped (C2)                                          (Enabled)
8. Physical failure forwarding                                   (Enabled)
8. Physical failure forwarding on RDI-L/AIS-L/Unequipped         (Disabled)

Please select item <1 to 8>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-13. Uplink Configuration Menu

Note

- *Item 9 of Figure 4-13, appears only when item 8, Physical failure forwarding, is enabled.*
- *If item 9 is enabled, RIC-155 considers the RDI-L/AIS-L/Unequipped status in addition to all the other alarms in physical failure forwarding.*

4.4 Configuring the Internal Bridge

Configuring Fast Ethernet Bridge

RIC-155 includes a high-performance Fast Ethernet QoS bridge with VLAN tagging capabilities, MDI/MDIX automatic crossover and FDX flow control. Each port works at 10 Mbps or 100 Mbps, full duplex or half duplex mode (forced or autonegotiated).

➤ **To configure the Fast Ethernet bridge:**

1. From the Configuration menu, select **Bridge Configuration**.
   The Bridge Configuration menu appears (see *Figure 4-14*).
2. From the Bridge Configuration menu, configure the following parameters:
   - **Aging Time** (a period of time from the moment when a node is disconnected from the network segment or becomes inactive and removal of the node address from the database.)
     - **0** to **4080** seconds in 16 second increments

Note *If aging time is set to 0 and address buffer has reached its maximum capability (1024 addresses) it stops storing new addresses.*

   - **Forwarding Mode** (operation mode of the internal bridge)
     - **Filter** (frames are received with VLAN tag or untagged, the bridge learns the source address of the incoming frames, performs the bridging according to the MAC address only)
     - **Filter Tagged** (The bridge separates management traffic from the user traffic by the tags assigned to the frames. The switch operation complies with the relevant parts of IEEE 802.1Q.)

Note *Whenever the Forwarding Mode is changed, the POS Port Egress (STM-1/OC3) and Tag Stripping (data and management Ethernet ports) are set to their default values and explained in Appendix B.*

   - **Statistics Counted** (statistics collection mode)
     - **OK only** (RIC-155 counts the number of received good frames and the number of transmitted frames)
     - **Failed only (**RIC-155 counts the number of received bad frames with the number of encountered collisions)
   - **Multicast & Broadcast Rate Limit** (controls the traffic volume coming into the internal bridge): **128 kbps**, **256 kbps**, **512 kbps**, **1 Mbps**, **2 Mbps**, **4 Mbps**, **8 Mbps**, **No Limit**.

```
                          RIC-155
                    Bridge Configuration
Aging Time (sec)                          (314)
Bridging Mode                             (Filter)
Statistics Counted                        (OK only)
Multicast and Broadcast Rate Limit      > (8 Mbps)
Bridge Ports                            >


Please select item <1 to 5>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-14. Bridge Configuration Menu

Configuring the Bridge Ports

The RIC-155 internal bridge includes four ports: Ethernet management, Ethernet data, POS (STM-1/OC-3c link) and host. The bridge ports can be used for isolating management traffic from data traffic, serving as an important security tool. *Appendix B* details the RIC-155 traffic separation mechanism.

➤ **To access the Bridge Port menu:**

- Follow the path: Configuration > Bridge Configuration > **Bridge Ports**.

  The Bridge Ports menu is displayed.

```
                          RIC-155
Bridge Ports
1. DATA Port                            >
2. MNG Port                             >
3. POS Port Egress                      > (Unmodified)
Please select item <1 to 3>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-15. Bridge Ports Menu

Configuring Ethernet Management and Data Bridge Ports

The Ethernet management and data bridge ports support VLAN tagging and VLAN prioritization. In addition, these ports can be configured to strip VLAN tags at egress or leave the frames unmodified.

➤ **To configure the Ethernet management and data bridge ports:**

1. From the Bridge Ports menu, select **DATA Port** or **MNG Port**.

   The DATA Port or MNG Port menu appears.

2. From the DATA Port or MNG Port menu, configure the following:
   - **PVID** (ID of the VLAN assigned to the current port): **1**–**4094.**
   - **PVID Priority** (priority of the assigned VLAN): **0**–**7**

- **Tag Stripping** (specifies whether the port strips the VLAN tags at egress or not)
  - **Enable** (the tags are stripped)
  - **Disable** (the frames are left unchanged).

Note *Whenever the Physical Ports Access mode is changed, Tag Stripping is set to its default value, as explained in Appendix B.*

```
                              RIC-155
DATA Port
1. PVID [1 - 4094]                          <2>
2. PVID priority                            <2>
3. Tag Stripping                            <No>

Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-16. DATA Port Menu

Configuring the POS Bridge Port

The POS bridge port receives frames coming from the Ethernet management and data ports. The POS port can be configured to add a tag identifying the source port of the outgoing frames.

➤ **To configure the POS port:**

1. Follow the path: Configuration > Bridge Configuration > **POS Port Egress**.
   The POS Port Egress menu is displayed.
2. From the POS Port Egress menu, select one of the following POS port values:
   - **Unmodified** (POS port leaves outgoing frames unchanged)
   - **Tag** (POS port adds a tag only if the frame is untagged)
   - **Stack** (POS port adds tags to all frames, tagged or untagged).

Note *Whenever the Physical Ports Access mode is changed, POS Port Egress is set to its default value, as explained in Appendix B.*

4.5 Displaying the RIC-155 Status

The RIC-155 software displays the converter system and physical port information. This section describes only status information of the RIC-155 device. For description of RIC-155 alarms, refer to *Chapter 5*.

The status information is available via the Monitoring menu.

Displaying the System Status

➤ **To display the system information:**

1. Follow the path: Monitoring > System Monitoring > **System Status**.

   The first page of the System Status screen appears (see *Figure 4-17*).

2. Type **N** (next) to display the second page of the System Status screen (see *Figure 4-18*).

3. Type **P** (previous) to return to the first page.

```
                              RIC-155
System Status
Clock Source: .....>    (Loop-Back Timing)
SW Version: .......     (1.1)
HW Version: .......     (1.0B)
BOOT Version: .....     (1.40)
System CPLD Version: ...(1.02)
POS CPLD Version:    ...(255.255)
Switch device ID:       (52 - 88E6063)
Switch revision ID:     (1.00)
Switch SW version:      (3.01)
POS device ID: ....     (1 - CX29701)
POS revision ID: ..     (3.00)
...(N)

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-17. System Status Screen, Page 1

```
                              RIC-155
System Status
... (P)
    POS SW version: ...     (5.82)
    Power Supply Type: ......>   (AC)
    MAC Address: ............    (0020D220A209)
    IP Address: .............    (172.17.161.98)
    Number of Ethernet ports:>   (2)
    Alarm Indication: .......>   (Normal)
    Hardware Status: ........    (OK)
    System Up Time: .........    <:Time 00:00:00: Day 0/00/00:>

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-18. System Status Screen, Page 2

Note *For system alarm and log file description, refer to Chapter 5.*

Displaying the Port Status

The Physical Port Status menu allows you to display status of the Ethernet and STM-1/OC-3c ports of RIC-155.

Displaying the Ethernet Port Status

Currently RIC-155 includes one user Ethernet port and one management Ethernet port.

➤ **To display the Ethernet port status:**

1. Follow the path: Monitoring > Physical Port Monitoring > Physical Port Status > **Ethernet Status**.

   The Ethernet Status menu appears.

2. From the Ethernet Status menu, select **DATA Port Status** to display the Ethernet data port status or **MNG Port Status** to display the management port status. (see *Figure 4-19*).

```
                              RIC-155
MNG Port Status
    Link Status          >    (Link Up)
    Auto-negotiation     >    (Complete)
    Duplex state              (Full duplex)
    Speed state               (10Mbps)
    Partner pause             (MAC pause implemented)
    Line indication           (Normal)


ESC-prev.menu; !-main menu; &-exit
```

Figure 4-19. MNG Port Status Screen

Table 4-1 lists parameters provided in the DATA and MNG Port Status screens.

Table 4-1. DATA/MNG Port Status Parameters

Parameters	Values
Link Status	• **Link Up** – DATA/MNG link is up • **Link Down** – DATA/MNG link is down
Autonegotiation	• **Disabled** – Autonegotiation is disabled • **Not Finished** – Autonegotiation is being currently performed • **Complete** – Autonegotiation process is completed
Duplex State	• **Full Duplex** – Full duplex operation • **Half Duplex** – Half duplex operation
Speed State	• **10 Mbps –** 10 Mbps LAN speed • **100 Mbps –** 100 Mbps LAN speed
Partner Pause	• **Unknown** – Autonegotiation process is not completed • **MAC Pause not Implemented –** MAC pause is not implemented in the link partner • **MAC Pause Implemented –** MAC pause is implemented in the link partner
Line Indication	• **Normal** – Primary/management link operates properly • **Major** – A major alarm is detected on the DATA/MNG link • **Minor** – A minor alarm is detected on the DATA/MNG link

Displaying the STM-1/OC-3c Port Status

Status of the STM-1/OC-3c port can be displayed via the Uplink Status menu. *Table 4-2* lists parameters provided in Uplink Port Status screen.

➤ **To display the STM-1/OC-3c port status:**

- Follow the path: Monitoring > Physical Port Monitoring > Physical Port Status > **Uplink Status**.

  The Uplink Status screen appears (see *Figure 4-20*).

```
                              RIC-155
Uplink Port Status

    Uplink Connector Type                >(Two BNC)
    Section                              >(Normal)
    Line       >(Normal)
    Path       >(Normal)
    Line Indication                         >(Normal)

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-20. Uplink Status Screen

Table 4-2. STM-1/OC-3c Port Status Parameters

Parameters	Description	Values
Uplink Connector Type	Type of the STM-1/OC-3c interface connector	• **Two BNC** – BNC coaxial connector • **SC –** Fiber optic SC connector • **ST –** Fiber optic ST connector • **FC** – Fiber optic FC connector • **SF1** – SF1 fiber optic interface • **SF2** – SF2 fiber optic interface • **SF3** – SF3 fiber optic interface
Section	SONET/SDH section status	• **Normal** – Normal • **LOS** – Loss of Signal is detected • **LOF** – Loss of Frame is detected
Line	SONET/SDH line status	• **Normal** – Normal • **AIS** – Alarm Indication Signal is detected • **RDI** – Remote Defect Indication is detected
Path	SONET/SDH path status	• **Normal** – Normal • **AIS** – Alarm Indication Signal is detected • **RDI** – Remote Defect Indication is detected • **LOP** – Loss of Pointer is detected • **Trace Mismatch** – Tx path trace mismatch is detected
Line Indication		• **Normal** – Primary/management link operates properly • **Major** – A major alarm is detected on the uplink • **Minor** – A minor alarm is detected on the uplink

4.6 Additional Tasks

Changing the Password

From the User Access menu change current passwords and display the list of users and their access levels. Currently the following permanent user names are available (case-sensitive): **SU** and **USER** with **1234** as default password.

➤ **To change the current password:**

1. Follow the path: Configuration > System Configuration > Management > Management Access > **User Access**.

   The User Access menu is displayed (see *Figure 4-21*).

2. From the User Access menu, select the following:
   - **Change Password** to assign a new password to the existing user name (SU or USER). Password can contain up to eight characters.

- **User Info** to display the list of current users, their access rights (read/write) and status (dynamic/permanent).
- **Reset users password to default** this selection is only available to a super user who has logged on with the super user name and password. The user's password is reset to the default value (1234) but the super user password is not changed.

```
                              RIC-155
User Access
1. Change Password                              >
2. User Info                                   []>
3. Reset users password to default
>

Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit
```

Figure 4-21. User Access Menu

Displaying the RIC-155 Inventory

The RIC-155 inventory displays information on the functional blocks of the unit.

RIC-155 consists of the following components:

- Chassis
- Power supply
- Ethernet port
- Management Ethernet port
- Terminal control port
- Alarm relay port
- STM-1/OC-3c port.

1. To display the RIC-155 inventory:

   The Inventory menu appears (see *Figure 4-22*).

2. From the Inventory screen, scroll right to display the second page of the Inventory screen.

```
                              RIC-155
Inventory

            Index      Description                Class
     1       1001      RAD-RIC-155 converter      Chassis
     2       4001      Power supply               Power Supply
     3       7001      Fast Eth DATA Port         Port
     4       7003      Fast Eth MNG Port          Port
     5       7004      RS-232-Control Port        Port
     6       7005      Alarm Port                 Port
     7       7006      STM1/OC3 port              Port
       ->>
>

ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 4-22. Inventory Screen

Installing Software Releases

This section presents procedures for installing new software releases into the RIC-155 units.

RIC-155 stores two software versions, each in one of two partitions of its flash memory, which also contains a boot program. The software is stored in compressed format. The active version is decompressed and loaded into the RAM on power-up. The passive software is kept for backup purposes. If the active software gets corrupted, you can swap it with the backup. By default, RIC-155 is delivered with active software only.

New software releases are distributed on diskettes as an ***.img** file, which is downloaded to the local RIC-155 using the TFTP or XMODEM protocol. When starting a download, RIC-155 erases the current backup and places the new software in the backup partition. When downloading is complete, the unit checks the integrity of the new software file. If it is correct, the backup and active files are swapped. The new software release becomes active and the former active software becomes the backup. If a failure occurs during downloading, the new version is erased. In this case, only one version is left stored in the flash memory.

Configuration files can be uploaded for storage and backup.

Installing a New Software Release via TFTP

➤ **To install a new software release via TFTP:**

1. Follow the path: Main menu> File Utilities > SW & File Transfer > **Via TFTP**.

   The Via TFTP menu appears.

2. From the Via TFTP menu, perform the following steps:
   - Select **TFTP File Name** and enter the name of the software file (for example, **ric155.img**).
   - Select **TFTP IP Server** and enter the IP address of the TFTP server.
3. From the Via TFTP menu, select **TFTP Command**.

4. From the TFTP Command menu, (see *Figure 4-23*) select **Download User File** to start downloading file to RIC-155.

   RIC-155 automatically erases the backup partition and downloads the new software into the backup partition. Once the download is complete, RIC-155 performs a check and displays the **`Ended OK`** message. Then the unit resets and loads the new software to the active partition; the old active software is swapped into the backup partition.

```
                              RIC-155
TFTP Command
1. No Operation
2. Download User File
3. Upload User File
4. Download Configuration
5. Upload Configuration
Please select item <1 to 5>

ESC - prev. menu ; ! - main menu ; & - exit
```

Figure 4-23. TFTP Command

Installing a New Software Release via XMODEM

Installation of the new software releases via XMODEM is possible only via terminal connection.

➤ **To install a new software release via XMODEM:**

1. Follow the path: Main menu> File Utilities > SW & File Transfer > **Via XMODEM**

   RIC-155 responds with the following string:

   `PLEASE OPEN XMODEM APPLICATION.`

   `For exit press Q(uit)`

   If you press **<Q>**, RIC-155 aborts the download process and displays **`Download failure. Press Esc to continue.`** in addition to the previous display.

2. Send the ***.img** file to RIC-155 using the XMODEM protocol of your terminal application.

   Once the download is complete, RIC-155 displays the following message:

   `Final process download. Reset`

   After the decompression, RIC-155 is automatically reset. This causes the new software to be loaded into the RIC-155.

Note *To minimize the software downloading time, it is recommended to configure the CONTROL port to the highest available data rate, see Changing the Control Port Data Rate section above.*

Transferring Configuration Files

Configuration files can be transferred between the RIC-155 and the host via TFTP.

➤ **To upload a configuration file**

1. Follow the path: Main menu > File Utilities menu > SW & File Transfer > **Via TFTP**.

   The Via TFTP menu appears.

2. From the Via TFTP menu, perform the following steps:
   - Select **TFTP File Name** and enter the name of the configuration file

Note *The file name field may contain the file name of the user software *.img. Be sure to insert a different file name and extension so that the software file is not overwritten.*

   - Select **TFTP IP Server** and enter the IP address of the TFTP server.

3. From the Via TFTP menu, select **TFTP Command**.
4. From the TFTP Command menu, select **Upload Configuration** to start uploading file to the host.

Note *IP parameters of RIC-155 are retained during uploading and downloading of configuration files.*

➤ **To download a configuration file**

1. Follow the path: Main menu> File Utilities > SW & File Transfer > **Via TFTP**.

   The Via TFTP menu appears.

2. From the Via TFTP menu, perform the following steps:
   - Select **TFTP File Name** and enter the name of the configuration file.

Note *The file name field may contain the file name of the user software *.img. Be sure to insert the configuration file name and extension.*

   - Select **TFTP IP Server** and enter the IP address of the TFTP server.

3. From the Via TFTP menu, select **TFTP Command**.
4. From the TFTP Command menu, select **Download Configuration** to start downloading file from the host.

   Once the download is complete, RIC-155 performs a reset.

Note *IP parameters of RIC-155 are retained during uploading and downloading of configuration files. If the configuration file is downloaded to a different RIC-155 then change the IP settings to keep them unique (see Configuring the Host Parameters).*

Displaying the Software Version

You can display the information on the software revision of the local or remote units. The information includes a description of the active program, which is currently being used by RIC-155, and also details of the backup software.

➤ **To display the software version:**

- Follow the path: Main Menu > File Utilities > File System >**SW**.

The Software Version screen appears (see *Figure 4-24)*.

```
                              RIC-155
SW files

Software active version:        1.00
Software active partition:      0
Code size:                      190
Date:                           28-02-03
Software backup version:        0.00n00
Software backup partition:      1
Code size:                      0
Date:                           0-0-0
Boot version:                   2.20
Boot mng version:               4.00

SW Files Table

ESC-prev.menu; !-main menu; &-exit
```

Figure 4-24. Software Version Screen

Switching Software Versions

If the active software becomes corrupted, you can switch it with the backup file.

➤ **To switch software versions:**

1. From the File System menu, select **Swap SW Files**.

   RIC-155 displays the following message:
   `Request to swap SW files!!! Are you sure? Y/N`

2. Type **Y** to confirm the file swap.

   RIC-155 performs the swap and sends the following string:

   `Program Switching`

   The active software becomes backup and vice versa. At this stage, RIC-155 is automatically reset.

   If you try to switch the software versions when only one version is available, RIC-155 responds with the following message:

   `Impossible to switch – no other program`

   `Press any key to continue`

Resetting RIC-155

RIC-155 supports two types of reset:

- Reset to the default setting
  - Resetting all parameters
  - Resetting all parameters, except for master clock and management options
- Overall reset of the device.

Resetting RIC-155 to Factory Defaults

You can reset RIC-155 to its default settings. Reseting to the defaults does not affect the master clock setting. In addition, you can reset local RIC-155 without affecting its management parameters (IP address, mask and default gateway).

➤ **To reset RIC-155 to the defaults:**

1. Follow the path: Configuration >System Configuration > **Factory default**.

   Factory Default menu is displayed.

2. From the Factory Default menu, perform one the following steps:
   - Select **All** to reset all RIC-155 parameters to the default settings.
   - Select **Without Management** to reset all parameters, except for IP address, mask and default gateway values, community names.

   RIC-155 displays the following message:
   `Request to factory default!!! Are you sure? Y/N`

3. Type **Y** to confirm the reset.

   RIC-155 performs the requested type of reset.

Resetting RIC-155

You can perform the overall reset of RIC-155.

➤ **To reset RIC-155:**

1. From the System Configuration menu, select **Reset Device**.

   A confirmation message appears.

2. Type **Y** to confirm the reset.

Chapter 5

Troubleshooting and Diagnostics

This chapter describes the RIC-155 diagnostic functions, which include:

- Statistics collection
- Status indications
- Alarms.

5.1 Monitoring Performance

RIC-155 has capabilities for collection of the Ethernet and SDH/SONET statistics.

Displaying the Ethernet Statistics

Performance statistic data is collected for the primary Ethernet port of RIC-155.

➤ **To display the Ethernet statistics:**

1. From the Main menu, select **Monitoring**.
   The Monitoring menu appears.
2. From the Monitoring menu, select **Physical Ports Monitoring**.
   The Physical Ports Monitoring menu appears.
3. From the Physical Ports Monitoring menu, select **Physical Port Statistics**.
   The Physical Port Statistics menu appears (see *Figure 5-1*).
4. From the Physical Port Statistics, select **DATA Statistics** to display the Ethernet statistics collected for the primary Ethernet port.
   The DATA Statistics screen appears (see *Figure 5-2*).
5. The DATA Statistics screen includes the following parameters:
   - RX OK frames – Number of valid frames received by the DATA port
   - TX OK frames – Number of valid frames transmitted by the DATA port
   - Run time – Time elapsed since the last RIC-155 power-up or statistics clearing.

➤ **To clear Ethernet statistics:**

- From the DATA Statistics, select **Clear Statistics** to clear all collected Ethernet statistic data.

Note *You can also clear all Ethernet and SDH/SONET statistic data by selecting **Clear All Statistics** from the Physical Port Statistics menu.*

```
                              RIC-155
Physical Port Statistics
Primary Ethernet Statistics                >
Uplink Statistics                          >
Clear All Statistics                       >

>
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-1. Physical Port Statistics Menu

```
                              RIC-155
DATA Statistics

RX OK frames  ...(100)
TX OK frames  ...(200)
Run time (sec)...(899)

1. Clear Statistics
>
ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-2. Primary Ethernet Statistics Screen

Displaying SDH/SONET Statistics

You can display detailed SDH/SONET performance statistics for the current 15-minute interval or for all 15-minute intervals of the last 24-hour period.

➤ **To display the current SDH/SONET statistics:**

1. From the Physical Port Statistics (*Figure 5-1*), select **Uplink Statistics**.
   The Uplink Statistics menu appears (see *Figure 5-3*).
2. From the Uplink Statistics menu, select **Current Statistics**.
   The first Uplink Statistics screen appears (see *Figure 5-4*).
3. Proceed to the second and third pages of the Uplink Statistics by typing **N**.
4. Return to the previous page by typing **P**.
   Table 5-1 explains all SDH/SONET statistics parameters.

```
                              RIC-155
Uplink Statistics
Current Statistics                         >
Intervals Statistics                       >
Clear All Statistics                       >

>
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-3. Uplink Statistics Menu

```
                                RIC-155
Uplink Statistics
 Time Elapsed     ...(6)                  Far End Line ESs     ... (7)
 LOS              ... (0)                 Far End Line SES     ... (5)
 Section CV       ... (6)                 Far End Line UASs    ... (6)
 Section ESs      ... (6)                 Path CV              ... (2)
 Section SESs     ... (6)                 Path ESs             ... (6)
 Section SEFSs    ... (4)                 Path SESs            ... (6)
 Line CV          ... (10)                Path UASs            ... (0)
 Line ESs         ... (7)                 Far End Path CV      ... (10)
 Line SESs        ... (6)                 Far End Path ESs     ... (7)
 Line UASs        ... (3)                 Far End Path SESs    ... (9)
Far End Line CV   ... (0)                 Far End Path UASs    ... (1)

... (N)
>

ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-4. Uplink Statistics Screen, Page 1

```
                                RIC-155
Uplink Statistics
...(P)
 Time Elapsed     ... (.)
 RCV frames       ... (6)              RCV FCS frames    ... (6)
 XMT frames       ... (10)             RCV ABORT frames  ... (6)
                                       XMT ABORT frames  ... (10)




>

ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-5. Uplink Statistics Screen, Page 2

Table 5-1. SDH/SONET Statistics Parameters

Display	**Description**	**Range** [15 min]
Time Elapsed	Number of seconds that have elapsed since the beginning of the current interval.	0–899
LOS	Number Loss of Signal errors occurred during the current interval.	0–899
Section CV	Number of Section Coding Violations occurred during the current interval. Section CVs are not counted during SES_S.	0–899

Display	Description	Range [15 min]
Section ESs	Number of Section Errored Seconds in the current interval. Section errored second is a second that contains one or more B1 BIP-8 errors. This counter is also incremented by one for each section severely errored second detected during the interval.	0–899
Section SESs	Number of Section Severely Errored Seconds in the current interval. Section severely errored second is a second that contains more then 2500 B1 BIP-8 errors. This counter is also incremented by one for each Severely Errored Frame Second or a second with the LOS defect detected during the current interval.	0–899
Section SEFSs	Number of Section Severely Errored Frame Seconds in the current interval. This counter is incremented by one for each second containing one or more SEF or LOS defects.	0–899
Line CV	Number of Line Coding Violations in the current interval. Line CV are not counted during SES_L.	0–899
Line ESs	Number of Line Errored Seconds in the current interval. Line errored second is a second that contains one or more B2 BIP errors. This counter is also incremented by one for each line severely errored second detected during the interval. ES are not counted during UAS.	0–899
Line SESs	Number of Line Severely Errored Seconds in the current interval. Line severely errored second is a second that second contains more then 2500 B2 BIP errors. This counter is also incremented by one for each severely errored frame second or a second with the LOS or AIS defect detected during the current interval. SES are not counted during UAS_L.	0–899
Line UASs	Number of Line Unavailable Seconds. Incremented by one if the second contains unavailable defects in the current interval. The line becomes unavailable if 10 contiguous SES_L appears. The 10 SES_L are included in the UAS_L time. The line becomes available if 10 contiguous seconds are with no SES_L. The 10 seconds with no SES_L are excluded from the UAS_L.	0–899
Far End Line CV	Number of Line Far End Coding Violation events that include M1-REIs in the current interval. CV_LFE are not counted during SES_LFE.	0–899
Far End Line ESs	Number of Line Far End CV Errored Seconds which include one or more M1-REIs or one or more RDI-L defects in the current interval. ES_LFE are not counted during UAS_LFE, LOS, LOF or AIS_L.	0–899
Far End Line SESs	Number of Line Far End Severely Errored Seconds which include more then 2500 REI-L errors, or one or more RDI-L defects in the current interval. SES_LFE are not counted during UAS_LFE, LOS, LOF or AIS-L.	0–899
Far End Line UASs	Number of Line Far End Unavailable Seconds in the current interval. The line becomes unavailable at the onset of 10 contiguous SES_LEF. The 10 SES_LFE are included in unavailable time. The line becomes available at the onset of 10 contiguous seconds with no SES_LFE. The 10 seconds with no SES_LFE are excluded from unavailable time. Not counted during LOS, LOF or AIS_L.	0–899
Path CV	Number of Path Coding Violation in the current interval. CV_P are not counted during an SES_P.	0–899

Display	Description	Range [15 min]
Path ESs	Number of Path Errored Seconds in the current interval. Incremented by one for each second containing one or more B3 BIP-8 errors or an SES_P is detected in the current interval. SES_P are not counted during UAS_P.	0–899
Path SESs	Number of Path Severely Errored Seconds. Incremented by one for each second containing more then 2500 B3 BIP-8 errors or one or more SEF detects, or one or more LOS, LOF, AIS_L, AIS_P, LOP_P, UNEQ_P, TIM-P defects in the current interval. SES_P are not counted during UAS_P.	0–899
Path UASs	Number of Path Unavailable Seconds. Incremented by one for each second contains unavailable detects in the current interval, the line becomes unavailable if 10 contiguous SES_P appears. The 10 SES_P are included in the UAS_P time. The line becomes available if 10 contiguous seconds are with no SES_P. The 10 seconds with no SES_P are excluded from the UAS_P.	0–899
Far End Path CV	Number of Path Far End Coding Violation events which include G1-REIs in the current interval. CV_PFE are not counted during SES_PFE, LOS, LOF, AIS_L, AIS_P, LOP_P or UNEQ_P.	0–899
Far End Path ESs	Number of Path Far End CV Errored Seconds which include one or more REI-P or an SES_PFE is detected in the current interval. ES_PFE are not counted during UAS_PFE, LOS, LOF or AIS_L, AIS_P, LOP_P, UNEQ_P.	0–899
Far End Path SESs	Number of Path Far End Severely Errored Seconds which include more then 2500 REI-P errors, or one or more RDI_P defects in the current interval. SES_PFE are not counted during UAS_PFE, LOS, LOF or AIS_L, AIS_P, LOP_P, UNEQ_P.	0–899
Far End Path UASs	Number of Path Far End Unavailable Seconds in the current interval. The line becomes unavailable at the onset of 10 contiguous SES_PEF. The 10 SES_PFE are included in unavailable time. The line becomes available at the onset of 10 contiguous seconds with no SES_PFE. The 10 seconds with no SES_PFE are excluded from unavailable time. UAS_PFE are not counted during LOS, LOF or AIS_L, AIS_P, LOP_P, UNEQ_P.	0–899
RCV Frames	Number of POS frames received in the current interval.	–
RCV ABORT Frames	Number of received POS frames that were aborted in the current interval.	–
RCV FCS Frames	Number of POS frames with an FCS error received in the current interval.	–
XMT Frames	Number of POS frames transmitted in the current interval.	–
XMT ABORT Frames	Number of transmitted POS frames that were aborted in the current interval.	–

➤ **To display SDH/SONET statistics for all intervals:**

1. From the Uplink Statistics menu (*Figure 5-3*), select **Intervals Statistics** to display the SDH/SONET for all 15-minute intervals.

   The first page of the Uplink Interval Statistics screen appears (see *Figure 5-6*).

2. Scroll right (**R**) and left (**L**) to navigate between statistics screens for interval 1 to interval 9 (see *Figure 5-7* and *Figure 5-8*).
   Table 5-1 explains all SDH/SONET statistics parameters.

3. Scroll up (**U**) and down (**D**) to display statistic data for the rest of the intervals.

Note *In the Uplink Interval Statistics screen the following abbreviations are used:*

- *S – section*
- *L – line*
- *P – path*
- *FE – far end.*

For example, SES_LFE means Line Severely Errored Seconds Far End.

```
                                    RIC-155
Uplink Interval Statistics

  Interval LOS  CV_S  ES_S  SES_S  SEF_S  CV_L  ES_L  SES_L UAS_L CV_LFE ES_LFE SES_LFE
  1        4    0     10    10     6      10    5     0     10    10     6      9
  2        5    0     10    9      6      10    5     0     10    10     6      9
| 3        7    0     10    6      9      4     4     0     10    10     6      9
V 4        2    0     10    7      9      4     4     0     10    10     6      9
  5        6    0     10    10     6      10    5     0     10    10     6      9
  6        5    0     10    10     9      4     4     0     10    10     6      6
  7        6    0     10    10     9      4     4     0     10    10     6      9
  8        4    0     10    9      4      10    4     0     10    10     6      9
  9        3    0     10    8      9      10    4     4     0     10     10     6

->>

ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-6. Uplink Interval Statistics, Page 1

```
                                    RIC-155
Uplink Interval Statistics

    UAS_LFE  CV_P  ES_P   SES_P  UAS_P  CV_PFE  ES_PFE   SES_PFE  UAS_PFE
  1 4        0     10     10     6      9       0        0        10
  2 5        0     10     9      6      9       0        0        10
| 3 7        0     10     6      9      10      0        10       10
V 4 2        0     10     7      9      10      0        10       10
  5 6        0     10     10     6      9       0        10       10
  6 5        0     10     10     9      10      0        10       10
  7 6        0     10     10     9      10      0        10       10
  8 4        0     10     9      9      10      0        10       10
  9 3        0     10     8      9      10      0        10       0

->>

ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-7. Uplink Interval Statistics, Page 2

```
                                        RIC-155
Uplink Interval Statistics

              RCV         XMT    RCV_ABORT   XMT ABORT   RCV_FCS
  1           100         50     0           1           6
  2           100         50     0           1           6
| 3           100         50     0           1           6
V 4           100         50     0           1           6
  5           100         50     0           1           6
  6           100         50     0           1           6
  7           100         50     0           10          6
  8           100         50     0           10          6
  9           100         50     0           10          6

->>

ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-8. Uplink Interval Statistics, Page 3

➤ **To clear SDH/SONET statistics:**

- From the Uplink Statistics, select **Clear Statistics** to clear all collected SDH/SONET statistic data.

Note *You can also clear all Ethernet and SDH/SONET statistic data by selecting **Clear All Statistics** from the Physical Port Statistics menu.*

5.2 Detecting Errors

Power-Up Self-Test

RIC-155 performs a hardware self-test upon turn-on. The self-test sequence checks the critical circuit functions of RIC-155. If RIC-155 fails the self-test, the Self test failure alarm is stored in the alarm buffer (see *Table 5-2*).

Front Panel LEDs

The status of RIC-155 is indicated by the ALM LED indicator located on the front panel. For the description of the ALM LED and its functions, refer to *Chapter 3*.

5.3 Handling Alarms

RIC-155 detects fault conditions and initiates alarms to alert the user. RIC-155 supports three alarm types:

- System alarms
- Information messages (warnings)
- Events.

RIC-155 maintains a separate display for all active system alarms. In addition, RIC-155 supports log file, holding up to 200 alarm entries.

An alarm or warning enters simultaneously both the alarms display and the log file, and the ALM LED turns on to indicate the condition. When the fault condition that caused the alarm is cleared, the alarm is removed from the alarm screen, but it remains in the log file, enabling you to view the alarm history.
Events enter only the log file.

The RIC-155 management software allows you to change alarm severity and perform alarm masking.

Displaying System Alarms

➤ **To display the system alarms:**

1. From the Main menu, select **Monitoring**.
2. From the Monitoring menu, select **System Monitoring**.

   The System Monitoring menu appears (see *Figure 5-9*).

```
                              RIC-155
System Monitoring
System Status                                >
System Alarms                                []>
Event Log                                    []>
Clear Event Log


>
ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-9. System Monitoring Menu

3. Select **System Alarms** to display the system alarms.

   The System Alarms screen appears (see *Figure 5-10*).

```
                              RIC-155
System Alarms

  Code       Name                                State
   1         Self-test failure                   Major
   2         Line Excessive Error Defect         Major
   3         Line Signal Degraded Error          Minor
   4         Loss Of Signal                      Major
   5         Loss Of Frame                       Major

ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-10. System Alarms Screen

Working with the Log File

RIC-155 maintains alarm log files for system alarms. The file stores up to 200 alarm messages. The log file specifies alarm or event name, state (major, minor, or OFF), and time when the alarm was initiated. OFF indicates that the fault condition that caused the alarm is cleared.

➤ **To display the event log file:**

- From the System Monitoring menu (*Figure 5-9*), select **Event Log**.

The Event Log screen appears (*Figure 5-11*).

```
                                    RIC-155
Event Log

     Source Alarm                          Status  Severity  Time      Date
  4  Event  Loss Of Signal                 ON      Major     2:11:13   12/06/03
  5         Loss Of Frame                  ON      Major     3:52:31   13/06/03
| 3         Line Signal Degraded Error     OFF     Minor     13:45:27  13/06/03
V 16        Software download              OFF     Warning   14:52:17  13/06/03
  2         Line Excessive Error Defect    ON      Major     20:46:02  13/06/03
 54         Buffer Overflow                OFF     Event     9:13:20   14/06/03
ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-11. Event Log Screen

➤ **To clear the event log:**

1. From the System Monitoring menu (*Figure 5-9*), select **Clear Event Log**.

   RIC-155 displays a confirmation message at the bottom of the screen:
   `Request to clear log file! Are you sure? (Y/N):`

2. Type **Y**.

   All the log file entries are deleted from the system log file.

Configuring Alarm Severity

Severity of the RIC-155 alarms can be defined by the user. Configuration of the alarm severity is performed via the System Alarms menu.

➤ **To configure the alarm severity:**

1. From the System Configuration menu, select **Alarm Configuration**.

   The Alarm Configuration menu appears (*Figure 5-12*).

```
                              RIC-155
Alarm Configuration
System Alarms                                  []>
Default Alarms Setting


>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit;
```

Figure 5-12. Alarm Configuration Menu

2. From the Alarm Configuration menu, select **System Alarms**.

   System Alarms menu appears (*Figure 5-13*).

3. From the System Alarms menu, select Severity column of the alarm that you intend to configure by moving cursor up/down or left/right.

4. Select a new alarm severity value by typing **1** (Minor) or **2** (Major).

Note *You can always reset all alarm severity values to their default settings by selecting Default Alarms Settings from the Alarm Configuration menu.*

```
                              RIC-155
System alarms
                        Alarm Name          Default Severity
                        Severity            Mask
   1. Self-test failure                     Major        MajorOFF
   2. Line Excessive Error Defect           Major        MajorOFF
|  3. Line Signal Degraded Error            Major        MinorOFF
v  4. Loss Of Signal   Major                Minor        OFF
   5. Loss Of Frame    Major                Minor        OFF
1. Minor
2. Major
ESC-prev.menu; !-main menu; &-exit; ?-help
```

Figure 5-13. System Alarms Menu

Masking Port Alarms

RIC-155 management software allows you to mask alarms to prevent them from being reported.

➤ **To mask RIC-155 alarms:**

1. From the System Alarms menu, select Mask column of the alarm that you intend to mask by moving cursor up/down or left/right.
2. Mask alarm by selecting **ON** or remove alarm masking by selecting **OFF**.

Table 5-2. RIC-155 Alarms and Warnings

Terminal Message	Description	Severity
Self test failure	Failure occurred during self-test	Major
Line Excessive Error Defect	Number of the Line Excessive Error Defect errors exceeds threshold	Major
Line Signal Degraded Error	Number of the Line Signal Degraded Errors exceeds threshold	Major
Uplink Port Loss Of Signal	Loss of Lock is detected	Major
Uplink Port Loss Of Frame	Loss of Frame is detected	Major
Line AIS: remote Ethernet port	Alarm Indication Signal is received from the Ethernet interface of the remote device	Minor
Line Remote Defect Indication	Line Remote Defect Indication signal is detected	Minor
Path AIS: Rx Facility Defect	Path Alarm Indication Signal is detected	Minor
Path Rx Facility Pointer loss	Path Loss Of Pointer defect is detected	Minor

Terminal Message	Description	Severity
Path Remote Defect Indication	Path Remote Defect Indication signal is detected	Minor
Path Excessive Error Defect	Number of the Path Excessive Error Defect errors exceeds threshold	Major
Path Signal Degraded Error	Number of Path Signal Degraded Errors exceeds threshold	Major
Path Trace J1 string mismatch	Rx path trace information mismatch is detected	Major
Uplink port signal loss	Receive signal loss is detected on the uplink	Major
Data 1 Ethernet port down	Data integrity failure is detected at the primary Ethernet port	Major
Management Ethernet port down	Data integrity failure is detected at the management port	Major

Table 5-3. RIC-155 Events

Number	Terminal Message	Description
23	Downloading...	Software download has started
24	Downloading failure	Software download has failed
25	User password has been changed	User password has been changed
27	User login has been changed	User name has been changed
32	Alarm log is full	More than 200 entries registered in the alarm log file

Appendix A
Connector Wiring

A.1 Ethernet Connectors

RIC-155 includes two Ethernet ports designated ETH and MNG-ETH. *Table A-1* lists the pinout of the Ethernet connectors.

Table A-1. ETH and MNG-ETH Connector Pinout

Pin	Designation	Function	Direction
1	RX+	Receive – positive lead	Input
2	RX–	Receive – negative lead	Input
3	TX+	Transmit – positive lead	Output
6	TX–	Transmit – negative lead	Output
4, 5, 7, 8	Not connected	–	–

A.2 Alarm Relay Connector

The RIC-155 alarm relay terminates in a 9-pin female connector, designated ALARM. *Figure A-1* shows the pin functions. The relay positions are shown in the non-energized (alarm active) state. *Table A-2* lists the pinout of the ALARM connector.

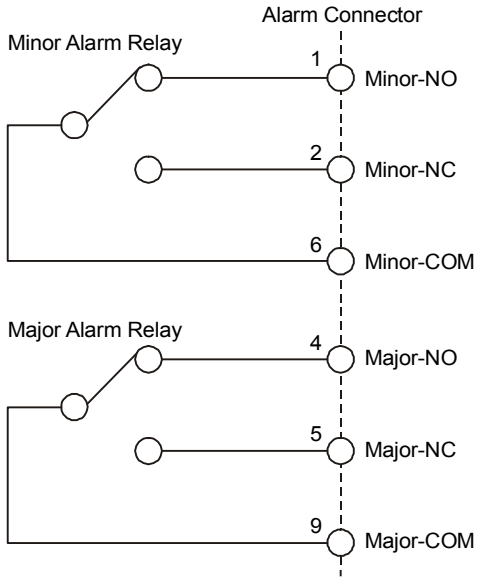


Figure A-1. ALARM Connector Wiring

Table A-2. ALARM Connector Pinout

Pin	Alarm Relay	Function
1	Minor	Minor NO (minor alarm is OFF)
2	Minor	Minor NC (minor alarm is ON)
6	Minor	Minor COM
4	Major	Major NO (major alarm is OFF)
5	Major	Major NC (major alarm is ON)
9	Major	Major COM
7	Input alarm	Exernal alarm (input)
8	Input alarm	External alarm (input)

A.3 Control Connector

The terminal interface of RIC-155 terminates in a 9-pin female connector, designated CONTROL. *Table A-3* lists the pinout of the CONTROL connector.

Table A-3. CONTROL Connector Pinout

Pin	Pin Name	Direction	Description
3	TXD	Output	TXD data to terminal
4	DTR	Output	DTR data terminal ready
2	RXD	Input	RXD data from terminal
5	GND	Output	Ground
1	DCD	Input	DCD input control from terminal
7	RTS	Output	RTS output command to terminal
8	CTS	Input	CTS input command from terminal
6	DSR	Input	Not used
9	RI	Input	Not used

Appendix B
Traffic Separation

RIC-155 supports separation between Ethernet management and user traffic. There are two traffic separation modes: port-based and port-based/VLAN-based. The traffic separation mode depends on the forwarding mode of the internal bridge:

- **Filter** – frames are received with VLAN tag or untagged, the bridge learns the source address of the incoming frames, performs the bridging according to the MAC address only. Traffic separation is port-based.
- **Filter Tagged** – the bridge separates management traffic from the user traffic by the tags assigned to the frames. The bridge operation complies with the relevant parts of IEEE 802.1Q. Traffic separation is port-based/VLAN-based.

B.1 Port-Based Traffic Separation

Port-based traffic separation is achieved by setting the physical port access to **None**, **MNG only** (Ethernet Management only) or **All**.

None

When the physical port access is set to **None**, only the 10/100BaseT data port is connected to the uplink port (*Figure B-1*). In this case, the local RIC-155 cannot be managed from either the local DATA or MNG port. However, the remote RIC-155 unit can be managed via the NMS connected to the local DATA port, and the remote unit can manage the local unit.

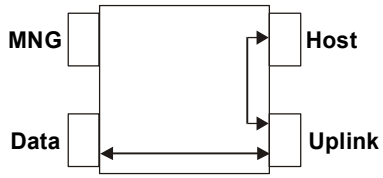


Figure B-1. Physical Port Access – None

MNG only

Setting the physical port access to **MNG only**, disconnects the local DATA port from the local CPU, preventing the local RIC-155 from being managed via the DATA port, but allowing management via the remote DATA port. At the same time, both local and remote RIC-155s can be managed via the MNG port.

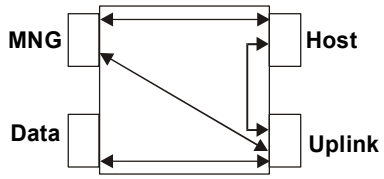


Figure B-2. Physical Port Access –MNG Only

All

When the physical port access is set to **All**, the internal bridge connections allow both local and remote RIC-155s to be managed via the MNG and DATA ports.

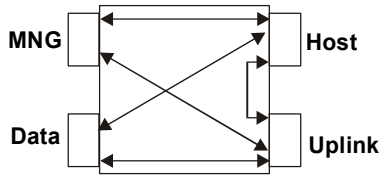


Figure B-3. Physical Port Access – All

Local Mng Only

When the physical port access is set to **Local Mng Only**, the internal bridge connections allow only the local RIC-155 to be managed via the MNG and DATA ports.

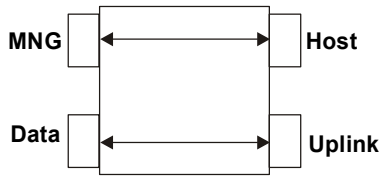


Figure B-4. Physical Port Access – Local Mng Only

B.2 Port-Based/VLAN-Based Traffic Separation

The main purpose of traffic separation is to prevent management frames from entering data ports of the local and remote units. The traffic separation mechanism can be further improved by using internal VLAN-based routing. Management and data Ethernet ports receive unique VIDs (VLAN Identifiers), which define frame routes inside the bridge.

Default port VIDs are set as follows:

- Management port – 1
- Data port – 2.

Tagging Modes of the Bridge Ports

Each frame is routed according to its VID. If the frame is untagged, it receives tag at egress from the uplink port.

Uplink and Host Ports

The uplink port operates in the following tagging modes:

- Unmodified – frames (tagged and untagged) are left unchanged.
- Tag – untagged frames are tagged and tagged frames are left unchanged.
- Stack – all frames (tagged and untagged) receive tags.

The host port of the internal bridge can be configured to add VLAN ID tags to the frames.

Management and Data Ports

The management and data ports can strip the frame tags at egress or leave the frames unchanged.

Default Tagging

Whenever the port access mode (**None**, **MNG only** or **All**) or forwarding mode of the bridge (**Filter** or **Filter Tagged**) is changed, the tagging modes of the bridge ports are set to one of the default tagging modes, as illustrated in *Table B-1*. This is made to simplify the bridge configuration procedure for the most common applications.

Table B-1. Default Tagging Modes

Port	Forwarding Mode				
	Filter	Filter Tagged			
		Management Access Mode			
		None	MNG Only	All	Local MNG Only
MNG	Tag stripping disabled	Tag stripping enabled	Tag stripping enabled	Tag stripping enabled	Tag stripping enabled
Data	Tag stripping disabled	Tag stripping enabled	Tag stripping enabled	Tag stripping disabled	Tag stripping enabled
Host	Tag stripping enabled	Tag stripping enabled	Tag stripping enabled	Tag stripping enabled	Tag stripping enabled
Uplink	Tag stripping disabled	Stack	Stack	Tag	Stack

Internal Operation Modes of the Bridge Ports

All VLAN information is kept in the VTU (VLAN Translation Unit) table. The bridge ports operate in the following internal modes:

- Secure – only frames with VIDs that are registered in the VTU table are forwarded according to the VTU rules. The management and host ports operate in the secure mode only.
- Fallback – untagged frames and tagged frames with VIDs that are not registered in the VTU table are forwarded according to the port-based procedures only.

The internal port operation modes depend on the port access mode and forwarding mode of the bridge, as detailed in *Table B-2*.

Table B-2. Internal Port Operation Modes

Port	Forwarding Mode				
	Filter	Filter Tagged			
		Management Access Mode			
		None	MNG Only	All	Local MNG Only
MNG	Disabled	Disabled	Secure	Secure	Secure
Data		Fallback	Fallback	Fallback	Fallback
Host		Secure	Secure	Secure	Secure
Uplink		Fallback	Fallback	Fallback	Fallback

Traffic Separation according to the Management Access and VLANs

The following diagrams illustrate how RIC-155 separates between the management and user traffic according to the port access mode and bridge port VLANs (management port VID is set to 1, data port VID is set to 2). Numbers 1 and 2 inside the bridge indicate the management and data frame routes inside the bridge.

None

When the port access mode is set to **None**, the management port is disabled. Frames coming from the local data port can reach the local uplink port only, and remote data frames can reach the local data port only. Remote management frames are forwarded to the local host port only.

In the None access mode, the host port checks the source port of the incoming frames and drops those that do not originate from the management port.

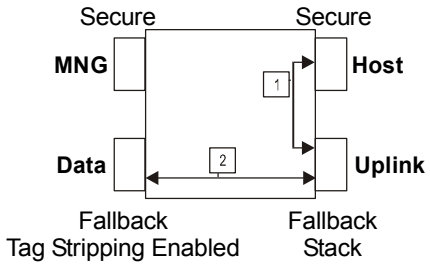


Figure B-5. Port Access Mode – None

MNG Only

In the **MNG Only** port access mode, local data frames can reach the uplink port only. Local management frames can reach the host and uplink ports, and the remote management frames can reach the local uplink, host and data ports.

In the MNG Only access mode, the host port checks the source port of the incoming frames and drops those that do not originate from the management port.

See *Managing RIC-155 via MNG Port* for the application example.

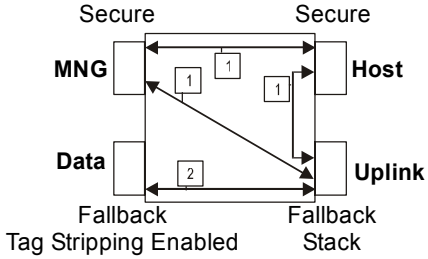


Figure B-6. Port Access Mode –MNG Only

All

In the **All** port access mode, data and management frames can reach all ports, allowing management of the local and remote units via the MNG and DATA ports.

If the units are going to be managed via the DATA port, it is necessary to add VLAN tags to the frames before they enter RIC-155. This can be done by an external device, such as a switch. In this case the host must be configured to tag the incoming management frames according to the setting of the external switch.

See *Managing RIC-155 via Data Port* for the application example.

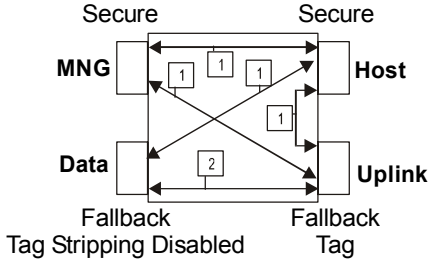


Figure B-7. Port Access Mode – All

Local MNG Only

In the **Local MNG Only** port access mode, local data frames can reach the uplink port only. Local management frames can reach the host and uplink ports, and the remote management frames can reach the local uplink, host and data ports.

In the MNG Only access mode, the host port checks the source port of the incoming frames and drops those that do not originate from the management port.

See *Managing RIC-155 via MNG Port* for the application example.

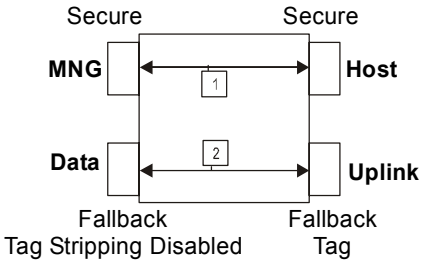


Figure B-8. Port Access Mode –MNG Only

B.3 Configuring for a Typical Application

Managing RIC-155 via MNG Port

Figure B-9 shows two RIC-155 units managed via MNG port. In this application the local management frames are forwarded to the host and uplink ports, and the local data frames are sent to the uplink port only. Both management and data frames receive tags according to their source port (1 for management and 2 for data). The tags are received at egress from the uplink port. When the frames enter the remote uplink port their tags are checked against the remote VTU table and forwarded according to their tags: 1 to the host port and 2 to the data port. The host port strips the VLAN tag of the management frames and forwards them to the CPU.

The units are configured as follows:

- Local RIC-155:
  - Forwarding – Filter Tagged
  - Port Management Access – MNG Only
  - Host Tagging – Untagged
  - Management and data ports – Tag stripping is enabled
  - uplink port – Stack.
- Remote RIC-155:
  - Forwarding – Filter Tagged
  - Port Management Access – None
  - Host Tagging – Untagged
  - Management and data ports – Tag stripping is enabled
  - uplink port – Stack.

Note *When the forwarding mode is set to Filter Tagged or port access mode is set to MNG Only, the following parameters are enabled automatically:*
- *Tag stripping at the management and data ports*
- *Stacking at the uplink port.*

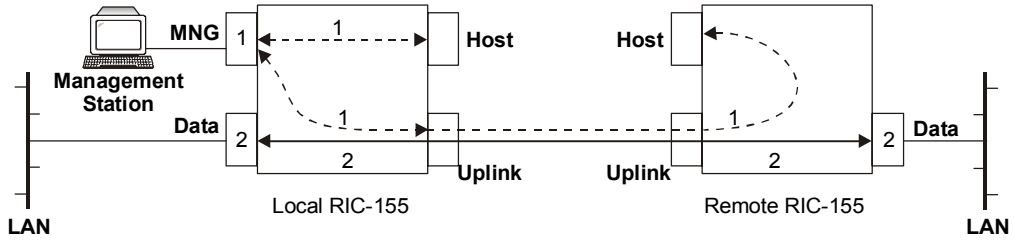


Figure B-9. Managing RIC-155 via MNG Port

Managing RIC-155 via Data Port

Figure B-10 shows two RIC-155 units managed via data port. In this application the management and data frames are tagged by an external switch and sent to the data port. The Data port is configured to leave the incoming frames unchanged (tag stripping is disabled). At the egress from the data port, the management frames are forwarded to the host and uplink ports, and the data frames are sent to the uplink port only. The host port adds VID 1 to the management frames to ensure that they reach the management station when they are sent back. At the egress from the uplink port, no tags are added to the frames, because they arrive tagged.

When the frames enter the remote uplink port their tags are checked against the remote VTU table and forwarded according to their tags: 1 to the host port and 2 to the data port. The host port strips the VLAN tag of the management frames and forwards them to the CPU.

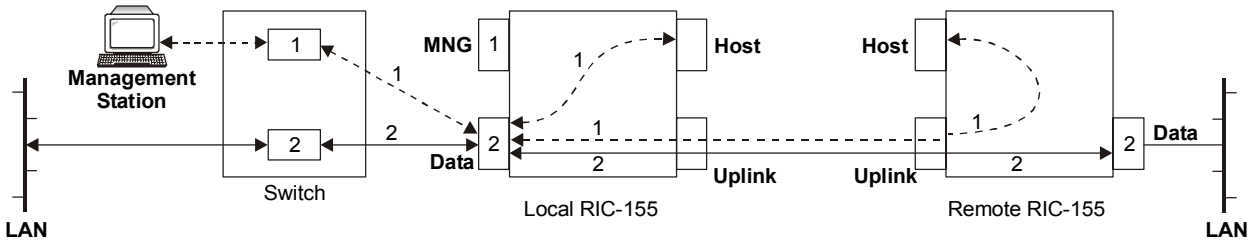


Figure B-10. Managing RIC-155 via Data Port

The units are configured as follows:

- Local RIC-155:
  - Forwarding – Filter Tagged
  - Port Management Access – All
  - Host Tagging – Tagged
  - Host VLAN – 1
  - Host VLAN Priority – any from 0 to 7
  - Management and data ports – Tag stripping is disabled
  - Uplink port – Tag.
- Remote RIC-155:
  - Forwarding – Filter Tagged
  - Port Management Access – None
  - Host Tagging – Untagged
  - Management and data ports – Tag stripping is enabled
  - Uplink port – Stack.

Index

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Manual Name: RIC-155

Publication Number: 187-200-01/06

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	Excellent	*Good*	*Fair*	*Poor*	*Very Poor*
Installation instructions	❒	❒	❒	❒	❒
Operating instructions	❒	❒	❒	❒	❒
Manual organization	❒	❒	❒	❒	❒
Illustrations	❒	❒	❒	❒	❒
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