RAD
data communications

Installation and Operation Manual

RIC-155GE

Gigabit Ethernet to STM-1/OC-3c Network Termination Unit

Version 1.10

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STM-1/OC-3c Network Termination Unit

Version
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Notice

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Limited Warranty

RAD warrants to DISTRIBUTOR that the hardware in the RIC-155GE 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.

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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-155GE shall not exceed the sum paid to RAD for the purchase of the RIC-155GE. 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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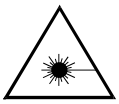
Protective earth: the marked lug or terminal should be connected to the building protective earth bus.



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!

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 form 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, 1000 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 their expense.

Note: The Gigabit Ethernet optical version complies with the limits of Class B, as does the copper version when used with an STP cable.

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.

Note: The Gigabit Ethernet optical version complies with the limits of Class B, as does the copper version when used with an STP cable.

La version Gigabit Ethernet optique est conforme Classe B, comme sur la version pour liaison cuivre quand elle est utilisée avec un cable STP.

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.

Quick Start Guide

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

1. Installing RIC-155GE

Connecting the Interfaces

1. Connect the STM-1/OC-3c equipment to the fiber optic front panel connectors.
2. Connect the 1000BaseT or 1000BaseSx LAN to the DATA front panel connector.
3. Use a cross cable to connect the control terminal to the front 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-155GE rear panel.

  The unit has no power switch. Operation starts when the power is applied to the power connector.

2. Configuring RIC-155GE

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

Starting a Terminal Session for the First Time

➤ **To start a terminal configuration session:**

1. Connect an ASCII terminal to RIC-155GE CONTROL port (default settings are: 19200, N, 8, 1, Flow control: None).
2. Set the terminal emulator to VT100 emulation for optimal view of system menus.
3. If you are using Hyper Terminal, set the terminal mode to 132 column mode for optimal view of system menus (**Properties->Settings->Terminal Setup->132 column mode**).

4. Power up RIC-155GE. Verify that the PWR LED in front panel is On.
5. Verify RIC-155GE correct startup by observing one of the following:
   - From the ASCII terminal verify that the Self-Test was successfully completed
   - Check the ALM LED on the front panel of the unit:
     - Off: no alarms present
     - On: device ALM is present.
6. If alarm is present, check physical conditions.
7. Press <ESC> to display the user name and password entry form.
8. Enter your user name and password and proceed with the management session.

Note *The RIC-155GE default user names is **su** (case-sensitive), default password is **1234**.*

Configuring RIC-155GE via the Quick Start Menu

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

➤ **To configure RIC-155GE:**

1. From the Main Menu, select **Main** > **Configuration** > **Quick Setup**.
2. Configure the parameters according to *Table 0-1*.

```
                    RIC-155GE - RAD data communications
Quick Setup

 1. Host IP address             ... (-)
 2. Host IP mask                ... (-)
 3. Default Gateway             ... (-)
 4. Host Tagging                ... >
 5. Host VLAN                   ... >
 6. Host VLAN priority          ...
 7. Bridge Type                 ... (VLAN unaware)

>
Main>Configuration>Quick Setup>

ESC-prev. menu; !-main menu; &-exit;                  1 user(s)
```

Table 0-1. Quick Setup Parameters

Parameter	Possible Values	Remarks
Host IP Address	0.0.0.0 to 255.255.255.255	**Default: None**
Host IP Mask	0.0.0.0 to 255.255.255.255	**Default: None**
Default Gateway	0.0.0.0 to 255.255.255.255	**Default: None**
Host Tagging	Tagged Untagged	Specifies if the Management station is using tagged or untagged frames. RIC-155GE must transmit in the same format, even if bridge is in VLAN aware mode. **Default: Untagged**
Host VLAN	1-4094	Set the VID of the packets sent by the host **Default: None**
Host VLAN priority	0-7	Set VLAN priority for packets sent by host. Relevant if Host Tagging is set to Tagged **Default: None**
Bridge Type	VLAN aware VLAN unaware	Select Bridge operation mode. **Default: VLAN unaware**

Note *When configuring RIC-155GE for the first time, define and save host parameters (Host IP address, Host IP mask, Host tagging, Host VLAN, Host VLAN priority). Then define and save the Default Gateway and the Bridge type. The Default Gateway and the Bridge type can be saved only after the host parameters have been defined.*

Contents

Chapter 1
Introduction

1.1 Overview

RIC-155GE is a network termination unit designed to offer simple and efficient connection of two remote LANs over SDH infrastructure, Gigabit Ethernet traffic over STM-1/OC-3c lines. Equipped with a fiber optic STM-1/OC-3c interface, RIC-155GE serves as cost-effective alternative to ATM devices and routers. The RIC-155GE's packet-over-SONET (POS) encapsulation protocol enables virtually total utilization of SDH/SONET payload traffic, since only a small header is required.

RIC-155GE supports VLAN-aware and VLAN-unaware bridging. RIC-155GE includes an electrical Fast Ethernet (100BaseT) port and a Gigabit Ethernet (1000BaseTx/Sx) port to the customer premises and a single port to the SDH/SONET network. RIC-155GE collects statistics to enable performance monitoring and troubleshooting.

The unit supports Telnet and ConfiguRAD (RAD's Web-based management utility) for inband management, as well as an ASCII terminal for out-of-band management.

RIC-155GE is supplied as a compact standalone 1U (½ 19-inch) enclosure.

The unit may be supplied with various types of network interfaces. The required interface must be specified when ordering.

Versions

RIC-155GE is available with several interface ports. The ports are described in detail in the *Technical Specifications* section below.

RIC-155GE is available with or without an alarm relay connector.

STM1/OC-3c Port

The STM1/OC-3c port versions are:

- Single mode, 1310 nm short haul per G.957-S1.1, SC connector
- Single mode, 1310 nm long haul per G.957-L1.1, SC connector
- Multimode, 1310 nm, SC connector.

Gigabit Ethernet Port

The 1GbE port versions are:

- 1000BaseSx
- 1000BaseT

Application

Figure 1-1 illustrates a typical application, where RIC-155GE transports Gigabit Ethernet traffic over SDH/SONET infrastructure.

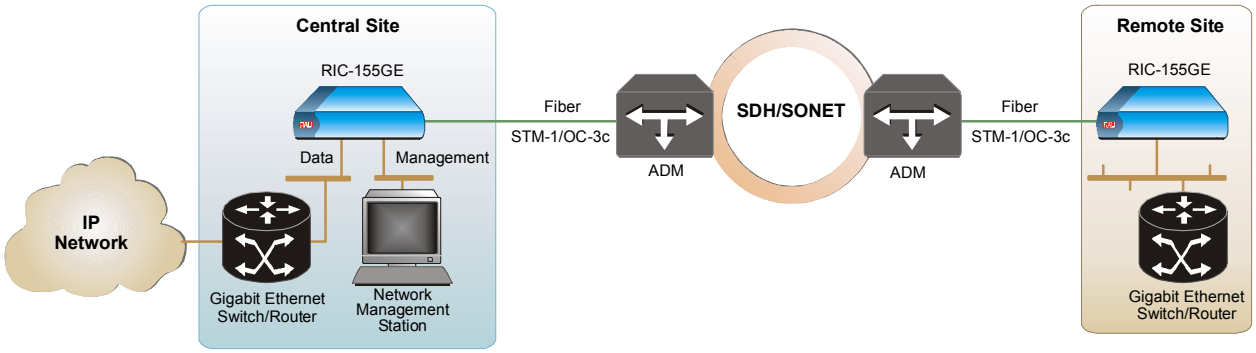


Figure 1-1. Typical Ethernet Access Application

Features

RIC-155GE is an Ethernet to SDH/SONET converter. It provides Ethernet access over SONET/SDH.

The RIC-155GE has:

- A single Gigabit Ethernet user interface
- A single STM-1 POS interface
- A single Fast Ethernet port for management
- Control port for out-of-band management
- Optional dry contact alarm connector.

User Ethernet Interface

The Gigabit Ethernet user interface operates in full duplex, supporting regular size (1668 bytes) frames. RIC-155GE supports the following Ethernet interfaces:

- 1000BaseSx
- 1000BaseT.

STM-1/OC-3c POS Interface

RIC-155GE converts Gigabit Ethernet frames into POS frames and vice versa. The fiber optic interface of the unit uses a single mode 1310 nm short or long haul laser diode transmitter or a multimode 1310 nm transceiver.

SDH/SONET mode is user-configurable. Jitter output and tolerance complies with G.825 requirements.

The STM-1/OC-3c port supports an egress priority queue. (Priority according to VLAN priority, in VLAN aware bridge mode).

Bridging

RIC-155GE provides a bridging function between its different bridge ports:

- User Ethernet port
- STM-1/OC-3c POS interface
- Fast Ethernet management port
- Internal host.

The internal bridge operates in VLAN-unaware (transparent) or VLAN-aware modes (with VLAN double tagging (stacking)).

VLAN-Unaware Mode

Ethernet packets (tagged or untagged) received from one of the bridge ports defined in the previous paragraph, is forwarded according to its destination MAC address. Thus, there is only a single queue towards the SDH/SONET interface. When operating in the VLAN-unaware mode, the internal bridge supports the following functions:

- Learning of up to 2048 MAC addresses
- Configuration of the aging time
- VLAN tagged frames transparency (forwarding according to MAC only)
- MAC table viewing (learnt MACs).

In this mode, forwarding of packets between the GbE data port and FE MNG port is blocked (locally in the device), however, there is no end-to-end separation between the GbE and FE data.

VLAN-Aware Mode

In the VLAN-aware mode, packets at the GbE ingress are VLAN tagged or double tagged with VID=PVID.

Frames at the FE ingress are tagged or double tagged with VID=PVID, the internal host PVID is the same as the FE PVID. These are internal settings and are transparent to the user application as the extra VID tag is stripped at FE and GbE egress.

In VLAN aware mode, forwarding is performed according to MAC and VLAN PVID. Using the internal setting of double tagging ensures total separation of FE and GbE traffic. Host traffic has the same internal VID as the FE tag, so management is allowed only from FE MNG port and is totally separated from GbE user traffic.

In this mode four priorities for user traffic are supported at the POS interface according to the frame VLAN priority.

When operating in the VLAN-aware mode, the internal bridge supports the following functions:

- Learning and forwarding according to MAC address and VID
- Learning of up to 2048 MAC table entries (MAC + VID pairs)

- Configuration of the aging time
- MAC table viewing (learnt MACs)
- Double-tagging – all frames are tagged. An untagged frame becomes tagged and a tagged frame becomes double-tagged. The added tag is stripped at FE, GbE egress.

Management

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

- Inband management:
  - Local and remote management via the Ethernet port for management
  - Local and remote management via the Gigabit Ethernet user port (VLAN unaware mode only)
- Out-of-band management:
  - Local management via ASCII terminal connected to the V.24 (RS-232) DCE control port
  - Local management via dedicated 10/100BaseT management port.

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

Diagnostics

RIC-155GE supports activation of the following diagnostic loopbacks:

- STM-1 timed external loopback (towards STM-1/OC-3c link)
- STM-1 timed internal loopback (towards RIC-155GE).

Statistics

Provides statistics and counters capability in the physical Ethernet and network interface level in 15-minute intervals (SONET/SDH physical layer only).

Compact Size

RIC-155GE is a compact unit, 1U high and half the width of a standard 19-inch rack. It can be mounted in a rack or used as a standalone unit.

1.2 Physical Description

RIC-155GE is a 1U high standalone or rack mountable device. *Figure 1-2* shows a three dimensional view of RIC-155GE with Gigabit Ethernet and STM1/OC-3c network interfaces, and the optional Alarm connector.

Figure 1-2. RIC-155GE 3-D View

LEDs, interface and control connectors are located on the front panel. For more information see *Chapter 2*.

The power connector is located on the rear panel. For more information, see *Technical Specifications*.

1.3 Functional Description

This section describes the major functional features of RIC-155GE.

Interfaces

SDH/SONET Interface

The SDH/SONET port supports STM-1/OC-3c over optical interface. The optical interface can be either single mode short haul according to G.957 S 1.1, single mode long haul according to G.957 L 1.1, or multimode according to G.825.

RIC-155GE can operate in either SONET or SDH mode to support the differences in framing parameters.

Note *The choice of SONET or SDH affects the terminology of the physical layer, so that the display of counters, alarms and log messages varies according to the standard that was selected.*

Table 1-1. SDH/SONET Terminology

SDH	SONET
MS-AIS	Line AIS
AU-AIS	Path AIS
MS-FERF	Line FERF/RDI
HP-FERF	Path FERF/RDI
RS-BIP (B1)	Section BIP
MS-BIP (B2)	Line BIP
HP-BIP (B3)	Path BIP
MS-FEBE	Line FEBE
HP-FEBE	Path FEBE

Ethernet Interface

The Ethernet physical interface is 10/100BaseT over UTP, RJ-45 connector port.

The Ethernet port supports 10/100Mbps rates and either full- or half-duplex operation. Autonegotiation for automatic speed and duplex mode are supported as well.

The Ethernet port supports Ethernet and 802.3 standards.

Gigabit Ethernet Interface

The Gigabit Ethernet physical interface is either an optical 1000BaseSx or an electrical 1000BaseT. 1000 Mbps full-duplex is supported with an option to enable or disable autonegotiation.

The Gigabit Ethernet interface supports Ethernet and 802.3 standards.

Bridge Operation Modes

This section describes the bridge operation mode, default bridge settings and management access.

RIC-155GE default mode is VLAN unaware. In this mode the bridge is configured to VLAN unaware and the bridge ports are automatically attached;
ETH MNG, Gigabit Ethernet user, STM1 POS and internal host.

No further configuration is needed except for defining the device host.

Bridge parameters such as aging time may be changed.

In this mode RIC-155GE is a transparent bridge with no separation between ETH MNG traffic and GbE user traffic.

Note *In this mode, traffic between **local** GbE user and ETH MNG is blocked.*

Management access (local and remote) is available from both ETH MNG and GbE user port.

When the RIC-155GE is configured as a VLAN aware bridge, the bridge is automatically configured to a predefined VLAN setting. This VLAN setting ensures transparent service (transparent bridge), but with a total separation between ETH MNG and GbE user traffic. This setting ensures that local and remote access to the device host is only available from ETH MNG port.

Traffic separation is achieved by internal configuration of the ETH MNG, GbE user and host bridge port to the double-tagging mode, and assigning internal VLANs in a way that ETH MNG and internal host are on a different VLAN than the GbE user port. As the bridge is VLAN aware, total separation of forwarding is achieved.

The VLAN double tagging is transparent to the user data as it is stripped from the frame at the GbE/FE Tx egress. Internal VLAN double tagging completely separates ETH MNG and GbE user port, even if the same VLANs are being used by attached networks. However, ingress filtering (blocking certain user VLANs) is not possible.

Bridge detailed description

RIC-155GE provides a bridging function between its different bridge ports:

- User Ethernet port
- STM-1/OC-3c POS interface
- Fast Ethernet management port
- Internal host.

The internal bridge operates in VLAN-unaware (transparent) or VLAN-aware modes, with VLAN double-tagging (VLAN stacking).

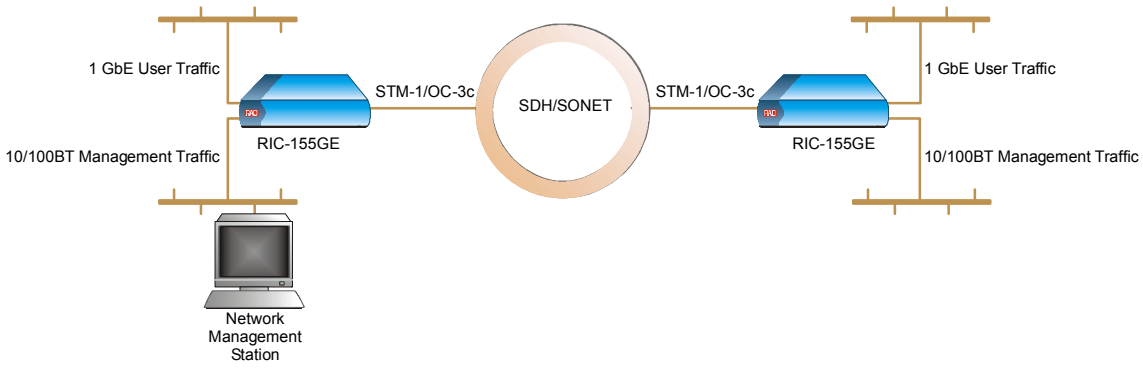


Figure 1-3. VLAN-Aware Mode Management Diagram

VLAN-Aware Mode

In the VLAN-aware mode the frame forwarding is based on the MAC addressing and VLAN tagging. RIC-155GE uses tagging and double-tagging methods to ensure ETH MNG and GbE user data separation.

When RIC-155GE receives frames (tagged or untagged), it tags or double tags them with a port default VID and forwards them according to the new VID and MAC. By using double tagging for the Gigabit Ethernet port, STM-1/OC-3c port, management port and the host, it is possible to separate data and management traffic, even without knowing user traffic parameters (tagged, untagged, user VLANs).

At the STM-1 port, RIC-155GE maps packets according to the VLAN priority bits into four fixed priority egress queues enabling differentiation between various user applications in case of congestion.

The mechanism of the VLAN-aware bridge can be described as five different processes:

- **Ingress** – checks each frame entering the bridge to decide if and how this frame should be passed on to the forwarding process
- **Learning** – learns new MAC table entries (MAC VID pairs)
- **Aging** – checks the forwarding MAC table periodically
- **Forwarding** – decides to which bridge port/ports to forward the frame
- **Transmission** – selects the format of the transmitted frame at the output port, with or without VLAN.

Ingress Process

The ingress process is composed of three processes: frame admission, ingress filtering and PVID assignment to untagged/priority only tagged frames.

- **Frame admission** – all frames, tagged and untagged, coming from the port are admitted.
- **PVID Assignment**.

  In VLAN-aware mode, each received frame entering the bridge is associated with a single VLAN ID (VID). In case the received frame does not have a VID (untagged or priority only tagged frames), a specific PVID will be assigned to these frames before they pass to the forwarding process. Every frame will be tagged with a PVID. Frames already having a VID will be double tagged.

  For untagged frames that were tagged during this process to VID=PVID, a priority tag of "0" will be assigned at the VLAN priority field.

  Double-tagged frames will copy the priority tag of the original frame priority tag.

Frames that pass this stage are submitted to the learning and forwarding processes.

Learning Process

The learning process observes the source MAC address (SA) and the PVID assigned at ingress, and updates the forwarding database with the MAC VID pair.

Aging Process

The aging process checks the forwarding MAC table periodically. Each dynamic entry aging time period that has exceeded the configured Aging Time Limit is deleted. The aging time period is the period of time since the last frame for this entry has entered the bridge. The periodic check of the MAC table (aging time intervals), results in actual aging time that can reach up to twice the value that was configured by the user.

Forwarding Process

The forwarding process is performed on the basis of the frame destination MAC VID pair. The frame is forwarded to bridge port that was specified in the MAC table for this MAC VID pair entry.

Tagged and double-tagged frames are forwarded according to the PVID that was attached to that frame during the ingress process.

In VLAN aware mode, internal settings of PVID and VLAN ports members ensures forwarding according to MAC address learnt from ports that share the same PVID (FE and internal host share the same PVID, but are different from the PVID assigned to GbE user port)

- Flooding:
  - If the (DA, VID) pair is not learned, and does not exist in the MAC table, the frame will be transmitted to all bridge ports that are associated with the same VLAN ID as the frame's PVID)internal settings GbE and STM1 as one VLAN domain and FE, Internal host as a second domain.
  - Multicasts and broadcasts are also flooded only through the bridge ports whose VLAN ID equals the frame's PVID.

Transmission Process

After the forwarding process matches the destination bridge port/ports to which the frame should be transmitted to, the transmission process transmits it while stripping the added PVID so that separation is totally transparent to end user traffic.

QoS Mapping

In VLAN-aware mode, the RIC-155GE STM1 port supports QoS mapping according to VLAN priority tag.

Four priority queues are available; each VLAN priority may be mapped to a certain priority queue.

VLAN-Unaware Mode

In this mode the bridge forwarding ignores the VLAN ID of VLAN tagged frames.

Each Ethernet packet received from Gigabit Ethernet user port is forwarded according to its destination MAC address.

Ingress Process

All frames are accepted in this mode: untagged, priority-tagged or VLAN-tagged.

Learning and forwarding is based on the MAC addresses, with no regard to the VLAN. This mode is sometimes regarded to as transparent mode, due to "tag transparency".

Learning Process

The learning process observes the source MAC address (SA) of the received frame and updates the forwarding database (FDB) with the MAC and the bridge port that the frame was received from. (FDB is also referred to as MAC table).

The learning process inserts a new entry into the MAC table. This entry consists of MAC and bridge port.

- If the MAC already exists for the same bridge port, the aging time will be updated
- If the MAC already exists, but for a different bridge port, (dynamic entry) the new entry will override the existing one

Aging Process

The aging process checks the forwarding MAC table periodically. Each dynamic entry aging time period that has exceeded the configured Aging Time Limit is deleted. The aging time period is the period of time since the last frame for this entry has entered the bridge. The periodic check of the MAC table (aging time intervals), results in an actual aging time that can reach up to twice the value that was configured by the user.

Forwarding Process

The forwarding process is performed based on the frame MAC Destination Address (MDA). The frame is forwarded to the Bridge/port specified in the MAC table for this MAC.

Frames are forwarded, dropped or flooded at this stage for the following reason:

- **Forwarded**: A frame will be forwarded according to its DA, to the bridge port where its DA was learnt.
- **Dropped**: if the port for that DA entry in the MAC table is the port on which the frame was received, the frame will be dropped
- **Flooded**:
  - If there is no information regarding the DA in the MAC table then the frame is flooded to all ports
  - Frames with multicast or broadcast address are flooded to all ports.

Transmission Process

In this bridge mode (VLAN-unaware), the frames are transmitted unchanged – no tags are added or removed.

Fault Propagation

In order to trigger the redundancy path mechanisms of the Ethernet traffic, it is necessary to notify the Ethernet device (router or switch), connected to the RIC-155GE port, of the SDH/SONET path failure. For this purpose the fault propagation mechanism is available.

If enabled, SDH/SONET alarms propagate and bring down the Gigabit Ethernet link. The Gigabit Ethernet link down can optionally propagate and cause alarms to be sent at the SDH/SONET egress.

Figure 1-4 shows the fault propagation behavior.

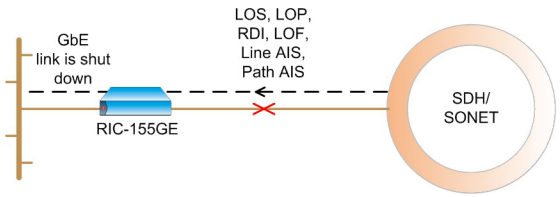


Figure 1-4. Fault Propagation

Figure 1-5 shows Gigabit Ethernet to SDH/SONET fault propagation.

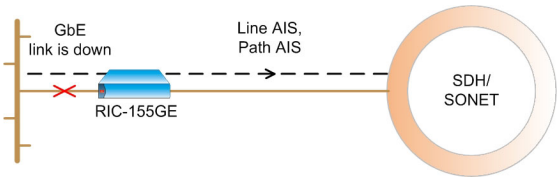


Figure 1-5. Gigabit Ethernet to SDH/SONET Fault Propagation

RIC-155GE waits for ten consecutive seconds with no alarms, before recovering.

Between SDH/SONET to Gigabit Ethernet, the Gigabit Ethernet link will recover only after ten seconds with no alarms on the SDH/SONET port.

Between Gigabit Ethernet to SDH/SONET, the SDH/SONET stops sending alarms only after ten consecutive seconds that the Gigabit Ethernet link is operating.

Management

RIC-155GE enables its performance monitoring locally from an ASCII terminal, or from a remote site using Telnet, ConfiguRAD Web based application, or RADviewLite SNMP-based fault management software.

Log Events File

Events are stored and time-stamped in an event log file that is saved in a non-volatile memory. Up to 2000 cyclic entries are maintained.

Inband Management

RIC-155GE supports inband management via Telnet, Web, and SNMP. Configuration, monitoring and statistics are available.

Out-of-Band Management

RIC-155GE enables full configuration and diagnostics via an ASCII terminal. The ASCII terminal is connected to the Control Port in the RIC-155GE front panel.

ASCII terminal activation is provided in *Chapter 3* including general instructions for navigating through the system menus and windows and modifying data.

Security

ASCII terminal, Telnet and Web access are password protected. After a period of 15 minutes of inactivity during which no character was sent to the terminal the system exits to the password screen.

If there are three attempts to enter the system using a wrong password, the RIC-155GE will disallow additional attempts and access shall be possible only by obtaining a new access code from RAD technical support.

RIC-155GE supports the following access authorization levels:

- Super user mode for configuration and monitoring
- User mode for monitoring only

Events/traps for local terminal login and for invalid (failed) login are sent to the log.

Statistics Collection and Alarms

RIC-155GE supplies extensive statistics on all levels. STM1 statistics are gathered in 15-minute period intervals. The built in volatile memory saves 24 intervals. GbE and FE statistics are not saved in intervals.

For more information, see *Chapter 6*.

Alarm Connector

RIC-155GE has an optional alarm connector including major and minor alarm dry contacts.

A Major alarm is set when one of the following occurs:

- LOS
- LOF
- LOP
- Line AIS
- Path AIS
- SLM
- Loss of integrity of the user GbE port.

A Minor alarm is set when one of the following occurs:

- Line RDI
- Path RDI
- Line BIP (above predefined threshold)
- Path BIP (above predefined threshold)
- Line FEBE (above predefined threshold)
- Path FEBE (above predefined threshold)

SDH/SONET Fault Localization (AIS/RDI)

- Line RDI – sent upon LOS, LOF or Line AIS
- Path RDI – sent upon LOS, LOF, Line AIS, LOP, SLM, Path AIS or LCD
- Section FEBE sent upon section BIP recognition
- Line FEBE sent upon line BIP recognition
- Path FEBE sent upon path BIP recognition.

Diagnostics

There are several types of diagnostics and troubleshooting procedures. For more information see *Chapter 6*.

- Loop-based troubleshooting:
  - SDH/SONET port-timed external loop, towards line
  - SDH/SONET port-timed internal loop, towards device.
- Ping tests to manager's station
- Events/Traps

  Hierarchically layered traps, event traps resulting from events that were already reported and are still active will not be sent. For example, LOF event traps will not be sent if LOS, was sent and the physical layer problem still exists.

  Physical layer events/traps for STM1, BIPs and FEBE are threshold triggered (the event/trap will be sent only if the threshold was exceeded). The threshold is configurable from 1 to 8000 events per second. One event is an errored frame.

  Traps can be disabled when a manager masks them. Events to the event log cannot be disabled. For more information, refer to *Chapter 6*.

1.4 Technical Specifications

User Ethernet Interface	*Number of Ports*	1
	Compatibility	Relevant sections of IEEE 802.3u, 802.3x, 802.1p and 802.3q
	Data Rate	1000 Mbps
	Frame Size	Regular (1668 bytes)
	Fiber Optic Interface	LC Connector
	Electrical Cable Type	Cat. 5 cable
	Options	1000BaseSx
		1000BaseT
STM-1 POS Interface	*Number of Ports*	1
	Connector	SC
	Data Rate	155 Mbps
	Options	Single mode 1310 short haul G.957 S1.1
		Single mode long haul G.957 L1.1
		Multimode ANSI T1.646
Internal Bridge	*Number of Ports*	Four: • Gigabit Ethernet • 10/100BaseT management • Local host • STM-1 POS
	LAN Table	Up to 2048 MAC addresses (learned)
	Operation Mode	VLAN-aware, VLAN-unaware
	Buffer	3150 frame buffer
	Filtering and forwarding	Up to 287,000 pps (VLAN unaware)
		Up to 270,000 pps (VLAN aware)
10/100BT Management Port	*Compliance*	IEEE 802.3
	Operation	Full duplex, autonegotiation
	Frame Size	Up to 1668 bytes
	Connector	RJ-45
Control Port	*Interface*	RS-232/V.24 (DTE asynchronous)
	Data Rate	9.6, 19.2, 38.4, 57.6, 115.2 kbps
	Connector	DB-9, female

Alarm Connector	*Connector*	DB-9 female
	Electrical Characteristics	Dry Contact, 30V/2A
Monitoring	*Statistics*	STM-1/OC-3c physical layer statistics
		STM-1/OC-3c frame counters
		Gigabit Ethernet physical layer statistics and frame counters
		10/100BaseT management port Ethernet physical layer statistics and frame counters
		10/100BaseT management port Rx/Tx frame counters
Indicators	*PWR (green)*	On: RIC-155GE is powered
		Off: RIC-155GE is off
	ALM (red)	On: SONET/SDH LOS/LOF/LOP/AIS, link down at Gigabit Ethernet, Self-test failed
		Off: No Alarm
	ETH LINK (Green)	On: link OK
		Off: link is disconnected
	ACT (Yellow)	Blinking: Ethernet frame received or sent within the last second
		Off: No frame received or sent within the last second
	SYNC (green)	On: STM-1 port is synchronized
		Off: LOS/LOF/LOP/AIS
		Blinking: RDI detected
Power	*AC Source*	100 to 240 VAC (±10%), 50 to 60 Hz
	DC Source	-48 VDC (±10%) or 24 VDC (±10%)
	Power Consumption	20W
Physical	*Height*	43 mm (1.7 in)
	Width	215 mm (8.5 in)
	Depth	300 mm (11.8 in)
	Weight	2.1 kg (4.7 lb)
Environment	*Temperature*	0–50°C (32–122°F)
	Humidity	Up to 90%, non–condensing

User Port Interface

The user interface of RIC-155GE is a Gigabit Ethernet port. The interface specifications according to the ordering options are shown below:

- 1000BaseSx (*Table 1-2*)
- 100BaseT (*Table 1-3*).

Table 1-2. 1000BaseSx Interface Specifications

Specifications	Ethernet Ports
Interface	1000BaseSx Ethernet Interface
Standards	Ethernet, IEEE 802.3
Data Rate	1000 Mbps
Interface type	Optical LC connector
Range	220m/720 ft over 62.5 µm multimode fiber or 500m/1640 ft over 50 µm multimode fiber
Wavelength	850 nm
Optical input range	0 to –17 dBm
Optical output power	0 to –9.5 dBm
Duplex modes	Full duplex

Table 1-3. 100BaseT Interface Specifications

Specifications	Ethernet Ports
Interface	1000BaseT Ethernet Interface
Standards	Ethernet, IEEE 802.3
Framing	N/A
Data Rate	1000 Mbps
Interface type, connector	Electrical, RJ-45
Range	100 meters/328 feet on UTP category 5 cables
Duplex modes	Full duplex

Network Port Interfaces

The SDH/SONET network interface is an STM1/OC-3c interface. Two options are available:

- 155 Mbps, single mode 1310 nm, short haul
- 155 Mbps, single mode 1310 nm, long haul.

Table 1-4. STM1/OC-3c Network Interface Specifications: Long Haul

Specifications	STM-1/OC-3c port
Interface	155 Mbps, single mode 1310 nm, long haul
Standards	G.957 (L 1.1) G.825 (jitter)
Framing	STS3C/STM-1
Data Rate	155 Mbps
Interface type, connector	Optical, SC
Range	40 km/25 miles
Wavelength	1310 nm
Optical output power	0 to -5 dBm
Optical input range	-10 to -34 dBm

Table 1-5. STM1/OC-3c Network Interface Specifications: Short Haul

Specifications	STM1/OC-3c port
Interface	155 Mbps, single mode 1310 nm, short haul
Standards	G.957 (S 1.1) G.825 (jitter)
Framing	STS3C/STM-1
Data Rate	155 Mbps
Interface type, connector	Optical, SC
Range	15 km/9.4 miles
Wavelength	1310 nm
Optical output power	-8 to -15 dBm
Optical input range	-8 to -28 dBm

Chapter 2

Installation and Setup

This chapter discusses RIC-155GE installation and setup, and includes the following sections:

- *Introduction*
- *Site Requirements and Prerequisites*
- *Package Contents*
- *Connecting the Interface Cables*
- *Connecting the Power Cables*.

2.1 Introduction

The RIC-155GE device is intended for installation on desktop, 19″ racks and walls. The following mounting kits are available from RAD:

- RM-35 for mounting one or two RIC-155GE units into a 19″ rack
- WM-35 for mounting one RIC-155GE unit on a wall.

After installing the unit, configure the RIC-155GE using an ASCII terminal connected to the RIC-155GE control port. The RIC-155GE configuration procedures are described in *Chapter 3* and *Chapter 4*. If problems are encountered, refer to *Chapter 6*.

Warning

No internal settings, adjustment, maintenance and repairs should be performed by either the operator or the user. Such activities must be performed only by skilled personnel who are aware of the hazards involved. Always observe standard safety precautions during installation, operation and maintenance of this product.

2.2 Site Requirements and Prerequisites

AC-powered RIC-155GE units should be installed within 1.5 meters (5 feet) of an easily accessible grounded AC outlet capable of furnishing the required supply voltage, in the range of 100 to 240 VAC, 50 or 60 Hz.

Allow at least 90 cm (36 in) of frontal clearance for operator access. For continuous product operation allow at least 10 cm (3.9 in) of frontal clearance and at least 15 cm (5.9 in) at rear of the unit, for cable connections and ventilation. For proper ventilation, keep at least 2.5 cm (0.9 in) clearance from the sides and top of the product.

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

2.3 Package Contents

RIC-155GE package contains the following items:

- RIC-155GE unit
- AC power cord
- RM-35 rack-mount kit (if ordered)
- WM-35 wall-mount kit (if ordered).

2.4 Connecting the Interface Cables

RIC-155GE includes one Ethernet port, one Gigabit Ethernet port and one SDH/SONET port. The SDH/SONET port supports a variety of interfaces (in accordance with the ordering option). In addition, RIC-155GE includes a Control port for connection to an ASCII terminal or an out-of-band management station (via a straight RS-232 cable).

➤ **To connect the user interface:**

- Connect the Ethernet cable to the designated port on the front panel.

➤ **To connect the network interface:**

- Connect the SDH/SONET interface to the designated port on the front panel.

➤ **To connect the RIC-155GE to an ASCII terminal:**

- Connect the RS-232 cable to the CONTROL port on the front panel.

2.5 Connecting the Power Cables

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 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.

RIC-155GE is equipped with a laser diode.
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 look into a laser connector when the power is turned on, a laser can cause eye damage.**
- **Do not use broken or unterminated fiber-optic cables/connectors.**

ATTENTION: The laser beam may be invisible!

Connecting AC Power

AC power is supplied to the RIC-155GE 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-155GE 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-155GE 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 discusses general RIC-155GE operation, and includes the following sections:

- RIC-155GE front panel indicators
- Operating procedures (power-on and power-off)
- Getting started instructions
- Overview of menu operations.

For detailed information on configuring RIC-155GE, see *Chapter 4*.

3.1 Turning RIC-155GE On

➤ **To power up the RIC-155GE:**

- Connect the AC mains cable to the AC connector on the rear panel. Refer to *Chapter 2*.

After power-up, check the LED indicators for proper operation. Refer to *Table 3-1*. For information on accessing RIC-155GE via an ASCII terminal, see *Connecting RIC-155GE to an ASCII Terminal*.

3.2 Controls and Indicators

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

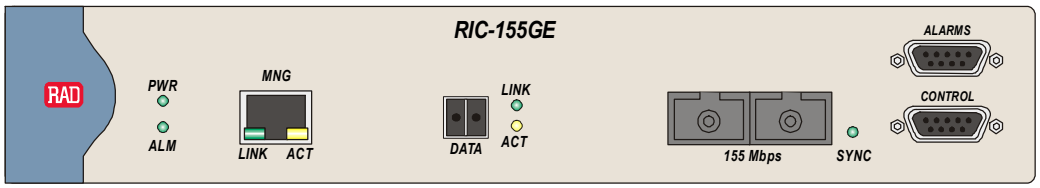


Figure 3-1. RIC-155GE Front Panel

Table 3-1. RIC-155GE LEDs

Name	LED Color	Function
PWR	Green	**On**: RIC-155GE is powered **Off**: RIC-155GE is off
ALM	RED	**On**: LOS/LOF/LOP/AIS at SONET/SDH, Link down at Giganet Ethernet, self-test failed **Off**: No Alarm
ETH LINK	Green	**On**: Link OK **Off**: Link is disconnected
ETH ACT	Yellow	**Blinking**: Frame received or sent within the last second **Off**: No frame received or sent within the last second
Network SYNC	Green	**On**: STM1 port is synchronized (no alarms) **Off**: LOS, LOF, LOP, AIS **Blinking**: RDI detected

3.3 Default Settings

Configuration parameters in RIC-155GE may or may not have defaults. Configuration parameters that have default values fall into one of two categories:

- Defaults that are configured. For example, terminal baud rate, which is 19200 and set on power up. These defaults are presented on the screen.
- Defaults that are not configurable. These defaults are not visible when entering the screen and are presented by a blank field. They show up after a 'Save' operation is done on the particular screen.

Configuration parameters that do not have default values must have values entered in their respective fields or the Save operation will fail.

Table 3-2. RIC-155GE Default Settings

Parameter	Default Value
System > Management	
Set Host IP address	0.0.0.0
Set Subnet Mask	0.0.0.0
Host Tagging	Untagged
Host VLAN	None
Host VLAN Priority	None
Authentication failure trap	ON
Trap community	Public
Read community	Public
Write community	Public
Manager IP Address	0.0.0.0

Table 3-2. RIC-155GE Default Settings (Cont.)

Parameter	Default Value
Alarm trap	All masked
System trap	ON
System > Terminal	
Baud rate	19200
Physical Layer > SDH/SONET	
Tx Clock Source	Loopback
Frame Type	SDH
Thresholds	2400
Physical Layer > Ethernet	
Auto negotiation	Enable
Max capacity advertised	100BaseT Full Duplex
Default Type	100BaseT Full Duplex
Bridge	
Bridge type	VLAN unaware
Aging time	300
Bridge > Bridge port parameters	
Priority	All VLAN priorities mapped to lower priority queue
Bridge > Bridge configuration > Ethernet priority > VLAN priority	
POS priority	4
VLAN priority	0

3.4 Configuration Alternatives

RIC-155GE has several management options:

- ASCII Terminal – connected to RIC-155GE via the RS-232 control port (see *Working with an ASCII Terminal*)
- Telnet – access to the configuration screens via any Telnet application
- RADview – RAD's user-friendly SNMP-based GUI application (refer to RADview-EMS/ATM RIC-155GE User's Manual)
- Other SNMP-based management applications

Working with an ASCII Terminal

Both the RIC-155GE configuration and monitoring operations can be performed locally, using an ASCII terminal connected to the control port. The following functions are supported:

- View system information
- Modify configuration and mode of operation, including setting system default values
- View statistics and status
- Perform diagnostics.

RIC-155GE configuration and system monitoring, including troubleshooting procedures, can also be performed from a remote site using Telnet or a Web application.

Connecting RIC-155GE to an ASCII Terminal

The ASCII terminal can be connected directly to the RIC-155GE Control port.

Use straight cable to connect directly between the Control Port and the ASCII terminal.

Any standard ASCII terminal (a dumb terminal, or a PC running terminal emulation application) that is equipped with a V.24/RS-232 communication interface can be used to set up and configure the RIC-155GE.

➤ **To connect RIC-155GE to a control terminal:**

1. Make sure that all the RIC-155GE connectors are properly connected to the appropriate media.
2. Turn on the control-terminal PC and set its default port parameters to 19,200 baud, 8 bits/character, 1 stop bit, no parity, Flow control: None.
3. Set the terminal emulator to VT100 emulation for optimal view of system menus.
4. If you are using Hyper Terminal, set the terminal mode to 132 column mode for optimal view of system menus (**Properties->Settings->Terminal Setup->132 column mode**).
5. Power up the RIC-155GE.

   The RIC-155GE displays the self-test result in the terminal. The PWR LED on the right side of the front panel is green at the end of the test.

Login

To gain access to the main menu you must login first.

➤ **To login:**

1. Press ESC to enter the login screen.

   The Login screen appears.

```
User name     >
Password      >
```

Figure 3-2. Login Screen

2. Enter your user name (**su** for full configuration and monitoring access) and then your password when prompted (the factory set password is **1234**).

Note *If the password is invalid in three consecutive attempts, the system will become inaccessible.*

User Name and Password

➤ **To enter as a supervisor:**

This allows you to configure all parameters of RIC-155GE and to change the *su* and *user* passwords.

1. Type **su** for User Name.
2. Press <**Enter**>.
3. Type **1234** for Password.
4. Press <**Enter**>.

➤ **To view the unit's statistics:**

This does not allow you to make configuration changes.

1. Type **user** for User Name.
2. Press <**Enter**>.
3. Type **1234** for Password.
4. Press <**Enter**>.

➤ **To set all passwords to the default value (1234)**:

- Enter as **su** and delete the unit's configuration through the Configuration screens.

Using the Command Language

Refer to *Figure 3-5* as a sample generic screen, to set up and configure RIC-155GE. Not all the elements appear on all the screens.

- Link to a sub menu, such as 1 or 2 on the sample screen. To reach a sub menu, select either 1 or 2 and press <**Enter**>
- Enter a value for a parameter (item 3). To enter a value, type 3, press <**Enter**>, type the value and press <**Enter**>.
- Select a value from a list (item 4). To select a value, type 4, press <**Enter**>, select the value from the list and press<**Enter**>.
- Table, to be filled with data, or viewed

Save command is shown only when at least one menu item has been changed, but illegal changes, such as a parameter out of range, shall not permit the Save operation to be carried out.

The area at the bottom of the screen is allocated for online messages. These messages carry online interactive user information containing configuration instructions and fail information with possible reasons of the failure.

Terminal Hot Keys

Terminal hot keys are provided per screen to enhance the functionality that is required of that screen. The available hot keys are listed in the lower part of each screen. The following hot keys are system keys, available on screens:

- Esc – Return to previous menu
- S or s – Save
- D or d – Delete, for example to delete an item from the Data Base
- ! – Return to the main menu
- & – Exit to password screen (to prevent unauthorized access after completing the session)
- X or x – Next item
- F or f – Forward interval (statistic menus)
- B or b – Backward interval (statistic menus)
- @ - Full Screen – Allocate full screen for messages.

Screen path, at the bottom, showing the path to the specific screen that is being currently displayed. Such as: Main>Configure>etc.

Viewing the Main Menu

Figure 3-3 shows the RIC-155GE Main Menu. Access to system configuration and control functions is via this menu.

At any point and from any screen, you can press <**Esc**> repeatedly, backing up until you reach the Main Menu.

```
              RIC-155GE - RAD data communications
 RIC-155GE


 1. Inventory                    >
 2. Configuration                >
 3. Monitoring                   >
 4. Diagnostic                   >
 5. File utility                 >
>
Main menu >
ESC-prev. menu; !-main menu; &-exit;                  1 user(s)
```

Figure 3-3. Main Menu

The Main menu options are:

- Inventory (type **1**): View system information, HW/SW versions and HW configuration
- Configuration (type **2**): Set and configure all the parameters required for the operation of RIC-155GE
- Monitoring (type **3**): Monitor system performance and statistics
- Diagnostics (type **4**): Perform diagnostics
- File utility (type **5**): Upload/download application files, configuration files and backup files.

Viewing the Configuration Menu

Figure 3-4 shows the RIC-155GE Configuration Menu. Access to the system configuration is via this menu.

Main Menu
↓
2. Configuration

```
              RIC-155GE - RAD data communications
Configuration
 1. Quick Setup              >
 2. System                   >
 2. Physical layer           >
 3. Bridge                   >
>
Main>Configuration>
ESC-prev. menu; !-main menu; &-exit;                  1 user(s)
```

Figure 3-4. Configuration Menu

The Configuration menu options are:

- Quick Setup (type **1**): Perform a quick setup when you are familiar with the system and basic configuration modes
- System (type **2**): Configure the global system parameters, such as Management, Terminal and others
- Physical layer (type **3**): Configure the physical layer parameters, such as SONET/SDH, clocks, ETH rate and duplex mode
- Bridge (type **4**): Configure the bridge, change bridge parameters.

Type the number for the type of configuration; the appropriate menu appears.

Sample Functional Screen

Figure 3-5 shows a generic sample screen, with main items displayed.

```
          Title line (For example: RIC-155GE Main menu
                        Short error message


1. Sub Menu>
2. Sub Menu>
3. Parameter X [Range] …… (value)
4. Parameter Y>           (Select value from the list)
5 Table Z []
prompt>

Help line message
Parameter help line such as "Esc" to return to previous menu
Main>Config>System.
-----------Division screen line ------------------
Scroll message are
```

Figure 3-5. Sample Functional Screen

Table Sample Screen

Figure 3-6 shows a typical table. V ID and Names are the columns of parameters to be defined.

```
              RIC-155GE - RAD data communications


                              VLAN Table
1. V ID       | NAME     |

>

Main>Configuration>Interworking>Bridge>VLAN Table
ESC-prev. menu; !-main menu; &-exit
1 user (s)
```

Figure 3-6. Sample Table Screen (VLAN)

The following hot keys are used to navigate a table screen:

- Scroll:
  - I – left
  - r – right
  - u – up
  - d – down
- Move:
  - L – left
  - R – right
  - U – up
  - D – down
- Row:
  - a – add
  - t – remove
- m – represents entry as menu
- c – clear table
- TAB – select next changeable cell
- S <row number><column number> – select cell

Menu Maps

The following figures illustrate the RIC-155GE menus. For detailed information on configuring RIC-155GE, refer to *Chapter 4*.

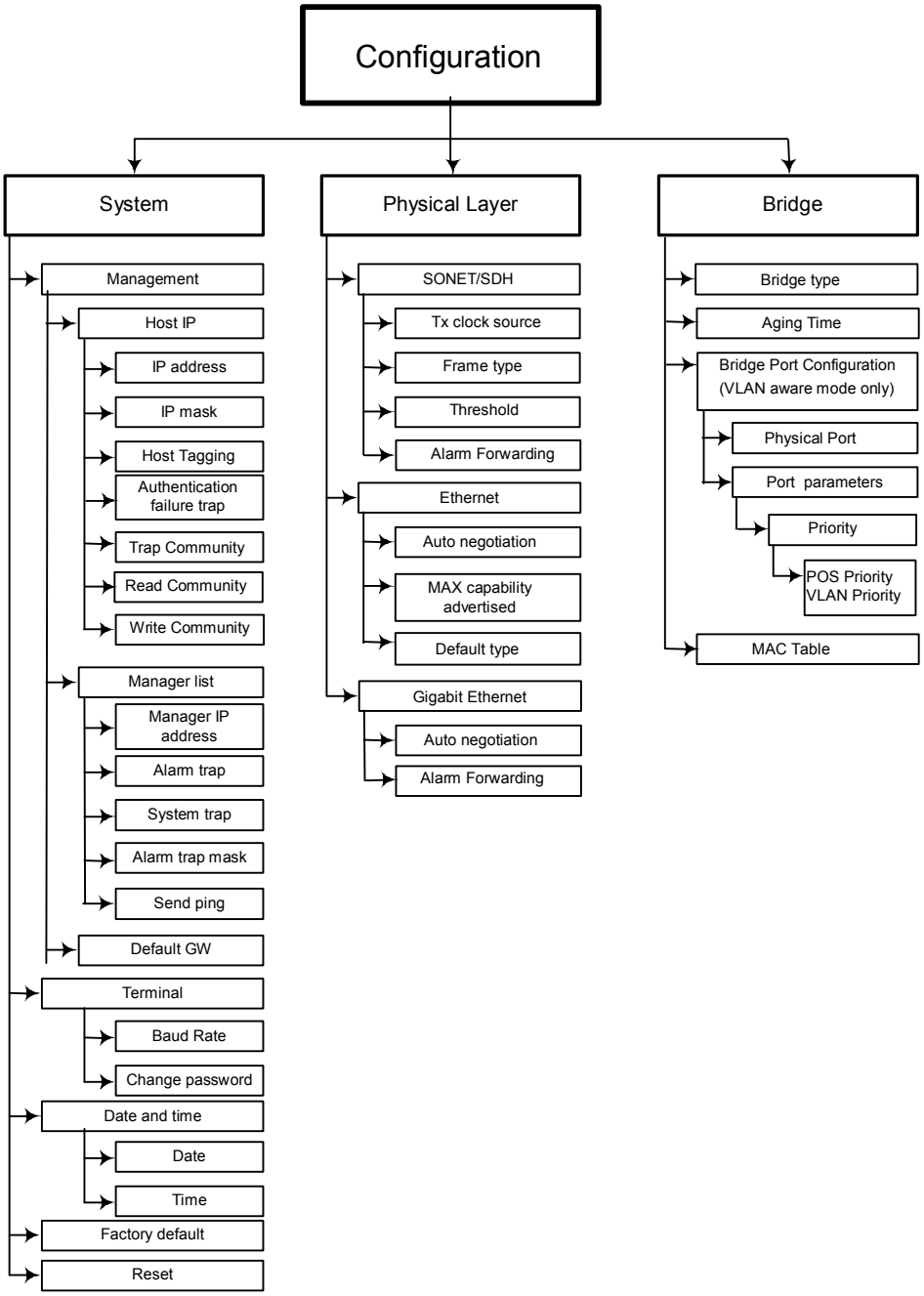


Figure 3-7. Configuration Menu Tree

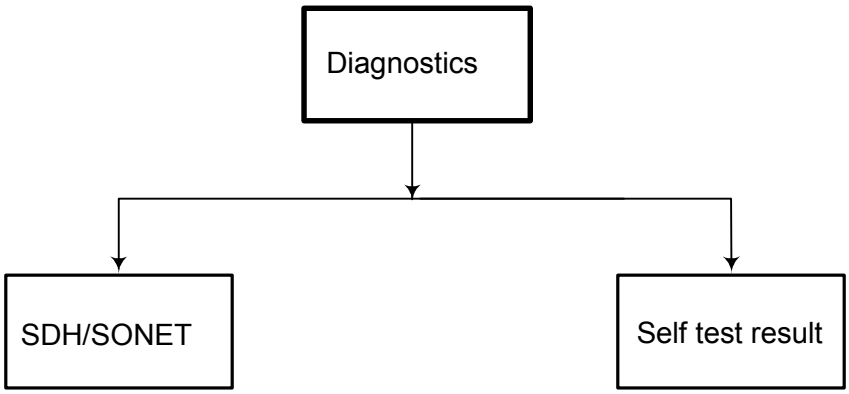


Figure 3-8. Diagnostics Menu Tree

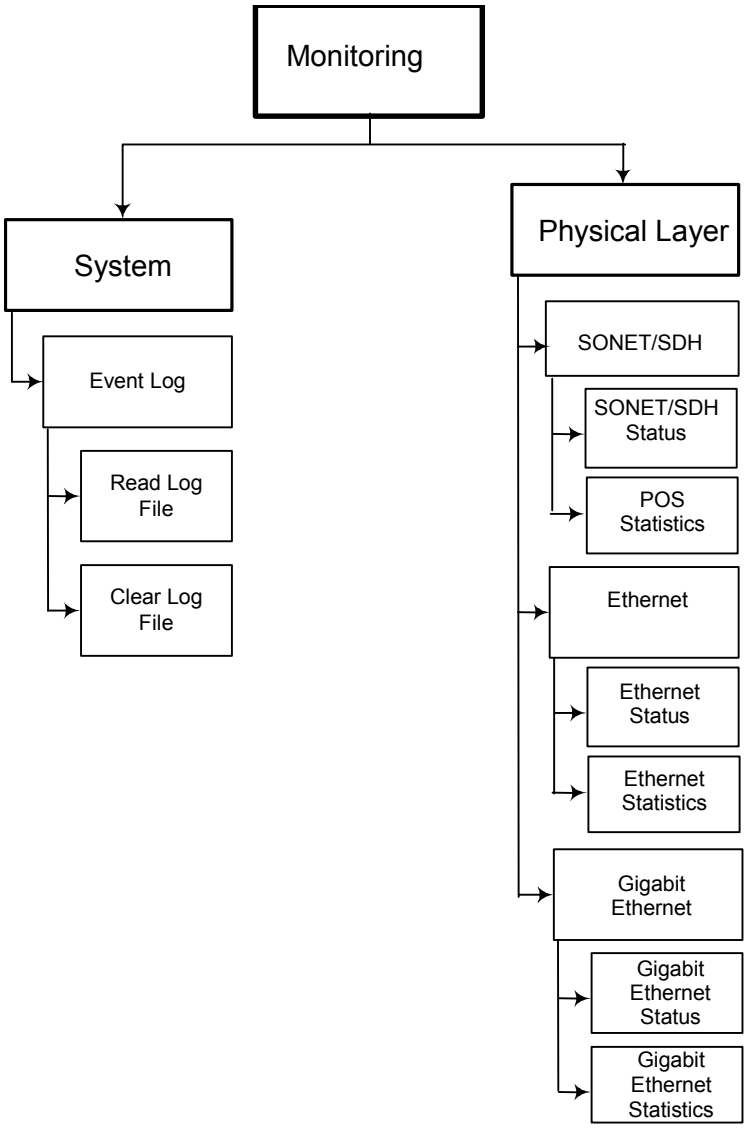


Figure 3-9. Monitoring Menu Tree

3.5 Turning RIC-155GE Off

➤ **To turn off RIC-155GE:**

- Disconnect the power cable from the rear panel.

Chapter 4

Configuration

This chapter describes the configuration procedures for RIC-155GE, and includes the following sections:

- *Configuring RIC-155GE for Management*
- *Configuring RIC-155GE for Operation*
- *Additional Tasks*

4.1 Configuring RIC-155GE for Management

Configuring the System Parameters

Main Menu
↓
2. Configuration
↓
2. System

The system menu allows access to system configuration sub-menus, such as: Management, Terminal, Date & Time and to other basic system parameters.

```
                RIC-155GE - RAD data communications
System

 1. Management                      >
 2. Terminal                        >
 3. Date & Time                     >
 4. Factory default                 ...
 5. Reset                           ...

>

Main>Configuration>System>

ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-1. System Menu

Note *If you select "Factory Default" or "Reset", you will be asked to confirm your selection by pressing Y or N.*
You will also be asked if management configuration should be set to default.

Defining the Host IP

➤ **To define the Host IP:**

- From the Main Menu, select **System > Management > Host IP**.

Main Menu
↓
2. Configuration
↓
1 System
↓
1. Management
↓
1. Host IP

```
                RIC-155GE - RAD data communications
Host IP

 1. IP address                      ... (-)
 2. IP mask                         ... (-)
 3. Host Tagging                    ... >
 4. Host VLAN                       ... >
 5. Host VLAN priority              ... >
 6. Authentication failure trap   >   (ON)
 7. Trap community                  ... (public)
 8. Read community                  ... (public)
 9. Write community                 ... (public)
>
Main>Configuration>System>Management>Host IP>

ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-2. Host IP Menu

Table 4-1. Host IP Parameters

Parameter	Possible Values	Remarks
IP Address	0.0.0.0 to 255.255.255.255	**Default: None**
IP Mask	0.0.0.0 to 255.255.255.255	**Default: None**
Host Tagging	Tagged Untagged	Specifies if the Management station is using tagged or untagged frames. RIC-155GE must transmit in the same format, even if bridge is in VLAN aware mode. **Default: Untagged**
Host VLAN	1–4094	Set the VID of the packets sent by the host **Default: None**
Host VLAN priority	0–7	Set VLAN priority for packets sent by host. Relevant if Host Tagging is set to Tagged **Default: None**
Authentication failure trap	ON OFF	Authentication failure trap is generated when a system manager attempts to set a RIC-155GE parameter with an incorrect community value. The authentication failure trap will not be generated. **Default: ON**
Trap community		Enter a name of up to 20 alphanumeric characters, case sensitive **Default: Public**
Read community		Enter a name of up to 20 alphanumeric characters, case sensitive **Default: Public**
Write community		Enter a name of up to 20 alphanumeric characters, case sensitive **Default: Public**

Setting the Manager List

The Manager List parameters are used when the RIC-155GE inband management capability is used. They contain the managers and trap masks per manager.

Main Menu
↓
2. Configuration
↓
1 System
↓
1. Management
↓
2. Manager List

➤ **To configure the Manager List:**

- From the Main Menu, select **System > Management > Manager List**.

```
              RIC-155GE - RAD data communications
Manager list
 1. Manager IP address       ... (-)
 2. Alarm trap               >   (MANUAL)
 3. System trap              >   (ON)
 4. Alarm trap mask          ... (-)
 5. Send Ping
>
Main>Configuration>System>Management>Manager list>


ESC-prev. menu; !-main menu; &-exit;                  1 user(s)
```

Figure 4-3. Manager List Menu

Table 4-2. Manager List Parameters

Parameter	Possible Values	Remarks
Manager IP Address	0.0.0.0 to 255.255.255.255	
Alarm trap	All masked	All alarm traps are masked.
	None masked	All alarms are enabled. The manager is informed on the occurrence of any alarm (entry and exit to/from alarm state).
	Manual	User can specifically enable/disable each singular trap. When set to this mode, select **4** (Alarm trap mask) to set each alarm trap to be **masked** or **active**.
		Default: All masked
System trap	ON, OFF	System traps are enabled. The manager is informed whenever there is a change in system status, such as cold start, login attempts.
		Default: ON
Alarm trap mask		See *Figure 4-4* for alarm trap mask menu.
Send Ping		Checks the connectivity to the manager by automatically sending a ping to the Manager IP Address. A success or fail message appears at the bottom of the screen.

```
                RIC-155GE - RAD data communications
Alarm trap mask

 1. LOS          >   (Active)    12. Line FEBE        >   (Active)
 2. LOF          >   (Active)    13. Path FEBE        >   (Active)
 3. SLM          >   (Active)
 4. LOP          >   (Active)
 5. Line AIS     >   (Active)
 6. Path AIS     >   (Active)
 7. Line RDI     >   (Active)
 8. Path RDI     >   (Active)
 9. Section BIP  >   (Active)
10. Line BIP     >   (Active)
11. Path BIP     >   (Active)

>

Main>Config.>System>Management>Manager list>Alarm trap mask

ESC-prev. menu; !-main menu; &-exit;                      1 user(s)
```

Figure 4-4. SDH/SONET Alarm Trap Mask Menu

All of the alarms above can be set to Active (the manager is informed when the specific alarm occurs) or Masked (the alarm is masked).

Defining the Default Gateway

➤ **To configure the Default Gateway:**

- From the Main Menu, select **System > Management**.

```
               RIC-155GE - RAD data communications
Management

 1. Host IP                  >
 2. Manager list             >
 3. Default GW               ... (0.0.0.0)

>

Main>Configuration>System>Management>

ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-5. Management Menu

Notes *Selecting "Default GW" as 0.0.0.0 disables the Default Gateway*
To configure "Default GW", a host should be configured first and the default gateway must be in the host subnet.

Configuring the Terminal Parameters

Main Menu
↓
2. Configuration
↓
1 System
↓
2. Terminal

Use the terminal configuration screen to configure the baud rate and to change the password.

```
                RIC-155GE - RAD data communications
Terminal
 1. Baud Rate                >    (19200bps)
 2. Change password          >
>
Main>Configuration>System>Terminal>

ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-6. Terminal Menu

Table 4-3. Terminal Parameters

Parameter	Possible Values	Remarks
Baud rate	9600, 19200, 38400, 57600 or 115200 bps	**Default: 19200**
Change password	User name	Type **su** (superuser) for full authorization or **user** for user level monitoring only.
	Current password	Enter the current password for the user name selected
	New password	Enter a name of up to 10 alphanumeric characters, case sensitive. This parameter appears only if the **User name** and **Current password** parameters are correct.
	Confirm new password	Retype the new password. This parameter appears only if the **User name** and **Current password** parameters are correct.

4.2 Configuring RIC-155GE for Operation

This section contains detailed instructions for configuring RIC-155GE, and contains the following sections:

- *Configuring the System Parameters*
- *Configuring the Terminal Parameters*
- *Configuring the Physical Layer Parameters*
- *Configuring the Bridge Parameters*
- *Defining the Host IP*

Figure 4-7 shows the recommended configuration order. RIC-155GE system configuration should be performed before configuring services (such as bridge).

General device configuration consists of:

Configuration of the System Parameters	Configure the System: Terminal, Date/Time and the Management functions: Host IP, Managers, and their sub-functions.
Configuration of the Physical Layer	Configure the Physical Layer: SDH/SONET, Ethernet, Gigabit Ethernet and their sub-functions.

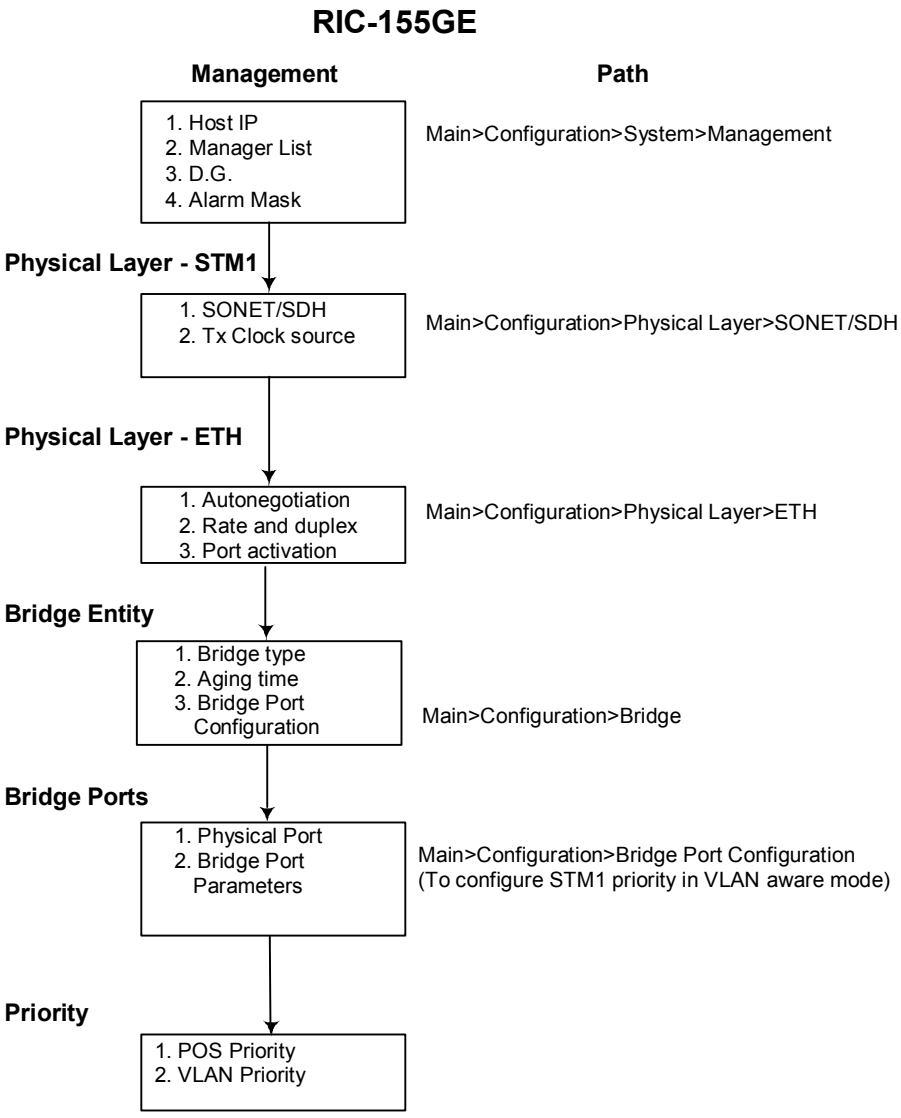


Figure 4-7. Flow of Configuration Operations

Configuring the Physical Layer Parameters

The physical layer configuration provides access to physical layer configuration menus that are required to configure the SDH/SONET, Ethernet or Gigabit Ethernet ports. This menu varies, depending on the type of network interface.

Defining the SDH/SONET Interface

Main Menu
↓
2. Configuration
↓
2. Physical layer
↓
1. SDH/SONET

```
                RIC-155GE - RAD data communications
SDH/SONET
 1. TX clock source                    >   (Loop Back)
 2. Frame type                         >   (SDH)
 3. Thresholds                         >
 4. SDH/SONET to GbE Alarm Forwarding  >
>


Main>Configuration>Physical layer>SDH/SONET


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-8. SDH/SONET Menu

Table 4-4. SDH/SONET Parameters

Parameter	Possible Values	Remarks
Tx Clock source	Internal	Transmit clock is generated by internal oscillator (at ±20 ppm accuracy).
	Loopback	Timing is recovered from line Rx clock and used as transmit clock.
		Default: Loopback
Frame type	SONET	SONET frame format
	SDH	SDH frame format
		The difference between the two formats is in the two bits in the H1 byte that have different value definitions (SS bits)
		Default: SDH
Thresholds		Sets the physical layer errors thresholds (See *Figure 4-9*).
		2400 is the default value for all thresholds.
		Physical layer events/traps are threshold triggered, that means that an event/trap will be sent only if the threshold was exceeded. Threshold can be configured for 1 to 8000 events per second, where an event is an errored SDH/SONET frame.
		For BIPs, the value is the threshold of the SES counter in the Physical Layer statistics.

```
              RIC-155GE - RAD data communications

Thresholds

 1. RS-BIP (B1) [1 - 8000]          ... (2400)
 2. MS-BIP (B2) [1 - 8000]          ... (2400)
 3. HP-BIP (B3) [1 - 8000]          ... (2400)
 4. MS FEBE     [1 - 8000]          ... (2400)
 5. HP FEBE     [1 - 8000]          ... (2400)
>
Main>Physical configuration>SDH/SONET>Threshold


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-9. Thresholds Screen

Configuring SDH/SONET to Gigabit Ethernet Fault Propagation

```
              RIC-155GE - RAD data communications
SDH/SONET to GbE Alarm Forwarding


Recovery                            (Automatic)
1. Physical failure forwarding      (Enable)


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-10. SDH/SONET to GbE Fault Propagation Menu

Table 4-5. SDH/SONET to GbE Fault Propagation Parameters

Parameter	Possible Values	Remarks
Physical failure forwarding	Enable Disable	When enabled, SDH/SONET alarms are allowed to propagate, and bring down the GbE link. **Default: Disable**

Defining the Gigabit Ethernet Interface

Main Menu
↓
2. Configuration
↓
2. Physical layer
↓
2. GbE

```
                RIC-155GE - RAD data communications
GbE
 1. Auto negotiation                    >   (Enable)
 2. GbE to SDH/SONET Alarm Forwarding   >
>

Main>Configuration>Physical layer>GbE

ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-11. GbE Menu

Configuring Gigabit Ethernet to SDH/SONET Fault Propagation

```
                RIC-155GE - RAD data communications
GbE to SDH/SONET Alarm Forwarding

Recovery                            (Automatic)
1. Physical failure forwarding      (Enable)

ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-12. SDH/SONET to GbE Fault Propagation Menu

Table 4-6. SDH/SONET to GbE Fault Propagation Parameters

Parameter	Possible Values	Remarks
Physical failure forwarding	Enable Disable	When enabled, GbE link integrity down triggers the transmission of SDH/SONET alarms (Line/Path AIS). **Default: Disable**

Defining the ETH MNG Interface

Main Menu
↓
2. Configuration
↓
2. Physical layer
↓
2. Ethernet

```
                RIC-155GE - RAD data communications
ETH MNG
 1. Auto Negotiation              >   (Enable)
 2. MAX capability advertised     >   (10 BaseT Half Duplex)
 3. Default type                  >   (100 BaseT Full Duplex)
>
Main>Configuration>Physical layer>ETHERNET


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-13. Ethernet Menu

Table 4-7. Ethernet Parameters

Parameter	Possible Values	Remarks
Auto negotiation	Enable	Auto negotiation mode is enabled. The rate and duplex modes will be set as the result of the auto negotiation process, while the maximum advertised port capability is set by selecting item 3 on the above menu
	Disable	The port does not respond when auto negotiation is initiated. Rate and duplex mode set require selection of item 4 on this menu.
		Default: Enable
Max capability advertised	10BaseT Half Duplex, 10BaseT Full Duplex, 100BaseT Half Duplex, 100BaseT Full Duplex	This max port capability will be advertised during auto negotiation process.
		Default: 100BaseT Full Duplex
Default type	10BaseT Half Duplex, 10BaseT Full Duplex, 100BaseT Half Duplex, 100BaseT Full Duplex	Sets the rate and duplex mode, only when auto negotiation is disabled. The options are:
		Default: 100BaseT Full Duplex

Configuring the Bridge Parameters

Main Menu
↓
2. Configuration
↓
4. Bridge

```
                RIC-155GE - RAD data communications
Bridge
1. Bridge type                        (VLAN aware)
 2. Aging time [300 - 1000000]sec       ... (300)
 3. Bridge port configuration     >
 4. MAC table                     >
>
Main>Configuration>Bridge>

ESC-prev.menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-14. Bridge Menu

Table 4-8. Bridge Parameters

Parameter	Possible Values	Remarks
Bridge type	VLAN Aware VLAN unaware	Set the bridge type mode. **Bridge type** – After changing Bridge type, device should be reset. **Default: VLAN unaware**
Aging time	300 to 10^6	Set the bridge aging time in Seconds. Actual aging time can reach up to twice the configured value. **Default: 300**
Bridge port configuration		Bridge port configuration is available only when the Bridge Type is VLAN aware.
MAC table		See MAC table screen description

Note *All bridge port parameters can be changed as required. There is no delete bridge function.*

Bridge Port Configuration

Main Menu
↓
2. Configuration
↓
4. Bridge
↓
3 Bridge port configuration

```
                RIC-155GE - RAD data communications
Bridge port configuration


 1. Physical port            >   (POS)
 2. Bridge port parameters   >
>
Main>Configuration>Bridge>Bridge port configuration>

ESC-prev. menu; !-main menu; &-exit;                   1 user(s)
```

Figure 4-15. Bridge Port Configuration Menu

Table 4-9. Bridge Port Configuration Parameters

Parameter	Possible Values	Remarks
Physical port	STM1 POS	Informative item. (POS only bridge port can be configured)
Bridge port parameters		See *Figure 4-16* and *Table 4-10*.

```
               RIC-155GE - RAD data communications
Bridge port parameters
1. Priority                    ...>
>
Main>Configuration>Bridge>Bridge port parameter>


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-16. Bridge Port Parameters Menu

Table 4-10. Bridge Port Parameters

Parameter	Possible Values	Remarks
Priority		Allows traffic transmitted by the ETH bridge port to be prioritized. Four priorities are available to map frames to different ETH port priority queues according to their VLAN priority fields. Relevant only when **Bridge type** is set to **VLAN aware** and **Bridge port physical layer** is set to **STM1 POS**. **Default : all VLAN priorities mapped to lower priority queue.**

Notes *Parameters can be changed at any time, but a short traffic interference will occur.*

Setting Priorities (STM-1 POS, VLAN-Aware Mode)

```
               RIC-155GE - RAD data communications
Priority
 1. POS Priority [1 - 4]      ... (4)
 2. VLAN priority             >   (0)
>
Main>Configuration>Bridge>Port configuration>ETH priority

ESC-prev.menu; !-main menu; &-exit;                      1
user(s)
```

```
              RIC-155GE - RAD data communications
VLAN priority (1)
 1. [0 - 7] ... (1)
 2. [0 - 7] ... (3)
 3. Save All
>
Main>Configuration>Bridge>Port configuration>Ethernet
Priority>VLAN priority


ESC-prev. menu; !-main menu; &-exit;        ; a-add   1 user(s)
```

Figure 4-17. VLAN Priority Menus

Table 4-11. VLAN Priorities Table

Parameter	Possible Values	Remarks
POS Priority	1 to 4	Set Egress port priority queue, with 1 assigned to highest priority and 4 to lowest priority. **Default: 4**
VLAN priority	0 to 7	Set VLAN priority to map frames with the selected VLAN priority to the priority queue that was selected in item 1. An ETH queue may be associated with one or more VLAN priorities. An ETH queue associated with VLAN priority 0 is automatically associated with all the rest of the VLAN priority values that are not attached to another ETH queue. VLAN priority frames that are not attached to an ETH queue while priority 0 is also not attached to an ETH queue are dropped. **Default: 0**

➤ **To add VLAN priorities:**

1. Type **a** and enter the desired priority value (0 to 7).
2. Continue typing **a** and entering priority values (up to eight) as needed.
3. Type the number associated with **Save All**.

➤ **To delete VLAN priorities:**

1. Type the number associated with the VLAN priority that you want to delete.
2. Type **t** to delete.

Viewing the MAC Table

The MAC table can be viewed or its contents erased.

Main Menu
↓
2. Configuration
↓
4. Bridge
↓
4. MAC table

```
               RIC-155GE - RAD data communications
MAC table
 1. View MAC table           >
 2. Erase MAC table
>
Main>Configuration>Bridge>MAC table>


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-18. MAC Table Menu

➤ **To view the MAC table:**

- Type **1** in the MAC Table menu.

  The following screen appears:

```
               RIC-155GE - RAD data communications
View MAC table [ Total = 19 Learned = 19 Static = 0 ]
 #   VLAN ID          MAC ADDRESS     BRIDGE PORT     STATUS
 1   ---           00-00-12-34-54-55       2          Learned
 2   ---           00-00-44-44-44-44       3          Learned
 3   ---           00-12-23-23-23-23       3          Learned
>
Main>Configuration>Bridge>View MAC table>


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Notes

- *This table is read-only and cannot be edited.*
- *VLAN ID column is visible only if the bridge is in VLAN aware mode. It will show the internal PVID assigned to this packet (according to the ingress port).*

➤ **To erase the MAC table entries:**

- Type **2** in the MAC Table menu.

4.3 Additional Tasks

Setting the Date and Time

Main Menu
↓
2. Configuration
↓
1 System
↓
3 Date & Time

The Date & Time menu enables you to set the date and time of the day in specified format.

```
                RIC-155GE - RAD data communications
Date & Time

 1. Date[yyyy-mm-dd]          ... (2003-03-03)

 2. Time[hh:mm:ss]            ... (02:34:50)

>


Main>Configuration>System>Date & Time>


ESC-prev. menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-19. Date and Time Menu

Note *The date and time format is specific and shown next to each parameter.*

Viewing the Inventory

The inventory menu enables you to view the RIC-155GE hardware configuration and hardware/software versions.

Main Menu
↓
1. Inventory

```
                    RIC-155GE - RAD data communications
Inventory
   Boot Version              ... (1.18) May 6 2004, 11:14:47
   Boot File System          ... (1.18 May 6 2004, 10:28:15)
   Application SW version    ... (1.00 - Feb 6 2005, 15:15:14)
   Main HW revision          ... (0.0-A)
   Device serial number      ... (12345678)

        INTERFACE INFORMATION
   ETHERNET 1          ... (ETH 10/100 Mbps over UTP RJ45)
   1 GbE               ... (ETH 1000 Mbps over UTP (1000BaseT) RJ45)
   POS port            ... (SONET/SDH 155M MM 1310 SC)
   Power supply type   ... (AC)
   Power supply CSL    ... (A)
   DRY Contact Port    ... (DB9)
>
Main>Inventory>
ESC-prev.menu; !-main menu; &-exit;                    1 user(s)
```

Figure 4-20. Typical Inventory Screen

Notes *POS Port options:*
- *S1.1, SC connector*
- *L1.1, SC connector*

DRY Contact Port available if ordered.

Returning to Factory Defaults

The Factory default option resets the system format to factory default values.

➤ **To configure the unit to factory default values:**

1. Type **4** (Factory default) in the **System** menu.

   A confirmation message appears.

```
ARE YOU SURE YOU WANT TO RETURN TO FACTORY DEFAULT? (Y/N)
```

2. Type **Y** to confirm or **N** to cancel.

   The device will reboot automatically after being reset to factory default.

Transferring Files

This section describes the software and file transfer procedures for RIC-155GE. *Figure 4-21* illustrates the File Utility menu terminal screens.

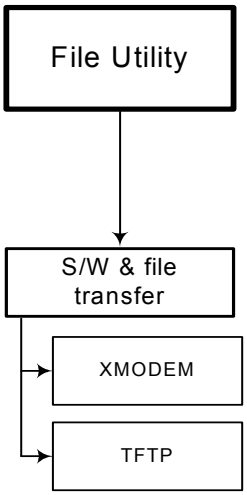


Figure 4-21. File Utility Menu Tree

RIC-155GE provides two ways to transfer files:

- Using the serial interface via X-modem
- Using the inband communication to download/upload files via TFTP.

Main Menu
↓
5. File Utility
↓
1. SW & File transfer

```
                RIC-155GE - RAD data communications
S/W & file transfer
 1. Download/Upload using XMODEM     >
 2. Download/Upload using TFTP       >
>
Main>File utility>
ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 4-22. S/W & File Transfer Menu

Warning

The Boot Code should not be tampered with. It should ONLY be handled by authorized personnel, or after contacting RAD Technical Support.

Notes

If you want to return to the original code version after downloading new software code, reboot RIC-155GE, enter the Boot menu and choose the File Swap option, as described in Appendix A.

Transferring files via XMODEM

Main Menu
↓
5. File Utility
↓
1. S/W & File transfer
↓
1. XMODEM

Only Configuration files can be uploaded. If you enter a software file, the **Upload** option is not displayed.

A confirmation message appears. Upon confirmation, the download or upload process begins.

```
              RIC-155GE - RAD data communications
Download/Upload using XMODEM


 1. File                          >   (Configuration code)
 2. Download
 3. Upload
>
Main>File utility>XMODEM>
ESC-prev.menu; !-main menu; &-exit; @-debug            1 user(s)
```

Figure 4-23. XMODEM Menu

Table 4-12. XMODEM Parameters

Parameter	Possible Values	Remarks
File	Application code, Boot code, Configuration code	Application and Boot codes can be downloaded only. Configuration code can be downloaded or uploaded.
Download		Download a software or configuration file.
Upload		Upload a configuration file

Transferring files via TFTP

Main Menu
↓
5. File Utility
↓
1. S/W & File transfer
↓
2. TFTP

```
              RIC-155GE - RAD data communications
Download/Upload using TFTP


1. File name                  ... (ric155ge.db)
2. Server IP                  ... (000.00.000.00)
3. Command                    >   (No Operation)
4. View Transfer Status       >
>
Main> >File Utility>TFTP
ESC-prev. menu; !-main menu; &-exit; @-debug           1 user(s)
```

Figure 4-24. TFTP Menu

Table 4-13. TFTP Parameters

Parameter	Possible Values	Remarks
File name		File name to be downloaded or uploaded.
Server IP	0.0.0.0 to 255.255.255.255	IP address of the server from/to which the file is loaded
Command	No Operation, Software download, Configuration download, Configuration upload,	
View transfer status		View the transfer status in real-time. It is updated every second. The screen is read-only.

If all parameters are correct, you will be asked for confirmation. After confirmation, the TFTP session begins. You can view the Transfer Status (see *Figure 4-25*).

The View Transfer Status values are listed in *Table 4-14*.

Note *Boot code download is not possible using TFTP.*

```
                RIC-155GE - RAD data communications
View transfer status
     Status                      ...   (Ended Ok)
     Error                       ...   (No Error)
>
Main> >File Utility>TFTP> View transfer status
ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 4-25. View Transfer Status Window

Table 4-14. View Transfer Status Parameters

Parameter	Possible Values
Status	No Operation, Connecting, Transferring Data, Ended OK, Error
Error	No Error, Unknown Host, Not Connected, Unknown Error, Time Out, Invalid Error, Interval Error

Performing Reset

The reset option resets the RIC-155GE and the entire initialization process is repeated.

➤ **To reset the RIC-155GE configuration:**

1. Type **5** (Reset) in the **System** menu.

   A confirmation message appears.

```
ARE YOU SURE YOU WANT TO RESET THE DEVICE? (Y/N)
```

2. Type **Y** to confirm or **N** to cancel.

   The device will reboot automatically after reset.

Chapter 5

Configuring Typical Applications

This chapter describes the configuration of RIC-155GE for two typical applications. Refer to *Chapter 4* for a detailed description of all configuration options available for RIC-155GE.

5.1 Transparent VLAN Unaware Application

Figure 5-1 illustrates a typical application in which the user and management traffic are transferred via the Gigabit Ethernet port.

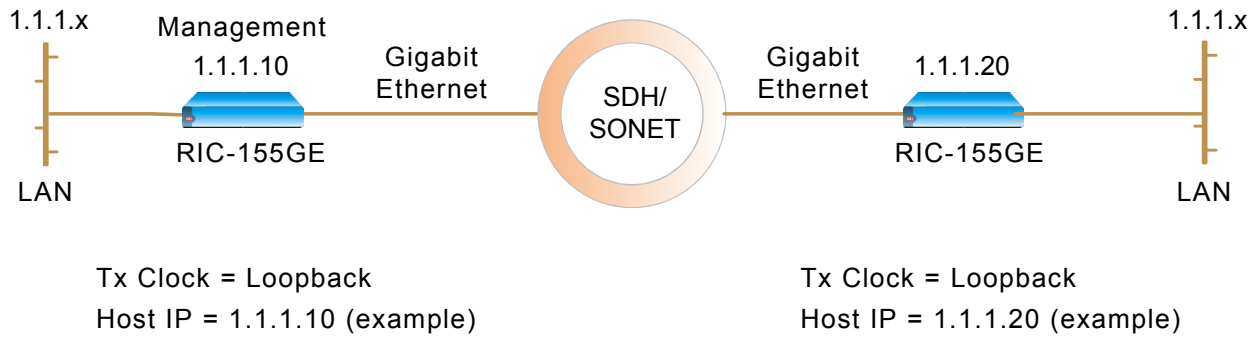


Figure 5-1. Transparent VLAN Unaware Application

Configuration Procedure

➤ **To configure the management parameters:**

1. From the Main Menu, select **Main> Configuration> System > Host IP**.
2. Define the Host IP (example 1.1.1.10).
3. Define the IP Mask (example 255.255.255.0).
4. Select <**Save**>.

➤ **To configure the physical layer parameters:**

1. From the Main Menu, select **Main> Configuration > Physical Layer > SDH/SONET**.
2. Define the Tx Clock source as Loopback (default).

3. Define the Frame type according to the network type, SDH or SONET (SDH is the default).
4. Select <**Save**>.

➤ **To configure the Bridge parameters:**

1. From the Main Menu, select **Configuration > Bridge**.
2. Define the Bridge type as VLAN unaware (default).
3. Select <**Save**>.

Note *When you change the Bridge type, the device is reset automatically.*

5.2 Typical VLAN Aware Application

Figure 5-2 illustrates a typical application in which the with user traffic transferred via the Gigabit Ethernet port and the management traffic is transferred via the Fast Ethernet port.

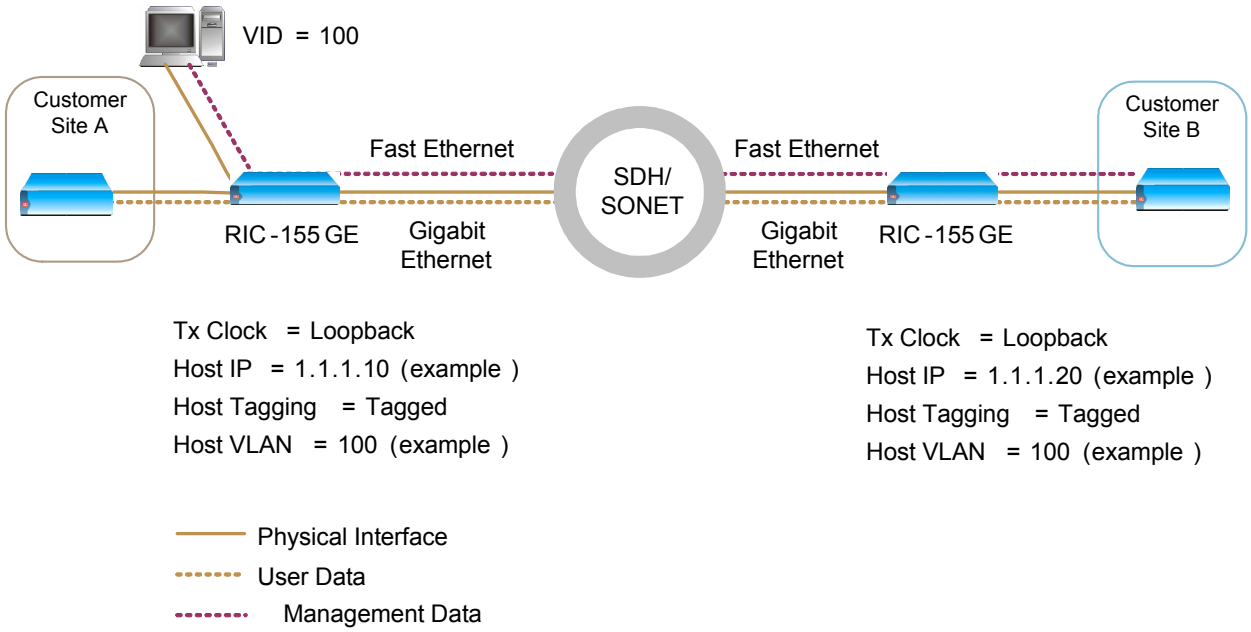


Figure 5-2. VLAN-Aware Application

Configuration Procedure

➤ **To configure the management parameters:**

1. From the Main Menu, select **Main> Configuration> System > Host IP**.
2. Define the Host IP (example 1.1.1.10).
3. Define the IP Mask (example 255.255.255.0).
4. Select <**Save**>.

➤ **To configure the physical layer parameters:**

1. From the Main Menu, select **Main> Configuration > Physical Layer > SDH/SONET**.
2. Define the Tx Clock source as Loopback (default).
3. Define the Frame type according to the network type, SDH or SONET (SDH is the default).
4. Select <**Save**>.

➤ **To configure the Bridge parameters:**

1. From the Main Menu, select **Configuration > Bridge**.
2. Define the Bridge type as VLAN aware.
3. Select <**Save**>.

Note *When you change the Bridge type, the device is reset automatically.*

Chapter 6

Troubleshooting and Diagnostics

This chapter describes the troubleshooting and diagnostic procedures for RIC-155GE.

Error detection, troubleshooting and diagnostics procedures are explained in this chapter. The fault detection and correction techniques rely on:

- Events recorded in the event log
- Loopback tests, external and internal, such as SDH/SONET port timed external loop (towards line) or SDH/SONET port timed internal loop (towards ATM)
- Ping tests to managers
- Troubleshooting charts, based on LED indications or other inputs.

Six LED indicators on the front panel indicate the operating status of RIC-155GE.

For detailed description of the LED functions refer to *Chapter 3*.

6.1 Monitoring Performance

This chapter describes the monitoring procedures for RIC-155GE. Monitoring menus provide the user with the capability to monitor performance via access to the various statistics.

Viewing the Event Log

Access the Event Log from the system menu. The event log presents all the events recorded during the past 24 hours.

Main Menu
↓
3. Monitoring
↓
1. System
↓
1. Event Log

```
                RIC-155GE - RAD data communications
Event log


 1. Read log file            >
 2. Clear log file

>

Main>Monitoring>System>Event log>


ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-1. Event Log Menu

➤ **To read the log file:**

- Type **1** in the Event Log menu.

  The log file will display a three-column table showing all events recorded. Up to 2000 events can be recorded with the text describing the event, date and time of the day.

➤ **To clear the log file:**

1. Type **2** in the Event Log menu.

   The following screen appears:

```
ARE YOU SURE THAT YOU WANT TO CLEAR ALL ALARMS (Y/N)?
```

2. Type **Y** to clear or **N** to return to the Event Log menu.

Table 6-1 lists an events file list for RIC-155GE. For detailed information about the event log, refer to *Chapter 1*. The list contains events that may appear in the log file.

The terminology used in *Table 6-1* is for SONET. For SDH terminology, refer to *Table 1-1*.

Table 6-1. Events File List

Event	Meaning	Explanation
LOS START/END	Loss Of Signal	Start or end of LOS event at the SONET/SDH, or Ethernet level
LOF START/END	Loss Of Frame	Start or end of LOF event at the SONET/SDH physical layer
SLM START/END	Signal Label Mismatch	Start or end of SLM event at the SONET/SDH physical layer
LOP START/END	Loss Of Pointer	Start or end of LOP event at the SONET/SDH physical layer
LINE AIS START/END	Line Alarm Indication Signal	Start or end of Line AIS event at the SONET/SDH physical layer
PATH AIS START/END	Path Alarm Indication Signal	Start or end of Path AIS event at the SONET/SDH physical layer
LINE RDI START/END	Line Remote Defect Indication	Start or end of Line RDI event at the SONET/SDH physical layer
PATH RDI START/END	Path Remote Defect Indication	Start or end of Path RDI event at the SONET/SDH physical layer
SECTION BIP START/END	Section Bit Interleaved Parity Error	Start or end of Section BIP event at the SONET/SDH physical layer (above configured threshold)
LINE BIP START/END	Line Bit Interleaved Parity Error	Start or end of Line BIP event at the SONET/SDH physical layer (above configured threshold)
PATH BIP START/END	Path Bit Interleaved Parity Error	Start or end of Path BIP event at the SONET/SDH physical layer (above configured threshold)
LINE FEBE START/END	Line Far End Block Error	Start or end of Line FEBE event at the SONET/SDH physical layer (above configured threshold)
PATH FEBE START/END	Path Far End Block Error	Start or end of Path FEBE event at the SONET/SDH physical layer (above configured threshold)
COLD START		RIC-155GE has been powered up
AUTHENTICATION FAILURE		Invalid community was received
LOCAL LOGIN		A local login occured
INVALID LOGIN		An invalid login attempt occurred (failed on password)

Note *All traps (alarm and system) can be masked per manager. See Setting the Manager List in Chapter 4 for details.*

Viewing the Physical Layer Statistics

Main Menu
↓
3. Monitoring
↓
2. Physical Layer

This menu provides access to the screens that display the statistics for SONET/SDH, Ethernet, and Gigabit Ethernet interfaces. The Physical Layer menu will vary, depending on the type of network interface.

```
               RIC-155GE - RAD data communications
Physical layer
 1. SONET/SDH                >
 2. ETHERNET                 >
 3. 1 GbE                    >
>

Main>Monitoring>Physical statistics>


ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-2. Physical Layer Menu – SONET/SDH Network Interface

SONET/SDH Statistics

Main Menu
↓
3. Monitoring
↓
2. Physical Layer
↓
1. SONET/SDH
↓
1. SONET/SDH Statistics

This screen displays all the statistics and counters at the SONET/SDH interface during the past 6 hours. You can select any 15-minute time interval to narrow the information source.

➤ **To view the SONET/SDH statistics:**

- Select **1. SONET/SDH** from the Physical Layer menu, to show the sub-menu for:
  - SONET/SDH statistics
  - POS statistics

Figure 6-3 shows a sample SONET statistics screen.

Table 6-2 lists the SONET faults, their meaning, and when they occur.

```
              RIC-155GE - RAD data communications
SONET/SDH Statistics
    LOS             ... (0)            MS-BIP (B2)      ... (0)
    LOF             ... (0)            HP-BIP (B3)      ... (0)
    LOP             ... (0)            MS-FEBE          ... (0)
    SLM             ... (0)            HP-FEBE          ... (0)
    MS-AIS          ... (0)            ES               ... (0)
    AU-AIS          ... (0)            SES              ... (0)
    MS-FERF         ... (0)            UAS              ... (0)
    HP-FERF         ... (0)            Time Since       ... (622)
    RS-BIP (B1)     ... (0)            Valid Intervals  ... (0)
 1. Interval number... (0)

>
Main>Monitoring>Physical layer>SONET/SDH Statistics>
ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-3. SONET Screen

Note *For SDH statistics the screen is similar except for terminology changes. Refer to Table 1-1 for assistance.*

Table 6-2. SONET Faults

Fault	Meaning	Occurs if:
LOS	Loss Of Signal	Number of secconds where loss of signal was detected
LOF	Loss Of Frame	Number of seconds where loss of frame was detected
LOP	Loss Of Pointer	Number of seconds where loss of pointer was detected
SLM	Signal Label Mismatch	Number of seconds where signal label mismatch was detected
LINE AIS	Line Alarm Indication Signal	Number of seconds where line AIS was detected
PATH AIS	Path Alarm Indication Signal	Number of seconds where Path AIS was detected
LINE RDI	Line Remote Defect Indication	Number of seconds where Line RDI was detected
PATH RDI	Path Remote Defect Indication	Number of seconds where path RDI was detected
SECTION BIP	Section Bit Interleaved Parity Error	Number of frames where section BIP errors where detected
LINE BIP	Line Bit Interleaved Parity Error	Number of frames where line BIP errors where detected
PATH BIP	Path Bit Interleaved Parity Error	Number of frames where path BIP errors where detected
LINE FEBE	Line Far End Block Error	Number of frames where line FEBE events where received

Table 6-2 SONET Faults (Cont.)

Fault	Meaning	Occurs if:
PATH FEBE	Path Far End Block Error	Number of frames where path FEBE events where received
ES	Errored second)	Number of seconds during which one or more section/line/path BIP occurred, or one of the following faults: LOS,LOF, LOP, LCD, SLM Line/path AIS
SES	Severely Errored second	Number of seconds during which section/line/pah BIP errors exceed threshold, or one of the following faults: LOS,LOF, LOP, LCD, SLM Line/path AIS.
UAS	UnAvailable Seconds	The count of the number of seconds that the resource is unavailable.

Notes

- *ES, SES and UAS conform to Standard G.826 Annex C (near end)*
- *Es and SES advance only on available state.*

Figure 6-4 and *Figure 6-5* illustrate the definitions of the physical layer errors.

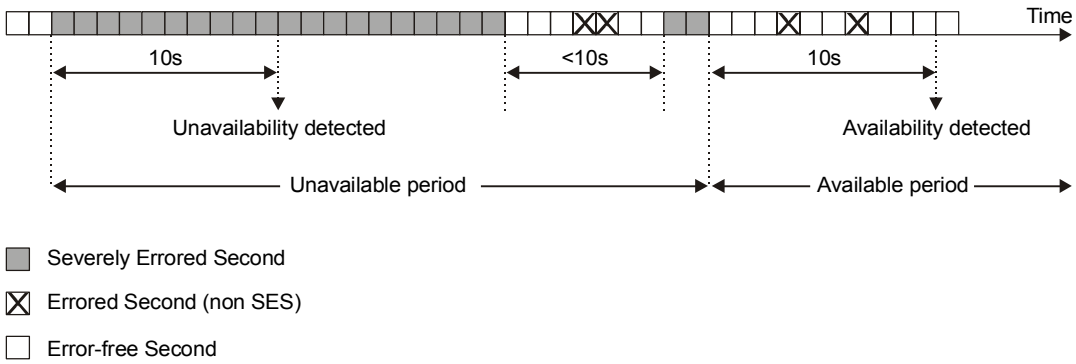


Figure 6-4. Definitions of ES, SES and UAS

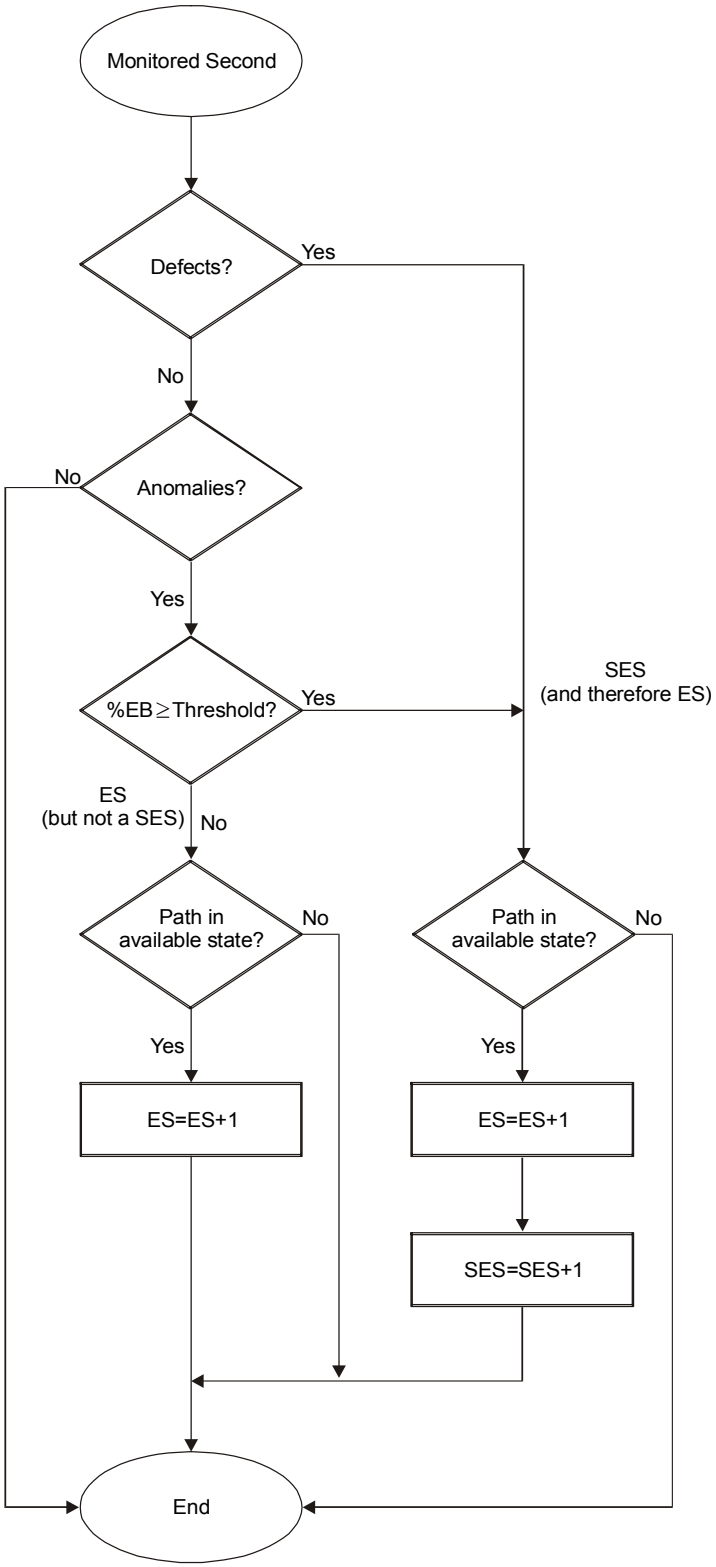


Figure 6-5. Statistics Flowchart

POS Statistics

Main Menu
↓
3. Monitoring
↓
2. Physical Layer
↓
1. SONET/SDH
↓
2. POS Statistics

This screen displays all the statistics and counters at the POS interface during the past 6 hours.

Figure 6-3 shows a sample SONET statistics screen.

Table 6-2 lists the SONET faults, their meaning, and when they occur.

```
              RIC-155GE - RAD data communications
POS Statistics
 1. Rx Correct Frames     (0)
 2. Rx FCS Error          (0)
 3. Tx Dropped Frames     (0)
 4. Tx Correct Frames     (0)
>

Main>Monitoring>Physical layer>SONET/SDH>POS Statistics>


ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-6. POS Statistics Screen

Table 6-3. POS Statistics

Term	Explanation
Rx Correct Frames	Number of good frames received by the POS interface
Rx FCS Error	Number of packets received over the POS interface that have errored HDLC FCS
Tx Dropped Frames	Frames dropped at the POS egress due to congested Tx queue
Tx Correct Frames	Number of correct frames transmitted over the POS interface.

Ethernet Statistics

Main Menu
↓
3. Monitoring
↓
2. Physical Layer
↓
2. Ethernet

From the Ethernet menu you can display the Ethernet status data and performance statistics for the last 24 hours. Ethernet statistics are not available in intervals.

Table 6-4 explains terms used in the Ethernet Status screen. *Table 6-5* explains terms used in the Ethernet Statistics screen.

➤ **To show the Ethernet Statistics:**

- Select **2. Ethernet** from the Physical Layer menu, to show the sub-menu for:
  - Ethernet Status (See *Figure 6-7*)
  - Ethernet Statistics (See *Figure 6-8*)

```
              RIC-155GE - RAD data communications
ETHERNET status


    MAC                        00-20-d2-21-80-00
    Mode                  ... (full duplex)
    Rate                  ... (100 Mbps)
    Status                ... (Not connected)

>

Main>Monitoring>Physical layer>ETH>Status


ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-7. Ethernet Status Screen

Table 6-4. Ethernet Status Terms

Term	Meaning
MAC	
Mode	Port mode is either the default mode set by the user or the mode selected based on the auto negotiation results, two available options **half duplex** or **full duplex** (current indication, not collected in intervals)
Rate	Port rate is either the default mode set by the user or the mode selected based on the auto negotiation results, two available rates **10** or **100 Mbps** (current indication, not collected in intervals)
Status	**Not connected** status indicates No link, **Connected** status indicates that link is normal (current indication, not collected in intervals)

```
              RIC-155GE - RAD data communications
ETHERNET statistics
    Rx Correct frames        ... (0)
    Rx Correct octets        ... (0)
    Rx Alignment error       ... (0)
    Rx FCS error             ... (0)
    Tx Dropped frames        ... (0)
    Tx Correct frames        ... (0)
    Tx Correct octets        ... (0)
    Tx single collision      ... (0)
    Tx multiple collision    ... (0)
    Tx deferred transmit     ... (0)
    Tx Late collision        ... (0)
>

Main>Monitoring>Physical layer>ETH>Statistics
ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-8. Ethernet Statistics Screen

Table 6-5. Ethernet Statistics Terms

Term	Meaning
	Frames received from the user
Correct Frames	The total number of correct frames received.
Correct Octects	The total number of correct octets received.
Alignment error	A counter of frames received that are not an integral number of octets in length received.
Rx FCS Error	A counter of frames received that do not pass the FCS check received.
	Frames transmitted to the user
Tx Dropped frames	A counter of frames that were dropped due to a congested Tx queue.
Correct Frames	The total number of frames successfully transmitted.
Correct Octects	The total number of octets successfully transmitted.
Single collision	A counter of successfully transmitted frames for which transmission is inhibited by exactly one collision (valid only in half duplex mode).
Multiple collision	A counter of successfully transmitted frames for which transmission is inhibited by more than one collision (valid only in half duplex mode).
Deferred transmit	A counter of frames for which the first transmission attempt is delayed because the medium is busy (valid only in half duplex mode).
Late collision	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet (valid only in half duplex mode).

Gigabit Ethernet Statistics

From the Gigabit Ethernet (1 GbE) menu you can display the status data and performance statistics.

➤ **To show the Gigabit Ethernet status and statistics:**

- Select **3. 1 GbE** from the Physical Layer menu, to show the sub-menu for:
  - Ethernet Status (See *Figure 6-9*)
  - Ethernet Statistics (See *Figure 6-10*)

Table 6-6 indicates terms used in the Gigabit Ethernet Status screen. *Table 6-7* indicates terms used in the Gigabit Ethernet Statistics screen.

Main Menu
↓
3. Monitoring
↓
2. Physical Layer
↓
3. 1 GbE

```
                RIC-155GE - RAD data communications
 G. ETHERNET1 GbE status


    Mode                        (Full Duplex)
    Rate                        (1000 Mbps)
    Mode                  ...   (full duplex)
    Rate                  ...   (100 Mbps)
    Status                ...   (connected)


>


Main>Monitoring>Physical layer>ETH>Status


ESC-prev.menu; !-main menu; &-exit; @-debug              1 user(s)
```

Figure 6-9. Gigabit Ethernet Status Screen

The Gigabit Ethernet Status Screen is informative only, and cannot be edited.

Table 6-6. Gigabit Ethernet Status Terms

Term	Explanation
Mode	Set to Full Duplex
Rate	Set to 1000Mbps
Status	**Connected** status indicates that link is normal (current indication, not collected in intervals)

```
                RIC-155GE - RAD data communications
1 GbE statistics


    Rx Correct frames         ... (0)
    Rx Correct octets         ... (0)
    Rx FCS error              ... (0)
    Tx Correct frames         ... (0)
    Tx Correct octets         ... (0)

>

Main>Monitoring>Physical layer>ETH>Statistics
ESC-prev.menu; !-main menu; &-exit; @-debug              1 user(s)
```

Figure 6-10. Gigabit Ethernet Statistics Screen

Table 6-7. Gigabit Ethernet Statistics Terms

Term	Meaning
	Frames received from the user
Correct Frames	The total number of correct frames received.
Correct Octects	The total number of correct octets received.
Alignment error	A counter of frames received that are not an integral number of octets in length received.
Rx FCS Error	A counter of frames received that do not pass the FCS check received.
	Frames transmitted to the user
Tx Correct Frames	The total number of frames successfully transmitted.
Tx Correct Octects	The total number of octets successfully transmitted.

6.2 Detecting Errors

SDH/SONET Diagnostics

The SDH/SONET menu is shown in *Figure 6-11* and the parameters are listed in *Table 6-8*. The screen and the parameters are identical for both types of network interfaces; only the name or the screen will vary to reflect the interface type.

Main Menu
↓
4. Diagnostics
↓
1. SDH/SONET

```
                RIC-155GE - RAD data communications


SDH/SONET


 1. Time for loop [0 - 300]  ... (5)
 2. Loopback                 >   (Disable)


>


Main>Diagnostic>SDH/SONET>


ESC-prev. menu; !-main menu; &-exit; @-debug          1 user(s)
```

Figure 6-11. SDH/SONET Menu

Table 6-8. SDH/SONET Parameters

Parameter	Possible Values	Remarks
Time for loop	0 to 300	Set the time period in minutes for operation of the loop. After the selected time period elapses, the loop (of the type selected in item 2) is released. 0 is forever. Time for loop is applicable for both external and internal loops. When the time period runs out the loopback parameter reverts to Disable. **Default: 5**
Loopback	External	A loop towards the STM1 line, the loop is performed on STM1 frames. See *Figure 6-12*.
	Internal	A loop towards the internal bus. See *Figure 6-13*.
	Disable	Normal operation, no loop.
		Default: External

Note *You may change the time for loop while the test is running.*

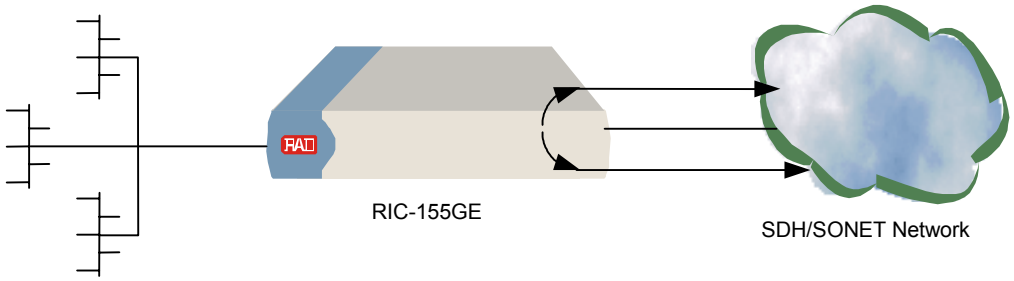


Figure 6-12. External Loop

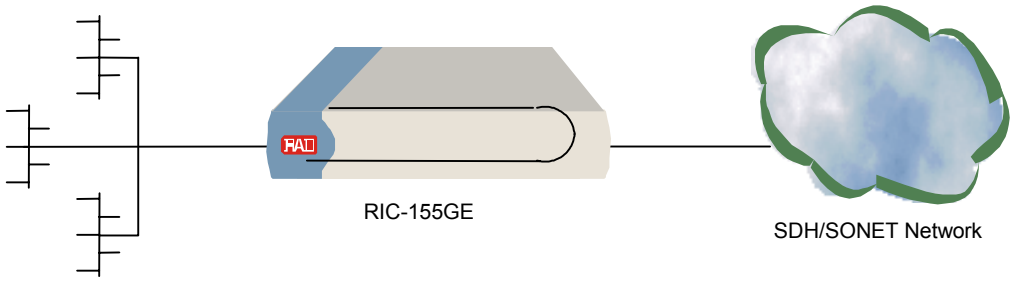


Figure 6-13. Internal Loop

Self Test Result

The self Test Result screen enables the user to locate the reason for failed power up. Locate the item for which the result is Error rather than Pass.

```
                  RIC-155GE - RAD data communications
Self test result

 Host memory              >  (Pass)  SDH/SONET frame access > (Pass)
 Packet memory            >  (Pass)  TOD access             >  (Pass)
 Parameter memory         >  (Pass)  ETHERNET Phy test      >  (Pass)

>

Main>Diagnostic>Self test result>

ESC-prev.menu; !-main menu; &-exit; @-debug                  1 user(s)
```

Figure 6-14. Self Test Results Screen

6.3 Handling Alarms

RIC-155GE maintains a cyclic event log file that stores up to 2000 events. All events are time-stamped.

Traps that are the result of events that were already reported by a different trap may not be repeated. For example, LOF traps will not be sent if the physical layer trap, such as LOS, was sent and the physical layer problem still exists.

The events are layered hierarchically, for example physical layer events/traps for BIP's and FEBE are threshold triggered, so that an event/trap is sent only if the threshold was exceeded.

Threshold can be configured for up to 8000 events per second.

The event log file contents can be viewed via an ASCII control terminal or a Network Management Station (NMS). The contents can be cleared at any time.

6.4 Troubleshooting

Consult this simple troubleshooting chart to localize a problem in RIC-155GE.

To correct the reported problem, perform the suggested remedial actions. If the problem cannot be fixed by carrying out the suggested actions, contact RAD technical support.

Table 6-9. Troubleshooting Chart

Fault/Problem	Probable cause	Remedial Action
RIC-155GE unit is "dead" (POWER LED is off)	No power	Check that both ends of the power cable are properly connected.
RIC-155GE unit is "dead" (POWER LED is off)	Blown fuse	Disconnect power cable from both ends and replace the fuse with another fuse of proper rating.
NETWORK SYNC LED is off	SDH/SONET Rx path failure	1. Check SDH/SONET statistics. 2. For SDH/SONET, upon AIS, check remote unit status 3. Check fiber or cable and Rx levels and remote unit Tx level
NETWORK SYNC LED blinks	SDH/SONET Tx path failure	1. Check SDH/SONET to verify RDI received. 2. Check Tx optical power to see if in range. If out of range, send for repair. 3. Check fiber
Ethernet/1GbE LINK LED is off	Ethernet cable problem	1. Check Ethernet cable to see if cross or straight cable is needed. 2. Check/replace Ethernet cable. 3. Check range to be within limits. 4. Check RIC-155GE port by connecting to a different port switch at the remote end. 5. send device for repair.
Ethernet service problems (End-to-End loss of Ethernet frames)	Physical layer problems	1. Check SDH/SONET statistics. 2. Follow remedial action described in SDH/SONET SYNC LED is off and SDH/SONET SYNC LED blinks. 3. Check Ethernet statistics. Late collisions may result with different duplex modes in RIC-155GE and Ethernet switch/device. 4. Check rate, duplex and autonegotiation in RIC-155GE and Ethernet device. CRC errors may indicate range/cable problems.

6.5 Testing RIC-155GE

Use the following techniques to detect and correct faults and errors:

- Events recorded in the event log
- Loopback tests, external and internal, such as timed external loop (towards line) or port timed internal loop (towards ATM).
- Troubleshooting charts, based on LED indications or other inputs.

Loopbacks

RIC-155GE supports several types of user-controlled loopbacks. The user either from the control port, or via a Network Management Station (NMS) activates these loopbacks. The available tests are:

- Internal Loopback
- External Loopback.

List of Traps/Events

The events file list for RIC-155GE is shown in *Table 6-1*. The list contains events that may appear in the log file. For detailed information about the event log refer to *Chapter 1*.

The terminology used in the events file list is for SONET. For SDH terminology, refer to *Table 1-1*.

6.6 Frequently Asked Questions

Q: If I forget my password, what should I do?

A: Reset the device via the Boot Manager, and contact technical support.

Q: Does RIC-155GE have a mechanism to prevent overloading/discarding frames?

A: The RIC-155GE prevents frame discard as much as possible by holding a frame buffer as STM-1 egress to absorb bursts. The buffer depth allows bursts at a Gigabit Ethernet rate of about n frames, where n is the buffer depth (in frames). The POS Tx default buffer depth is 1500 frames and can be configured to hold up to 3000 frames. (Contact technical support if you need to change the buffer depth).

6.7 Technical Support

Technical support for this product can be obtained from the local distributor from whom it was purchased.

For further information, please contact the RAD distributor nearest you or one of RAD's offices worldwide.

Appendix A
Pinouts

A.1 Control Cable

The control port is located on the right side of RIC-155GE front panel. The connecting cable is a straight RS-232/V.24, DB-9 connector for ASCII terminal.

Table A-1 specifies the relevant pinout connections for this cable.

Table A-1. Control Cable Pinout

EIA 232 Name	DB-9 Female Pin Number
Common	5
Rx Data	2
Tx Data	3

A.2 Alarm Connector

The alarm connector is an ordering option. If ordered, it is located on the top, right-hand side of the front panel. The connecting cable is a straight DB-9 connector.

Table A-2 specifies the pinout connections for this cable.

Table A-2. Alarm Connector Pinout

Pin	Function
1	–
2	–
3	Minor Alarm 1
4	Major Alarm 1
5	Minor Alarm 2
6	–
7	–
8	Gnd
9	Major Alarm 2

A.3 Interface Connectors

Interface connectors include:

- *SDH/SONET Connector*
- *Ethernet Interface Connector*
- *Gigabit Ethernet Interface Connector (Cx)*
- *Optical Gigabit Ethernet Interface Connector (LC)*

SDH/SONET Connector

The SDH/SONET network interface requires an SC fiber optic connection media.

Ethernet Interface Connector

RIC-155GE Ethernet interfaces require an RJ-45, 8 pin connection media.

Table A-3. Ethernet Port Pinout

Pin	Function
1	Tx+
2	Tx-
3	Rx+
4	–
5	–
6	Rx-
7	–
8	–

Gigabit Ethernet Interface Connector (Cx)

RIC-155GE Gigabit Ethernet interfaces require an RJ-45, 8 pin connection media.

Table A-4. Gigabit Ethernet Port Pinout

Pin	Function
1	B+
2	B–
3	A+
4	D+
5	D–
6	A–

Table A-4. Gigabit Ethernet Port Pinout (Cont.)

Pin	Function
7	C+
8	C–

Optical Gigabit Ethernet Interface Connector (LC)

The Gigabit Ethernet optical connector is LC, 850 nm multimode fiber.

Appendix B
Boot Manager

B.1 Introduction

This appendix provides a description of the RIC-155GE boot procedure via an ASCII terminal for downloading software.

The RIC-155GE software is stored in flash memory in two sections, in the boot sector and in the file system. The boot sector holds a boot program that calls up the rest of the program from the file system.

The file system contains two compressed copies of the RIC-155GE code. One copy is called the **operating file**, and the other is called the **backup file**. The operating file is the default-executable RIC-155GE code. The backup file is used whenever the operating file is absent or corrupted.

B.2 Booting RIC-155GE

RIC-155GE boots up automatically. After powering up, no user intervention is required, except when the user wishes to access the file system to modify or update the RIC-155GE application software.

Boot Sequence

The following is a description of the boot sequence. If the system is working normally, the entire process is completed within two minutes.

- The boot program searches for the operating file in the file system. If the file exists, the program continues.

  If the file does not exist, the boot program searches for the backup file. If the backup file is found, it is used instead of the operating file and the boot process continues.

  If there is no backup file, you must download a file via the XMODEM protocol or via TFTP. The received file is saved as the operating file in the file system.
- Files in the file system are compressed and automatically decompressed into the RAM before execution begins.
- After decompression, the software starts to execute and the user can begin working.

Boot Process

When RIC-155GE is turned on, the first screen that appears is the Main Boot screen.

```
RIC-155GE
RAD DATA COMMUNICATIONS
Boot software version 1.00 JUN 3 2003, 8:41:00
Press Ctrl-A to enter debug screen
```

Figure B-1. Main Boot Screen

If Ctrl-A is not pressed, the boot will proceed as described in *Boot Sequence*.

If Ctrl-A is pressed, the Boot Option screen appears.

```
RIC-155GE - FILE MENU
1. File Download
2. File Utility

Select:
```

Figure B-2. Boot Option Screen

File Download

In this mode, the user is able to perform a download of a new application file. In order to use this mode two conditions apply:

- No application file was found
- Option **1** was selected after Ctrl-A was pressed.

➤ **To download an application file:**

- Type **1** in the Boot Option screen.

  The Application File Not Found screen appears:

```
                          RIC-155GE


Application file was not found
Download application file using:
0. Exit
1. XMODEM protocol
2. TFTP protocol

Select one protocol:
```

Figure B-3. Application File Not Found Screen

Downloading via XMODEM

➤ **To download an application file via XMODEM:**

1. Type **1** in the Application File Not Found screen.
   The following screen appears.

```
                          RIC-155GE

Application file was not found
Download application file using:
0. Exit
1. XMODEM protocol
2. TFTP protocol

Select one protocol: 1

Downloading application file using XMODEM (Y/N)
```

2. Type **Y**.
   The XMODEM File Transfer screen appears and downloading begins.

```
RIC-155GE - XMODEM FILE TRANSFER

Downloading application file. Send the file.
```

Figure B-4. XMODEM File Transfer Screen

Downloading via TFTP

➤ **To download an application file via TFTP:**

1. Type **2** in the Application File Not Found screen.
   The TFTP Parameters Setting screen appears.

```
RIC-155GE - TFTP Parameters Setting

FILE NAME:               RIC-155GE
HOST IP:                192.168.211.83
HOST MASK:              255.255.255.0
Default Gateway:        192.168.211.1
TFTP IP Server:         172.17.140.15

Press S to start transferring the file.    s
```

Figure B-5. TFTP Parameters Setting Screen

2. Type in the file name, host IP, host mask and default gateway information.

3. Type **s**.

   Downloading begins.

After downloading the application file into RAM the minimal VxWorks file that is part of the boot starts to run. This file contains initialization of the DOC driver and the TFFS to manage the file system. The process copies the downloaded file into the DOC to save the application file.

When completed, the process sets the application exist flag and the last thing is to force a HW reset.

During the next run time the flag will indicate that there is an application file.

File Utility (Accessing the File Menu)

The File Menu is an option that allows the user to perform basic file transfer operations. These operations are all optional.

➤ **To access the File Menu:**

1. Type **2** in the Boot Option screen.

   The File Menu appears.

```
RIC-155GE - File Menu

0. Reset the System
1. File swap: operating backup
2. Delete Operating file (existing Backup file will be saved as Operating)
3. Delete Configuration file
9.Delete ALL File system (Software and Configuration files)

Select operating mode:
```

Figure B-6. File Menu

From the File menu, you can:

- Exchange the operating and backup files
- Delete the operating file. The backup file becomes the operating file
- Delete all the configuration files
- Format the files system.

Caution Formatting the file system means deleting all files in the system, including the software-operating main, backup and configuration files.

If you choose to exchange or delete a file, a prompt asking for confirmation is displayed.

Index

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Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: RIC-155GE

Publication Number: 356-200-02/06

Please grade the manual according to the following factors:

	Excellent	*Good*	*Fair*	*Poor*	*Very Poor*
Installation instructions	❒	❒	❒	❒	❒
Operating instructions	❒	❒	❒	❒	❒
Manual organization	❒	❒	❒	❒	❒
Illustrations	❒	❒	❒	❒	❒
The manual as a whole	❒	❒	❒	❒	❒

What did you like about the manual?

_____

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_____

_____

_____

Error Report

Type of Error(s) or Problem(s):

- ❒ Incompatibility with product
- ❒ Difficulty in understanding text
- ❒ Regulatory information (Safety, Compliance, Warnings, etc.)
- ❒ Difficulty in finding needed information
- ❒ Missing information
- ❒ Illogical flow of information
- ❒ Style (spelling, grammar, references, etc.)
- ❒ Appearance
- ❒ Other _____

Please list the exact page numbers with the error(s), detail the errors you found (information missing, unclear or inadequately explained, etc.) and attach the page to your fax, if necessary.

_____

_____

_____

_____

Please add any comments or suggestions you may have.

_____

_____

_____

You are:

- ❒ Distributor
- ❒ End user
- ❒ VAR
- ❒ Other _____

Who is your distributor? _____

Your name and company: _____

Job title: _____

Address: _____

Direct telephone number and extension: _____

Fax number: _____

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