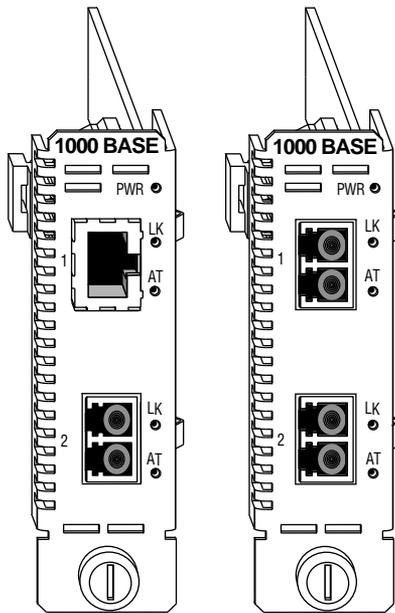# RADIANCE
1GBPS
INTERFACE LINE CARDS
WITH SFP OPTICS

Installation & User Guide

Models: R153-1S / R153-SS

Radiance 1Gbps Interface Line Cards with Small Form-Factor Pluggable (SFP) Optics

Line Cards:
R153-1S _____ 1000BASE-T RJ-45 to 1000BASE-X LC
R153-SS _____ 1000BASE-X LC to 1000BASE-X LC

SFP Optics:
O211-M5 _____ SFP LC (multimode, 550 m 50 μm; 275 m 62.5 μm)
O211-10 _____ SFP LC (singlemode, 10 km)
O211-25 _____ SFP LC (singlemode, 25 km)
O211-40 _____ SFP LC (singlemode, 40 km)
O211-70 _____ SFP LC (singlemode, 70 km)
O211-1A _____ SFP LC (singlemode, 100 km)
O411-80-31 ____ SFP LC (Coarse Wavelength Division Multiplexing, 80 km, 1310 nm)
O411-80-33 ____ SFP LC (CWDM, 80 km, 1330 nm)
O411-80-35 ____ SFP LC (CWDM, 80 km, 1350 nm)
O411-80-37 ____ SFP LC (CWDM, 80 km, 1370 nm)
O411-80-39 ____ SFP LC (CWDM, 80 km, 1390 nm)
O411-80-41 ____ SFP LC (CWDM, 80 km, 1410 nm)
O411-80-43 ____ SFP LC (CWDM, 80 km, 1430 nm)
O411-80-45 ____ SFP LC (CWDM, 80 km, 1450 nm)
O411-80-47 ____ SFP LC (CWDM, 80 km, 1470 nm)
O411-80-49 ____ SFP LC (CWDM, 80 km, 1490 nm)
O411-80-51 ____ SFP LC (CWDM, 80 km, 1510 nm)
O411-80-53 ____ SFP LC (CWDM, 80 km, 1530 nm)
O411-80-55 ____ SFP LC (CWDM, 80 km, 1550 nm)
O411-80-57 ____ SFP LC (CWDM, 80 km, 1570 nm)
O411-80-59 ____ SFP LC (CWDM, 80 km, 1590 nm)
O411-80-61 ____ SFP LC (CWDM, 80 km, 1610 nm)

Table of Contents

**Radiance 1Gbps Interface Line Cards with SFP Optics
Installation & User Guide**

Overview

The Radiance R153 1Gbps interface line card with Small Form-Factor
Pluggable (SFP) optics provides an affordable and flexible solution for the
creation or expansion of high capacity fiber networks. A wide range of inter-
changeable optics offers maximum versatility and support for Gigabit Ethernet
connectivity across multiple fiber types and distances. Advanced SFP port
monitoring features help to ensure network reliability. With a maximum reach of
up to 100 km, the Radiance line card is ideal for GigE applications in metropoli-
tan, enterprise, government, campus, or military environments. The R153-1S
also provides 1000Base copper to fiber migration.

Designed as an integral component of the Radiance Coarse Wavelength Division
Multiplexing (CWDM) System, the R153 line card supports all Metrobility
CWDM pluggable optics with wavelengths from 1310 to 1610 nm. When
installed in a managed Radiance R5000 Central Service Platform, the R153 line
card provides the interface between the service provider's switch and a wave-
length-specific connection to the mux/demux module in an R4000 chassis. At
the customer site, the R153 line card converts the specific wavelength back to
copper or a standard fiber media that matches the end-user's equipment.

Network management over the Radiance line card allows a system administrator
to monitor and configure the card from a PC using console commands,
Metrobility's NetBeacon® or WebBeacon management software, or any SNMP
application. Through software, the R153 delivers real-time monitoring of the
line card's internal temperature, optical receive/transmit laser levels, link state,
activity status, and switch settings, along with other hardware data.

The Radiance 1Gbps interface line card includes the following key features:

- Full signal retiming, reshaping and re-amplification, allowing the maximum
  segment length and ensuring quality signal transmission.

- Small form-factor pluggable (SFP) fiber optic transceivers fully compliant
  with applicable aspects of IEEE 802.3-2002.

- Support for CWDM technology.

- Link Loss Carry Forward on the R153-SS and Copper Loss Carry Forward
  on the R153-1S for troubleshooting remote network connections.

- Link Loss Return on all fiber optic ports.

- Duplex auto-negotiation switch for each fiber port.

- Support for point-to-point, ring and OADM topologies.

- Compatibility with devices configured for auto-negotiation.

- Transparency to data frame sizes, including jumbo packets.

- SNMP manageable with real-time analog monitoring of SFP optical power, internal temperature, and other parameters.

- Auto-polarity support on the twisted-pair port.

- Auto-crossover (i.e., no crossover cables to install or switches to set) on the twisted-pair port.

- Fused power on each line card to protect the system from short circuits. This prevents a faulty card from bringing down an entire system.

The Radiance 1Gbps card with SFP optics is available in two models, each with two ports. The fiber ports support any Metrobility® Gigabit Ethernet SFP transceiver with LC connectors. See page 2 for the complete list of available options.

Model Number	Connectors	Maximum Supported Link Length
R153-1S	RJ-45 to dual LC	100 m / 100 km
R153-SS	LC to dual LC	100 km / 100 km

R153-1S   R153-SS
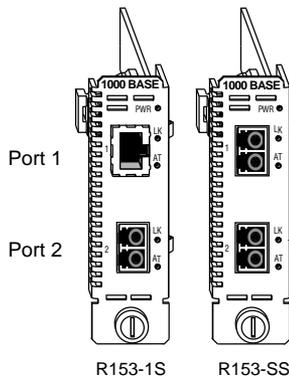
Installation Guide

Follow the steps outlined in this section to install and start using the Radiance 1Gbps interface line card with SFP optics.

NOTE: Electrostatic discharge precautions should be taken when handling any line card. Proper grounding is recommended (i.e., wear a wrist strap).

1 Unpack the Line Card

Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your order carefully for damage that may have occurred during shipment. If you discover any shipping damage, notify the carrier and follow their instructions for damage and claims. Save the original shipping carton if return or storage of the unit is necessary.

2 Set the DIP Switches

A set of DIP switches is located on the back of the line card. These switches are used to enable/disable functions and are clearly marked on the printed circuit board. Unmarked switches are nonfunctional. The default settings for the two models are shown below.

Default DIP Switch Settings

R153-1S
(TX-FX)

R153-SS
(FX-FX)
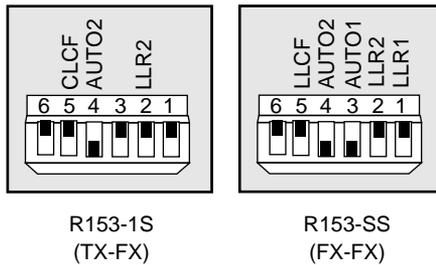
When setting DIP switches[*], the UP position is when the lever of the switch is pushed away from the circuit board. The DOWN position is when the lever of the switch is pushed toward the circuit board.

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* DIP switches can also be managed via console commands or through Metrobility NetBeacon or WebBeacon management software. Refer to the **Command Line Interface Reference Guide**, **NetBeacon Element Management Software Installation & User Guide** or **WebBeacon Management Software Installation & User Guide** for software management information.

Link Loss Return (LLR) Switch

The Radiance 1Gbps line card offers Link Loss Return functionality as an aid in troubleshooting remote fiber connections. When LLR is enabled on a fiber port, loss of link by the port's receiver disables its own transmitter from sending out link pulses. LLR is enabled independently on each fiber port and is not applicable to the copper port.

LLR2 enables/disables Link Loss Return on Port 2. **LLR1** enables/disables the function on Port 1 of the R153-SS. To enable Link Loss Return, set the switch to the UP position. Set the switch DOWN to disable the LLR. The unit is shipped with LLR disabled.

For more information, refer to Link Loss Return.

Link Loss Carry Forward (LLCF) Switch

On the R153-SS, Link Loss Carry Forward is provided as an additional aid in troubleshooting remote connections. If the card loses link on one of its receivers, LLCF will inhibit the transmission of link pulses out the opposite port.

For example, if LLCF is enabled and the line card fails to detect link on Port 2, the card will not transmit link pulses from Port 1. In doing this, LLCF provides a way to extend the link loss indication beyond a single segment.

LLCF is enabled when the **LLCF** switch is in the UP position. The R153-SS is shipped with LLCF disabled. For more information, refer to Link Loss Carry Forward in the User Guide section. LLCF is not applicable to the R153-1S.

Copper Loss Carry Forward (CLCF) Switch

The R153-1S provides Copper Loss Carry Forward to assist in identifying a lost copper link. When CLCF is enabled and the card loses link on its copper port, CLCF stops the fiber port from transmitting link pulses. CLCF has no effect on the copper port, which continually transmits pulses, even if the fiber port loses link.

CLCF is enabled when the **CLCF** switch is in the UP position. The card is shipped with CLCF disabled. For more information, refer to Copper Loss Carry Forward in the User Guide section.

Auto-Negotiation (AUTO) Switch

The auto-negotiation switch is applicable only to the fiber ports and is enabled independently on each port. When AUTO is enabled, the fiber port advertises full duplex capability and the mode of operation is determined through the auto-negotiation process.

By default, AUTO is enabled (UP position). When AUTO is disabled, the duplex mode is fixed at full duplex. Use AUTO1 to set auto-negotiation on Port 1 and AUTO2 for Port 2.

For the copper port on the R153-1S, auto-negotiation is always enabled and it cannot be changed.

3 Install the SFP Optics

The R153-1S and R153-SS require one or two sets of small form-factor pluggable (SFP) optics. Each set of optics is shipped separately.

To install the optics, slide the SFP module into an empty slot, pushing it firmly in place. Remove the protective covering on the LC connectors.
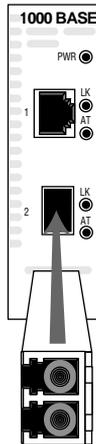
4 Install the Line Card

The Radiance line card offers the ease of plug-and-play installation and is hot-swappable. The card must be secured firmly to the chassis before making network connections. Follow the simple steps outlined below to install the 1Gbps interface line card.

• Grasp the card by the front panel as shown.

Card Guide

Slot for Management Card

IMPORTANT!
Tighten thumb screw to secure each card firmly to chassis before making network connections.

Thumb Screw

Card Guide

Blank Panel
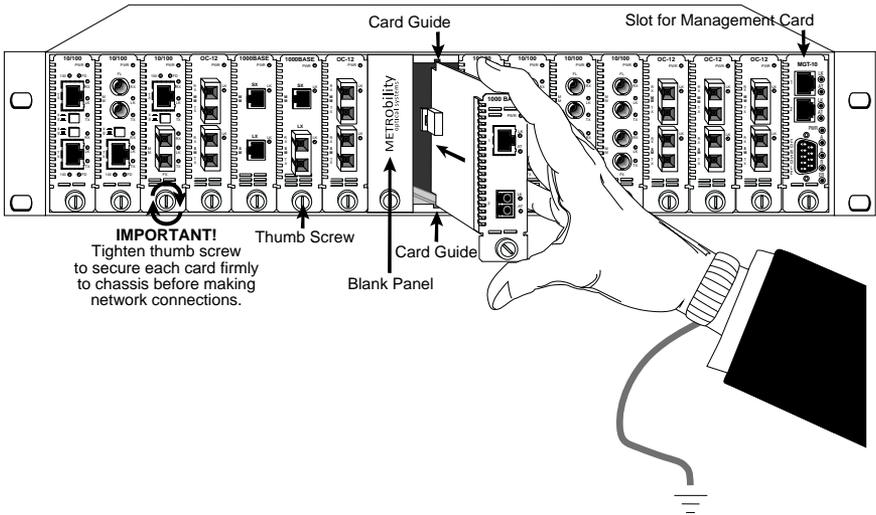
• Insert the card into a slot on the chassis making sure that the top and bottom edges of the circuit board are aligned with the top and bottom card guides in the chassis. Do not force the card into the chassis unnecessarily. It should slide in easily and evenly.

• Slide the card in until the top and bottom edges of the front panel are flush and even with the top and bottom edges of the chassis.

• Turn the thumbscrew clockwise until it is snug to secure the card to the chassis. The card is now properly installed and ready for connection to the network.

5 Connect to the Network

To connect the line card to the network, insert the cables into the appropriate connectors as illustrated below. Make sure the card is secured to the chassis before making network connections. Once power is applied to the unit, correct connectivity can be verified via the link (LK) LED, which will be lit.

Twisted-Pair Interface (R153-1S only)

The twisted-pair port provides an auto-sensing RJ-45 connector that supports a maximum segment length of 100 meters over Category 5e twisted-pair cable. Crossover cables are not needed because the port automatically adjusts itself to the proper setting.

Fiber Optic Interface

The R153-1S and R153-SS interface line cards provide one or two fiber optic ports, respectively. Each fiber port provides a set of LC connectors with the receiver located above the transmitter. For maximum flexibility in designing or expanding your network, the fiber ports support any combination of the following Metrobility small form-factor pluggable (SFP) transceivers. The maximum distance supported by each model is listed below:

Model #	Max Distance
O211-M5	550 m
O211-10	10 km
O211-25	25 km
O211-40	40 km
O211-70	70 km
O411-80-xx	80 km
O211-1A	100 km

For more detailed information about the optics, refer to the Technical Specifications.

*IMPORTANT: The Radiance 1Gbps interface line card is designed to operate using only the Metrobility SFP transceivers listed in this document. **Installing unspecified parts may damage the product and will void the unit's warranty.***

When making fiber optic connections, make sure that the optical transmitter on the Radiance line card connects to the optical receiver on the connected device, and that the optical transmitter on the device connects to the optical receiver on the Radiance line card.

Use the link (LK) LEDs on the front panel of the card to verify correct segment connectivity. As you insert the cable into each port, the LK LED will be lit if the following conditions are met:

- Power is being applied to the chassis.
- There is an active device connected to the other end of the cable, and it is sending idle link signals.
- All connections are secure and the cables are undamaged.
- Both ends of the cable are set to the same auto-negotiation state. To maximize device compatibility, the Radiance line card is shipped with auto-negotiation enabled on both ports. If necessary, disable auto-negotiation and set full duplex on the fiber port of the remote device to establish link.

For information on replacing the SFP transceiver, refer to Changing the SFP Optics.

User Guide

This section contains information regarding the operating features of the
Radiance 1Gbps interface line card with SFP optics.

LED Operation

Several LEDs are visible from the front panel. These include the power (PWR),
link (LK) and activity (AT) LEDs. There are separate link and activity LEDs for
each port. Refer to the table below for a description of each LED.

The function of each LED is as follows:

LED Label	Color (Status)	Indication
PWR	Green (steady)	Power is ON.
(Port 1) LK	Green (steady)	Port 1 is receiving a valid link integrity signal. Link signals are derived from idle symbols for a copper port or the presence of an optical signal for a fiber port.
(Port 1) AT	Green (blinking)	Port 1 is receiving data.
(Port 2) LK	Green (steady)	Port 2 is receiving a valid link integrity signal (i.e., the presence of an optical signal is detected).
(Port 2) AT	Green (blinking)	Port 2 is receiving data.
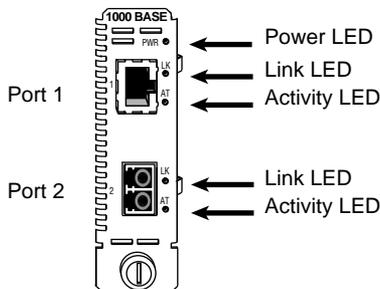
Fiber Optic Power Monitors

Through software*, you can read the receive (RX) and transmit (TX) power levels on the 1Gbps line card's fiber optic port(s). The accuracy of the RX and TX monitors is ±5%.

Receive Power Level
The RX power monitor shows a reading between -40 dB and 0 dB.

Transmit Power Level
The TX power monitor shows a reading between -16 dB and +11 dB.

Internal Temperature Reading

Through software, you can obtain the internal temperature reading for Port 2. To view the temperature, an SFP transceiver must be installed in Port 2. The temperature range is from -40° to +125° C.

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* Refer to the **Command Line Interface Reference Guide**, **NetBeacon Element Management Software Installation & User Guide** or **WebBeacon Management Software Installation & User Guide** for software management information.

Link Loss Return (LLR)

The fiber ports on the Radiance 1Gbps interface line card have been designed with Link Loss Return functionality for troubleshooting remote connections. When LLR is enabled[*], the port's transmitter shuts down if its receiver fails to detect a valid link signal. LLR should only be enabled on one end of a cable and is typically enabled on either the unmanaged or remote device. LLR works in conjunction with LLCF and CLCF.

The diagram below shows a typical network configuration with good link status using two Radiance line cards for remote connectivity. Note that LLR and LLCF are enabled as indicated in the diagram.
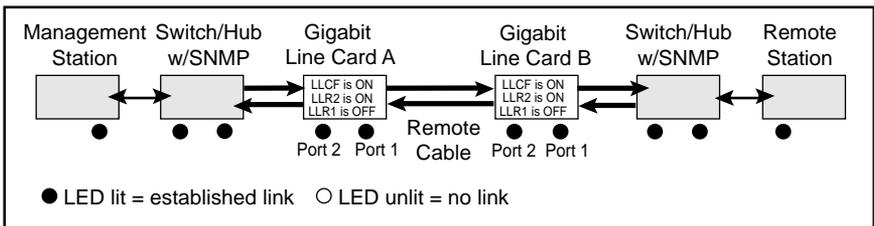
Example: If one of the optical conductors breaks (as shown in the diagram box below), Gigabit Line Card B, with LLR2 enabled, will return a no-link condition to its link partner, Line Card A. Using two R153-SS cards with LLCF enabled on both cards, the no-link condition is carried forward to the switch/hub where a trap is generated to the management station. The network administrator can then determine the source of the loss.
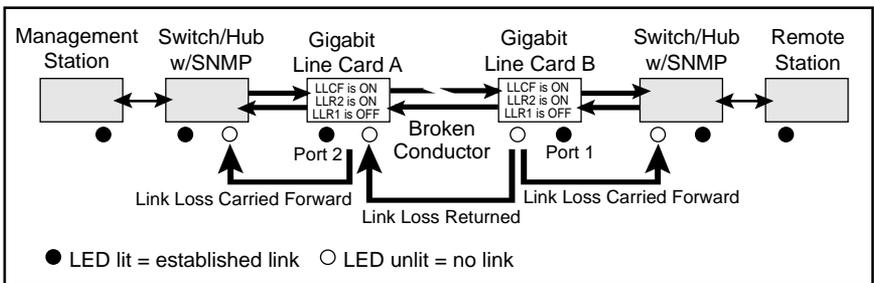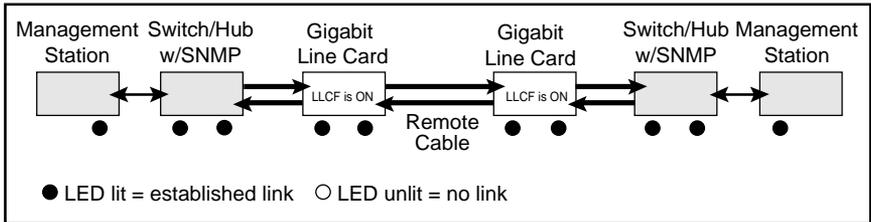

IMPORTANT: LLR must not be active on both ends of the same cable. If it is, the link can never be established.

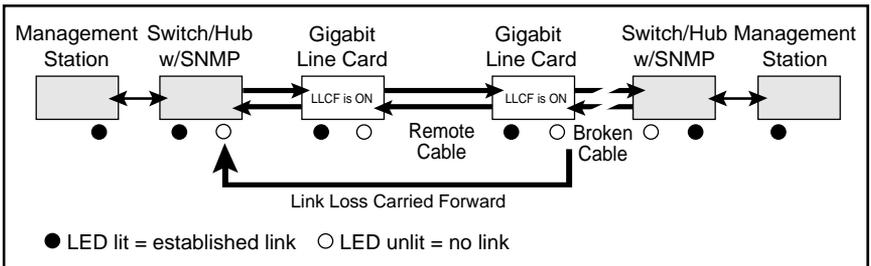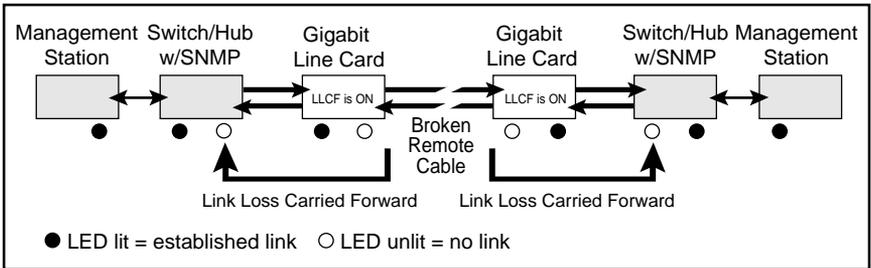[*]Units are shipped with the LLR disabled (DOWN).

Link Loss Carry Forward (LLCF)

The Radiance R153-SS line card incorporates LLCF for troubleshooting a remote connection. When LLCF is enabled[*], the ports do not transmit a signal until they receive a signal from the opposite port. When a lost link signal is returned to an unmanaged line card, that lost link must then be carried forward to a managed device (switch/hub) for trap generation.

The diagram below shows a typical network configuration with good link status using two Radiance R153-SS line cards for remote connectivity. Note that LLCF is enabled as indicated in the diagram.

Management Station	Switch/Hub w/SNMP	Gigabit Line Card	Gigabit Line Card	Switch/Hub w/SNMP	Management Station

LLCF is ON   LLCF is ON   Remote Cable

● LED lit = established link   ○ LED unlit = no link

If a connection breaks, the line cards will carry that link loss forward to a switch/hub which generates a trap to the management station. The network administrator can then determine the source of the problem.

Management Station	Switch/Hub w/SNMP	Gigabit Line Card	Gigabit Line Card	Switch/Hub w/SNMP	Management Station

LLCF is ON   LLCF is ON   Broken Remote Cable

Link Loss Carried Forward   Link Loss Carried Forward

● LED lit = established link   ○ LED unlit = no link

Management Station	Switch/Hub w/SNMP	Gigabit Line Card	Gigabit Line Card	Switch/Hub w/SNMP	Management Station

LLCF is ON   LLCF is ON   Remote Cable   Broken Cable

Link Loss Carried Forward

● LED lit = established link   ○ LED unlit = no link

Copper Loss Carry Forward (CLCF)

The R153-1S copper-to-fiber card incorporates CLCF for identifying a lost copper connection. When CLCF is enabled[*], the fiber port's transmitter shuts down if the copper port stops receiving link pulses. The copper port, however, continually transmits link signals regardless of whether or not the fiber port receives link signals.
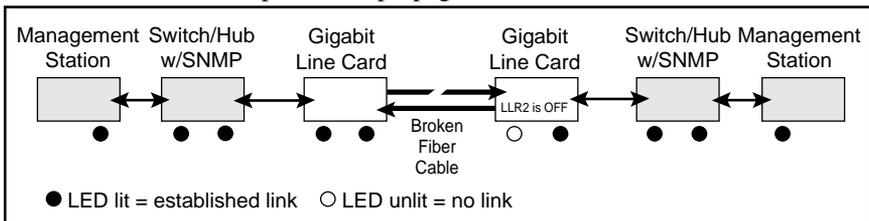
The diagram below shows a typical network configuration with good link status using two R153-1S line cards for remote connectivity. Note that CLCF is enabled as indicated.
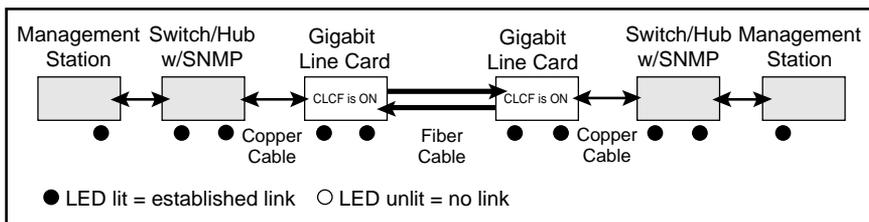
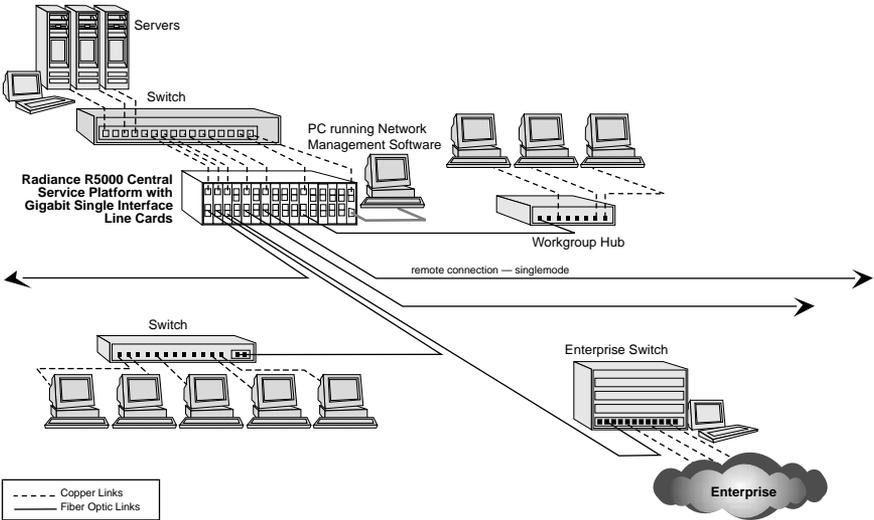If a copper connection breaks, the line card will carry that link loss forward.
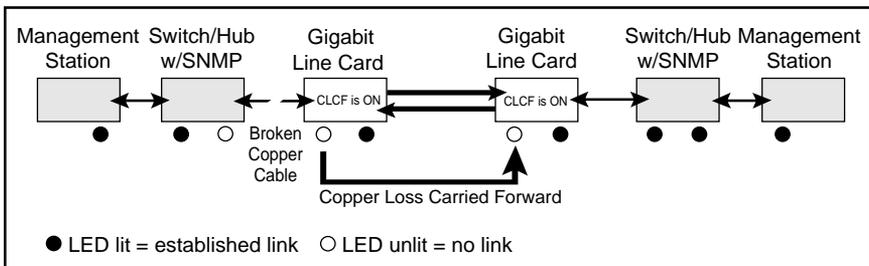
Loss of link at the fiber port is not propagated, as shown below.

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*Units are shipped with CLCF disabled (DOWN). CLCF is not applicable to the R153-SS.

Topology Solutions

Coarse Wavelength Division Multiplexing (CWDM)

Using the CWDM optics, the R153 line cards can be integrated into a Radiance CWDM system, in which a single fiber pair carries data bidirectionally on multiple wavelengths. In the following examples, each colored line represents a different wavelength. The network connections are shown in gray with the magnification circles displaying the wavelengths carried on the lines. Connections to the end user are shown in dark gray.

POINT TO POINT TOPOLOGY

RING TOPOLOGY

Radiance R5000
with R153
Line Cards

Radiance R4000
with 4-Channel
CWDM Mux/Demux
Modules

Central
Office

Radiance R1000
with R153
Line Cards

Radiance R4000
with OADM Modules

Drop & Pass

Radiance R4000
with OADM Modules

Drop & Insert

Drop & Pass

Radiance R1000
with R153
Line Card

Radiance R1000
with R153
Line Card

Radiance R4000
with OADM Modules

Drop & Insert

Radiance R1000
with R153 Line Cards

Radiance R4000
with OADM Modules

Drop & Pass

Radiance R1000
with R153 Line Card

Changing the SFP Optics

Depending on the model, the 1Gbps interface line card supports one or two replaceable small form-factor pluggable (SFP) transceivers for the fiber port(s). This section explains how to remove and install the optics on the card. Metrobility SFP transceivers are hot-swappable and can be changed without disrupting traffic on the other port.

IMPORTANT: Use only Metrobility SFP transceivers with this product.
Installing any other optics may damage the unit and will void the product's
warranty.

1. Disconnect the fiber optic network cables, if they are installed, from both the receiver (top) and transmitter (bottom) of the SFP transceiver.

    WARNING: Avoid looking into the laser or cable.

2. To remove the SFP optics from the interface line card, simply pull the release mechanism (i.e., plastic tab, release wire, etc.) and slide the module out of the slot, as shown below.

RELEASE MEHCANISM
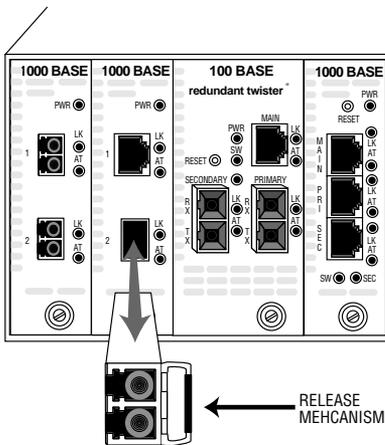
3. Slide the new SFP module into the slot, pushing it firmly in place.

4. Remove the protective cover on the LC connector.

5. Reconnect the network cables. Verify proper segment connectivity via the green LK LED, which will be lit.

Technical Specifications

Data Rate
Full duplex _____ 1Gbps

Power Requirements
Power _____ 5 V DC @ 1 A, 5 W

Environmental
Operating Temperature _____ 0 to 50° C
Storage Temperature _____ -30 to 70° C
Operating Humidity _____ 5% to 95% non-condensing
Weight _____ 5 oz (0.14 kg)

Twisted-Pair Interface (R153-1S only)
Connector _____ Shielded RJ-45, 8-pin jack
Impedance _____ 50 ohms nominal
Signal Level Output (differential) _____ 0.95 to 1.05 V
Signal Level Input _____ 200 mV minimum
Supported Link Length _____ 100 m
Cable Type _____ Category 5e UTP

RJ-45 Pin Layout	
Pin #	Signal
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-

Multimode Fiber Optic Plug-in (O211-M5)
Connector _____LC
Wavelength _____ 850 nm
RX Input Sensitivity _____ -19 dBm to 0 dBm
Output Power _____ -9 dBm to -3.5 dBm
Typical Link Budget _____ 16 dBm
Supported Link Length _____up to 550 m (50/125 µm); or 275 m (62.5/125 µm)
Cable Type _____ 50/125 or 62.5/125 µm multimode or 9/125 µm

Singlemode Fiber Optic Plug-in (O211-10)

Connector _____ LC
Wavelength _____ 1310 nm
RX Input Sensitivity _____ -20 dBm to -3 dBm
Output Power _____ -9.5 dBm to -3 dBm
Typical Link Budget _____ 19 dBm
Supported Link Length _____ up to 10 km
Cable Type _____ 9/125 µm singlemode

Singlemode Fiber Optic Plug-in (O211-25)

Connector _____ LC
Wavelength _____ 1310 nm
RX Input Sensitivity _____ -24 dBm to -3 dBm
Output Power _____ -7 dBm to -3 dBm
Typical Link Budget _____ 21 dBm
Supported Link Length _____ up to 25 km
Cable Type _____ 9/125 µm singlemode

Singlemode Fiber Optic Plug-in (O211-40)

Connector _____ LC
Wavelength _____ 1550 nm
RX Input Sensitivity _____ -24 dBm to -3 dBm
Output Power _____ -5 dBm to 0 dBm
Typical Link Budget _____ 23.5 dBm
Supported Link Length _____ up to 40 km
Cable Type _____ 9/125 µm singlemode

Singlemode Fiber Optic Plug-in (O211-70)

Connector _____ LC
Wavelength _____ 1550 nm
RX Input Sensitivity _____ -24 dBm to -3 dBm
Output Power _____ 0 dBm to 5 dBm
Typical Link Budget _____ 28 dBm
Supported Link Length _____ up to 70 km
Cable Type _____ 9/125 µm singlemode

Singlemode Fiber Optic Plug-in (O211-1A)

Connector _____ LC
Wavelength _____ 1550 nm
RX Input Sensitivity _____ -32 dBm to -3 dBm
Output Power _____ 0 dBm to 5 dBm
Typical Link Budget _____ 36 dBm
Supported Link Length _____ up to 100 km
Cable Type _____ 9/125 μm singlemode

Singlemode Fiber Optic Plug-in (O411-80-xx) for CWDM*

Connector _____ LC
Wavelength _____ (see tables below)
RX Input Sensitivity _____ -26 dBm to -24 dBm
Output Power _____ 0 dBm to 5 dBm; 2 dBm (typical)
Typical Link Budget _____ 28 dBm
Supported Link Length _____ up to 80 km
Cable Type _____ 9/125 μm singlemode

Model Number	Wavelength	Model Number	Wavelength
O411-80-31	1310 nm	O411-80-47	1470 nm
O411-80-33	1330 nm	O411-80-49	1490 nm
O411-80-35	1350 nm	O411-80-51	1510 nm
O411-80-37	1370 nm	O411-80-53	1530 nm
O411-80-39	1390 nm	O411-80-55	1550 nm
O411-80-41	1410 nm	O411-80-57	1570 nm
O411-80-43	1430 nm	O411-80-59	1590 nm
O411-80-45	1450 nm	O411-80-61	1610 nm

*Coarse Wavelength Division Multiplexing

Acronyms and Abbreviations

AT   Activity
AUTO   Auto-negotiation
CLCF   Copper Loss Carry Forward
CWDM Coarse Wavelength Division Multiplexing
dB   Decibel
dBm   Decibels relative to 1 mW of power (0 dBm equals 1 mW)
Demux Demultiplexer
FX   Ethernet over fiber
Gbps   Gigabits per second
GigE   Gigabit Ethernet
km   Kilometer
LED   Light emitting diode
LK   Link
LLCF   Link Loss Carry Forward
LLR   Link Loss Return
Mux   Multiplexer
nm   Nanometer
OADM Optical Add/Drop Module
PWR   Power
RX   Receive
SFP   Small Form-Factor Pluggable

Product Safety, EMC and Compliance Statements

This equipment complies with the following requirements:

- UL
- CSA
- EN60950 (safety)
- FCC Part 15, Class A
- EN55022 Class A (emissions)
- DOC Class A (emissions)
- EN55024: 1998 (immunity)
- IEC 825-1 Classification
- Class 1 Laser Product

This product shall be handled, stored and disposed of in accordance with all governing and applicable safety and environmental regulatory agency requirements.

The following *FCC* and *Industry Canada* compliance information is applicable to North American customers only.

USA FCC Radio Frequency Interference Statement
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution: Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canadian Radio Frequency Interference Statement
This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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

Warranty and Servicing

Three-Year Warranty for the Radiance 1Gbps Line Card

Metrobility Optical Systems, Inc. warrants that every Radiance 1Gbps interface line card will be free from defects in material and workmanship for a period of THREE YEARS from the date of Metrobility shipment. This warranty covers the original user only and is not transferable. Should the unit fail at any time during this warranty period, Metrobility will, at its sole discretion, replace, repair, or refund the purchase price of the product. This warranty is limited to defects in workmanship and materials and does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including overvoltage failures caused by use outside of the product's specified rating, or normal wear and tear of mechanical components.

To establish original ownership and provide date of purchase, complete and return the registration card or register the product online at www.metrobility.com. If product was not purchased directly from Metrobility, please provide source, invoice number and date of purchase.

To return a defective product for warranty coverage, contact Metrobility Customer Service for a return materials authorization (RMA) number. Send the defective product postage and insurance prepaid to the address provided to you by the Metrobility Technical Support Representative. Failure to properly protect the product during shipping may void this warranty. The Metrobility RMA number must be clearly on the outside of the carton to ensure its acceptance.

Metrobility will pay return transportation for product repaired or replaced in-warranty. Before making any repair not covered by the warranty, Metrobility will estimate cost and obtain authorization, then invoice for repair and return transportation. Metrobility reserves the right to charge for all testing and shipping costs incurred, if test results determine that the unit is without defect.

This warranty constitutes the buyer's sole remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Under no circumstances will Metrobility be liable for any damages incurred by the use of this product including, but not limited to, lost profits, lost savings, and incidental or consequential damages arising from the use of, or inability to use, this product. Authorized resellers are not authorized to extend any other warranty on Metrobility's behalf.

ADDITIONAL IMPORTANT WARRANTY INFORMATION:
The Radiance 1Gbps line card is designed to operate using only the Metrobility small form-factor pluggable (SFP) transceivers specified in this manual. The use and installation of parts not included in this document will void the product's warranty and may cause damage to the unit.

Product Manuals

The most recent version of this manual is available online at
http://www.metrobility.com/support/manuals.htm

Product Registration

To register your product, go to
http://www.metrobility.com/support/registration.asp

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