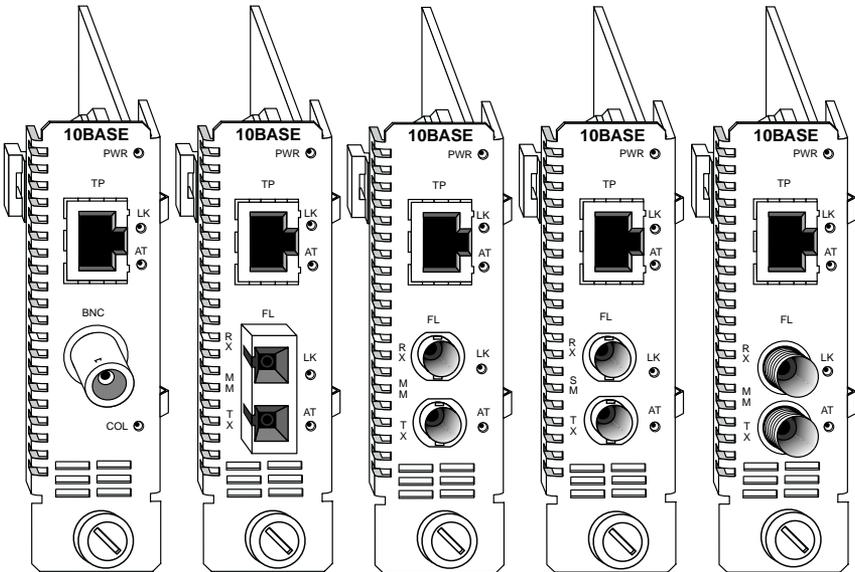


RADIANCE

10MBPS

SINGLE INTERFACE LINE CARDS



Installation & User Guide

Models: R111-12 / R111-13 / R111-15 /
R111-16 / R111-18 / R111-1T

Radiance 10Mbps Single Interface Line Cards

Copper to Copper:

R111-12 _____ RJ-45 to Thinnet Coaxial BNC

Copper to Fiber:

R111-13 _____ RJ-45 to FL multimode SC

R111-15 _____ RJ-45 to FL multimode ST

R111-16 _____ RJ-45 to FL singlemode ST

R111-18 _____ RJ-45 to FL multimode SMA

R111-1T _____ RJ-45 to FL multimode ST (LH)

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Table of Contents

Radiance 10Mbps Single Interface Line Cards Installation & User Guide

<i>Overview</i>	4
<i>Installation Guide</i>	5
STEP 1: Unpack the Line Card	5
STEP 2: Set the Jumper	5
STEP 3: Set the MDI-II/MDI-X Switch	7
STEP 4: Install the Line Card	8
STEP 5: Connect to the Network	8
<i>User Guide</i>	10
LED Indicators	10
Topology Solutions	10
Link Loss Carry Forward (LLCF)	11
Technical Specifications	12
Product Safety, EMC and Compliance Statements	14
Warranty and Servicing	15

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Overview

The Radiance 10Mbps single interface line cards offer transparent integration of fiber optic connectivity or copper-to-coaxial integration in Ethernet networks. These innovative solutions provide full signal restoration—with low bit delay—ensuring accurate data transmission and guaranteeing maximum cable length support. All cards are compatible with any Ethernet device.

Through Metrobility's unique management functionality, you can manage remote connections through console commands, our NetBeacon® or WebBeacon software, or with any standard SNMP application. This end-to-end visibility of your network not only simplifies network management but also increases network reliability.

The Radiance 10Mbps line card provides the following key features:

- Fused power on each line card to protect the rest of the cards in the chassis from a short circuit. The power (PWR) LED on an affected line card will not be lit if its fuse is blown.
- Half or full duplex support.
- Auto polarity support on all twisted-pair ports.
- Link Loss Carry Forward functionality to aid in troubleshooting a remote network connection (excluding the R111-12). Refer to the section titled [Link Loss Carry Forward](#) for more information.
- MDI-II/MDI-X switch installed on all twisted-pair ports to eliminate the need for crossover cables.
- Low bit delay to ensure accurate data flow across the network.
- Strict standards compliance that provides compatibility with other vendors' equipment for flexible connectivity.
- Transparency to data frame sizes.

Installation Guide

Follow the simple steps outlined in this section to install and start using your Radiance 10Mbps single interface line card.

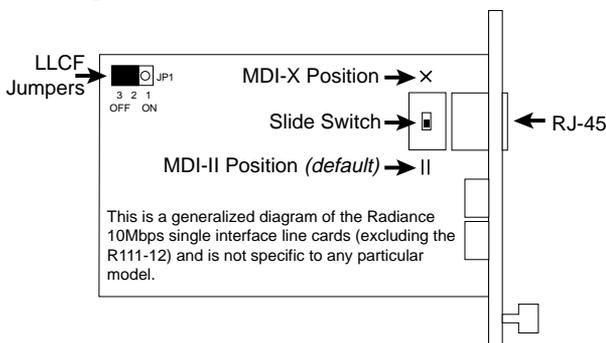
NOTE: Electrostatic discharge precautions should be taken when handling any line card. Proper grounding is recommended (i.e., wear a wrist strap).

1 **Unpack the Line Card**

Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your line card carefully. If you discover any shipping damage, notify your 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 Jumper**

All Radiance 10Mbps single interface line cards, excluding the R111-12, incorporate LLCF (Link Loss Carry Forward) functionality as an aid in troubleshooting a remote connection. The jumper configures the LLCF operation.*



Jumper Settings

See the diagram above for the location of the LLCF jumper.

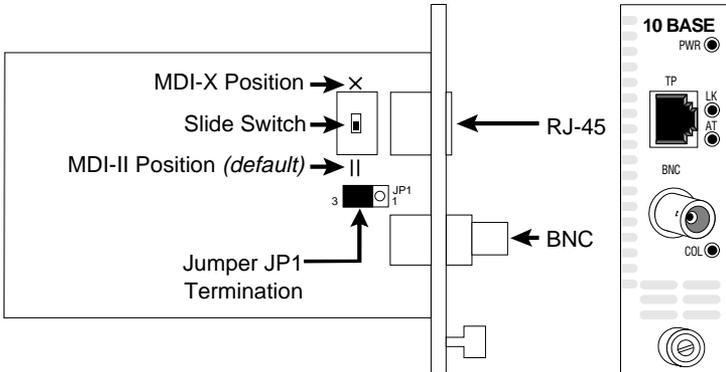
- Connect pins 1 and 2 to enable LLCF.
- Connect pins 2 and 3 to disable LLCF. (*default*)

*LLCF also can be controlled via console commands or with Metrobility's NetBeacon or WebBeacon management software. Refer to the *Command Line Interface Reference Guide*, *NetBeacon Element Management Software Installation & User's Guide* or *WebBeacon Management Software Installation & User's Guide* for software management information.

R111-12 Only

On the RJ-45 to BNC line card, a jumper is used to set either internal or external termination of the BNC port. See the diagram below to locate the jumper, labeled JP1.

- Connect pins 1 and 2 to enable internal 50Ω termination.
- Connect pins 2 and 3 to enable use of external termination.
(*default*)



3 Set the MDI-II/MDI-X Switch (twisted-pair ports only)

To eliminate the need for crossover cables, the Radiance line cards have an MDI-II to MDI-X slide switch for each twisted-pair port. This switch is positioned directly behind its associated RJ-45 connector and allows simple setup in either straight-through (*default*) or crossover configurations. See the diagrams on pages 5 and 6 for the location of the switch.

When setting the MDI-II to MDI-X switch, observe the positioning of the following symbols:

- the parallel symbol (II) indicates a straight-through or parallel connection. (*default*)
- the cross symbol (X) indicates a crossover connection.

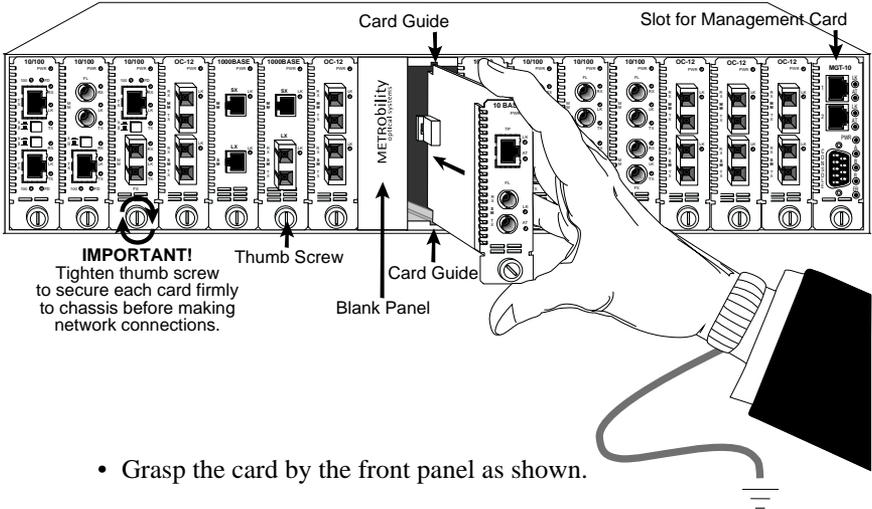
These symbols are clearly marked on the printed circuit board. Simply slide the switch in the direction of the appropriate symbol. Use the following tables as a guide.

A device that is wired straight through needs one crossover connection:	
If the cable is	the MDI-II to MDI-X Switch Setting should be
straight through	X
crossover	II

A device that is wired crossover needs a parallel connection:	
If the cable is	the MDI-II to MDI-X Switch Setting should be
straight through	II
crossover	X

4 Install the Line Card

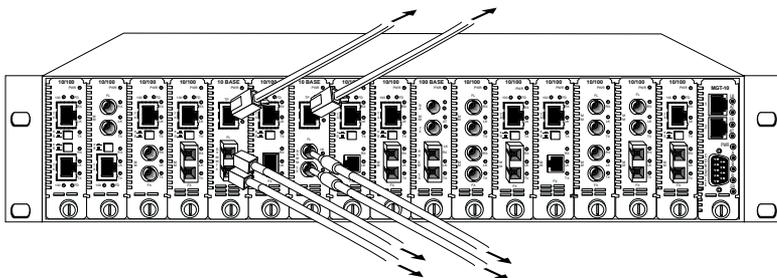
The Radiance 10Mbps single interface line card offers the ease of plug-and-play installation and is hot-swappable. The card must be firmly secured to the chassis before network connections are made. Follow the simple steps outlined below to install your line card.



- Grasp the card by the front panel as shown.
- Insert the line card into a slot on the chassis making sure that the top and bottom edges of the board are aligned with the top and bottom card guides in the chassis. Do not force the board 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.
- To secure the line card to the chassis, turn the thumbscrew clockwise until it is snug. The card is now properly installed and ready for network connections.

5 Connect to the Network

To connect the Radiance line card to the network, insert the cables into the appropriate connectors as illustrated below. Be 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 LK (link) LED.



Twisted-Pair Interface

Twisted-pair ports provide shielded RJ-45 connectors that support a maximum segment length of 100m. Use Category 3, 4 or 5 cables.

Fiber Optic Interface

When making network connections, make sure that the transmit (TX) port of the card connects to the receive (RX) port of the connected device, and that the transmit (TX) port of the connected device connects to the receive (RX) port of the card.

The singlemode (SM) interface supports a maximum segment length of 14km. The multimode (MM) port on the R111-1T supports a maximum segment length of 5km. All other MM ports support a maximum segment length of 2km for remote links.

Thinnet Coaxial Interface

The R111-12 BNC connector supports a maximum segment length of 185m over RG-58 coaxial cable.

Network Connections

Thinnet Coaxial:

R111-12 RJ-45 to BNC _____ 100m/185m

Copper to Fiber:

R111-13 RJ-45 to FL multimode SC _____ 100m/2km

R111-15 RJ-45 to FL multimode ST _____ 100m/2km

R111-16 RJ-45 to FL singlemode ST _____ 100m/14km

R111-18 RJ-45 to FL multimode SMA _____ 100m/2km

R111-1T RJ-45 to FL multimode ST _____ 100m/5km

User Guide

This section contains information about the operating features of the Radiance 10Mbps single interface line cards.

LED Indicators

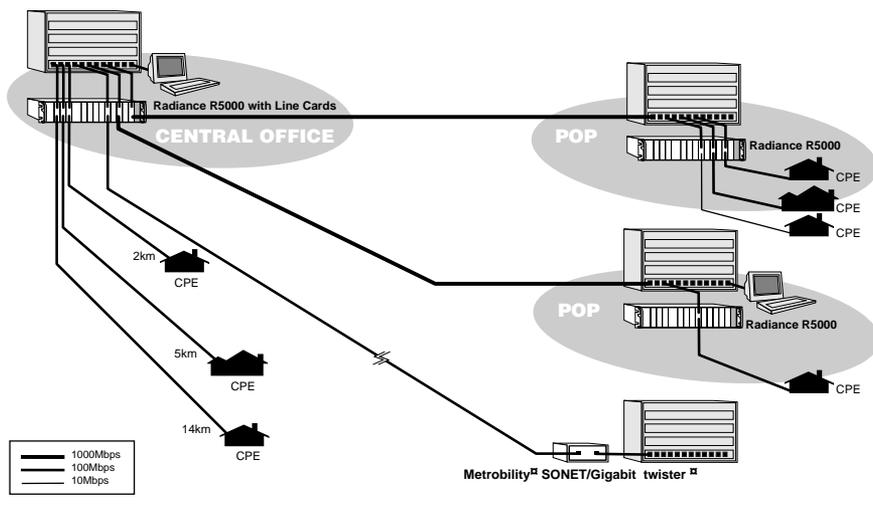
The Radiance 10Mbps single interface line cards provide several LEDs for the visible verification of unit status and proper functionality. These LEDs can help with troubleshooting and overall network diagnosis and management. There are separate activity (AT) and link (LK) indicators for each port.

When lit, the LEDs indicate the following information:

- **PWR** (power): normal operation.
- **LK** (link): satisfactory link status.
- **AT** (activity): receiving data.
- **COL** (collision): collision detected. (R111-12 only)

Once power is applied to the card, verify correct connectivity via the LK LED.

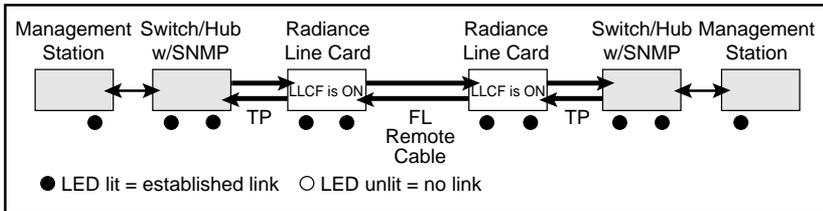
Topology Solutions



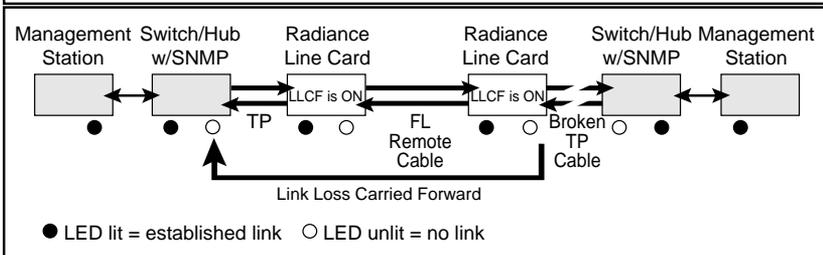
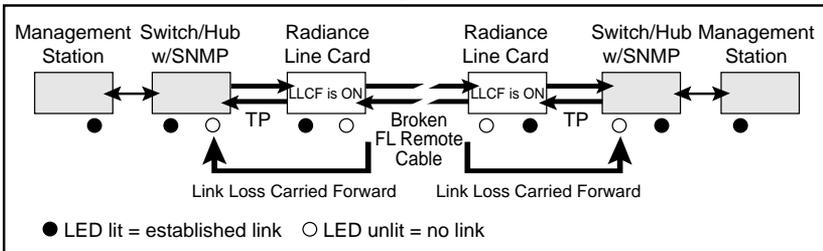
Link Loss Carry Forward (LLCF)*

The Radiance 10Mbps single interface line cards incorporate an LLCF function for troubleshooting a remote connection. When LLCF is enabled, the FL and TP ports do not transmit a link signal until they receive a link signal from the opposite port.

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



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



Important: When connecting a Radiance line card with LLCF enabled to an auto-negotiating device, force both sides of the configuration to 10Mbps and either full or half duplex. This allows the card to immediately see link pulses and start passing data.

* Line cards are shipped with LLCF disabled (OFF).

Technical Specifications

Data Rate

Data Rate _____ 10Mbps half duplex; 20Mbps full duplex
Bit Delay _____ < 5 bits

Environmental

Power _____ 5V @ 1.0 Amp, 5W average
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)

Network Connections

Twisted-Pair Interface

Connector _____ Shielded RJ-45, 8-pin jack
Impedance _____ 100 Ohms nominal
Signal Level Output _____ 2.0 to 2.8V
Signal Level Input _____ 350mV minimum
Supported Link Length _____ 100m
Cable Type _____ Category 3, 4 or 5 UTP

(For NEBS Level III and EN55024:1998 compliance, use only
Category 5 STP cables.)

Singlemode F/O Interface

(R111-16)

Connector _____ ST
Wavelength _____ 1310nm
RX Input Sensitivity _____ -32.5 dBm minimum
Output Power _____ -27 dBm to -17 dBm
Supported Link Length _____ up to 14km full duplex
Cable Type _____ 9/125 μm F/O

Thinnet Coax Interface

(R111-12)

Connector _____ BNC receptacle
Termination _____ User Selectable Jumper
Supported Link Length _____ up to 185m
Cable Type _____ RG-58 coaxial cable

Multimode F/O Interface

(R111-13, R111-15, R111-18)

Connector _____ SC, ST or SMA
Wavelength _____ 820nm
RX Input Sensitivity _____ -32.5 dBm minimum
Output Power _____ -21.8 dBm to -16.8 dBm (50/125 μm)
_____ -19 dBm to -14 dBm (62.5/125 μm)
Supported Link Length _____ up to 2km full duplex
Cable Type _____ 50/125 or 62.5/125 μm F/O

Multimode Fiber Optic Interface—Long Haul Distance Support

(R111-1T)

Connector _____ ST
Wavelength _____ 1300nm
Output Power _____ -23.5 dBm to -16 dBm (50/125 μm)
_____ -20 dBm to -14 dBm (62.5/125 μm)
Supported Link Length _____ up to 5km full duplex
Cable Type _____ 50/125, 62.5/125, 100/140 μm F/O

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)
- EN55024: 1998 (immunity)
- IEC 825-1 Classification
- Class 1 Laser Product
- DOC Class A (emissions)
- CB

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 Règlement sur le matériel brouilleur du Canada.

Warranty and Servicing

Three-Year Warranty for Radiance 10Mbps Single Interface Line Cards

Metrobility Optical Systems, Inc. warrants that every Radiance 10Mbps single 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.

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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