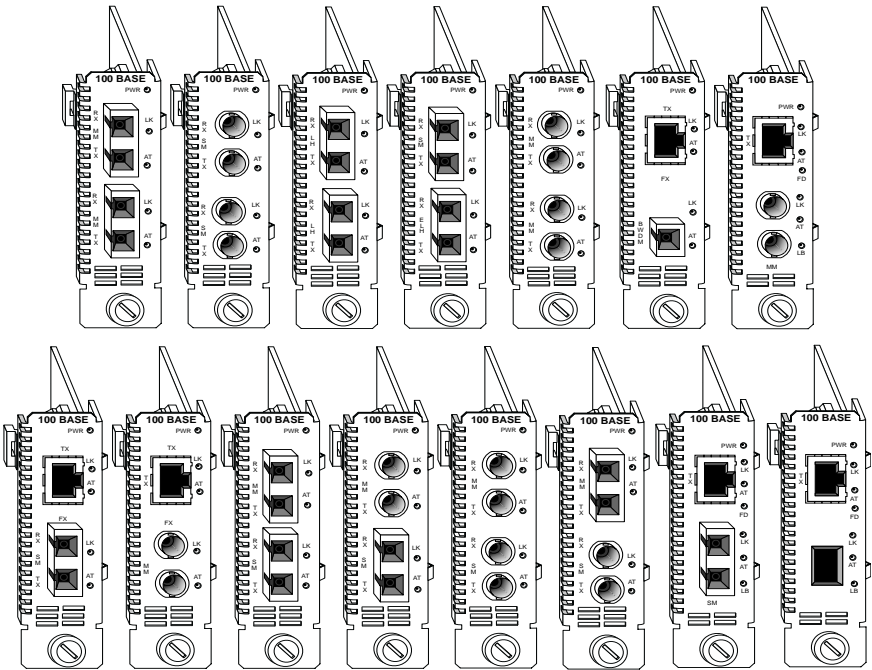


RADIANCE 100MBPS SINGLE INTERFACE LINE CARDS



Installation & User Guide

Models: R131-13 / R131-14 / R131-15 / R131-16 / R131-17 / R131-1J /
R131-1X / R131-1Y / R131-33 / R131-34 / R131-36 / R131-44 /
R131-47 / R131-4J / R131-54 / R131-55 / R131-56 / R131-66 /
R131-77 / R131-JJ / R133-13 / R133-14 / R133-15 / R133-16 /
R133-17 / R133-1E / R133-1J / R133-1K / R133-1M / R133-1X /
R133-1Y

Radiance 100Mbps Single Interface Line Cards

Full-Featured Copper to Fiber with LLCF, FEF, Remote Loopback, Auto-Negotiation, and Auto-Crossover:

- R133-13 ___ RJ-45 to FX multimode SC
- R133-14 ___ RJ-45 to FX singlemode SC
- R133-15 ___ RJ-45 to FX multimode ST
- R133-16 ___ RJ-45 to FX singlemode ST
- R133-17 ___ RJ-45 to FX singlemode SC (40km)
- R133-1E ___ RJ-45 to FX multimode MT-RJ
- R133-1J ___ RJ-45 to FX singlemode SC (100km)
- R133-1K ___ RJ-45 to FX multimode LC
- R133-1M ___ RJ-45 to FX singlemode LC
- R133-1X ___ RJ-45 to FX singlemode SC 1550/1310nm bidirectional wavelength division multiplexed (BWDM)
- R133-1Y ___ RJ-45 to FX singlemode SC 1310/1550nm BWDM

Copper to Fiber with LLCF:

- R131-13 ___ RJ-45 to FX multimode SC
- R131-14 ___ RJ-45 to FX singlemode SC
- R131-15 ___ RJ-45 to FX multimode ST
- R131-16 ___ RJ-45 to FX singlemode ST
- R131-17 ___ RJ-45 to FX singlemode SC (40km)
- R131-1J ___ RJ-45 to FX singlemode SC (100km)
- R131-1X ___ RJ-45 to FX singlemode SC 1550/1310nm BWDM
- R131-1Y ___ RJ-45 to FX singlemode SC 1310/1550nm BWDM

Fiber to Fiber with LLCF:

- R131-33 ___ FX multimode SC to FX multimode SC
- R131-34 ___ FX multimode SC to FX singlemode SC
- R131-36 ___ FX multimode SC to FX singlemode ST
- R131-44 ___ FX singlemode SC to FX singlemode SC
- R131-47 ___ FX singlemode SC to FX singlemode SC (40km)
- R131-4J ___ FX singlemode SC to FX singlemode SC (100km)
- R131-54 ___ FX multimode ST to FX singlemode SC
- R131-55 ___ FX multimode ST to FX multimode ST
- R131-56 ___ FX multimode ST to FX singlemode ST
- R131-66 ___ FX singlemode ST to FX singlemode ST
- R131-77 ___ FX singlemode SC (40km) to FX singlemode SC (40km)
- R131-JJ ___ FX singlemode SC (100km) to FX singlemode SC (100km)

This publication is protected by the copyright laws of the United States and other countries, with all rights reserved. No part of this publication may be reproduced, stored in a retrieval system, translated, transcribed, or transmitted, in any form, or by any means manual, electric, electronic, electromagnetic, mechanical, chemical, optical or otherwise, without prior explicit written permission of Metrobility Optical Systems, Inc.

Table of Contents

Radiance 100Mbps Single Interface Line Cards Installation & User Guide

Overview	4
Installation Guide	5
STEP 1: Unpack the Line Card	5
STEP 2: Set the Jumper (R131 Only)	5
STEP 3: Set the MDI-II/MDI-X Switch (R131-1x twisted-pair ports only)	6
STEP 4: Set the DIP Switches (R133 Only)	7
STEP 5: Install the Line Card	9
STEP 6: Connect to the Network	10
User Guide	13
LED Indicators	13
Link Loss Carry Forward (LLCF)	14
Far End Fault (FEF—R133 Only)	16
Remote Loopback (R133 Only)	17
Topology Solutions	18
Technical Specifications	19
Product Safety, EMC and Compliance Statements	21
Warranty and Servicing	22

Metrobility, Metrobility Optical Systems, and NetBeacon are trademarks of Metrobility Optical Systems, Inc. The Metrobility Optical Systems logo is a trademark of Metrobility Optical Systems, Inc. All others are trademarks of their respective owners.

The information contained in this document is assumed to be correct and current. The manufacturer is not responsible for errors or omissions and reserves the right to change specifications at any time without notice.

Overview

For updating or expanding an existing network, Metrobility® offers the Radiance 100Mbps single interface line cards in various combinations including copper to fiber, multimode to singlemode, and fiber optic distance extension.

Use the optical extender units to increase your network reach up to 100km over singlemode cables at full duplex without the need for repeaters. These line cards allow you to maximize your Fast Ethernet segments and transparently transmit all signal activity for multimode-to-multimode or singlemode-to-singlemode configurations.

The mixed-media line cards offer seamless integration of copper and fiber connections in copper-to-fiber networks. This innovative solution provides full signal restoration ensuring accurate data transmission and guaranteeing maximum cable length support. All line cards are compatible with any Fast 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 100Mbps 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 card will not be lit if its fuse is blown.
 - Half and full duplex support.
 - Auto polarity support on all twisted-pair ports.
 - Link Loss Carry Forward functionality to aid in troubleshooting.
 - MDI-II/MDI-X switch on all R131 twisted-pair ports. The R133 provides built-in crossover to automatically perform the function of the switch.
 - On the R133, the copper port supports auto-negotiation and the fiber port supports both Far End Fault (FEF) and remote loopback.
 - Data frame size transparency.
 - Numerous connectivity options, including bidirectional wavelength multiplexed (BWDM) fiber.
-

Installation Guide

Follow the simple steps outlined in this section to install and start using the Radiance 100Mbps 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.

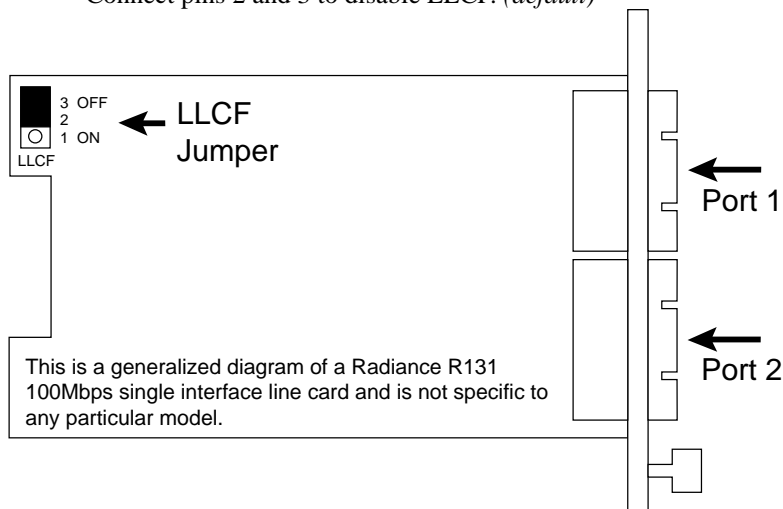
2 **Set the Jumper (R131 Only)**

All Radiance 100Mbps single interface line cards incorporate LLCF (Link Loss Carry Forward) functionality as an aid in troubleshooting a remote connection. A jumper configures LLCF* operation on the R131 models.

Jumper Settings

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

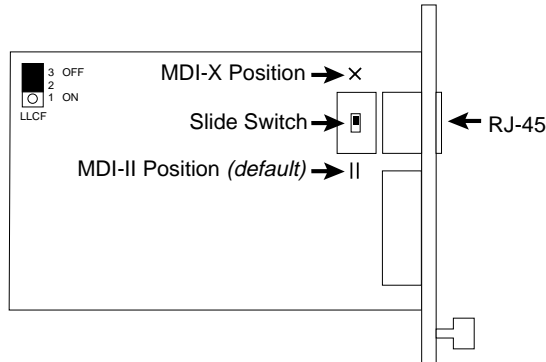
- Connect pins 1 and 2 to enable LLCF.
- Connect pins 2 and 3 to disable LLCF. (*default*)



*LLCF also can be controlled through 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.

3 **Set the MDI-II/MDI-X Switch (R131-1x twisted-pair ports only)**

To eliminate the need for crossover cables, the R131-1x line card has an MDI-II to MDI-X slide switch for its twisted-pair port. The switch is positioned directly behind its associated RJ-45 connector and allows simple setup in either straight-through (*default*) or crossover configurations. See the diagram below 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 (||) 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 table as a guide.

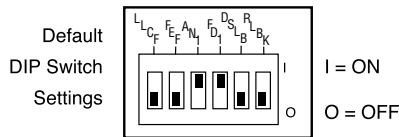
A device that is wired straight through needs one crossover connection:	
If the cable is	the MDI-II to MDI-X Switch Setting should be
straight through	X
crossover	

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	
crossover	X

4

Set the DIP Switches (R133 only)

The R133 provides a set of six DIP switches located on the back of the board. These switches allow you to select from several modes of operation. To enable a function, set the switch UP (lever pushed away from the printed circuit board); to disable a function, set the switch DOWN (lever pushed toward the circuit board). The default settings are shown below.



Link Loss Carry Forward Switch (LLCF)

The R133 incorporates Link Loss Carry Forward functionality as an aid in troubleshooting remote connections. When LLCF is enabled, the loss of inbound link pulses on a port stops the transmission of outbound link pulses from the *opposite* port. For example, if LLCF is enabled, the loss of incoming link pulses at *Port 1* will stop the transmission of link pulses out of *Port 2*. Conversely, if *Port 2* stops receiving link pulses, *Port 1* will not transmit link pulses.

Link Loss Carry Forward is enabled simultaneously on both ports when switch LLCF is enabled. The unit is shipped with LLCF disabled. Refer to [Link Loss Carry Forward](#) in the User Guide section of this manual for further details.

Far End Fault Switch (FEF)

The R133 supports Far End Fault functionality to detect the loss of link by the remote unit's fiber port receiver.

FEF is only applicable to the fiber port (Port 2). When FEF is enabled on a port, the loss of the inbound link pulses on that port generates an alarm, which is sent out the port's transmitter. FEF also enables a port to read the alarm. To function properly, the FEF setting on both the local and remote R133 line cards must be the same.

For example, if FEF is enabled on both line cards and the remote unit's fiber receiver (RX) stops detecting link pulses, then its fiber transmitter (TX) will send an alarm. The local line card will receive the alarm and report it through its fiber port FEF LED, which will turn amber. No

alarm will be issued if FEF is disabled on the remote card. The FEF LED will not turn amber if FEF is disabled on the local R133 line card because it will not be able to detect the alarm.

Far End Fault is enabled on Port 2 when switch FEF is ON. The unit is shipped with FEF disabled. Refer to [Far End Fault](#) in the User Guide section of this manual for more information.

Auto-Negotiation Switch (AN1)

Switch AN1 controls the use of auto-negotiation on the copper port. Auto-negotiation determines whether the port operates at half or full duplex. When AN1 is enabled, the copper port advertises full duplex capabilities to its connected device, if the duplex switch, FD1, is enabled. The port will advertise half duplex capabilities if FD1 is disabled. If AN1 is disabled, the duplex switch will determine the port's duplex mode. By default, auto-negotiation is enabled.

Duplex Switch (FD1)

Switch FD1 sets the duplex mode for the copper port when auto-negotiation is disabled. The port operates at full duplex when FD1 is enabled; and it operates at half duplex when FD1 is disabled. If auto-negotiation is enabled, the FD1 switch setting will determine whether the port advertises full or half duplex (refer to Auto-Negotiation above). The default is set to full duplex enabled.

Copper Port Configuration Table

Use the table below to set the duplex and auto-negotiation DIP switches to obtain specific modes of operation for the copper port.

Copper Port Configuration	FD1	AN1
Full Duplex	ON	OFF
Half Duplex	OFF	OFF
Auto-Negotiate Full Duplex	ON	ON
Auto-Negotiate Half Duplex	OFF	ON

Disable Loopback Switch (DSL B)

This switch determines the response of the fiber port when it receives the remote loopback command. If the DSL B switch is enabled, the port will ignore all remote loopback commands. When the switch is disabled, the port will permit remote loopback to occur. By default, the response switch is disabled, which allows remote loopback.

Remote Loopback Switch (RLBK)

The remote loopback switch allows you to test the fiber connection between two Metrobility x133 units. Enabling the switch sends a loopback request to the remote fiber port. To run the remote loopback test properly, the following conditions must be met:

- The remote unit must be a Metrobility x133. The remote unit may be either a standalone converter or line card.
- The DSLB response switch on the remote unit must be disabled.

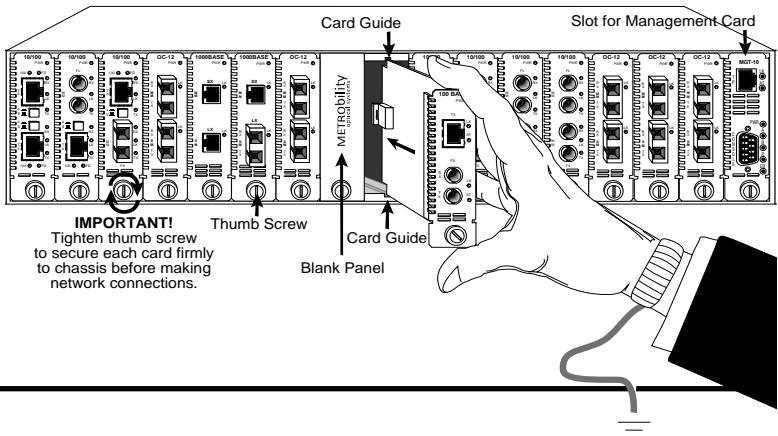
If the conditions are satisfied, the remote loopback sequence will begin. The remote fiber port will go into loopback mode. Next, the local card will generate a test pattern that is sent to the remote unit and then looped back. The local card will read the returned data to verify proper transmission. The LB LED on the local card will indicate whether the test passed (green) or failed (amber). Refer to [Remote Loopback](#) for further information.

If the conditions for remote loopback are not met, the remote loopback test will always fail. By default, remote loopback is disabled.

5 **Install the Line Card**

The Radiance 100Mbps 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.

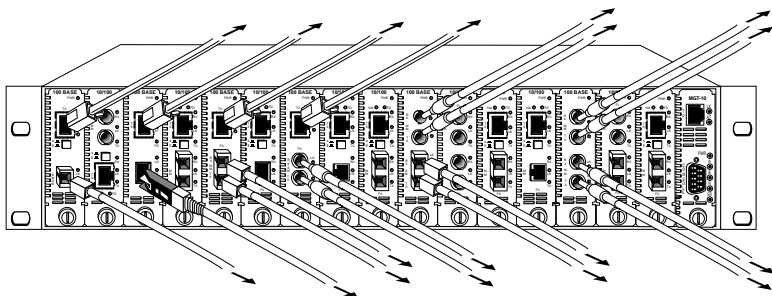
- Grasp the card by the front panel as shown.



- Insert the 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 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.
- 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 connection to the network.

6 **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 Interfaces

All twisted-pair ports provide a shielded RJ-45 connector that supports a maximum segment length of 100 meters. Use only Category 5 cables.

Fiber Optic Interfaces

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

All multimode (MM) fiber optic interfaces support a maximum segment length of 2km for remote links.

The singlemode (SM) interface supports a maximum segment length of 20km, 40km, or 100km. Refer to the Network Connections list below for the maximum cable length supported by each model number.

BWDM Interfaces

The bidirectional wavelength division multiplexed (BWDM) port provides one singlemode SC connector that supports a maximum segment length of 20km. BWDM line cards must always be used in complementary pairs. That is, a -1X model must always be connected to a -1Y. The -1X cards are designed to transmit data at a wavelength of 1550nm and receive at 1310nm. Correspondingly, the -1Y cards transmit data at 1310nm and receive at 1550nm.

Network Connections

<i>TX-to-FX:</i>	Max Distance
R131-13 RJ-45 to FX multimode SC _____	100m/2km
R131-14 RJ-45 to FX singlemode SC _____	100m/20km
R131-15 RJ-45 to FX multimode ST _____	100m/2km
R131-16 RJ-45 to FX singlemode ST _____	100m/20km
R131-17 RJ-45 to FX singlemode SC _____	100m/40km
R131-1J RJ-45 to FX singlemode SC _____	100m/100km
R131-1X RJ-45 to FX singlemode BWDM SC _____	100m/20km
R131-1Y RJ-45 to FX singlemode BWDM SC _____	100m/20km
R133-13 RJ-45 to FX multimode SC _____	100m/2km
R133-14 RJ-45 to FX singlemode SC _____	100m/20km
R133-15 RJ-45 to FX multimode ST _____	100m/2km
R133-16 RJ-45 to FX singlemode ST _____	100m/20km
R133-17 RJ-45 to FX singlemode SC _____	100m/40km
R133-1E RJ-45 to FX multimode MT-RJ _____	100m/2km
R133-1J RJ-45 to FX singlemode SC _____	100m/100km
R133-1K RJ-45 to FX multimode LC _____	100m/2km
R133-1M RJ-45 to FX singlemode LC _____	100m/20km
R133-1X RJ-45 to FX singlemode BWDM SC _____	100m/20km
R133-1Y RJ-45 to FX singlemode BWDM SC _____	100m/20km

MM-to-MM:

R131-33 FX multimode SC to FX multimode SC _____	2km/2km
R131-55 FX multimode ST to FX multimode ST _____	2km/2km

MM-to-SM:

- R131-34 FX multimode SC to FX singlemode SC _____ 2km/20km
- R131-36 FX multimode SC to FX singlemode ST _____ 2km/20km
- R131-54 FX multimode ST to FX singlemode SC _____ 2km/20km
- R131-56 FX multimode ST to FX singlemode ST _____ 2km/20km

SM-to-SM:

- R131-44 FX singlemode SC to FX singlemode SC _____ 20km/20km
- R131-47 FX singlemode SC to FX singlemode SC _____ 20km/40km
- R131-4J FX singlemode SC to FX singlemode SC _____ 20km/100km
- R131-66 FX singlemode ST to FX singlemode ST _____ 20km/20km
- R131-77 FX singlemode SC to FX singlemode SC _____ 40km/40km
- R131-JJ FX singlemode SC to FX singlemode SC _____ 100km/100km

User Guide

This section contains information about the operating features of the Radiance 100Mbps single interface line cards.

LED Indicators

The Radiance 100Mbps 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. Once power is applied to the card, verify correct connectivity via the LK LED.

R131 LEDs

LED Label	LED Name	Color (Status)	Indication
PWR	power	green (steady)	The unit is ON.
LK	link	green (steady)	Verifies that the port has link established.
AT	activity	green (flashing)	The port is receiving data.

R133 LEDs

LED Label	LED Name	Color (Status)	Indication
PWR	power	green (steady)	The unit is ON.

Copper Port LEDs

LK	link	green (steady)	Verifies that the port has link established.
AT	activity	green (flashing)	The port is receiving data.
FD	duplex	green (steady)	The port is in full-duplex mode when lit. It is in half-duplex mode when not lit.

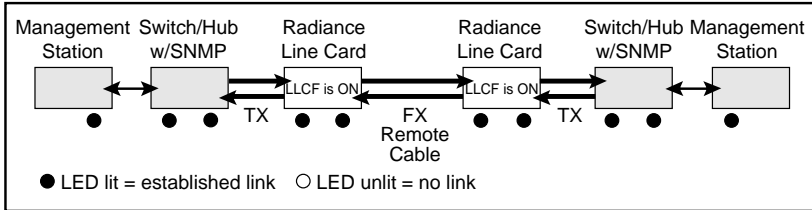
Fiber Port LEDs

LK	link	green (steady)	Verifies that the port has link established.
		amber (steady)	Far end fault detected. The remote fiber port is not receiving a valid signal from the local unit.
AT	activity	green (flashing)	The port is receiving data.
LB	remote loopback	green (steady)	Remote loopback test was successful; OR on the remote card, fiber port is receiving test pattern.
		amber (steady)	Remote loopback test has failed; OR on the remote card, fiber port is not receiving test pattern.
		off	Normal operation.

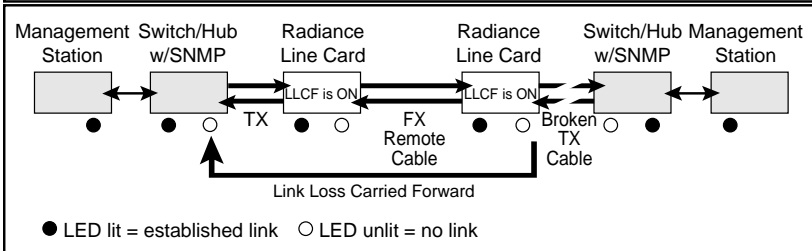
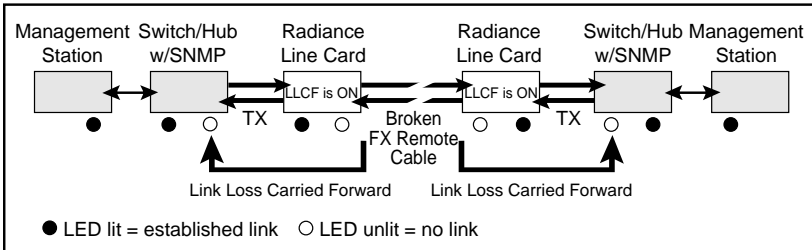
Link Loss Carry Forward (LLCF)*

The Radiance 100Mbps single interface line cards incorporate an LLCF function for troubleshooting a remote connection. When LLCF is enabled, the 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 fiber connection breaks, the line cards carry the 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.



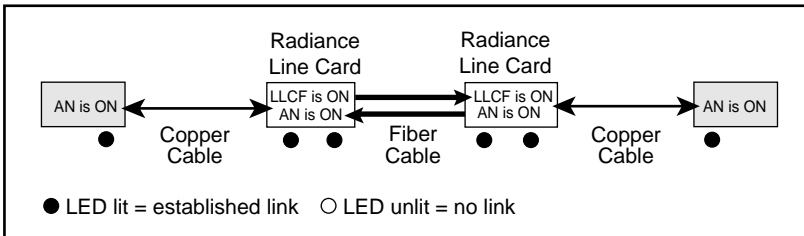
Important: When connecting a Radiance line card with LLCF enabled to an auto-negotiating device, force both sides of the configuration to 100Mbps and either full or half duplex. This allows the card to immediately see link pulses and start passing data.

* Line cards are shipped with LLCF disabled.

LLCF with Auto-Negotiation (R133 only)

Important: To prevent synchronization problems, we recommend that you do not enable both LLCF and auto-negotiation at the same time on both the local and remote Radiance line cards. Disable one of the functions on either card to ensure quick link establishment.

When LLCF and auto-negotiation (AN) are enabled simultaneously on both the local and remote Radiance line cards, as shown in the following diagram, it may take a few seconds for the cards to establish link.



As connections are created, the line cards may enter a situation in which the LLCF and auto-negotiation functions become synchronized but slightly out of phase. This will cause continuous up-down link conditions on all ports. That is, the link (LK) LEDs on the ports will blink on and off.

If the condition lasts more than 10 seconds, reset one of the Radiance line cards, or unplug and then reconnect one of the connectors. The links should be established within a few seconds.

Far End Fault (FEF—R133 Only)

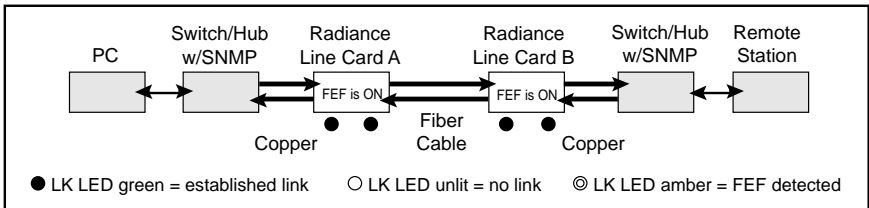
The R133 is designed with Far End Fault* functionality to identify the loss of link in the remote unit's fiber receiver. FEF is not applicable to the copper port.

Setting FEF on the fiber optic port enables two operations:

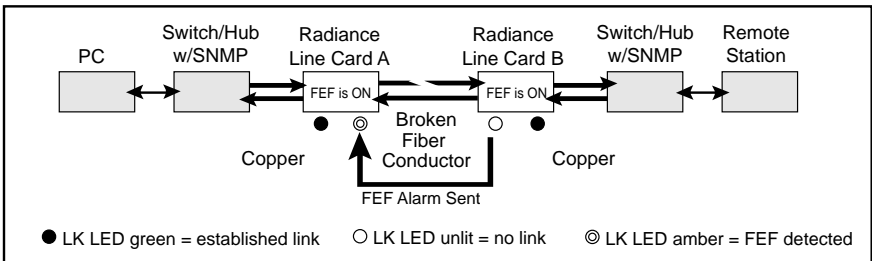
1. It allows the fiber *transmitter* to issue a FEF alarm when the fiber *receiver* fails to detect a valid link.
2. It enables the port to read the FEF alarm, so it can report the condition by changing the color of the LK LED to amber.

Important: To function properly, the FEF setting on both the local and remote R133 line card must be the same.

The diagram below shows a typical network configuration with good link status using two Radiance R133 line cards with FEF enabled.



If one of the optical conductors is bad (as shown in the diagram box below), Card B will send a FEF alarm to its link partner on Card A. The condition will be indicated on Card A through its amber LK LED on the fiber port.



In the example described above, if FEF is disabled on Card B, the FEF alarm will not be transmitted to Card A. If FEF is disabled on Card A, it will not be able to read the FEF alarm and its LK LED will remain green.

*Line cards are shipped with the FEF function disabled.

Remote Loopback (R133 Only)

The Radiance R133 line card supports remote loopback testing, which is typically used to verify the integrity of the fiber link to and from a remote unit. Use this feature to remotely initiate loopback testing from a central office and to monitor the results without making a trip to the remote site.

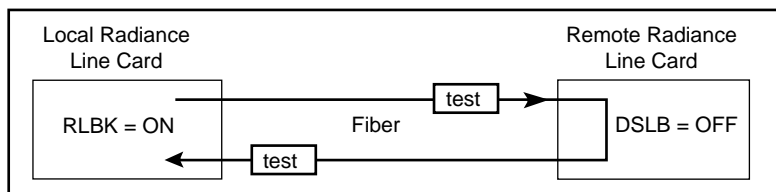
Remote loopback is enabled through software commands or through the DIP switch labeled RLBK on the locally managed line card. When it is set, a request for loopback is sent to the remote fiber port. To run the loopback test properly, the following conditions must be met:

- The remote unit connected to the fiber port is another Metrobility x133. The remote unit may be either a standalone converter or another line card.
- The disable loopback (DSL) response switch on the remote unit is disabled. DSLB determines whether commands to enter remote loopback are executed or ignored.

If the two conditions are not met, the remote loopback test will always fail.

If the conditions are satisfied, the remote loopback sequence begins:

- The remote unit goes into loopback mode, in which the fiber port returns the incoming traffic back to the sender.
- The local line card generates a test pattern that is sent to the remote port and then looped back.



- The local line card reads the returned data to see if there are any errors or problems.
- The LB LED color on the local line card indicates whether the operation succeeded (green) or failed (amber). On the remote unit, the LB LED is green when it receives the test pattern and amber when it does not.

Remote Loopback Time Out

The fiber port is designed to resume normal data transmission within 15 seconds after receiving the remote loopback command. If the RLBK switch is still enabled on the local line card after time-out period occurs, the remote port will repeat the loopback sequence. During this transitional period, when the remote

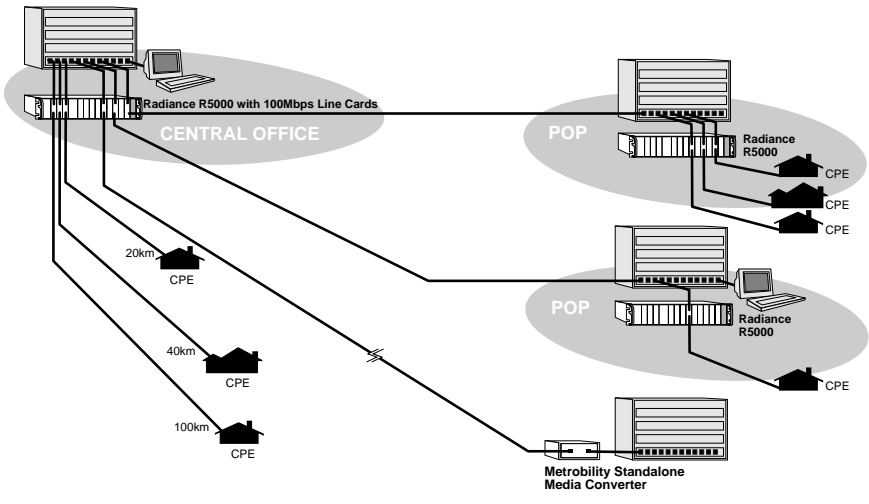
port has reset itself and is no longer looping back the test pattern, the LB LED on the local card may briefly turn amber. For example, if the RLBK switch is ON for 40 seconds, the LB LED may briefly turn amber after 15 seconds and again after 30 seconds.

If the RLBK switch setting on the local line card is changed from ON to OFF before the remote card resets itself, the LB LED on the remote unit may be amber for a few seconds. This is because the remote port has not timed out and is still in loopback mode waiting to receive test patterns. The remote port will resume normal operation after the time out occurs, which will be in less than 15 seconds.

Time Out Indications

Local LB LED		Remote LB LED	
Color (status)	Indication	Color (status)	Indication
Amber (brief)	Remote port has reset itself to begin passing data, however, the remote loopback switch is still enabled on the local unit.	Amber (less than 15 seconds)	The remote loopback switch on the local unit has been disabled, but the remote port has not timed out yet.

Topology Solutions



Technical Specifications

Data Rate

Data Rate _____ 100Mbps half duplex; 200Mbps full duplex

Power

Input _____ 5V @ 1.0A, 5W average (R131)

_____ 5V @ 0.5A, 2.5W average (R133)

Network Connections

Twisted-Pair Interface

Connector _____ Shielded RJ-45, 8-pin jack

Impedance _____ 100 Ohms nominal

Signal Level Output (differential) _____ .95 to 1.05V

Signal Level Input _____ 350mV minimum (R131)

_____ 200mV minimum (R133)

Supported Link Length _____ 100m

Cable Type _____ Category 5 or 5E UTP/STP

(R131-1x: For NEBS Level III and EN55024:1998 compliance, use only Category 5 STP cables.)

Multimode F/O Interface

Connector _____ LC, MT-RJ, SC, or ST

Wavelength _____ 1310nm

RX Input Sensitivity _____ -31 dBm minimum

_____ -32 dBm minimum (R133-1K)

Output Power _____ -23.5 dBm to -14 dBm (50/125 μ m)

_____ -20 dBm to -14 dBm (62.5/125 μ m)

_____ -20 dBm (R133-1K)

Supported Link Length _____ up to 2km full duplex

Cable Type _____ 50/125 or 62.5/125 μ m F/O

Singlemode F/O Interface

Connector _____ LC, SC, or ST

Wavelength _____ 1310nm

RX Input Sensitivity _____ -35 dBm minimum (R131)

_____ -31 dBm (R133-14, -16)

_____ -32 dBm (R133-1M)

Output Power _____ -15 dBm to -8 dBm

Supported Link Length _____ up to 20km full duplex

Cable Type _____ 9/125 μ m F/O

Singlemode F/O Interface — long haul distance support

Connector _____ SC
Wavelength _____ 1310nm
RX Input Sensitivity _____ -35 dBm minimum (R131-17, -47, -77)
_____ -34 dBm minimum (R133-17)
Output Power _____ -5 dBm to 0 dBm (R131-17, -47, -77)
_____ -6 dBm to 0 dBm (R133-17)
Supported Link Length _____ up to 40km full duplex
Cable Type _____ 9/125 μ m SM F/O

Singlemode F/O Interface — extended long haul distance support

Connector _____ SC
Wavelength _____ 1550nm
RX Input Sensitivity _____ -37 dBm minimum (R131-1J, -4J, -JJ)
_____ -34 dBm minimum (R133-1J)
Output Power _____ -3 dBm to 0 dBm (R131-1J, -4J, -JJ)
_____ -5 to 0 dBm (R133-1J)
Supported Link Length _____ up to 100km full duplex
Cable Type _____ 9/125 μ m SM F/O

Singlemode BWDM Fiber Optic Interface

Connector _____ SC
RX Input Sensitivity _____ -32 dBm minimum
Output Power _____ -15 dBm to -8 dBm
Supported Link Length _____ up to 20km full duplex
Cable Type _____ 9/125 μ m F/O
(R131-1X, R133-1X)
TX Wavelength _____ 1550 nm
RX Wavelength _____ 1310 nm
(R131-1Y, R133-1Y)
TX Wavelength _____ 1310 nm
RX Wavelength _____ 1550 nm

Environmental

Operating Temperature _____ 0° to 50° C (R131 series)
_____ -20° to 70° C (R133 series)
Storage Temperature _____ -30° to 70° C
Operating Humidity _____ 5% to 95% non-condensing
Weight _____ 5 oz (0.14 kg)

Regulatory

Compliance _____ IEEE 802.3 and 802.3u

Product Safety, EMC and Compliance Statements

This equipment complies with the following requirements:

- UL
- CSA
- EN55024: 1998 (immunity)
- IEC 825-1 Classification
- DOC Class A (emissions)
- NEBS Level III (excludes R133, R131-1X and R131-1Y)
- CE
- EN60950 (safety)
- Class 1 Laser Product
- FCC Part 15, Class A
- EN55022 Class A (emissions)

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 100Mbps Single Interface Line Cards

Metrobility Optical Systems, Inc. warrants that every Radiance 100Mbps 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.

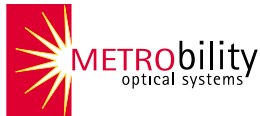
Product Manuals

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

To obtain additional copies of this manual, contact your reseller, or call
1.877.526.2278 or 1.603.880.1833

Product Registration

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



25 Manchester Street, Merrimack, NH 03054 USA
tel: 1.603.880.1833 • fax: 1.603.594.2887

www.metrobility.com