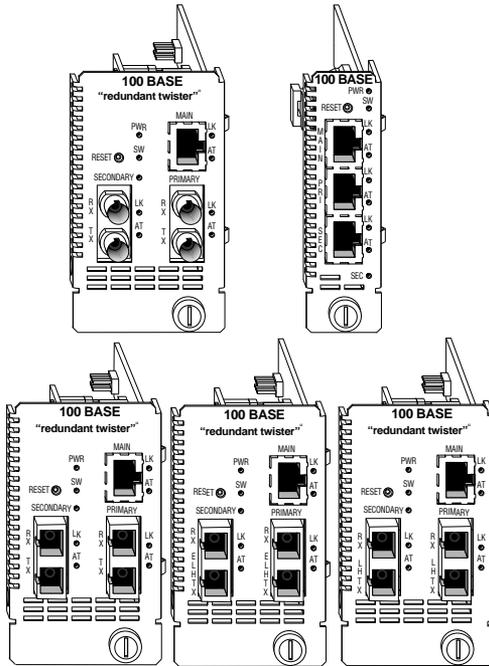


RADIANCE

100MBPS REDUNDANT INTERFACE

LINE CARDS



Installation & User Guide

Models: R731-13 / R731-14 / R731-15 / R731-16 /
R731-17 / R731-1J / R732-11 / R732-13 /
R732-14 / R732-15 / R732-16 / R732-17 /
R732-1J

Radiance 100Mbps Redundant Interface Line Cards

R731-13 _____ RJ-45 to redundant FX multimode SC
R731-14 _____ RJ-45 to redundant FX singlemode SC
R731-15 _____ RJ-45 to redundant FX multimode ST
R731-16 _____ RJ-45 to redundant FX singlemode ST
R731-17 _____ RJ-45 to redundant FX singlemode SC (40km)
R731-1J _____ RJ-45 to redundant FX singlemode SC (100km)

With SONAR (Switch On No Activity Received)

R732-11 _____ RJ-45 to redundant RJ-45
R732-13 _____ RJ-45 to redundant FX multimode SC
R732-14 _____ RJ-45 to redundant FX singlemode SC
R732-15 _____ RJ-45 to redundant FX multimode ST
R732-16 _____ RJ-45 to redundant FX singlemode ST
R732-17 _____ RJ-45 to redundant FX singlemode SC (40km)
R732-1J _____ RJ-45 to redundant FX singlemode SC (100km)

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“redundant twister” technology is a patent of Metrobility Optical Systems. (U.S. Patent No. 6,058,479)

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

The Radiance 100Mbps redundant interface line card offers the resiliency of data link redundancy to ensure network integrity with no down time. This link duplication provides the nonstop networking capability essential for high priority traffic and mission-critical applications. The Radiance redundant interface line card provides full redundant data paths for Fast Ethernet devices. The card also provides 100Base-TX to FX migration. The redundant line card actively monitors the primary link and if it fails, automatically activates the secondary link without interruption to network operation.

The R732-xx features a function called SONAR (Switch On No Activity Received). With SONAR enabled, the card provides protection against loss of data activity in addition to link integrity.

Management control over the Radiance redundant interface line card allows a network administrator to monitor and configure the card via a PC using console commands, Metrobility's NetBeacon® or WebBeacon management software or any SNMP application.

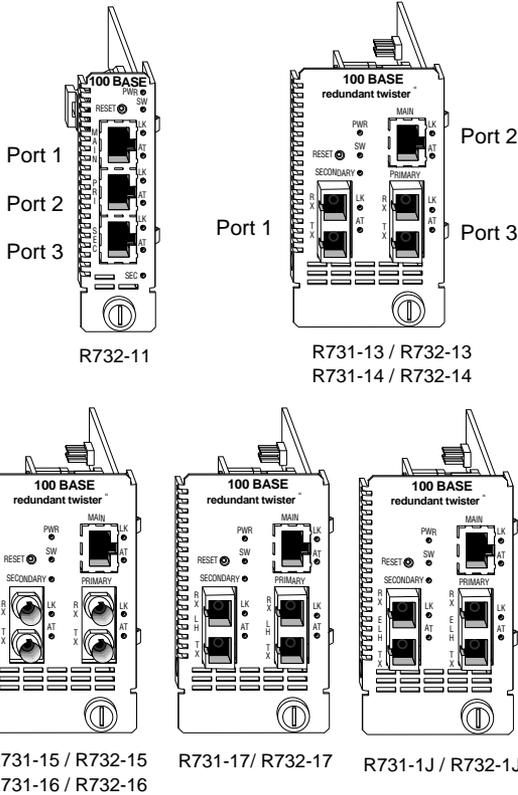
The Radiance 100Mbps redundant interface line card has the following features:

- Can be configured to operate in Dynamic Recovery Mode (DRM) to ensure session integrity and increased uptime.
- Can be configured to operate in Network Select Mode (NSM) to redirect and isolate traffic adding extra security.
- Immediately switches from the primary port to the secondary port if the primary link fails.
- In addition to switching on loss of link, the R732-xx can be configured to switch on loss of data (SONAR).
- Minimal impact on the round trip delay for communication in half-duplex collision domains.
- A maximum loss of 2-3 packets (measured with minimum packet size and minimum inter-packet gap) during fail-over transmission.
- All twisted-pair ports are equipped with an MDI-II to MDI-X switch to eliminate the need for crossover cables.

- Can be configured to return automatically to the primary port after the failure condition is resolved or only upon secondary failure, or manually switched back to primary after fail-over.
- Supports full- and half-duplex operation.
- Auto-polarity support on all twisted-pair ports.
- In addition to providing link and data on the active ports, the R732-xx line cards can be configured to provide link or link and redundant transmit data on the inactive port.
- Link Loss Carry Forward enable/disable functionality.
- Compatible with devices configured for auto-negotiation.
- Fused power on each redundant line card protects the system from a short circuit. This prevents a faulty card from bringing down an entire system.
- Full compliance with all applicable sections of IEEE 802.3 and 802.3u.

The Radiance 100Mbps redundant interface line card is available in several models. Each model contains a MAIN port, a PRIMARY port and a SECONDARY port. Redundancy is provided between the PRIMARY and SECONDARY ports. Because of the size of the redundant fiber optic cards, each TX-FX card uses two slots in the chassis. The TX-TX line card uses only one slot.

Model Number	Mbps	Connectors	Maximum Supported Link Length
R732-11	100	RJ-45 to redundant RJ-45	100m/100m
R73x-13	100	RJ-45 to redundant FX multimode SC	100m/2km
R73x-14	100	RJ-45 to redundant FX singlemode SC	100m/20km
R73x-15	100	RJ-45 to redundant FX multimode ST	100m/2km
R73x-16	100	RJ-45 to redundant FX singlemode ST	100m/20km
R73x-17	100	RJ-45 to redundant FX singlemode SC	100m/40km
R73x-1J	100	RJ-45 to redundant FX singlemode SC	100m/100km



* Refer to [Link Loss Carry Forward \(LLCF\)](#) in the User Guide section for more detailed information.

Installation Guide

Follow the simple steps outlined in this section of the manual to install and start using your Radiance 100Mbps redundant interface line card.

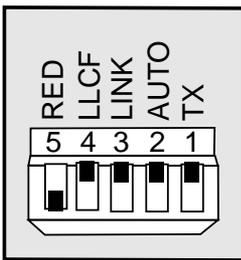
NOTE: Electrostatic discharge precautions should be taken when handling any line card. Proper grounding is recommended (i.e., wear a wrist strap).

1 Unpack the Line Card

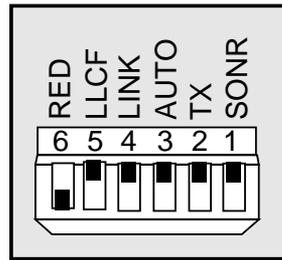
Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your order carefully for damage that may have occurred during shipment. If you discover any shipping damage, notify the carrier and follow their instructions for damage and claims. Save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

2 Set the DIP Switches

A set of five (5) or six (6) DIP switches, located on the circuit board, provide user-selectable configuration options for several modes of operation. These switches are clearly marked on the card's printed circuit board. Refer to the tables on the following pages for the proper setting of the DIP switches.*



R731-xx



R732-xx

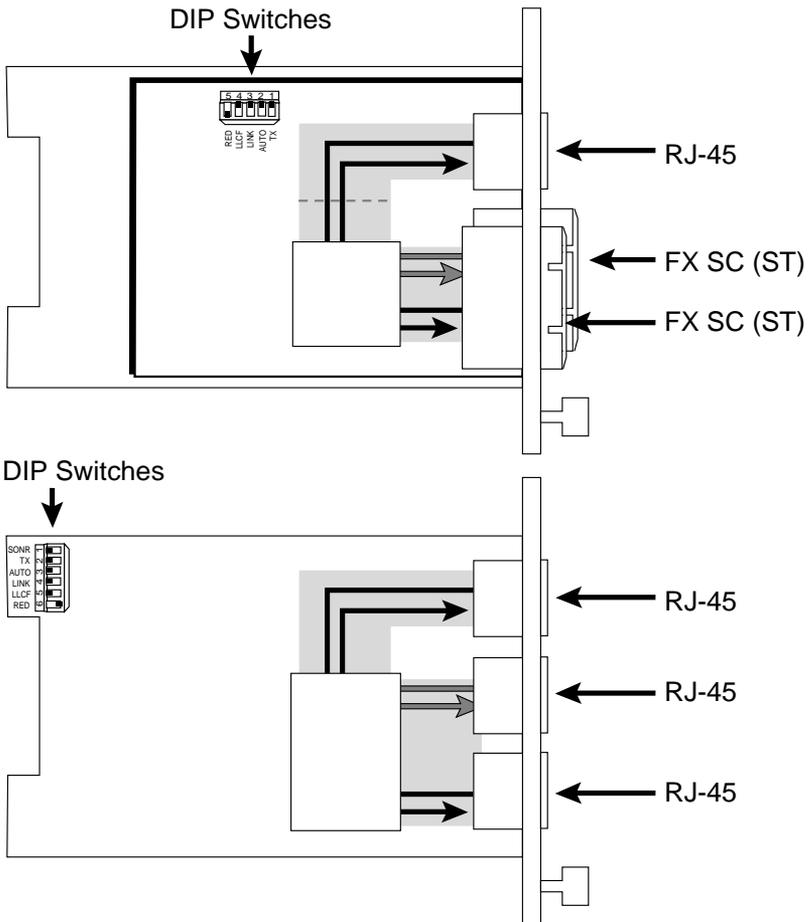
* DIP switches can also be managed via console commands or through Metrobility NetBeacon or WebBeacon management software. Refer to the **Command Line Interface Reference Guide**, **NetBeacon Element Management Software Installation & User Guide** or **WebBeacon Management Software Installation & User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

R731-xx: The DIP switches for these cards can be set for the following operational functions:

Switch Name	Position*	Operation
TX	UP	Transmits data on both the PRIMARY and SECONDARY ports simultaneously. LINK must be enabled on both ports. Only applicable in Dynamic Recovery Mode (DRM).
	DOWN <i>(default)</i>	Transmits data on the active port only.
AUTO	UP	In DRM, automatically reverts the active port back to the PRIMARY port when the primary link is reestablished. In Network Select Mode (NSM), sets the default active port to SECONDARY.
	DOWN <i>(default)</i>	In DRM, does not revert the active port back to the PRIMARY port when a primary link is reestablished until the SECONDARY link fails. If the SECONDARY link does not fail, the SECONDARY port remains active. Use the RESET push button located on the front of the card to force the active port back to the PRIMARY port and to clear the SW LED. In NSM, sets the default active port to PRIMARY.
LINK	UP	Link signals are sent out on both the PRIMARY and SECONDARY ports (i.e. link is sent out both ports). Only applicable in DRM.
	DOWN <i>(default)</i>	Link signals are sent out on the active port only. With the LINK switch in this position, data is <u>not</u> transmitted out the inactive port regardless of the TX switch setting.
LLCF	UP	Link Loss Carry Forward is enabled.
	DOWN <i>(default)</i>	Link Loss Carry Forward is disabled.

* 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.

Switch Name	Position*	Operation
RED	UP <i>(default)</i>	Operates in Dynamic Recovery Mode. If the PRIMARY PRIMARY link fails, the SECONDARY port becomes active. Refer to the description of the AUTO switch.
	DOWN	Operates in Network Select Mode. Use the RESET push button to toggle between PRIMARY and SECONDARY. In NSM, the AUTO switch sets the initial active port on power up. Up is SECONDARY and down is PRIMARY.



R732-xx: The table below describes the operational functions for the DIP switches on the Radiance redundant line card with SONAR.

Switch Name	Position*	Operation
SONR	UP	SONAR is enabled. To properly activate SONAR, the RED and LINK switches also must be enabled.
	DOWN <i>(default)</i>	SONAR is disabled.
TX	UP	Transmits data on both the PRIMARY and SECONDARY ports simultaneously. The LINK switch must be enabled on both ports.
	DOWN <i>(default)</i>	Transmits data on the active port only.
AUTO	UP	In Network Select Mode (NSM), sets the default port to SECONDARY. In Dynamic Recovery Mode (DRM), the active port automatically reverts back to the PRIMARY port when the primary link is reestablished. If SONAR is enabled, activity detection is also required before the active port reverts back to PRIMARY.
	DOWN <i>(default)</i>	In NSM, sets the default port to PRIMARY. In DRM, the active port does not revert back to the PRIMARY port when the primary link is reestablished or if activity is detected (SONAR enabled). Use the RESET push button located on the front of the card to force the active port back to PRIMARY and to clear the SW (switchover) LED. Note: The active port will revert back to PRIMARY if the SECONDARY port has no link

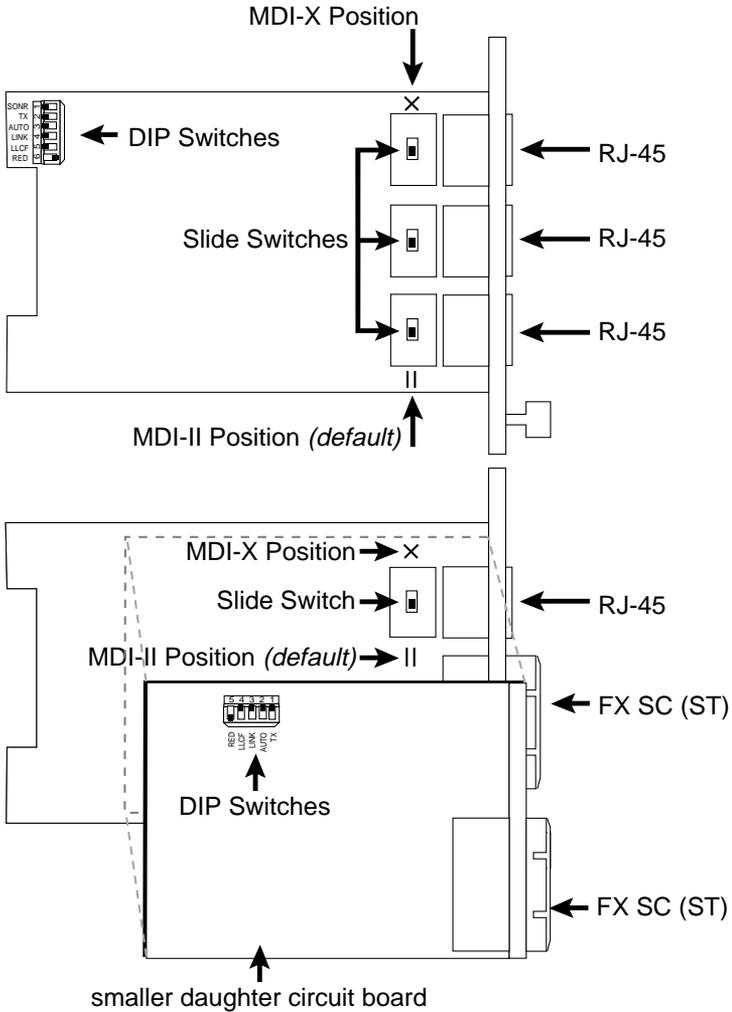
* When setting DIP switches, the UP position is when the lever of the switch is pushed away from the circuit board. The DOWN position is when the lever of the switch is pushed toward the circuit board.

Switch Name	Position	Operation
AUTO (cont'd)	DOWN (cont'd)	or a loss of activity for two (2) seconds (SONAR enabled) and the PRIMARY port has a valid link and data is detected (SONAR enabled).
LINK	UP	Link signals are sent out on both the PRIMARY and SECONDARY ports (i.e. link is sent out both ports).
	DOWN (default)	Link signals are sent out on the active port only. Note: The TX switch is ignored in this setting.
LLCF	UP	Link Loss Carry Forward is enabled.
	DOWN (default)	Link Loss Carry Forward is disabled.
RED	UP (default)	Operates in Dynamic Recovery Mode (DRM). If the primary link fails and the secondary link is present, the SECONDARY port becomes active. When SONAR is enabled, if the PRIMARY port loses activity for two (2) seconds and activity is present on the SECONDARY port, then the SECONDARY port becomes active.
	DOWN	Operates in Network Select Mode (NSM). Use the RESET push button to toggle between PRIMARY and SECONDARY. Use the AUTO switch to set the initial active port on power up.

3

Set the MDI-II/MDI-X Switch

For every twisted-pair port, a switch is used to implement the transmit and receive crossover functionality. The switch is positioned just behind its associated RJ-45 connector. On TX-FX cards, the switch is hidden from direct view by the smaller daughter circuit board. Use a small paperclip for easy access. See the illustration below for the location of the MDI-II/MDI-X switch(es):



The switch connects the transmit and receive signal pairs in either straight-through or crossover configurations.

The signal routing is as follows:

Switch Position	Connection
	TX+ to TX+ TX- to TX- RX+ to RX+ RX- to RX-
×	TX+ to RX+ TX- to RX- RX+ to TX+ RX- to TX-

When setting the MDI-II/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.

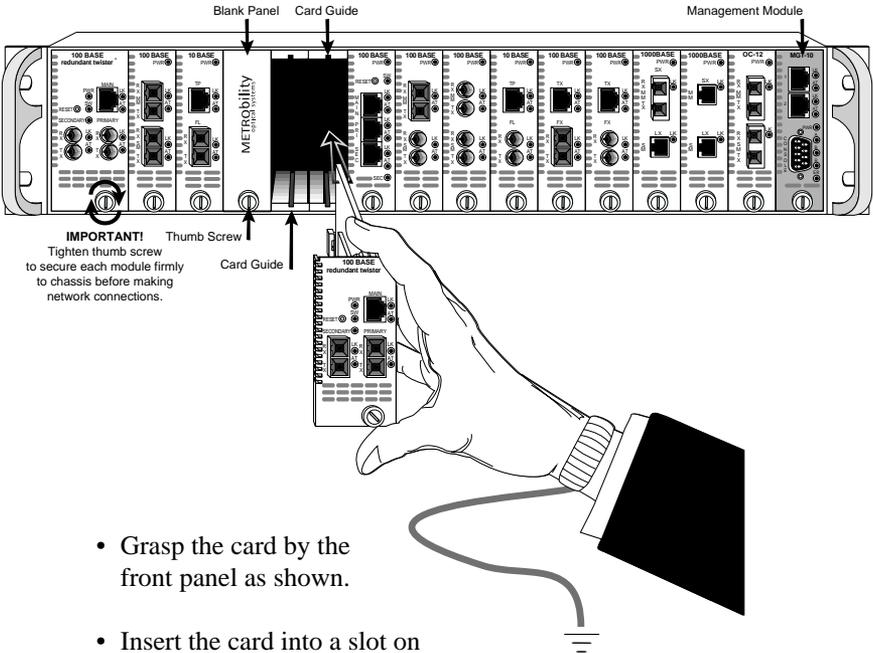
These two symbols are clearly marked on the printed circuit board. Simply slide the switch in the direction of the appropriate symbol. Because of the smaller space between boards on TX-FX cards, use a paperclip to reach in and push or pull the switch toward the appropriate symbol.

4

Install the Line Card

Radiance line cards offer the ease of plug-and-play installation and are hot-swappable. All cards must be firmly secured to the chassis before network connections are made. Follow the simple steps outlined below to install the redundant interface line card.

NOTE: Each TX-FX line card uses two slots in the chassis. The TX-TX cards use only one.



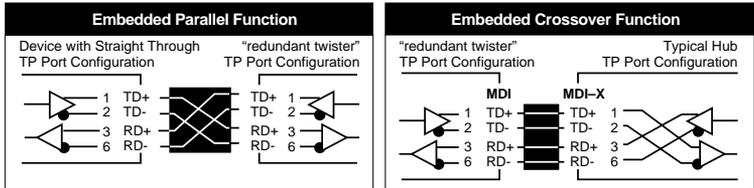
- Grasp the card by the front panel as shown.
- Insert the card into a slot on the chassis making sure that the top and bottom edges of the main board are aligned with the top and bottom card guides in the chassis. Do not force the card into the chassis unnecessarily. It should slide in easily and evenly.
- 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

A total of three connections must be made on the front panel when connecting the Radiance redundant line card to the network. Be sure that all cards are firmly secured to the chassis before making network connections.

- Connect to the MAIN port.
Each redundant line card provides one shielded RJ-45 jack for 100Base-TX connections and supports a maximum segment length of 100 meters over Category 5 twisted-pair cables.

Refer to STEP 3 for MDI-II to MDI-X switch functionality. Before making the proper twisted-pair connection, verify the port configuration of the connected device.



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

If you do not know the internal wiring configuration of the other device's RJ-45 port, consult the product documentation.

- Connect to the PRIMARY port.
- Connect to the SECONDARY port.
The R732-11 redundant interface line card provides two additional RJ-45 jacks for 100Base-TX connections and support a maximum segment length of 100 meters over Category 5 twisted-pair cables.

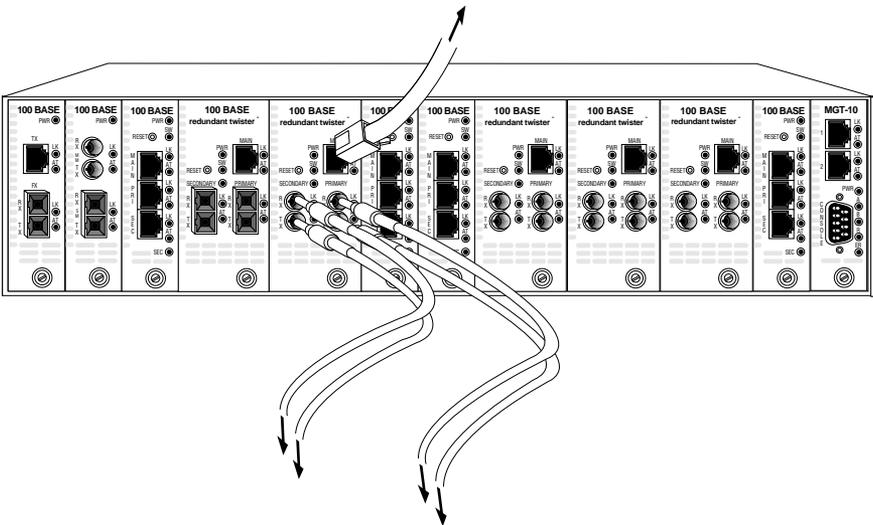
The R73x-13 and -15 provide two sets of 100Base-FX multimode SC or ST connectors that support a maximum segment length of 2km.

The R73x-14 and -16 provide two sets of 100Base-FX singlemode SC or ST connectors that support a maximum segment length of 20km.

The R73x-17 and -1J provide two sets of 100Base-FX singlemode SC connectors. The R73x-17 supports a maximum segment length of 40km. The R73x-1J supports a maximum segment length of 100km.

When making fiber optic connections, make sure that the transmit (TX) optical conductor of the Radiance redundant line card connects to the receive (RX) optical conductor of the connected device, and that the transmit (TX) optical conductor of the device connects to the receive (RX) optical conductor of the card for both the PRIMARY and SECONDARY links.

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 illuminates provided there is power being applied to the chassis and that there is an active device connected to the other end of the cable sending idle link signals.



User Guide

This section contains information regarding the operating features of your Radiance 100Mbps redundant interface line card.

LED Operation

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

The function of each LED is as follows:

LED Label	Color (Status)	Indication
SW	Amber (steady)	SECONDARY port was the active port at some point.
PWR	Green (steady)	Power ON
SECONDARY	Green (steady)	SECONDARY active
	(off)	PRIMARY active
(MAIN) LK	Green (steady)	Receive link present
(MAIN) AT	Green (blinking)	Receiving data
(PRIMARY) LK	Green (steady)	Receive link present
(PRIMARY) AT	Green (blinking)	Receiving data
(SECONDARY) LK	Green (steady)	Receive link present
(SECONDARY) AT	Green (blinking)	Receiving data

Reset Push Button

A small RESET push button is located on the front panel of the Radiance redundant line card. When used in conjunction with the card's SW and SECONDARY LEDs and the AUTO DIP switch setting, this push button allows you to effectively maintain or troubleshoot a PRIMARY link connection.

Because of its small size and recessed placement within the front panel, press the RESET push button with the tip of a pointed object. Pushing and holding the RESET push button has no effect. It is the act of pressing the push button that causes a reset.

In the event of a PRIMARY link failure, pressing the RESET push button has the following effects:

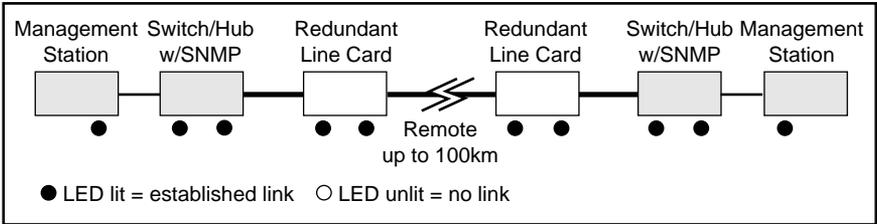
If the AUTO switch is UP and the RED switch is UP.	The active port automatically reverts to PRIMARY when the primary link is reestablished. Pressing the RESET switch clears the SW LED.
If the AUTO switch is DOWN and the RED switch is UP.	The active port does <u>not</u> automatically revert to PRIMARY when the primary link is reestablished. Pressing the RESET switch clears the SW LED and the SECONDARY LED and forces the PRIMARY port to be the active port. If the SECONDARY link is disabled, it reverts to the PRIMARY if the PRIMARY has a good link.
	If there is only a SECONDARY link, then the SW and SECONDARY LEDs remain lit and pressing the RESET switch has no effect.
If the RED switch is DOWN.	The card operates in Network Select Mode (NSM). The RESET push button toggles the active link between the PRIMARY and SECONDARY ports.

Link Loss Carry Forward (LLCF)

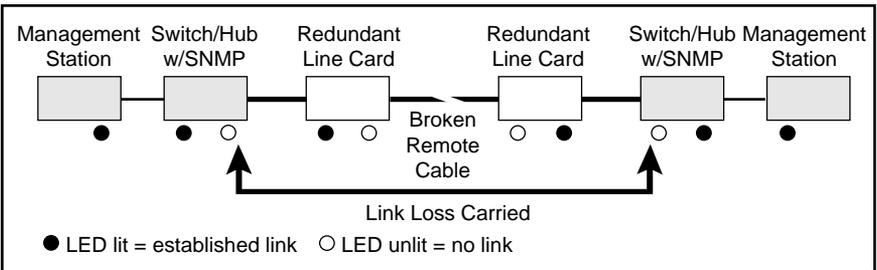
The Radiance 100Mbps redundant interface line cards have been designed with an LLCF function for troubleshooting a remote connection. The cards are shipped with LLCF disabled.

When LLCF is enabled, the fiber optic ports as well as the twisted-pair ports on the card do not transmit a link signal until they receive a link signal from the opposite port. For example, if LLCF is enabled and two Radiance redundant line cards are connected via a fiber cable with nothing else connected to them, the Link LED does *not* illuminate. When a valid link is established at the twisted-pair port, a complete connection is accomplished.

The diagram below shows a typical network configuration using Radiance redundant line cards for remote connectivity:



If the fiber connection breaks, or the remote device fails, the card carries that link loss all the way to the switch/hub which generates a trap to the management station. The administrator can then look at the card to determine the source of the loss.



IMPORTANT: When connecting a line card to a port that supports auto-negotiation, it is strongly recommended to fix the port setting to 100Mbps at either full or half duplex. This allows the card to sense receive links and select the active port.

Switch On No Activity Received (SONAR)

The R732-xx is designed to protect a network from failure that would prevent data from reaching its destination. With SONAR enabled, the line card monitors the active port for loss of data activity, as well as loss of a valid link. SONAR enables the redundant line card to automatically change its active port to its backup when the following two conditions occur:

- No data activity is detected on the active port for two (2) seconds.
- Data activity is detected on the backup port.

To switch active ports, the backup port must have data activity within the two-second time-out period when the active port lost activity. If both ports have no activity, the port that receives data activity first becomes the active port.

The active port is switched immediately if it loses its link and the backup port has a link.

To properly activate SONAR, make sure that the following switches are enabled:

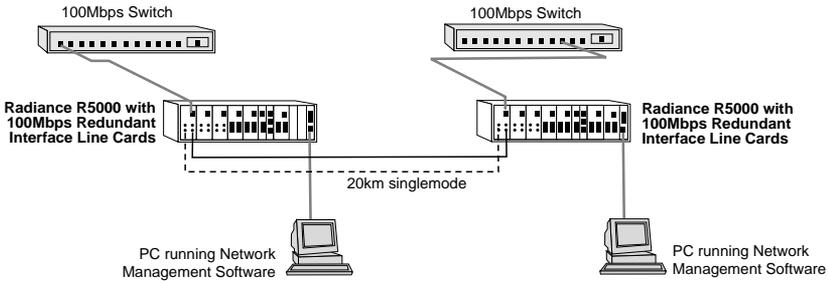
1. RED switch. This sets the redundant line card to operate in Dynamic Recovery Mode.
2. LINK switch. This allows link signals to be sent out both ports.
3. SONAR switch.

The settings of the other DIP switches do not affect SONAR operation. However, SONAR will override the Auto Restore Primary Circuit (AUTO) switch. If both SONAR and AUTO are enabled, the active port will not automatically revert to the primary port (after switching to the secondary port) if the primary port has link but no activity. Data activity on the primary port must also be detected during the two-second time-out period before the active port reverts back to the primary port.

*NOTE: The R732-xx is shipped with SONAR disabled. In addition to the hardware switch setting, SONAR can be enabled via console commands or by using WebBeacon or NetBeacon management software (version 2.0 or later). Refer to the **Command Line Interface Reference Guide, NetBeacon Element Management Software Installation & User Guide** or **WebBeacon Software Installation & User Guide** for software instructions.*

Back-to-Back Application

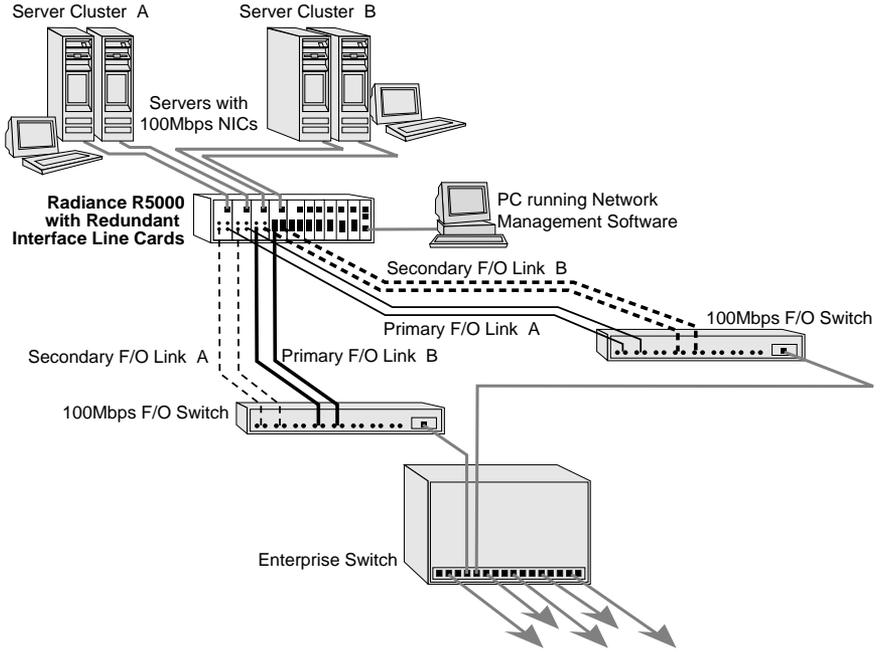
A typical application of the 100Mbps redundant interface line cards is to use them in pairs to extend a network's reach between two remote devices. In the back-to-back setup, both primary ports are linked to each other and both secondary ports are linked to each other as shown in the figure below.



In a back-to-back application, make sure that the following switches are enabled on both redundant interface line cards:

1. **RED switch.** Sets the card to operate in Dynamic Recovery Mode. In this mode, the secondary port automatically becomes the active port if the primary link is lost and the secondary link is present.
2. **TX switch.** Allows the redundant interface line card to transmit data on both the primary and secondary ports simultaneously. The cards must have this switch enabled because they cannot determine which port is active on the other card.
3. **LINK switch.** This allows link pulses to be sent out both the primary and secondary ports. If neither secondary port is transmitting link pulses and one of the primary ports loses link, a switchover will NOT occur. A switchover will occur only if the secondary port has link.

Topology Solution



Technical Specifications

Data Rate

Half duplex _____ 100Mbps
Full duplex _____ 200Mbps

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
Supported Link Length _____ 100m
Cable Type _____ Category 5 UTP
(For NEBS Level III and EN55024:1998 compliance, use only
Category 5 STP cables.)

Multimode Fiber Optic Interface (R73x-13, R73x-15)

Connector _____ ST or SC
Wavelength _____ 1310nm
RX Input Sensitivity _____ -31 dBm minimum
Output Power _____ -14 dBm to -23.5 dBm (50/125 μ m)
_____ -14 dBm to -20 dBm (62.5/125 μ m)
Supported Link Length _____ up to 2km full duplex
Cable Type _____ 50/125 or 62.5/125 μ m F/O

Singlemode Fiber Optic Interface (R73x-14, R73x-16)

Connector _____ ST or SC
Wavelength _____ 1310nm
RX Input Sensitivity _____ -35 dBm minimum
Output Power _____ -8 dBm to -15 dBm
Supported Link Length _____ up to 20km full duplex
Cable Type _____ 9/125 μ m F/O

Singlemode Fiber Optic Interface—Long Haul (R73x-17)

Connector _____ SC
Wavelength _____ 1310nm
RX Input Sensitivity _____ -35 dBm minimum
Output Power _____ 0 dBm to -5 dBm
Supported Link Length _____ up to 40km full duplex
Cable Type _____ 9/125 μ m SM F/O

Singlemode Fiber Optic Interface—Extended Long Haul (R73x-1J)

Connector _____ SC
Wavelength _____ 1550nm
RX Input Sensitivity _____ -37 dBm minimum
Output Power _____ 0 dBm to -3.0 dBm
Supported Link Length _____ up to 100km full duplex
Cable Type _____ 9/125 μ m SM F/O

Power Requirements

R732-11 _____ 5V DC @ 0.750A, 3.75W
R73x-13, -14, -15, -16, -17, -1J _____ 5V DC @ 1.3A, 6.5W

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)

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)

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 the Radiance 100Mbps Redundant Interface Line Card

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