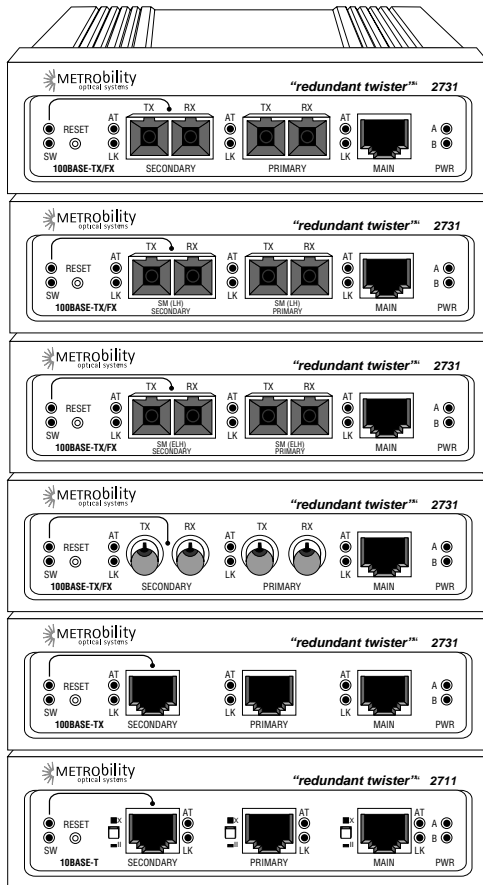


“redundant twister”™



Installation & User Guide

100Mbps Models: 2731-11/ 2731-13/ 2731-14/ 2731-15/ 2731-17/ 2731-1J
10Mbps Model: 2711-11

Metrobility “redundant twister”™

Standalone Units

10Mbps

2711-11 _____ RJ-45 to redundant RJ-45

100Mbps

2731-11 _____ RJ-45 to redundant RJ-45

2731-13 _____ RJ-45 to redundant FX multimode SC

2731-14 _____ RJ-45 to redundant FX singlemode SC

2731-15 _____ RJ-45 to redundant FX multimode ST

2731-17 _____ RJ-45 to redundant FX singlemode SC (40km)

2731-1J _____ RJ-45 to redundant FX singlemode SC (100km)

Lancast® Intelligent “redundant twister” Modules

10Mbps

7711-11-75 ___ RJ-45 to redundant RJ-45

7712-11-75 ___ RJ-45 to redundant RJ-45 with SONAR

100Mbps

7731-11-75 ___ RJ-45 to redundant RJ-45

7731-13-75 ___ RJ-45 to redundant FX multimode SC

7731-14-75 ___ RJ-45 to redundant FX singlemode SC

7731-15-75 ___ RJ-45 to redundant FX multimode ST

7731-16-75 ___ RJ-45 to redundant FX singlemode ST

7731-17-75 ___ RJ-45 to redundant FX singlemode SC (40km)

7731-1J-75 ___ RJ-45 to redundant FX singlemode SC (100km)

7732-11-75 ___ RJ-45 to redundant RJ-45 with SONAR

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“redundant twister” technology is a patent of Metrobility Optical Systems, Inc.

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 Metrobility “redundant twister” 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 “redundant twister” is a 100BASE-TX to TX/FX or 10BASE-T to 10BASE-T device that provides full redundant data paths. In Dynamic Recovery Mode (DRM), the “redundant twister” actively monitors the primary link and if it fails, automatically activates the secondary link without interruption to network operation.

The “redundant twister” has the following features:

- Immediately switches over from the primary to the secondary link if the primary link fails.
- Supports full- and half-duplex operation.
- Provides redundant power to ensure no down time.
- Can be configured to operate in Dynamic Recovery Mode (DRM) to ensure session integrity and increased uptime. (2711-11 only)
- Can be configured to operate in Network Select Mode (NSM) to redirect and isolate traffic adding extra security. (2711-11 only)
- Fast Ethernet models demonstrate a maximum loss of 2-3 packets (measured with minimum packet size and minimum inter-packet gap) due to fail-over transition.
- Can be configured to return automatically to the primary link after the failure condition is resolved.
- Provides minimal impact on the round trip delay for communication in half-duplex collision domains.
- Link Loss Carry Forward* enable/disable functionality. (2711-11 only)
- Can be configured to operate with auto-negotiating devices.
- The twisted-pair ports on the 2711 are equipped with an MDI-II to MDI-X switch eliminating the need for crossover cables.

* Refer to the page titled “Link Loss Carry Forward (LLCF)” in the User Guide section of this document for more detailed information.

The “redundant twister” is available in several different models. These models each contain a MAIN port, a PRIMARY port and a SECONDARY port. Redundancy is provided between the PRIMARY and SECONDARY ports. The models are as follows:

Model Number	Mbps	Connectors	Maximum Supported Link Length
2711-11	10	RJ-45 to Redundant RJ-45	100m/100m
2731-11	100	RJ-45 to Redundant RJ-45	100m/100m
2731-13	100	RJ-45 to Redundant FX multimode SC	100m/2km
2731-14	100	RJ-45 to Redundant FX singlemode SC	100m/15km
2731-15	100	RJ-45 to Redundant FX multimode ST	100m/2km
2731-17	100	RJ-45 to Redundant FX singlemode SC	100m/40km
2731-1J	100	RJ-45 to Redundant FX singlemode SC	100m/100km

Installation Guide

Follow the simple steps outlined in this section of the guide to install and start using your Metrobility “redundant twister”.

1

Unpack the “redundant twister”

Check that the following components have been included:

- “redundant twister” 2711 or 2731
- Two (2) 12V Power Supplies
- Four (4) Rubber Feet

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. Be sure to save the original shipping carton if return or storage of the unit is necessary.

2

Choose an Appropriate Location

The “redundant twister” is intended for use in either office or industrial environments. The converter must be located within six (6) feet of the AC power source being used and placed as far away as possible from electrical noise generating equipment such as copiers, electrostatic printers and other motorized equipment. If exposed twisted-pair wiring is used nearby, the wiring should be routed as far away as possible from power cords and data cables to minimize interference.

The units may be oriented in any manner which permits the user to make physical connection to the power supplies and leaves a minimum of six (6) inches of space for proper ventilation.

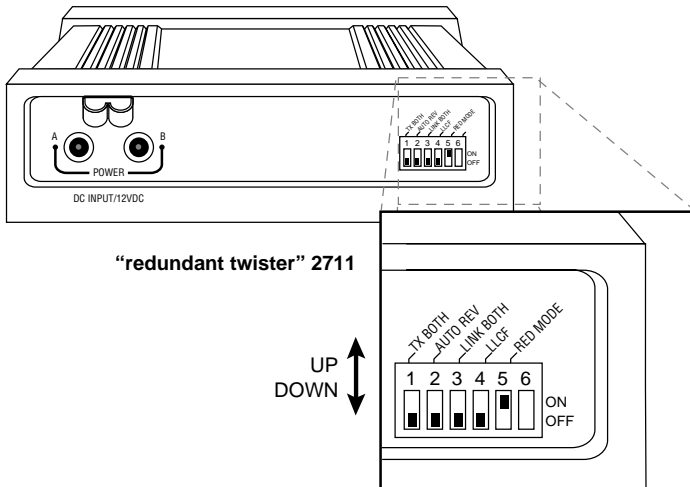
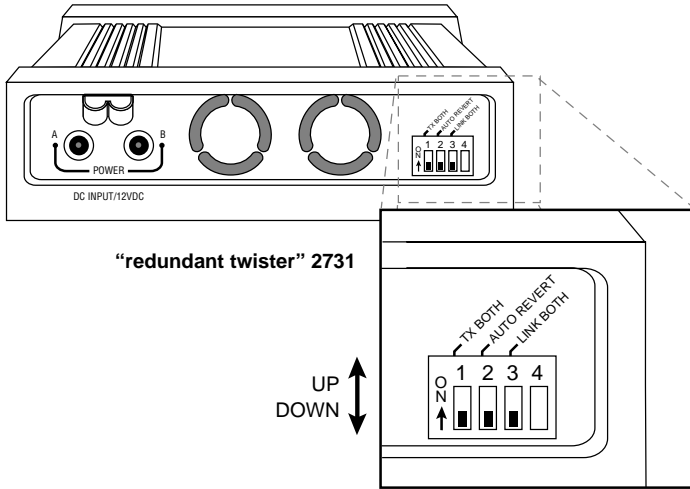
TUV Compliance Note: For pluggable equipment, the socket outlet must be installed near the equipment and be easily accessible.

Bei Geräten mit Steckanschluß muß die Steckdose nahe dem Gerät angebracht und leicht zugänglich sein.

3

Set the DIP Switches

A set of DIP switches, located on the back panel, provides user-selectable configurability options for several modes of operation. Refer to the table on the following pages for the proper setting of the DIP switches.



2731-XX and 2711-11: The DIP switches are marked on the back panel and can be set for the following operational functions.

Switch Name	Position	Operation
TX BOTH	UP	Transmits data on both the PRIMARY and SECONDARY ports simultaneously.
	DOWN <i>(default)</i>	Transmits data on the active port only.
AUTO REVERT	UP	Active port automatically reverts back to the PRIMARY port when the primary link is reestablished.
	DOWN <i>(default)</i>	Active port will not revert back to the PRIMARY port when a primary link is reestablished. The SECONDARY port remains active. Use the RESET push button located on the front of the unit to force the active port back to the PRIMARY port and clear the SW LED.
LINK BOTH	UP	Link signals are sent out on both the PRIMARY and SECONDARY ports (i.e. Link is sent out both ports).
	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. IMPORTANT NOTE: With the LINK switch in this position, the device on the other end of the PRIMARY and SECONDARY ports must <u>not</u> be in auto-sense mode.

2711-11 Only: The 2711-11 provides two additional DIP switches which are described in the following table.

Switch Name	Position	Operation
LLCF*	UP	Link Loss Carry Forward is enabled.
	DOWN <i>(default)</i>	Link Loss Carry Forward is disabled.
RED MODE	UP <i>(default)</i>	Operates in Dynamic Recovery Mode (DRM). If the PRIMARY link fails, the SECONDARY port becomes active. Refer to the description of the AUTO switch.
	DOWN	Operates in Network Select Mode (NSM). Use the RESET push button on the front of the unit 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. Note that the SW LED remains off in NSM.

* Refer to the page titled "Link Loss Carry Forward (LLCF)" in the User Guide section of this manual for more information.

Set the MDI-II/MDI-X Switches

(2711-11 only)

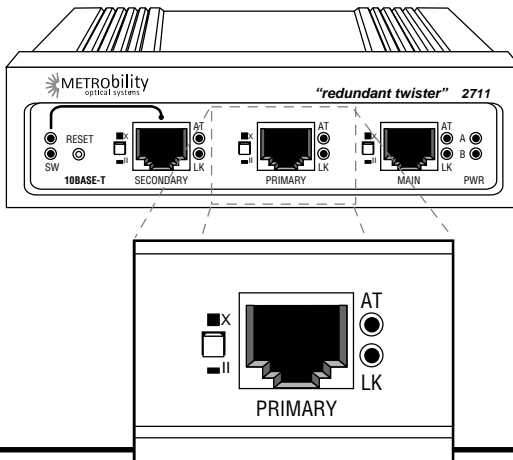
Next to each RJ-45 connector is a small push button switch used to implement the transmit and receive crossover functionality for that particular port. The position of this switch connects the transmit and receive signal pairs in either a straight through or crossover configuration. The signal routing is as follows:

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

When setting the MDI-II/MDI-X switch, simply press the push button IN or OUT to achieve the desired setting. Observe the positioning of the push button in relation to these symbols:

- The parallel symbol (||) indicates a straight through or parallel connection. Press the button OUT for a straight through connection.
- The cross symbol (X) indicates a crossover connection. Press the button IN for a crossover connection.

These two symbols are clearly marked on the front panel in conjunction with each switch. Refer to the illustration below:



4

Connect to the Network

A total of three connections must be made on the front panel when connecting the “redundant twister” media converter to the network.

Connect to the MAIN port.

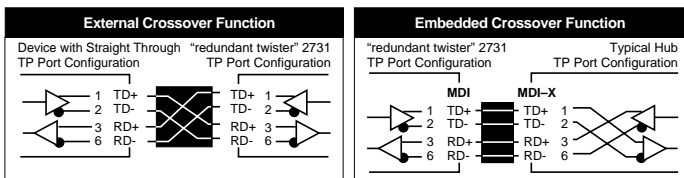
- Each “redundant twister” provides one RJ-45 jack for 10BASE-T connections that supports a maximum segment length of 100m Category 3 or 5 twisted-pair; or one RJ-45 jack for 100BASE-TX connections that support a maximum segment length of 100m of Category 5 twisted-pair.

Connect to the PRIMARY port.

Connect to the SECONDARY port.

- The “redundant twister” 2731-11 (100Mbps) and 2711-11 (10Mbps) each provide two sets of RJ-45 connectors that support a maximum cable length of 100m.
- The “redundant twister” 2731-13 and 2731-15 each provide two sets of 100BASE-FX multimode SC/ST connectors that each support a maximum cable length of 2km.
- The “redundant twister” 2731-14, 2731-17 and 2731-1J provide two sets of 100BASE-FX singlemode SC connectors. The 2731-14 supports a maximum cable length of 15km, the 2731-17 supports a maximum segment length of 40km, and the 2731-1J supports a maximum length of 100km.

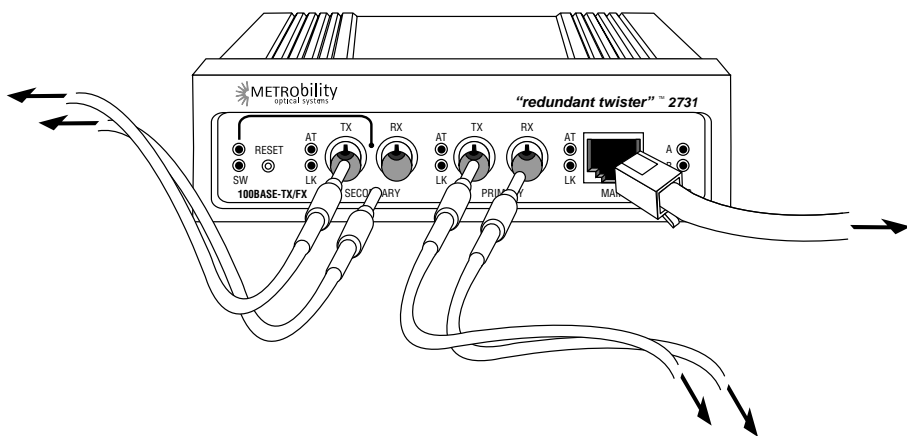
IMPORTANT: 100Mbps RJ-45 ports are wired straight through. Before making the proper twisted-pair connection, you must verify the port configuration of the connected device. This does not apply to 10Mbps models.



2731-XX 100BASE-TX connections:

- When connecting a “redundant twister” 2731 to another device that is internally wired straight through, use a crossover cable.
- When connecting a “redundant twister” 2731 to a device that is internally wired crossed over, use a straight through cable.
- If you do not know the internal wiring configuration of the other device’s RJ-45 port, consult the product documentation.
- Refer to the diagrams titled “Straight/Crossover RJ-45 Twisted-pair Cables” in the User Guide section of this manual for more detailed information.

When making fiber optic connections, be sure that the transmit (TX) optical conductor of the “redundant twister” connects to the receive (RX) optical conductor of the connected device; and be sure that the transmit (TX) optical conductor of the device connects to the receive (RX) optical conductor of the “redundant twister” for both the PRIMARY and SECONDARY links.



2711-II 10BASE-T connections:

Be sure to set the MDI-II/MDI-X switch appropriately for each port.

Once power is applied to the unit, use the Link (LK) LEDs on the front panel to verify correct segment connectivity. The LK LED illuminates provided there is an active device connected to the other end of the cable sending idle link signals.

5

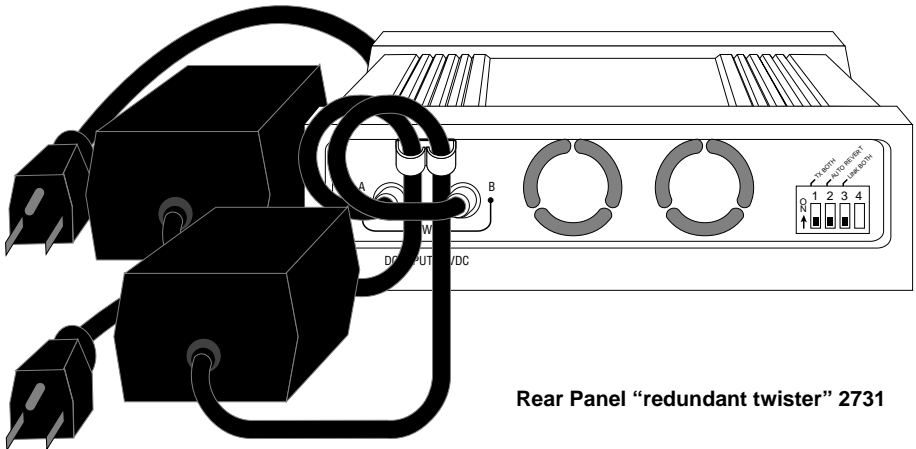
Apply Power to the “redundant twister”

Power is provided to the “redundant twister” from the desktop, universal input, switching power modules. Each universal power supply module provides a DC jack for connection of the desktop switching power supply module. The power modules are equipped with S760 hollow-type plugs and standard IEC 320-type AC power receptacles.

IMPORTANT: When making power connections, connect the DC power cord to the DC input jack located on the back panel **before** making the connection to the outlet. **Failure to do this properly can damage the product and void the unit’s warranty.**

If a redundant power supply module is being used, simply connect the individual power cords to separate power sources. A convenient bracket provides strain relief from the weight of the cords to eliminate an accidental disconnection.

The “redundant twister” does not have a power switch. After connecting the unit to the AC receptacle, verify that the PWR (power) LEDs illuminate. A steady green light indicates the unit is receiving power. There is one LED for each power supply. They are labeled A and B.



Rear Panel “redundant twister” 2731

Upon receiving power, the “redundant twister” goes into normal operation mode and automatically provides the appropriate signal conversion between the connected network segments. Use the individual Link (LK) LEDs on the front panel to verify correct segment connectivity.

Refer to the section titled “LED Operation” in the User Guide section of this manual for more information.

If an additional extension cord is used to connect the power module to the power source, the following guidelines must be followed:

While one end of the AC power cord can be fitted with whatever plug is standard for the country of operation, the end that connects to the “redundant twister” power supply module must have a female plug that fits this type of AC receptacle.

- AC 115V (North American): use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, type SVT or SJT three conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15A, 125V.
- AC 230V (USA): use a UL-listed cord set consisting of a minimum No. 18 AWG, type SVT three-conductor cord, a maximum of 15 feet in length and a Tandem blade grounding-type attachment plug rated 15A, 250V.
- 240V (outside USA): use a cord set consisting of a minimum No. 18 AWG cord and grounding-type attachment plug rated 15A, 250V. The cord set should have the appropriate safety approvals for the country in which the “redundant twister” unit is installed and marked HAR.

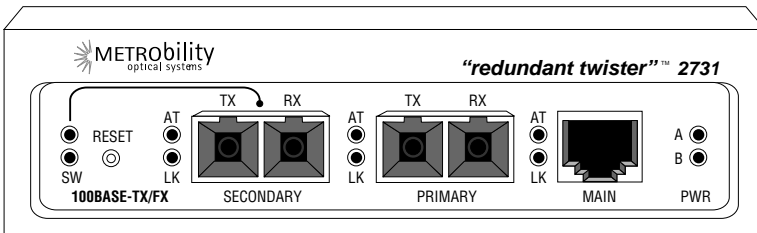
User Guide

This section contains more detailed user information regarding the operating features of your “redundant twister”.

LED Operation

All LEDs are located on the front panel. These include SW, PWR A & B, SECONDARY, LK and AT LEDs. There are separate LK and AT LEDs for each of the three ports (MAIN, PRIMARY and SECONDARY). Refer to the table below for reference. The function of each LED is specified below:

LED Label	Color (Status)	Indication
SW*	Amber (steady)	SECONDARY port was the active port at some point
PWR (A & B)	Green (steady)	Power ON
SECONDARY	Green (steady)	ON 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



* This LED functions in Dynamic Recovery Mode (DRM) only.

Reset Push Button

A small RESET push button is located on the front panel of the “redundant twister”. When used in conjunction with the unit’s SW and SECONDARY LEDs, and the AUTO DIP switch setting, this push button allows a network administrator 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 effect:

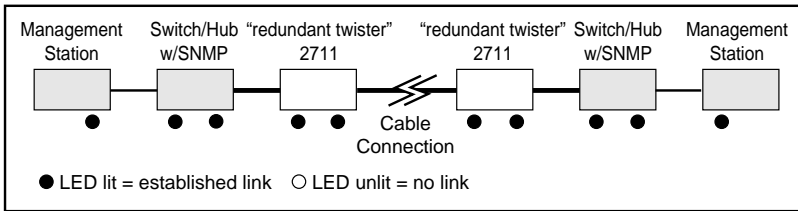
If the AUTO switch is UP and RED switch is UP	The active port automatically reverts to PRIMARY when primary link is reestablished and pressing the RESET switch clears the SW LED.
If the AUTO switch is DOWN and RED switch is UP	The active port does <u>not</u> automatically revert to PRIMARY when a primary 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 illuminated and pressing the RESET switch has no effect.
If the RED switch is DOWN	The unit operates in Network Select Mode (NSM). The RESET push button toggles the active link between the PRIMARY and SECONDARY ports. Note that the SW LED remains off during Network Select Mode (NSM) operation.

Link Loss Carry Forward (LLCF)

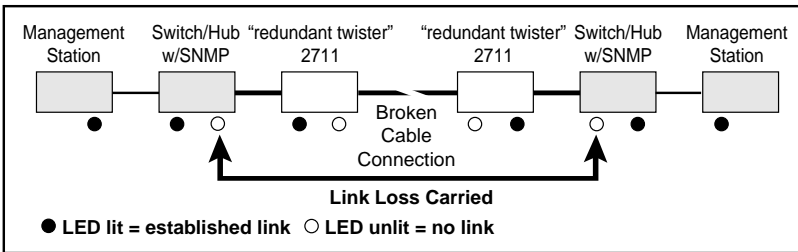
The “redundant twister” 2711-11 has been designed with a LLCF function for troubleshooting a remote connection. The unit is shipped with the LLCF disabled.

When LLCF is enabled, the twisted-pair ports on the “redundant twister” do not transmit a link signal until they receive a link signal from the opposite port. For example, if LLCF is enabled and two “redundant twister” units are connected via a twisted-pair 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 a “redundant twister” for remote connectivity:



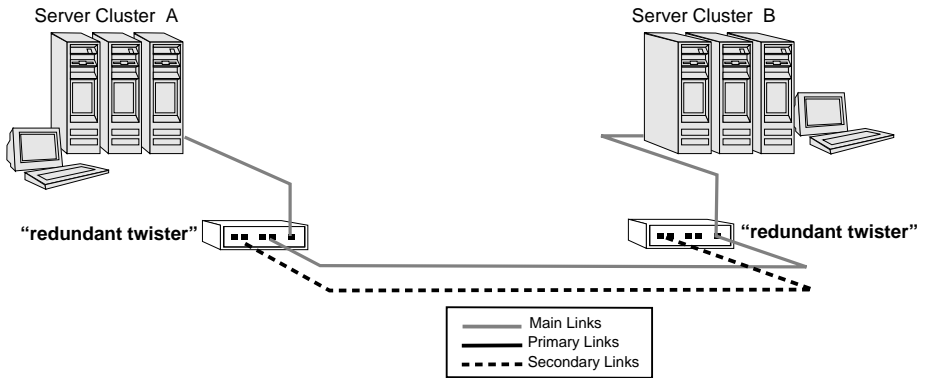
If the connection breaks, or the device fails, the “redundant twister” carries that link loss all the way to the switch/hub which generates a trap to the management station. The administrator can then look at the “redundant twister” to determine the source of the loss.



IMPORTANT: When connecting a “redundant twister” to a port that supports auto-negotiation, it is strongly recommended to fix the port settings to 10Mbps and either full or half duplex. This allows the “redundant twister” to sense receive link and select the active port.

Back-to-Back Application

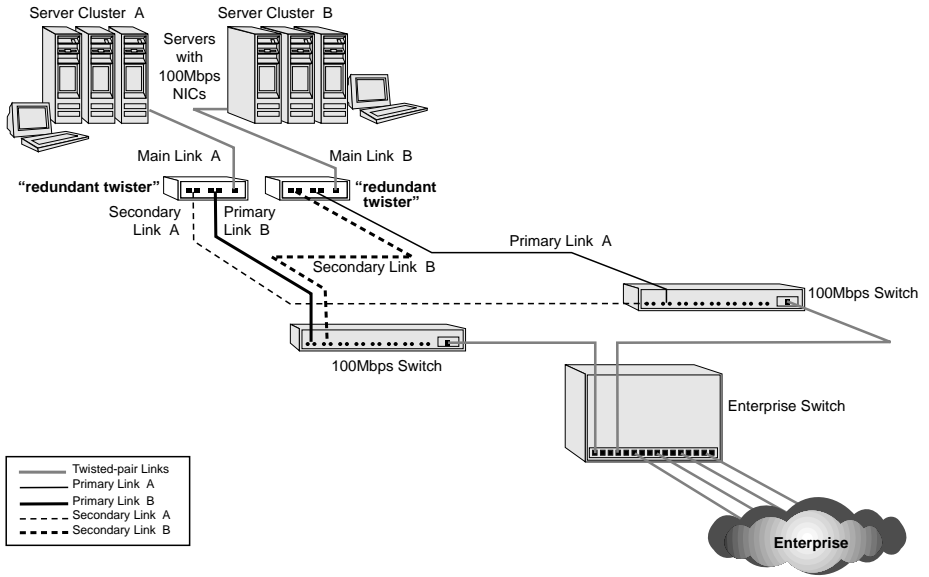
A typical application of the “redundant twister” is to use them in pairs to extend a network’s reach between two remote devices. In the back-to-back setup, both primary ports are linked to each other and both secondary ports are linked as shown in the figure below.



In a back-to-back application, make sure that the following switches are enabled on both “redundant twister” units:

1. **RED MODE** switch. Sets the “redundant twister” 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 BOTH** switch. Allows the “redundant twister” to transmit data on both the primary and secondary ports simultaneously. The units must have this switch enabled because they cannot determine which port is active on the other “redundant twister”.
3. **LINK BOTH** 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 Solutions



Technical Specifications

Data Rate

2711-11

Half duplex _____ 10Mbps

Full duplex _____ 20Mbps

2731-XX

Half duplex _____ 100Mbps

Full duplex _____ 200Mbps

10Mbps Twisted-Pair Interface (2711-11)

Connector _____ Shielded RJ-45, 8-pin jack

Impedance _____ 100 Ohms nominal

Signal Level Output (differential) _____ 2.2 to 2.8V

Signal Level Input _____ .3 to 3.1V p-p minimum

Supported Link Length _____ 100m

Cable Type _____ Category 3 or 5 UTP

(EN55024:1998 compliance) _____ Category 5 STP

100Mbps Twisted-Pair Interface (2731-XX)

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

(EN55024:1998 compliance) _____ Category 5 STP

100Mbps Multimode Fiber Optic Interface (2731-XX)

Connector _____ ST or SC

RX Input Sensitivity _____ -31 dBm peak 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, 62.5/125, 100/140 μ m F/O

100Mbps Singlemode Fiber Optic Interface (2731-XX)

Connector _____ SC
RX Input Sensitivity _____ -31 dBm peak minimum
Output Power _____ -8 dBm to -15 dBm (9/125 μ m)
Supported Link Length _____ up to 15km full duplex
Cable Type _____ 8.3/125, 8.7/125, 9/125, 10/125 μ m F/O

100Mbps Singlemode Fiber Optic Interface—Long Haul (2731-17)

Connector _____ SC
Wavelength _____ 1300nm
RX Input Sensitivity _____ -35 dBm maximum
Output Power _____ 0 dBm to -5 dBm (9/125 μ m)
Supported Link Length _____ up to 40km full duplex
Cable Type _____ 8.3/125, 8.7/125, 9/125, 10/125 μ m SM F/O

100Mbps Singlemode Fiber Optic Interface—Extended Long Haul (2731-1J)

Connector _____ SC
Wavelength _____ 1550nm
RX Input Sensitivity _____ -37 dBm minimum
Output Power _____ 0 dBm to -3.01 dBm (9/125 μ m)
Supported Link Length _____ up to 100km full duplex
Cable Type _____ 8.3/125, 8.7/125, 9/125, 10/125 μ m SM F/O

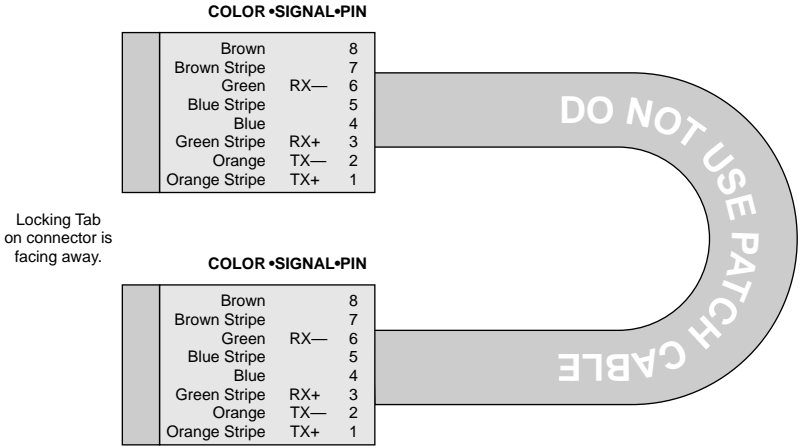
Power Requirements

Input _____ 90 -260V AC 50/60 Hz
Output _____ +12 VDC @ 1 A

Environmental

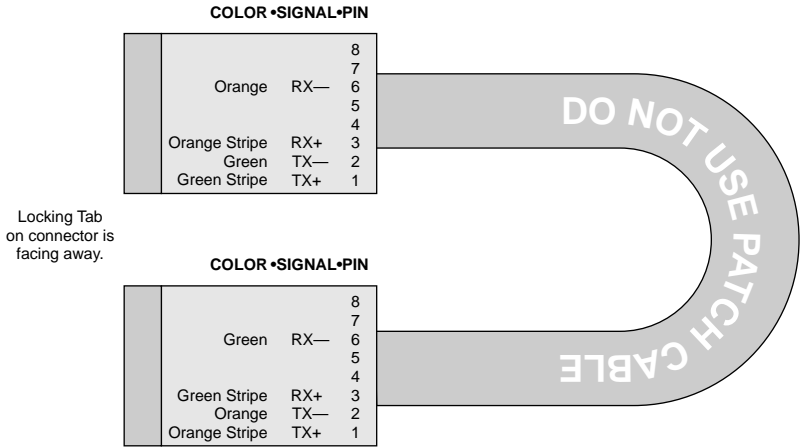
Operating Temperature _____ 0 to 50° C
Storage Temperature _____ -30 to 70° C
Operating Humidity _____ 5% to 95% non-condensing
Dimensions _____ 4.5"L x 5.75"W x 1.5"H
_____ 11.4 cm x 14.6 cm x 3.8 cm
Weight (including power supplies) _____ 3 lb, 1.36 kg

Straight RJ-45 Twisted-Pair Cables



NOTE: Wire colors are straight through.

Crossover RJ-45 Twisted-Pair Cables



NOTE: Wire colors have been crossed.

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)
- IEEE 802.3/802.3u
- 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 the user's 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 Metrobility “redundant twister”

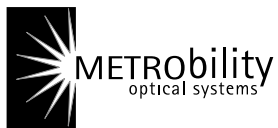
Metrobility Optical Systems, Inc. warrants that every “redundant twister” will be free from defects in material and workmanship for a period of THREE YEARS. This warranty covers the original user only and is not transferable. Should the unit fail at any time during this warranty period, Metrobility will, 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 on-line 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’ behalf.



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