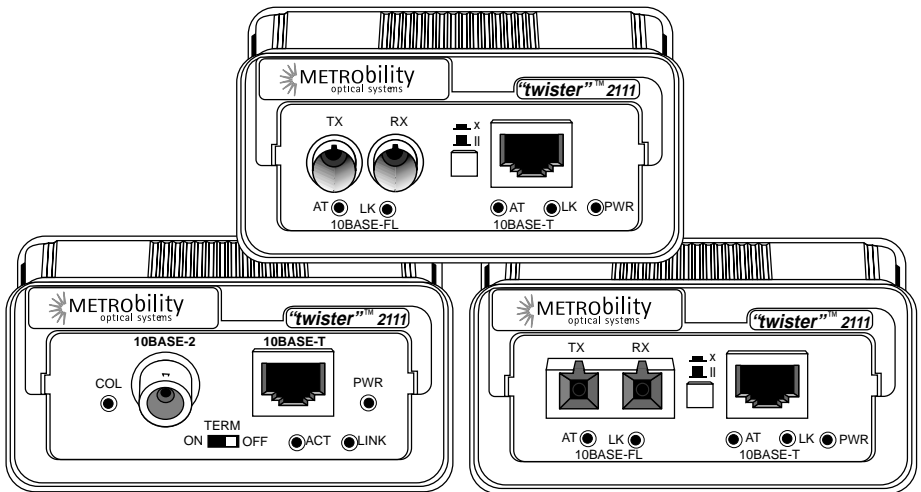


# “twister”<sup>®</sup> 2111

## 10 Mbps Media Converter



### *Installation & User Guide*

Models: 2111-12-01 / 2111-13-B / 2111-15-B

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## ***Metrobility® 10 Mbps “twister”® Standalone Media Converters***

2111-12-01 \_\_\_\_\_ RJ-45 to BNC  
2111-13-B \_\_\_\_\_ RJ-45 to FL multimode SC  
2111-15-B \_\_\_\_\_ RJ-45 to FL multimode ST

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# Introduction

**Metrobility “twister” media converters represent the hottest technology** available for extending Ethernet networks. Since Metrobility first developed “twister” media conversion, it has become a standard for providing cost-effective means of integrating mixed media environments. As LANs grow and evolve, this technology provides the ideal solution for building effective migration strategies.

Designed to meet IEEE 802.3 compliance, these media converters are compatible with Ethernet devices from other leading network technology providers. This increases the flexibility of your network by ensuring reliable data transmission in multi-vendor as well as mixed media environments.

The information in this guide will help you to install and start using your “twister” 2111 media converter.

# Overview

**The Metrobility “twister” 2111 10 Mbps media converter provides seamless** integration of 10BASE-T Category 3, 4, and 5 twisted-pair segments with either multimode 10BASE-FL fiber optic segments or thinnet coax in Ethernet environments.

To optimize your Ethernet network, the 2111 media converter provides seamless operation in half- or full-duplex modes. Full signal restoration—with a low bit delay—ensures accurate data transmission to and from LANs within an organization. All signal activity is completely converted ensuring accurate communication and collision detection in connected segments and allowing maximum media length to be achieved on either side of the device.

The “twister” 2111 provides the following key features:

- MDI-II/MDI-X switch on the twisted-pair port to eliminate the need for crossover cables.
- Transparency Mode that allows auto-negotiation by end points through the media converter. (2111-13-B and 2111-15-B only.)
- Auto polarity on the twisted-pair port.
- Half- and full-duplex support.
- Low bit delay to ensure accurate data flow across the network.
- Transparency to data frame sizes.
- Full compliance with applicable sections of IEEE 802.3.

# Installation Guide

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

## 1 **Unpack the “twister” and Accessories**

Check that the following components have been included with your order:

- “twister” 2111 media converter
- Power supply
- Power cord
- Four (4) rubber feet

Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your order carefully. 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 **Attach the Rubber Feet**

The “twister” 2111 is shipped with four rubber feet. To install the feet, turn the “twister” upside-down. Peel the self-adhesive rubber feet from the paper strip and attach one foot to each corner on the bottom of the “twister” 2111. Installing the feet provides an air gap which helps to cool the unit, adds stability, and prevents marring and scratching of the desktop surface.

## 3 **Choose an Appropriate Location**

The “twister” 2111 media converter is intended for use in an office or industrial environment. The unit 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 that permits you to make physical connection to the power supply 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.*

# 4

## Set the Switches

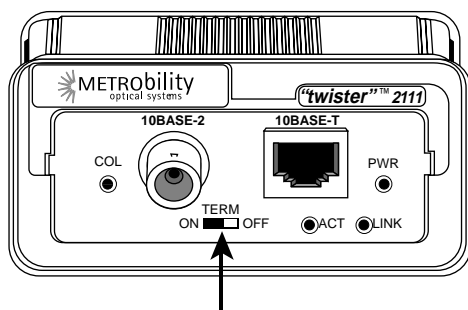
### Termination Switch

(2111-12-01 only)

The “twister” 2111-12-01 has a termination switch located on the front panel. This switch, labeled TERM, is used to set either internal or external termination on the BNC port.

External termination is enabled when the switch is in the OFF position (*default*). Use this setting if the “twister” will be used in a daisy-chain configuration, or if you must use a BNC T-connector and terminator for proper external termination.

Internal 50Ω termination is enabled when the switch is in the ON position. To change the setting, use a pointed object to slide the switch. When internal termination is enabled, the unit’s BNC port can be connected directly to another device, without the use of an external BNC terminator.



Termination Switch  
(default is OFF)

## Transparency Switch

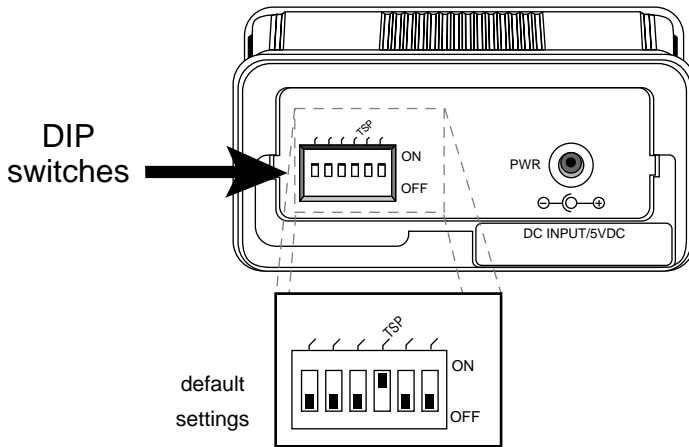
(2111-13-B and 2111-15-B only)

The “twister” 2111-13-B and 2111-15-B have a set of DIP switches located on the back panel. Only the transparency switch, labeled TSP, is configurable. All other DIP switches are nonfunctional.

When TSP is ON (*default*), the “twister” becomes completely transparent to the end devices connected to its two ports. This allows the devices to perform auto-negotiation directly with each other. For most applications, we recommend this mode of operation.

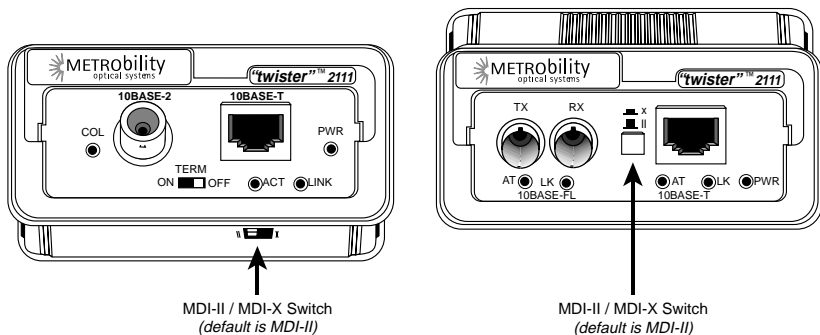
When TSP is disabled (OFF), you must manually configure the speed and duplex on both end devices to the same setting.

Refer to [Transparency Mode](#) for more information about this feature.



## MDI-II to MDI-X Switch

All “twister” media converters with twisted-pair ports have an MDI-II to MDI-X switch that eliminates the need for crossover cables. The switch allows simple setup in either straight through or crossover configurations. It is located on the bottom of the unit directly below the RJ-45 connector, or on the front panel between the two ports. Refer to the illustrations below.



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 unit. Using a pointed object, simply slide the switch in the direction of the appropriate symbol, or press the switch to the desired setting. Use the following table as a guide:

<b>A device that is wired straight through, needs one crossover connection:</b>	
If the cable is	the MDI-II to MDI-X switch setting should be
<b>straight through</b>	<b>X</b>
<b>crossover</b>	<b>  </b>

<b>A device that is wired crossover, needs a parallel connection:</b>	
If the cable is	the MDI-II to MDI-X switch setting should be
<b>straight through</b>	<b>  </b>
<b>crossover</b>	<b>X</b>



# 5

## Connect to the Network

The Metrobility “twister” 2111 media converter offers the ease of plug-and-play installation. Refer to the appropriate section below for guidelines regarding specific network connections.

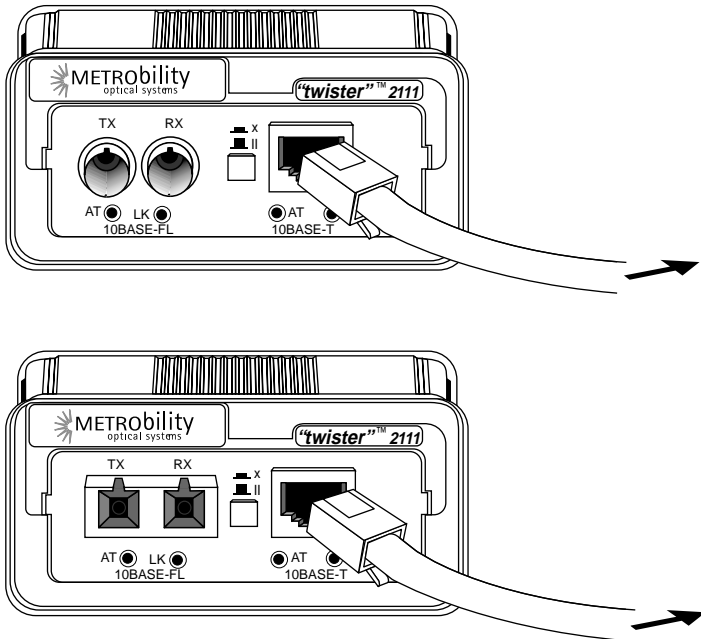
### Twisted-pair Interface

(all models)

The “twister” 2111 provides one shielded RJ-45 connector for Category 3, 4, or 5 twisted-pair segments and supports a maximum link length of up to 100 meters.

**NOTE:** Be sure you have set the MDI-// to MDI-X switch to the proper configuration. Refer back to STEP 4 if necessary.

Once power is applied to the unit, correct connectivity can be verified via the link (LK) LED.



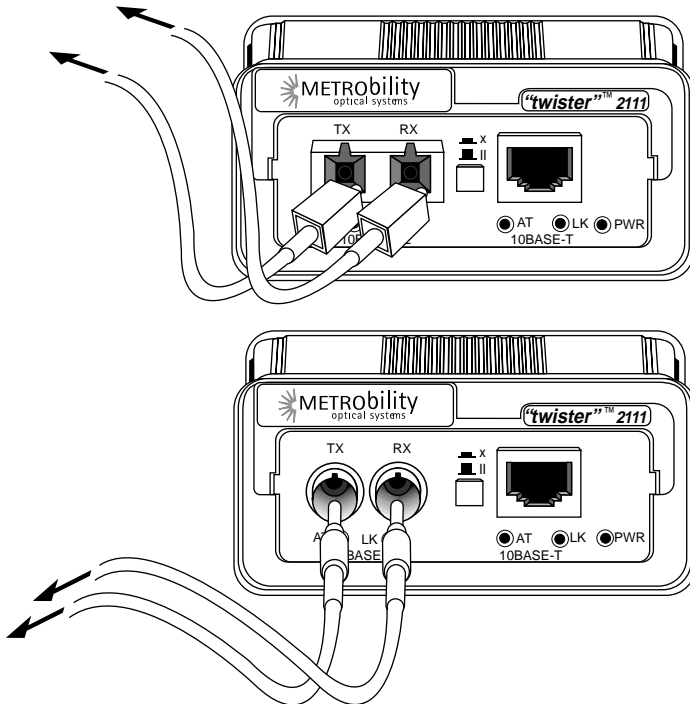
## Fiber Optic Interface

The following “twister” models support 10BASE-FL segments via ST or SC connectors.

- The 2111-13-B provides one set of FL multimode SC connectors, which support a maximum segment length of up to 2 km for remote links.
- The 2111-15-B provides one set of FL multimode ST connectors, which support a maximum segment length of up to 2 km for remote links.

When making fiber optic connections, be sure that the transmitter (TX) on the “twister” connects to the receiver (RX) on the connected device and that the transmitter (TX) on the connected device connects to the receiver (RX) on the “twister” unit.

Once power is applied to the unit, correct connectivity can be verified via the LK LED.

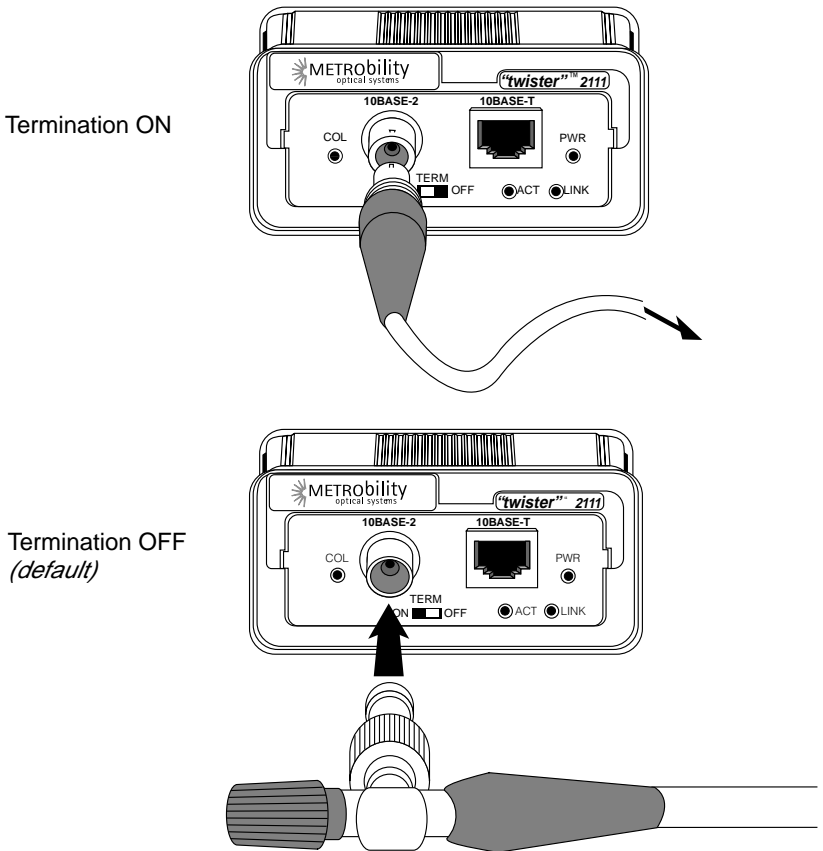


## BNC Interface

(2111-12-01)

The “twister” 2111-12-01 attaches to thinnet coaxial cable via a standard BNC connector and supports a maximum segment length of 185 meters.

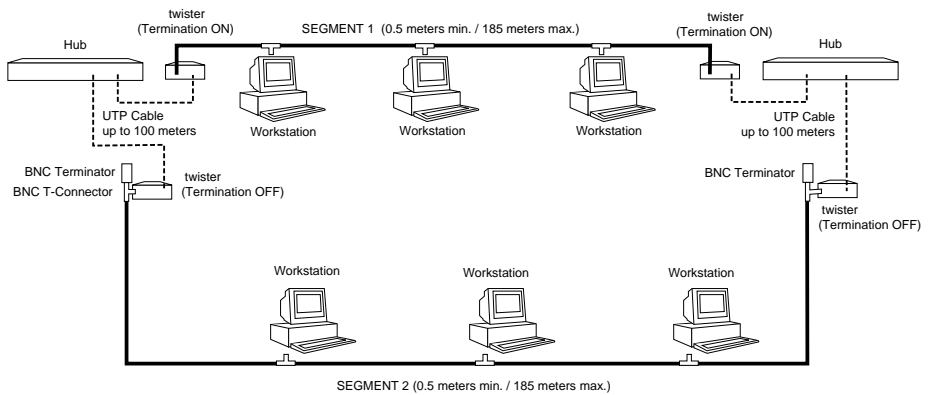
**IMPORTANT:** The coaxial cable of a LAN must be properly terminated at the end of each segment regardless of the device used at the end of each cable. One end of the two terminators on each segment must be grounded.



When the internal 50Ω termination switch is enabled (ON), the “twister” can be connected directly to a workstation or other device.

When the termination switch on the “twister” is disabled (OFF), you must attach a BNC terminator to the T-connector which connects to the unit.

The example below illustrates how to connect the “twister” 2111-12-01 when the termination switch is disabled and when it is enabled.

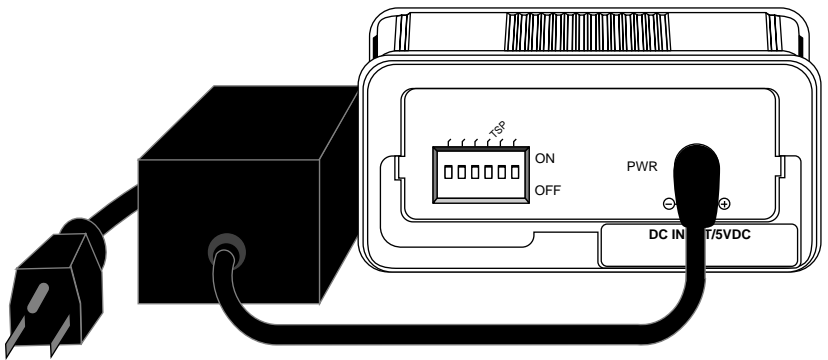


# 6

## Apply Power

Power is provided to the “twister” unit from the 90-250V universal desktop power supply module. This power module is equipped with a S760 hollow-type plug for insertion into the DC jack located on the back of the “twister” unit and standard IEC 320-type AC power receptacle.

When making power connections, it is recommended that the DC power cord be connected to the DC input jack located on the back of the “twister” media converter *before* making the AC connection to the outlet.



Upon receiving power, the “twister” media converter goes into normal operation mode and automatically provides the appropriate signal translation between the connected network segments.

Be sure to verify correct segment connectivity via the link (LK) LEDs on the front of the unit.

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 “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 No. 18 AWG, type SVT or SJT three-conductor cord (15 feet maximum 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 (15 feet maximum 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 “twister” 2111 is being installed and be marked HAR.

# User Guide

**This section contains more detailed information regarding certain operating features for the “twister” media converter.**

## **System LEDs**

The Metrobility “twister” 2111 media converter provides LEDs for the visible verification of unit status and proper functionality as well as aiding in troubleshooting and overall network diagnosis and management.

LEDs indicate the following:

- PWR (power): the unit is receiving power and functioning normally.
- LK: (link): satisfactory link status on the respective port.
- AT (activity): the respective port is receiving data.
- COL\* (collision): detection of a collision condition and subsequent JAM packets generated on both segments.

Once power is applied to the unit, you can verify correct connectivity via the LK LED(s).

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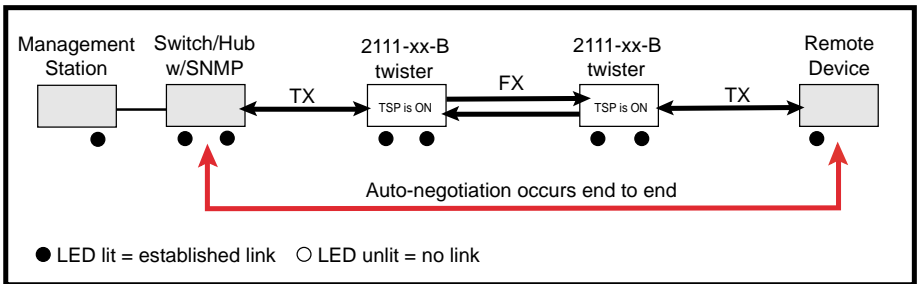
\* Applies to the “twister” 2111-12-01 only.

## Transparency Mode

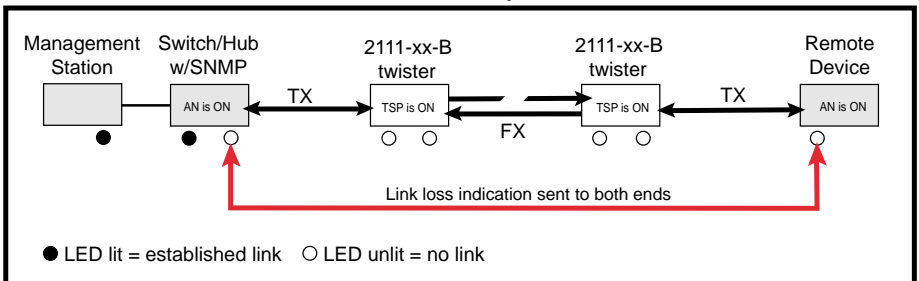
(2111-13-B and 2111-15-B only)

By default, the “twister” 2111-13-B and 2111-15-B are configured with the Transparency Mode enabled (ON). In this mode, the “twister” is completely transparent to devices connected to its ports. To the end devices, it appears that they have a direct connection to each other and can auto-negotiate their duplex mode. Both end devices can also see any link loss conditions simultaneously. For most applications, we recommend this mode of operation.

The following diagram shows a typical network configuration using two “twister” 2111-xx-B media converters for remote connectivity. Because Transparency (TSP) is enabled, the end devices can negotiate whether to use half or full duplex.

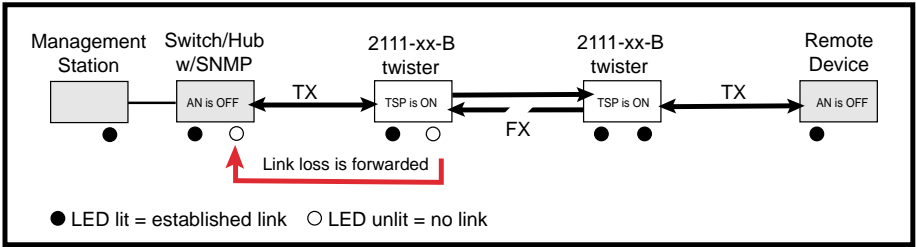


When the end devices have auto-negotiation (AN) enabled, a loss of link anywhere in the segment is propagated to both ends, as shown in the diagram below. This allows both end devices to become aware of any link loss condition.



If auto-negotiation is disabled on the end devices, a loss of link anywhere along the segment will be propagated to both ends except when the failure occurs on a single fiber strand, as shown in the following diagram. In this situation, the link loss will be forwarded in only one direction.

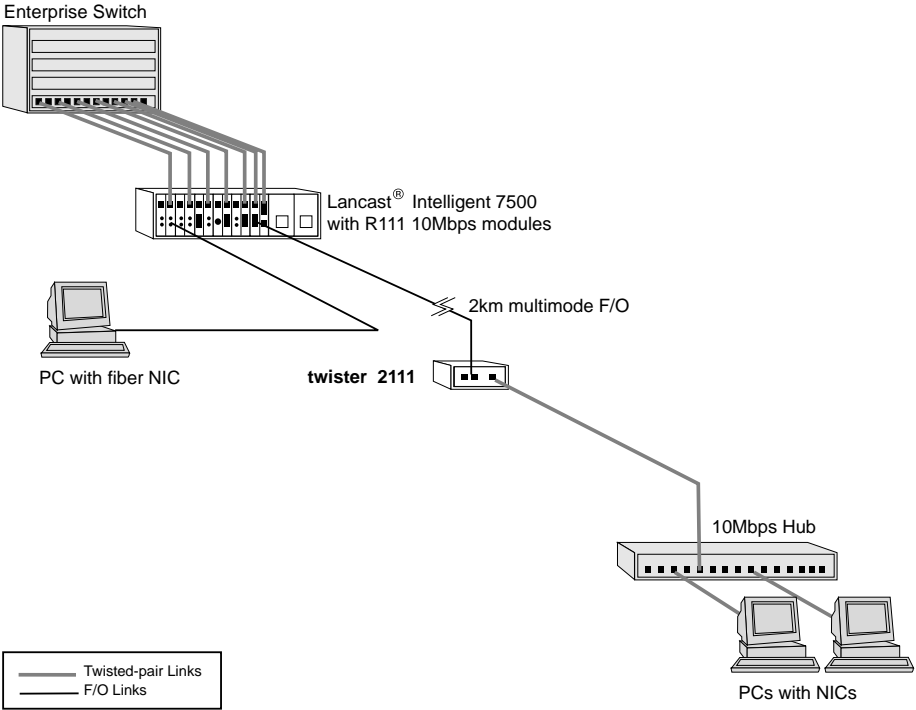




When the Transparency Mode is disabled (OFF), you must manually configure the speed and duplex on both end devices to the same setting. That is, both end devices must be set to one of the following configurations:

- 10 Mbps full duplex.
- 10 Mbps half duplex.

# Topology Solutions



## **Technical Specifications**

### **Data Rate**

Data Rate \_\_\_\_\_ 10 Mbps half duplex  
\_\_\_\_\_ 20 Mbps full duplex\*  
Bit Delay \_\_\_\_\_ < 5 bits

### **Network Connections**

#### **Twisted-Pair Interface**

Connector \_\_\_\_\_ Shielded RJ-45, 8-pin jack  
Impedance \_\_\_\_\_ 100 Ohms nominal  
Signal Level Output (differential) \_\_\_\_\_ 2.0 to 2.8 V  
Signal Level Input \_\_\_\_\_ 350 mV minimum  
Supported Link Length \_\_\_\_\_ 100 m  
Cable Type \_\_\_\_\_ Category 3, 4, or 5 UTP  
(EN55024:1998 compliance) \_\_\_\_\_ Category 5 STP

#### **Multimode Fiber Optic Interface (2111-13-B, 2111-15-B)**

Connector \_\_\_\_\_ ST or SC  
Wavelength \_\_\_\_\_ 820 nm  
RX Input Sensitivity \_\_\_\_\_ -32.5 dBm peak minimum  
Output Power \_\_\_\_\_ -21.8 dBm to -16.8 dBm (50/125  $\mu$ m)  
\_\_\_\_\_ -19 dBm to -14 dBm (62.5/125  $\mu$ m)  
Supported Link Length \_\_\_\_\_ up to 2 km full duplex  
Cable Type \_\_\_\_\_ 50/125, 62.5/125, 100/140  $\mu$ m F/O

#### **Thinnet Coax Interface (2111-12-01)**

Connector \_\_\_\_\_ BNC receptacle  
Internal Transceiver \_\_\_\_\_ IEEE 802.3  
Supported Link Length \_\_\_\_\_ up to 185 m  
Cable Type \_\_\_\_\_ RG-58 coaxial cable

### **Power**

Input \_\_\_\_\_ 90-250V AC 50/60 Hz  
Output \_\_\_\_\_ +5 VDC @ 1.2 A

### **Environmental**

Operating Temperature \_\_\_\_\_ 0° to 55° C  
Storage Temperature \_\_\_\_\_ -25° to 70° C  
Relative Humidity \_\_\_\_\_ 5% to 95% non-condensing  
Physical Case \_\_\_\_\_ Fully enclosed metal construction  
Dimensions \_\_\_\_\_ 4.83" L x 3.26" W x 1.71" H  
\_\_\_\_\_ 12.3 cm x 8.3 cm 4.3 cm  
Weight (including power supply) \_\_\_\_\_ 3 lb, 1.36 kg

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\* Does not apply to the "twister" 2111-12 (BNC).

## **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
- ICES-003 Class A (emissions)
- CB

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

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

### **USA FCC Radio Frequency Interference Statement**

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

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

### **Canadian Radio Frequency Interference Statement**

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

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

## ***Warranty and Servicing***

### **Three-Year Warranty for Metrobility “twister” Media Converters**

Metrobility Optical Systems, Inc. warrants that every “twister” media converter 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 online at [www.metrobility.com](http://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.

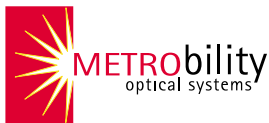
This warranty constitutes the buyer’s sole remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Under no circumstances will Metrobility be liable for any damages incurred by the use of this product including, but not limited to, lost profits, lost savings, 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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