

MEDIA CONVERTER TECHNICAL SPECIFICATIONS

Standards	802.3, 100BASE-SX PMD
Case dimensions	4.75" x 3.0" x 1.0" (119mm x 76mm x 25mm)
Shipping Weight	2 pounds (0.9 kilograms)
Environment	Temperature: 0-40°C (32° to 104° F) Humidity 10-90%, non condensing Altitude 0-10,000 feet
Warranty	Lifetime



CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EG-Mitgliedstaaten verstößt gegen die jeweiligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

Compliance Information

UL Listed
C-UL Listed (Canada)
CISPR/EN55022 Class A

FCC Regulations

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.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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33104.B



Minneapolis, MN 55344 USA

10BASE-T/100BASE-TX to 100BASE-SX

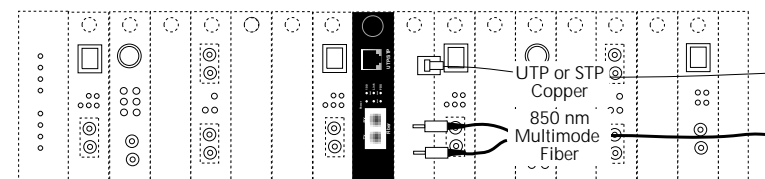
Bridging Media Converter Slide-In Module

C/E-PSW-SX-01, C/E-PSW-SX-01(SC)

USER'S GUIDE

TRANSITION Networks C/E-PSW-SX-01 series two-port bridging media converter, designed to be installed in the TRANSITION Networks Media Conversion Center, E-MCC-1600, segments 10BASE-T/100BASE-TX copper and 100BASE-SX fiber Ethernet™ collision domains to extend total network diameter, to reduce network congestion, and to convert between legacy 10BASE-T and 100BASE-SX environments.

A four-position DIP switch located at the side of the media converter allows site-selection of auto-negotiation, of 10MB/s or 100Mb/s speed, and of full-duplex or half-duplex mode.



C/E-PSW-SX-01

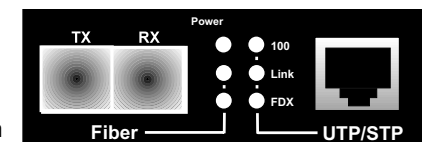
Provides an RJ-45 twisted-pair connector to UTP/STP copper cable and a set of RX (receive) and TX (transmit) ST 850nm multimode fiber connectors.

C/E-PSW-SX-01(SC)

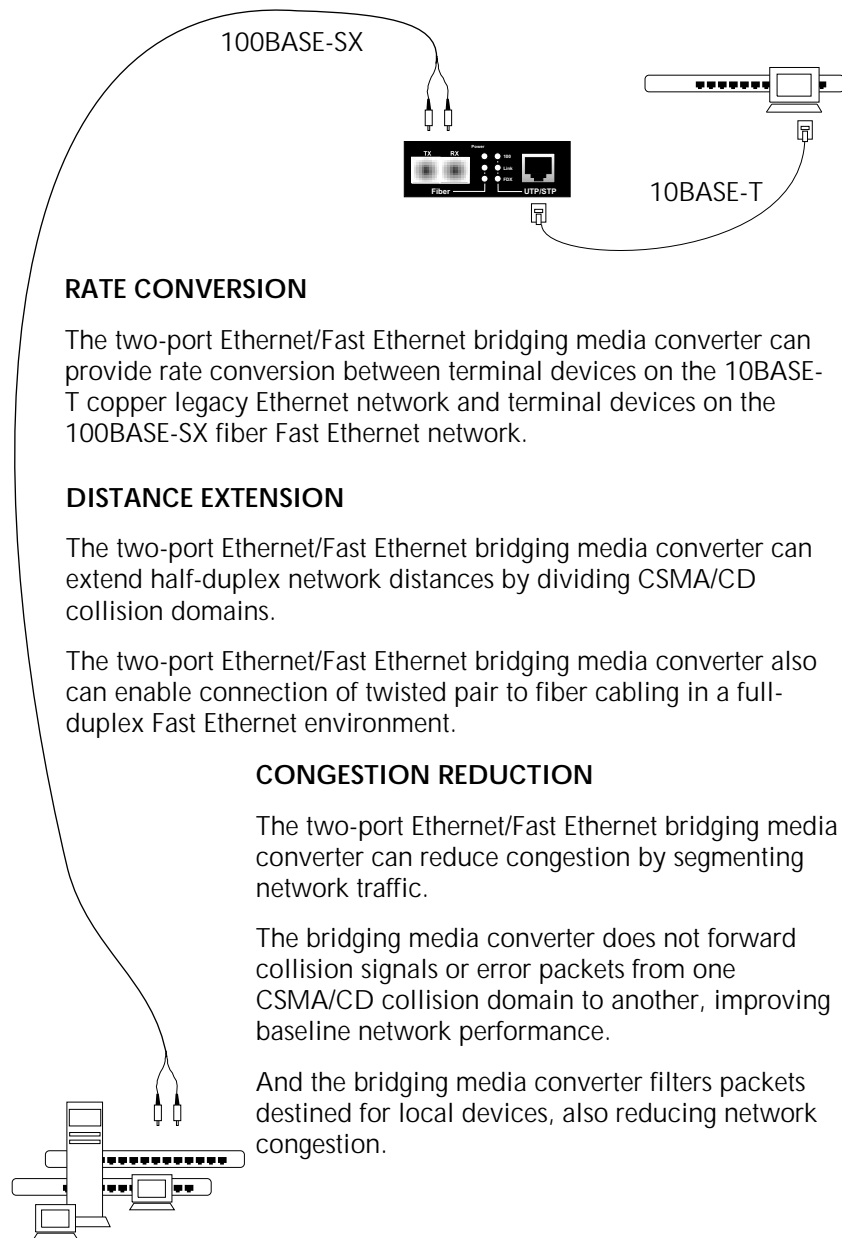
Provides an RJ-45 twisted-pair connector to UTP/STP copper cable and an RX (receive) and TX (transmit) SC 850nm multimode fiber connector.

STATUS LEDS

- Power** Steady green LED indicates connection to external AC power.
- 100** Indicates 100MB/s mode on **UTP/STP**.
- Link** (RECEIVE) Steady green LED indicates **UTP/STP OR Fiber** link. Blinking green LED indicates packet reception on **UTP/STP OR Fiber** link.
- FDX** Steady green LED indicates full-duplex operation on **UTP/STP OR on Fiber** link.



THE C/E-PSW-SX-01 IN THE NETWORK



RATE CONVERSION

The two-port Ethernet/Fast Ethernet bridging media converter can provide rate conversion between terminal devices on the 10BASE-T copper legacy Ethernet network and terminal devices on the 100BASE-SX fiber Fast Ethernet network.

DISTANCE EXTENSION

The two-port Ethernet/Fast Ethernet bridging media converter can extend half-duplex network distances by dividing CSMA/CD collision domains.

The two-port Ethernet/Fast Ethernet bridging media converter also can enable connection of twisted pair to fiber cabling in a full-duplex Fast Ethernet environment.

CONGESTION REDUCTION

The two-port Ethernet/Fast Ethernet bridging media converter can reduce congestion by segmenting network traffic.

The bridging media converter does not forward collision signals or error packets from one CSMA/CD collision domain to another, improving baseline network performance.

And the bridging media converter filters packets destined for local devices, also reducing network congestion.

ETHERNET CABLE SPECIFICATIONS

FIBER CABLE SPECIFICATIONS

The physical characteristics of the 100BASE-SX cable must meet or exceed the 100BASE-SX specifications.

MULTIMODE

Fiber-optic Cable Recommended:	62.5 / 125 μ m multimode fiber
Optional:	50 / 125 μ m multimode fiber
Modal bandwidth:	≤ 160 MHz-Km
Fiber-optic Transmitter Power:	min: -20 dBm max: -12 dBm
Fiber-optic Receiver Sensitivity:	min: -24 dBm max: -12 dBm
Wavelength:	850nm
Bit error rate:	$\leq 2.5 \cdot 10^{-10}$
Maximum Cable Distance:	300 meters

TWISTED-PAIR CABLE SPECIFICATIONS

The physical characteristics of **10BASE-T** cable must meet or exceed IEEE 802.3 10BASE-T specifications. Though **Category 3 cable is adequate** for the 10BASE-T installation, Category 5 cable is strongly recommended, since Category 3 cable can NOT be used for a later upgrade to 100BASE-TX. **DO NOT USE FLAT OR SILVER SATIN WIRE.**

The physical characteristics of **100BASE-TX** cable must meet or exceed IEEE 802.3 100BASE-TX specifications. **Category 5 cable or better is required.** Either shielded twisted pair (STP) or unshielded twisted pair (UTP) can be used. **DO NOT USE FLAT OR SILVER SATIN WIRE.**

Category 3:

Gauge	24 to 22 AWG
Attenuation	6.5 dB/100' @ 10 MHz
Differential Characteristic Impedance	100 Ω $\pm 15\%$

Category 5:

Gauge	24 to 22 AWG
Attenuation	22 dB/100' @ 100 MHz
Differential Characteristic Impedance	100 Ω $\pm 15\%$

Maximum Cable Distance:

100 meters (330 feet)

TROUBLESHOOTING SUGGESTIONS

If a bridging media converter fails, ask the following questions:

1. Is the power LED on the media converter illuminated?

NO

- Is the power adapter the proper type of voltage and cycle frequency for the AC outlet?
- Is the power adapter properly installed in the media converter and in the outlet?
- Contact Technical Support.

YES

- Proceed to step 2.

2. Is the Link LED illuminated on a port with twisted-pair installed?

NO

- Check UTP cables for proper connection/pin assignment.
- Contact Technical Support.

YES

- Proceed to step 3.

3. Is the Link LED illuminated on a port with fiber installed?

NO

- Check fiber cables for proper connection.
- Verify that TX and RX cables are connected to RX and TX ports, respectively, on 100BASE-SX device.
- Refer to Tech Tips available at: <http://www.transition.com>
- Contact Technical Support.

YES

- Contact Technical Support.

(800) 260-1312/(800)-LAN-WANS

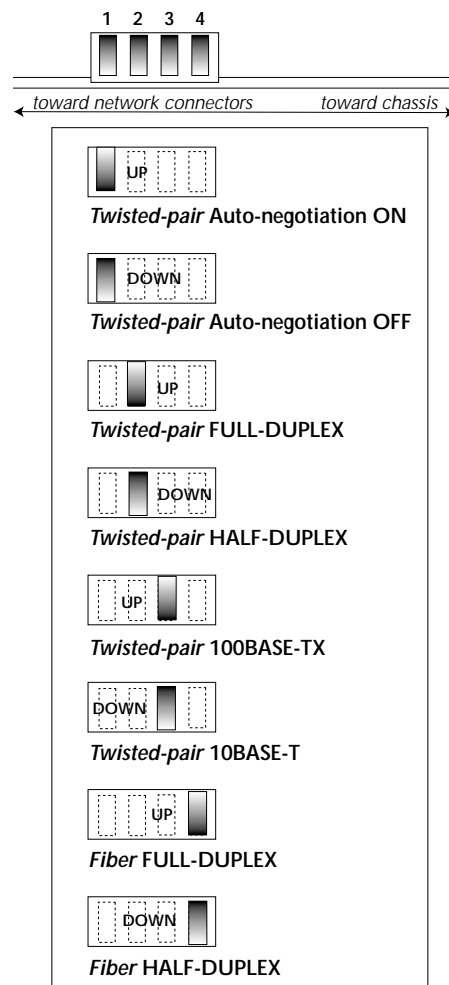
INSTALLATION

Setting DIP Switch

NOTE: Set DIP switch (located on Media Converter Slide-in-Module circuit board) BEFORE installing Media Converter Slide-in-Module in the Media Conversion Center.

DIP switch settings shown below are set to configure the bridging media converter for the site installation.

To set network speed(s) and operating mode(s), use a VERY small flatblade screwdriver or similar device and refer to the table at the left and to the examples on the next page to set DIP switch for the site installation.



NOTE: Auto-negotiation is designed so that a twisted-pair link will not become operational until matching capabilities exist in the devices installed at both ends of the 802.3u twisted-pair network.

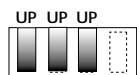
- When auto-negotiation is enabled using switch #1, the bridging media converter "advertises" rate and mode capabilities to the network. Switch #2 and switch #3 are used selectively to set the twisted-pair rate and mode to be "advertised" OR to allow the full range of rates and modes.

- When auto-negotiation is disabled using switch #1, the bridging media converter does not "advertise" rate and mode capabilities to the network. Switch #2 and switch #3 are used to set twisted-pair rate and mode.

(See examples on next page.)

EXAMPLE DIP SWITCH SETTINGS:

TWISTED-PAIR AUTO-NEGOTIATION:



Set auto-negotiation (DIP switch #1) to select auto-negotiation: ON=UP

Set twisted-pair full-duplex/half-duplex (DIP switch #2) to select full-duplex: ON=UP

Set twisted-pair 10BASE-T/100BASE-TX (DIP switch #3) to select 100BASE-TX: ON=UP

TWISTED-PAIR FULL-DUPLEX 100BASE-TX:

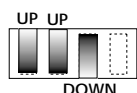


Set auto-negotiation (DIP switch #1) to de-select auto-negotiation: OFF=DOWN

Set twisted-pair full-duplex/half-duplex (DIP switch #2) to select full-duplex: ON=UP

Set twisted-pair 10BASE-T/100BASE-TX (DIP switch #3) to select 100BASE-TX: ON=UP

TWISTED-PAIR 10BASE-T WITH MODE AUTO-NEGOTIATION:



Set auto-negotiation (DIP switch #1) to select auto-negotiation: ON=UP

Set twisted-pair full-duplex/half-duplex (DIP switch #2) to select full-duplex: ON=UP

Set twisted-pair 10BASE-T/100BASE-TX (DIP switch #3) to select 10BASE-T: OFF=DOWN

FIBER FULL-DUPLEX 100BASE-SX:



Set fiber full-duplex/half-duplex (DIP switch #4) to select full-duplex: ON=UP

FIBER HALF-DUPLEX 100BASE-SX:



Set fiber full-duplex/half-duplex (DIP switch #4) to select half-duplex: OFF=DOWN

Connecting Fiber Cable to TX/RX Connector (100BASE-SX)

100BASE-SX AND THE FAST ETHERNET COLLISION DOMAIN

- Refer to the 512-Bit Rule (page 7) before installing **half-duplex** 100BASE-SX cable.
- Using **full-duplex** fiber cable avoids collision domain considerations and extends distances up to 2 kilometers (multimode) or up to 20 kilometers (singlemode).
- NOTE: A Fast Ethernet collision domain can have **ONLY ONE** CLASS I repeater **OR TWO** CLASS II repeaters.

INSTALLING CABLE

To install 100BASE-SX cable:

- Locate or build 100BASE-SX cables:
 - 100BASE-SX compliant (page 11)
 - with male transmit (TX) and receive (RX) fiber connectors installed at both cable ends.
- Connect transmit cable connector at one end of fiber cable to bridging media converter connector marked with an "outbound" arrow; connect receive cable connector to bridging media converter connector marked with an "inbound" arrow.
- Connect other end of cable installed at transmit (TX) connector of bridging media converter to receive (RX) connector on network device; connect other end of cable installed at receive (RX) connector of bridging media converter to transmit (TX) connector on network device.

Powering the Bridging Media Converter

To power ON the bridging media converter:

- Locate power receptacle on back of bridging media converter
- Connect the bridging media converter power connector end of the power supply adapter to the power receptacle on the back of the Transition Network's bridging media converter.
- Connect the external power connector end of the power supply adapter to external AC power.

NOTE: After the power supply adapter is connected to the bridging media converter and to external power, the green **Power** LED is illuminated.

Connecting Twisted-Pair Copper Cable to UTP/STP Connector (10BASE-T/100BASE-TX)

Ensure that the correct cable type is installed to support the highest speed and mode of operation to be selected. Though Category 3 cable is adequate for the 10BASE-T installation, Category 5 cable is strongly recommended, since Category 3 cable can NOT be used for 100BASE-TX.

10BASE-T AND THE ETHERNET COLLISION DOMAIN

- Refer to the 5-Segment Rule (page 6) before installing **half-duplex** 10BASE-T cable.
- Installing **full-duplex** twisted-pair cable avoids collision domain considerations; distances remain ≤ 100 meters.

100BASE-TX AND THE FAST ETHERNET COLLISION DOMAIN

- Refer to the 512-Bit Rule (page 7) before installing **half-duplex** 100BASE-TX cable.
- Installing **full-duplex** twisted-pair cable avoids collision domain considerations; distances remain ≤ 100 meters.
- NOTE: A Fast Ethernet collision domain can have **ONLY ONE CLASS I** repeater **OR TWO CLASS II** repeaters.

INSTALLING CABLE

To install 10BASE-T or 100BASE-TX cable:

1. Locate or build 10BASE-T or 100BASE-TX cables:
 - 803.2 (10BASE-T) or 803.2u (100BASE-TX) compliant (page 11)
 - with *Straight-through* or *Crossover* RJ-45 cable/connectors as required for site installation (page 7)
 - with RJ-45 plug connectors installed at both cable ends.
2. Connect RJ-45 plug connector at one end of 10BASE-T or 100BASE-TX cable to bridging media converter RJ-45 jack connector.
3. Connect RJ-45 plug connector at other end of 10BASE-T or 100BASE-TX cable to RJ-45 jack connector on network device.

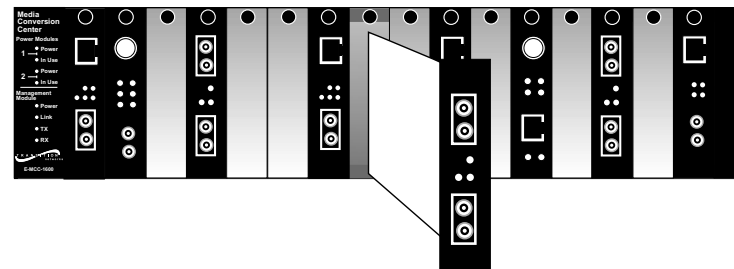
Installing Slide-In-Module(s)

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when installing Media Converter Slide-in-Module(s) in the Media Conversion Center. Failure to observe this caution could result in damage to, and subsequent failure of, the Media Converter Slide-in-Module(s).

NOTE: Slide-in-Modules can be installed in any installation slot, in any order.

To install the Media Converter Slide-in-Module in the E-MCC-1600 chassis:

1. Remove Media Converter Slide-in-Module protective plate from selected installation slot by removing two screws that secure plate to front of E-MCC-1600.
2. Carefully slide Media Converter Slide-in-Module into installation slot, aligning Media Converter Slide-in-Module with installation guides.

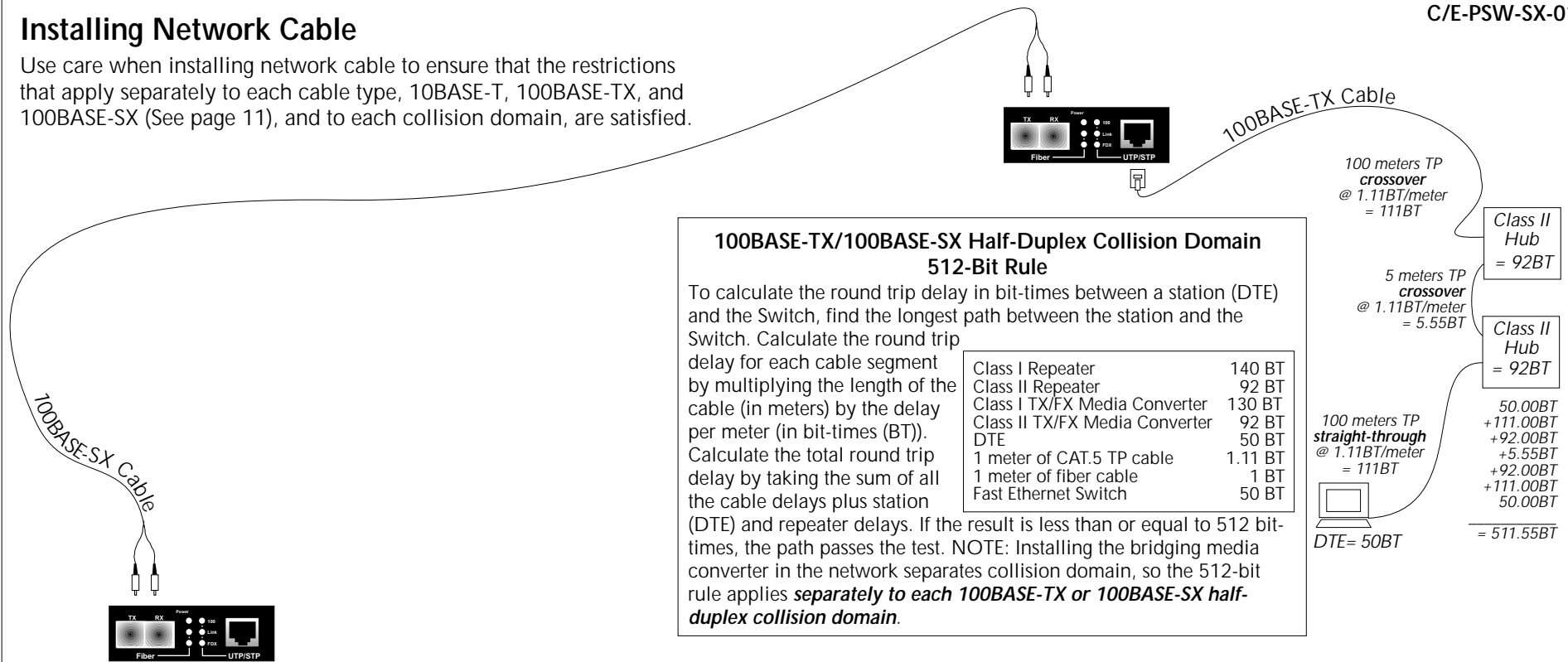


NOTE: Ensure that the Media Converter Slide-in-Module is seated firmly against the backplane.

3. Secure Slide-in-Module to E-MCC-1600 chassis by rotating captive screw attached to Slide-in-Module clockwise into chassis.

Installing Network Cable

Use care when installing network cable to ensure that the restrictions that apply separately to each cable type, 10BASE-T, 100BASE-TX, and 100BASE-SX (See page 11), and to each collision domain, are satisfied.



100BASE-TX/100BASE-SX Half-Duplex Collision Domain 512-Bit Rule

To calculate the round trip delay in bit-times between a station (DTE) and the Switch, find the longest path between the station and the Switch. Calculate the round trip delay for each cable segment by multiplying the length of the cable (in meters) by the delay per meter (in bit-times (BT)). Calculate the total round trip delay by taking the sum of all the cable delays plus station (DTE) and repeater delays. If the result is less than or equal to 512 bit-times, the path passes the test. NOTE: Installing the bridging media converter in the network separates collision domain, so the 512-bit rule applies *separately to each 100BASE-TX or 100BASE-SX half-duplex collision domain.*

Class I Repeater	140 BT
Class II Repeater	92 BT
Class I TX/FX Media Converter	130 BT
Class II TX/FX Media Converter	92 BT
DTE	50 BT
1 meter of CAT.5 TP cable	1.11 BT
1 meter of fiber cable	1 BT
Fast Ethernet Switch	50 BT

100 meters TP crossover @ 1.11BT/meter = 111BT

Class II Hub = 92BT

5 meters TP crossover @ 1.11BT/meter = 5.55BT

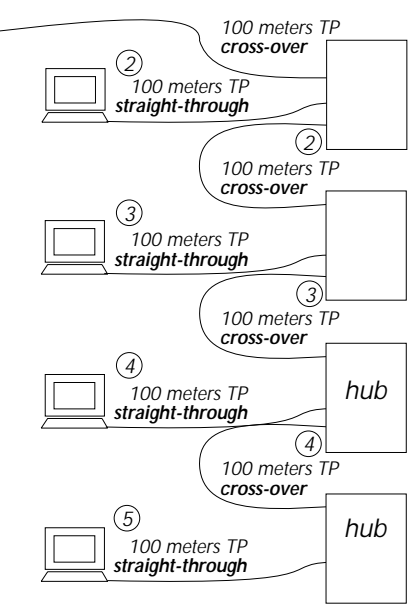
Class II Hub = 92BT

50.00BT + 111.00BT + 92.00BT + 5.55BT + 92.00BT + 111.00BT + 50.00BT = 511.55BT

DTE = 50BT

10BASE-T Half-Duplex Collision Domain 5-Segment Rule

A segment is the cable connection between interfaces. A transmission path between any two terminal devices (including the Transition Networks' Switch) in the same collision domain can consist of no more than five segments. To assign segment numbers to cable connections, determine the network device separated from the Switch by the greatest number of segments. Define a segment path between that network device and the Switch by labeling the cable connection to the Switch "segment 1" and numbering each segment in the path to the network device up to "segment n" (n = total number of segments ≤ 5). Verify that no segment path in the collision domain contains more than n ≤ 5 segments. NOTE: Installing the Switch in the network separates collision domains, so the 10BASE-T 5-Segment Rule applies *separately to each 10BASE-T collision domain.*



Twisted-pair Copper Straight-Through /Crossover Configurations

The two active pairs in a 10BASE-T or 100BASE-TX network are pins 1 & 2 and pins 3 & 6. Use only dedicated wire pairs (such as blue/white & white/blue, orange/white & white/orange) for the active pairs.

The two wires in each pair of the cable must be twisted together for the entire length of the segment and kept twisted to within approximately 1/2 inch of any connector to ensure the integrity of the signal-carrying characteristics of the unshielded wire pair.

Crossover Cable at RJ-45 Plug		Straight-Through Cable at RJ-45 Plug	
Bridging Media Converter RJ-45 Male	Network Device RJ-45 Male	Bridging Media Converter RJ-45 Male	Network Device RJ-45 Male
1 (TX+)	3	1 (TX+)	1
2 (TX-)	6	2 (TX-)	2
3 (RX+)	1	3 (RX+)	3
6 (RX-)	2	6 (RX-)	6

NOTE: Media converter is pinned as DTE device.