

# 4x T1/E1/J1 + 10/100 Ethernet to Fiber Transport Mux

## Point System™ Slide-In-Module Media Converters

### C4TEF10xx-11x

These products offer low cost transport capability for four T1/E1/J1, one Ethernet, and one RS232 data channel line (x4TEF10XX-11X). Provides copper connections compatible with G.703, AMI/B8ZS/HDB3, 10/100BASE-TX, as well as RS232 channel; while the optical connection runs at 155Mbps. **TDM traffic is not mapped to Ethernet.** A hardware-based solution guarantees the constant bit rate of TDM transport without requiring traffic management. Provides physical layer status monitoring and alarm classification functions for Telecom operators to **manage their fiber optic network and reduce operation and maintenance costs.** Target applications include: FTTx, such as Fiber-to-the-Business, Fiber-to-the-Building, Fiber-to-the-MDU and Fiber-to-the-Home.

#### Features

- ▶ Auto-Negotiation for 10/100BASE-TX (next pages)
- ▶ AutoCross™ (auto MDI/MDI-X) (see next pages)
- ▶ Transparent Link Pass Through for Ethernet (see next pages)
- ▶ Automatic Link Restoration (see next pages)
- ▶ Pause (Flow Control) (see next pages)
- ▶ Remote Management (see next pages)
- ▶ Local and Remote Loopback (see next pages)
- ▶ Remote Fiber Loss Signaling
- ▶ AIS/TAOS
- ▶ LEDs for each data port
- ▶ DIP switches for line code, line length, local loopback or remote loopback
- ▶ T1/E1/J1 mode settings
- ▶ Dry Relay Contacts on each TDM port
- ▶ Local (AUX) Management Interface (RS232 connector)
- ▶ Switch selection for Data or Management mode on RS232 interface
- ▶ Access to complete status information on local and remote device
- ▶ Access to local and remote configuration
- ▶ Switch or SNMP selected Baud rate operation
- ▶ 802.1Q VLAN Management
- ▶ Remote Firmware Upgrade (see next pages)

#### SNMP Management Features

- ▶ Report local converter status:
  - Fiber Link Status
  - Copper Link Status for each T1/E1
  - Hardware switch settings: LBO, AIS on C/F, HW/SW, speed
  - AIS detected Fiber & Copper
  - Model Number
  - Copper & Fiber Connectors
- ▶ Local command operations include:
  - Loopback Fiber & T1/E1 per channel
  - AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link
  - Serial connection speed and parity (Software Mode)
  - T1/E1 Mirror Port Modes
  - Boot-load firmware upgrades
  - Ethernet settings:
    - Auto-Negotiation Enable/Disable
    - Force speeds and modes on 10/100TX
- ▶ Remote converter status:
  - Fiber Link status
  - Copper Link Status for each T1/E1
  - Hardware switch settings: LBO, AIS on C/F, HW/SW, speed
  - AIS detected Fiber & Copper
  - Model Number
  - Copper & Fiber Connectors
- ▶ Remote Commands:
  - Loopback Fiber & T1/E1 per channel
  - Serial connection speed and parity (Software Mode)
  - AIS TX on fiber on loss of copper link & AIS TX on copper on loss of fiber link
  - T1/E1 Monitor Modes
  - Ethernet settings (Software Mode):
    - Auto-Negotiation Enable/Disable
    - Force speeds and modes on 10/100TX
    - Link Pass Through Enable/Disable
    - Flow Control Enable/Disable
    - AutoCross™ Enable/Disable



Convert Copper to Fiber

#### Specifications

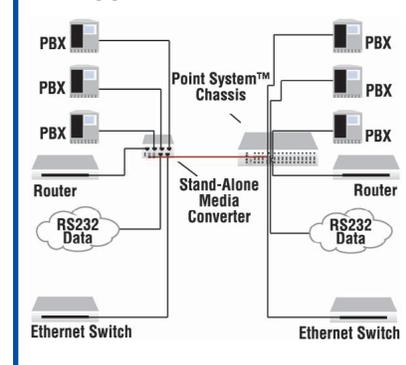
Standards	IEEE Std. 802.3 2003; Telecordia TR-NWT-001089; FCC Part 68, UL1459; ITU-T, ANSI, AT&T, ETSI; TBR 12; PD 7024: 1994 (NTR 4)
Fiber Optic Connector Specs	
<b>C4TEF1011-110 &amp; C4TEF1013-110</b>	Min TX PWR: -19.0 dBm Max TX PWR: -14.0 dBm RX Sensitivity: -30.0 dBm Max In PWR: -14.0 dBm Link Budget: 11.0 dB
<b>C4TEF1014-110</b>	Min TX PWR: -15.0 dBm Max TX PWR: -8.0 dBm RX Sensitivity: -31.0 dBm Max In PWR: -8.0 dBm Link Budget: 16.0 dB
<b>C4TEF1015-110</b>	Min TX PWR: -8.0 dBm Max TX PWR: -2.0 dBm RX Sensitivity: -34.0 dBm Max In PWR: -7.0 dBm Link Budget: 26.0 dB
<b>C4TEF1016-110 &amp; C4TEF1017-110</b>	Min TX PWR: -5.0 dBm Max TX PWR: 0.0 dBm RX Sensitivity: -34.0 dBm Max In PWR: -7.0 dBm Link Budget: 29.0 dB
<b>C4TEF1035-110</b>	Min TX PWR: 0.0 dBm Max TX PWR: 5.0 dBm RX Sensitivity: -36.0 dBm Max In PWR: -3.0 dBm Link Budget: 36.0 dB
Single Fiber Products	
<b>C4TEF1029-110 &amp; C4TEF1029-111</b>	Min TX PWR: -13.0 dBm Max TX PWR: -6.0 dBm RX Sensitivity: -32.0 dBm Max In PWR: -3.0 dBm Link Budget: 19.0 dB
<b>C4TEF1029-112 &amp; C4TEF1029-113</b>	Min TX PWR: -8.0 dBm Max TX PWR: -3.0 dBm RX Sensitivity: -33.0 dBm Max In PWR: -3.0 dBm Link Budget: 25.0 dB
Dimensions	Width: 1.72" [44 mm] Depth: 5.0" [127 mm] Height: 3.4" [86 mm]
Power Consumption	6.0 watts
Environment	See chassis specifications
Shipping Weight	1 lb. [0.45 kg]
Regulatory Compliance	FCC Class A; VCCI Class A; EN 55022 (CISPR 22) Class A; ICES-003
Warranty	Lifetime

#### Ordering Info

Product Number	Port 1	Ports 2-5	Port 6	Port 7
<b>C4TEF1011-110</b>	1300nm multimode (ST) [2 km / 1.2 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1013-110</b>	1300nm multimode (SC)	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1014-110</b>	1310nm single mode (SC) [20 km / 12.4 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1015-110</b>	1310nm single mode (SC) [40 km / 24.9 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1016-110</b>	1310nm single mode (SC) [60 km / 37.3 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1017-110</b>	1550nm single mode (SC) [80 km / 49.7 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1035-110</b>	1550nm single mode (SC) [120 km / 74.6 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>Single Fiber Products</b> <i>Note: Recommended use in pairs (see next pages)</i>				
<b>C4TEF1029-110</b>	1310nm TX / 1550nm RX single fiber single mode (SC) [20 km / 12.4 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1029-111</b>	1550nm TX / 1310nm RX single fiber single mode (SC) [20 km / 12.4 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1029-112</b>	1310nm TX / 1550nm RX single fiber single mode (SC) [40 km / 24.9 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]
<b>C4TEF1029-113</b>	1550nm TX / 1310nm RX single fiber single mode (SC) [40 km / 24.9 miles]	RJ-48 [1.5 km / 0.9 miles]	10/100BASE-TX (RJ-45) [100 m / 328 ft.]	6-pin DIN [3 m / 10 ft.]

Note: C4TEF cards cannot be used with the 1-Slot Point System™ Chassis

#### Application



# ADVANCED PRODUCT FEATURES

## ▶ Auto-Negotiation (802.3u)

Auto-Negotiation allows devices to perform automatic configuration to achieve the best possible mode of operation over a link. Devices with this feature will broadcast their speed (10Mbps, 100Mbps, etc.) and duplex (half/full) capabilities to other devices and negotiate the best mode of operation between the two devices.

- ▶ No user intervention required to determine best mode of operation
- ▶ Optimal link established automatically
- ▶ Quick and easy installation

While the inclusion of this feature is beneficial, the ability to disable it is equally beneficial. In the event of a non-negotiating end device trying to connect to a negotiating device, the mode of operation will drop to the least common denominator between the two devices (i.e. 100Mbps, half-duplex). Disabling this feature gives the user the ability to force the connection to the best mode of operation when trying to link with a non-negotiating device. Most Transition converters with Auto-Negotiation will allow you to disable this feature.

## ▶ AutoCross™

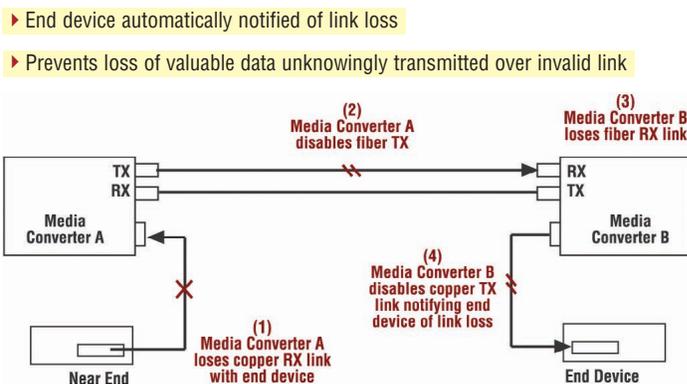
Automatically detects and configures the twisted pair port on the converter to the correct MDI or MDI-X configuration.

- ▶ Eliminates an entire category of troubleshooting
- ▶ No need to identify cable type—straight-through or crossover
- ▶ No user intervention required to determine correct button / switch settings

## ▶ Link Pass Through

Link Pass Through is a troubleshooting feature that allows the media converter to monitor both the fiber and copper RX ports for loss of signal. In the event of a loss of RX signal on one media port, the converter will automatically disable the TX signal of the other media port, thus "passing through" the link loss.

(see diagram below)



If someone tells you media conversion is a commodity product that anyone can bring to market, they probably haven't looked at the extensive product suite offered by Transition Networks. With the industry's most comprehensive offering of full-featured products, Transition's media converters stand out as "the choice" among industry IT professionals.

Generally, media converters are low-level OSI model devices with no IP or MAC addresses and therefore are transparent to the network. This "transparency" makes them very inexpensive and easy to use, but also can make troubleshooting the network very difficult. In an effort to overcome this difficulty and to make media converters "visible" to network managers, Transition has designed their full-featured products to include the most advanced features on the market today.

# ADVANCED PRODUCT FEATURES

## ▶ Automatic Link Restoration

Transition Networks's converters will automatically re-establish link in all network conditions.

### ▶ No need to reset devices

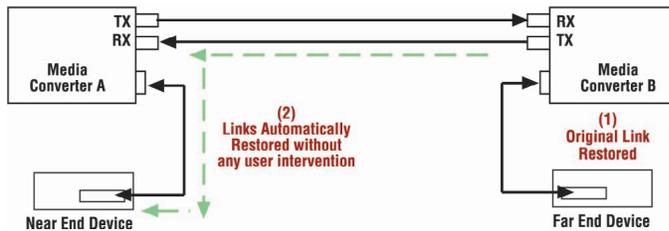
Transition Networks's converters will automatically re-establish link when connected to switches if link was lost. With other manufacturers' converters the user must reset the converter to re-establish the link.

### ▶ Auto-Negotiation Enabled

Automatic Link Restoration allows the users to continue using Auto-Negotiation with Link Loss Notification features. With other manufacturers' converters the user must disable Auto-Negotiation and hard set the link.

### ▶ Link Pass Through Activated in both directions

Automatic Link Restoration on Transition Networks's products allows users to continue using Link Loss Notification feature activated in both directions. Many competitive solutions allow for Link Loss Notification activation only in one direction. If Link Loss feature is activated in both directions, competitive products are put in a "deadly embrace" and they cannot restore the link without resetting the converters.

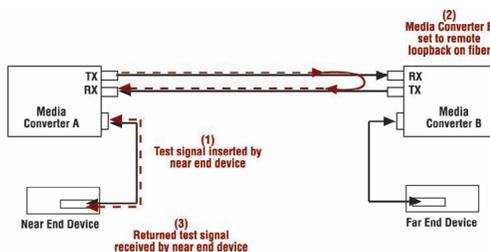


## ▶ Loopback

Select Transition Networks products are equipped with Loopback. This feature puts a converter in a special mode that enables the device to loop back the signal from the RX port to the TX port on either media for testing and troubleshooting purposes. Test signals from a tester (Firebird, etc.) can then be inserted into the link and looped back as received by a device to test a particular segment of the link (i.e. copper or fiber). Loopback can be either local or remote depending on the location of the converter in the link.

### ▶ Allows network diagnostics from local or remote location

### ▶ Quickly pinpoints problem areas of end to end link by testing a particular segment



Some converters have separate copper and fiber loopback functions that can be enabled separately, while others will loopback both copper and fiber at the same time when enabled. Please refer to the specific product page for details.

## ▶ Pause (IEEE 802.3xy)

PAUSE signaling is an IEEE feature that temporarily suspends data transmission between two devices in the event that one of the devices becomes overwhelmed. In the event that a device needs some time to clear network congestion, it will send out a PAUSE signal to the other end device, which will then wait a pre-determined amount of time before re-transmitting the data. Transition's converters will pass PAUSE signaling unhindered; ensuring that the message is delivered to the end device.

### ▶ PAUSE enabled devices allowed to work properly

### ▶ Prevents loss of valuable data transmission

### ▶ Reduces bottlenecks and allows for efficient use of network devices

PAUSE signaling is not standardized over fiber media. Transition's media converters will communicate this signaling over fiber between the converters to pass this signaling on to the other end device.

## ▶ Remote Management

All chassis-based converters from Transition Networks® can be managed through SNMP. Now, select stand-alone products can also be managed through SNMP when used in conjunction with a chassis based converter. While chassis based products are generally placed in the telecommunications room, stand-alone converters are generally placed in remote locations away from network administrators. Remote in-band management over fiber allows administrators access to the remote device to check status and enable/disable features or the device itself.

### ▶ Visibility of remote converters for network administrators

### ▶ Allows for centralized management of media converters

# ADVANCED PRODUCT FEATURES

## ► Remote Firmware Upgrade

New product features are continuously being added to Transition Networks's products. These improvements are also available for many products already installed in the field. Management modules and many media converters can be updated remotely via firmware upgrade. The remote upgrade feature eliminates the need to ship the products back to the manufacturer. The firmware upgrades can be performed by a user either locally via a Console port or remotely via TFTP.

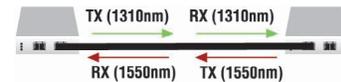
The upgrades do not require the reconfiguration of the SNMP management or converter feature settings.

## ► Single Fiber

**Single fiber technology offers a 50% savings** in fiber utilization. It is an attractive solution to maximize the usage of a limited number of fiber runs.

In a traditional optical link, a fiber pair consists of two uni-directional strands. The single fiber technology multiplexes two optical wavelengths of 1310nm and 1550nm into a single strand fiber. In a single fiber media converter each wavelength is responsible for either the transmit or receive function. Consequently, the bi-directional transmission is achieved by using a single strand. The converters in a single fiber scenario "match" each other's wavelengths. Converter A transmits at the wavelength of 1310nm and receives at 1550nm while the other converter transmits at 1550nm and receives at 1310nm. Therefore, converters are usually used in pairs.

### Single Fiber



Single fiber technology is available on all Transition Networks Media Converters in maximum distance ranges from 20 to 80km.