

# C4TEF10xx-1xx

## User Guide

### Chassis Device

- 4x RJ-48 T1/E1 ports
- 1x RJ-45 Ethernet 10/100Base-TX Port
- Fiber Port(s)
- 1x USB Serial Port
- Extended Temperature



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## Introduction

The C4TEF10xx-1xx Device is designed to extend signals from a 10Base-T Ethernet/100Base-TX Fast Ethernet port, a USB data port, and up to four (4) T1/E1/J1 network ports over fiber. The Ethernet and T1/E1/J1 interfaces are independent of each other and the signals from these ports can be sent over the fiber interface simultaneously.

The C4TEF10xx-1xx is designed to be installed in pairs. For example, install one C4TEF10xx-1xx as the local Device and another C4TEF10xx-1xx as the remote Device.

## Model Numbers

Part Number	Duplex Fiber-Optic - 100Base-FX
C4TEF1011-120/125	ST, 1300 nm multimode, 2 km (1.2 miles)*
C4TEF1013-120/125	SC, 1300 nm multimode, 2 km (1.2 miles)*
C4TEF1014-120/125	SC, 1310 nm single mode, 20 km (12.4 miles)*
C4TEF1015-120/125	SC, 1310 nm single mode, 40 km (24.8 miles)*
C4TEF1016-120/125	SC, 1310 nm single mode, 60 km (37.2 miles)*
C4TEF1017-120/125	SC, 1550 nm single mode, 80 km (49.7 miles)*

\*Typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network. The standalone version of the Device is S4TEF10xx-1xx. For more information, see the online user's guide at: [www.transition.com](http://www.transition.com) then click Product/Product Finder.

## Model Descriptions

The various fiber connectors are available on separate models. Both duplex and single mode fiber optic Devices are available:

Part Number	Fiber-Optic - Single Fiber, Single Mode, 100Base-FX
C4TEF1029-120/125	SC, 1310nm TX/1550 nm RX, 20 km (12.4 miles)*
C4TEF1029-121/126	SC, 1550nm TX/1310 nm RX, 20 km (12.4 miles)*
<b>Note:</b> C4TEF1029-120/125, and C4TEF1029-121/126 are intended to be installed in the same link where one is the local Device and the other is the remote Device.	
C4TEF1029-122 /127	SC, 1310nm TX/1550 nm RX, 40 km (24.8 miles)*
C4TEF1029-123/128	SC, 1550nm TX/1310 nm RX, 40 km (24.8 miles)*
<b>Note:</b> C4TEF1029-122/127, and C4TEF1029-123/128 are intended to be installed in the same link where one is the local Device and the other is the remote Device.	
C4TEF1035-120/125	SC, 1550 nm single mode, 120 km (74.6 miles)*
C4TEF1040-120/125	1 SFP Port (empty)
C4TEF1040-140/145	2 SFP Ports (empty)

\*Typical maximum cable distance. Actual distance depends on the physical characteristics of the network. (TX) = transmit, (RX) = receive

## Port Descriptions

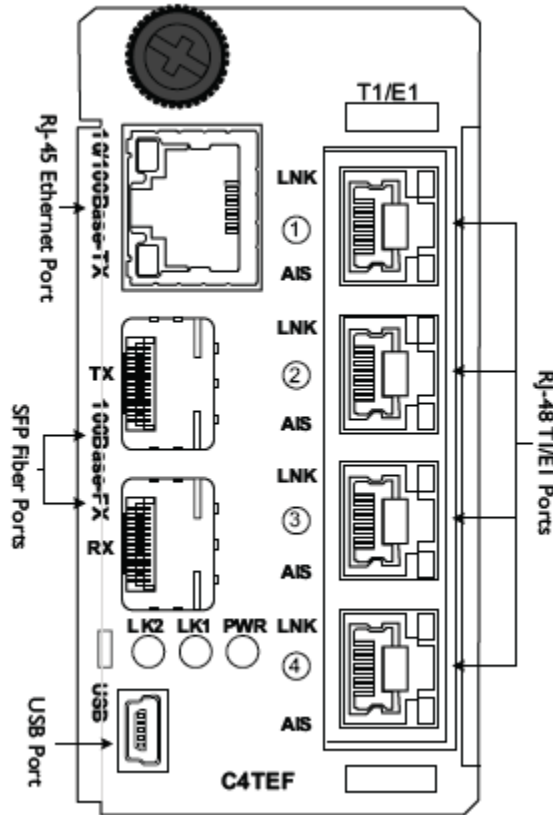
Port	No. of Ports	Port Description
Ethernet	1	RJ-45, 100 Mb/s, 100 m (328 ft.)*
USB	1	57600 bps 8-N-1 serial port
RJ-48	4	T1/E1/J1
Fiber	2	SFP/ST/SC

## Installation

**Note:** Due to proprietary communications over fiber, the C4TEF10xx-1xx series must be installed in pairs, where one is the local Device and the other is the remote Device.

### Copper and fiber ports

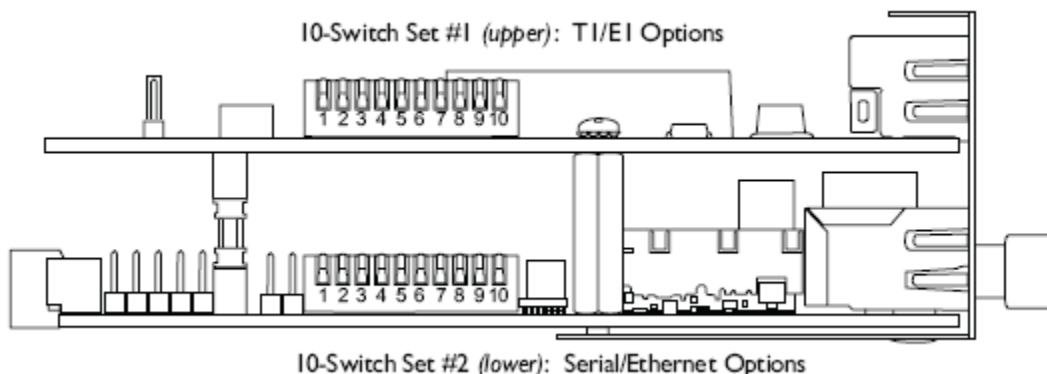
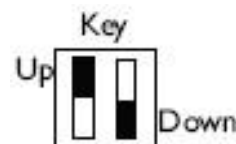
The figure below show the locations of the fiber ports, the Ethernet port, the USB port, and the four (4) T1/E1/J1 ports.



## Configuration switches

The C4TEF10xx-1xx Device has two (2) sets of configuration switches.

- Set #1 (upper) sets the T1/E1/J1 options.
- Set #2 (lower) sets the Ethernet options.



**Note:** Use a small device to set the switches as shown below:

### Switch set #1 - T1/E1/J1 options

#### 1, 2, 3, 4 - Line settings

Switches 1, 2, 3, and 4 are used to setup the line settings for the T1/E1/J1 ports. The selected setting applies to all four (4) T1/E1/J1 ports.

#### Top Board DIP Switches

Switch Position 1, 2, 3, 4	Mode	Distance
UP,UP,UP,UP	DSX-1,100Ω	0 - 133ft
UP,UP,UP,DN	DSX-1,100Ω	133 - 266ft
UP,UP,DN,UP	DSX-1,100Ω	266 - 399ft
UP,UP,DN,DN	DSX-1,100Ω	399 - 533ft
UP,DN,UP,UP	DSX-1,100Ω	533 - 655ft
UP,DN,UP,DN	J1, 110Ω	0 - 665ft
UP,DN,DN,UP	DS1, 100Ω	0 db LBO
UP,DN,DN,DN	DS1, 100Ω	-7.5 db LBO
DN,UP,UP,UP	DS1, 100Ω	-15db LBO
DN,UP,UP,DN	DS1, 100Ω	-22.5db LBO
DN,DN,DN,DN	E1, 120Ω	
All Others	DSX-1,100Ω	0 - 133ft

## 5, 6, 7, 8 - Loopback settings

The loopback settings are used for installation and network debugging procedures. Each T1/E1/J1 port can be individually set for loopback mode:

- SW 5 controls T1/E1/J1 port 1
- SW 6 controls T1/E1/J1 port 2
- SW 7 controls T1/E1/J1 port 3
- SW 8 controls T1/E1/J1 port 4

When the loopback switch for a particular T1/E1/J1 port is enabled, the port loops the signal from the receive port back to the transmit port. The T1/E1/J1 loopback test scenarios are illustrated in the Troubleshooting section.

- SW 5 TDM P1 Loopback, Up = disable; Down = enable
- SW 6 TDM P2 Loopback, Up = disable; Down = enable
- SW 7 TDM P3 Loopback, Up = disable; Down = enable
- SW 8 TDM P4 Loopback, Up = disable; Down = enable

## 9 - Transmit AIS

**Up** - Enable the transmit AIS (Alarm Indication Signal) on loss of the carrier signal. This function is unframed and applies to ALL channels, both copper and fiber.

**Down** - Disable the transmit AIS function.

10 - Not used

## Switch set #2 - Ethernet options

### 1 - Twisted-pair Auto-Negotiation

**Up** (*Enabled*) - The Device “advertises” ALL rate and mode capabilities to the network:

- 100 Mb/s full or half-duplex
- 10 Mb/s full or half-duplex

The Device raises the Ethernet link to the highest speed and mode possible for all the attached network devices.

When selected, Auto-Negotiation allows a twisted-pair link to become operational only after the Auto-Negotiation function matches network speed capabilities at both ends of the twisted-pair copper segment.

**Down** (*Disabled*) - The bridging Device does not “advertise” its rate and mode capabilities to the network. Switch 2 and switch 3 are then used to set the speed and duplex for the Ethernet link.

### 2 - Ethernet speed

**Up** (*100Base-TX*) - Sets the Ethernet port to 100Base-TX (100 Mb/s).

**Down** (*10Base-T*) - Sets the Ethernet port to 10Base-T (10 Mb/s).

### 3 - Ethernet duplex

**Up** (*Full-Duplex*) - Sets the Ethernet port to full-duplex mode. The twisted-pair cable distances are constrained by the cable requirements (see Cable Specifications for the various C4TEF10xx-1xx models).

**Down (Half-Duplex)** - Sets the Ethernet port to half-duplex mode. The twisted-pair cable distances are constrained by the 512-bit rule:

*In a half-duplex network, the maximum cable length is determined by the round trip delay limitations of each Fast Ethernet collision domain. (A collision domain is the longest path between any two terminal devices, e.g. a terminal, switch, or router.)*

The 512-bit rule determines the maximum cable length permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good.

For more information on the 512-bit rule, see the white paper titled “Collision Domains” on the Transition Networks website at: [www.transition.com](http://www.transition.com).

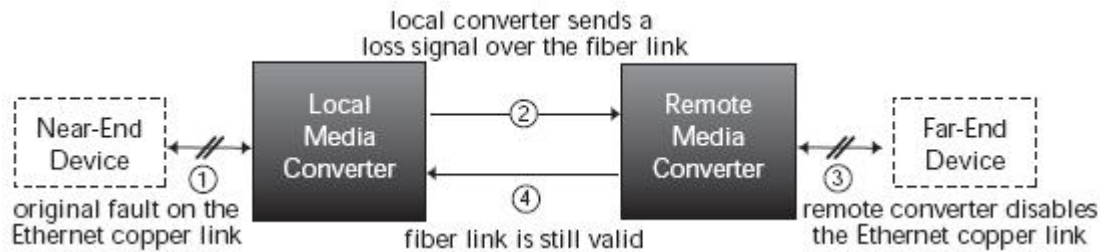
#### 4 - Transparent Link Pass-Through

**Up** - Enable Link Pass-Through

**Down** - Disable Link Pass-Through

The Transparent Link Pass-Through feature allows the Device to monitor the Ethernet copper RX (receive) ports for loss of signal. For example, when the Ethernet copper link on the near-end device is lost (1), the local Device transmits a signal to the remote Device (2), thus, “passing through” the link loss. The remote Device disables the Ethernet copper link to the far-end device (3), which prevents the loss of valuable data unknowingly transmitted over an invalid link.

It is important to remember that although the Ethernet copper link has been disabled, the fiber link is still valid (4). Thus, there is no disruption to the transfer of T1/E1/J1 data signals over the fiber link.



#### 5 - Fiber loopback

**Up** - Disable fiber loopback

**Down** - Enable fiber loopback

The loopback setting is used for installation and network debugging procedures. When the fiber loopback function is enabled, the fiber port loops all T1/E1/J1 and Ethernet signals from the receive port back to the transmit port.

#### 6 - In-Band loopback detection

**Up** - Disable in-band loopback

**Down** - Enable in-band loopback

The remote in-band loopback (IBL) detection is based on NIU Facility 1 (FAC1), (FAC2) or (FAC3), or user-defined loopback codes. When enabled and a tester like the T-Berd 2310 sends IBL codes to a particular local TDM TP port (e.g., CH1), which are transmitted to the remote through the fiber. The remote Device can detect and react to this activate by de-activating the loopback codes. The corresponding remote TP port (CH1) is in loopback mode via fiber.

#### 7 - Fiber redundancy mode

**Up** - Revertive Fiber Redundancy

**Down** - Non-Revertive Fiber Redundancy

Fiber Redundancy either “Revertive Mode” or “Non-Revertive Mode”

**Note:** When in Revertive Mode and the primary port loses connectivity, the secondary port takes over and when the primary port comes back up the connectivity returns to the primary port. In Non-Revertive Mode the connectivity remains on the secondary port even after the primary port regains connectivity.

### 8 - In-band loopback timer

**Up** - Enable

**Down** - Disable

**Note:** The loopback timer provides a fixed 20 minute loopback timeout when enabled. Normally, after 20 minutes, the loopback state will timeout and release. While the Device is in loopback, a reapplication of any loopback activation will reset the timer to 20 minutes.

### 9-10 - Not used

## Hardware/Software Mode jumper (J11)

The 3-pin header (J11) is located on the top circuit board of the Device.

### Hardware mode:

The Device mode is determined by the switch setting.

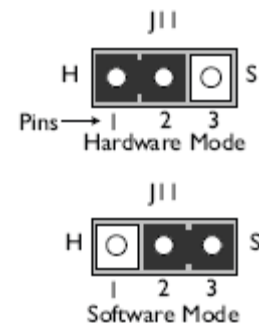
### Software mode:

The Device mode is determined by the most-recently saved, on-board microprocessor settings.

To set the jumper:

1. Locate the jumper near the back end on the upper circuit board.
2. Move the jumper to the desired position (see above).

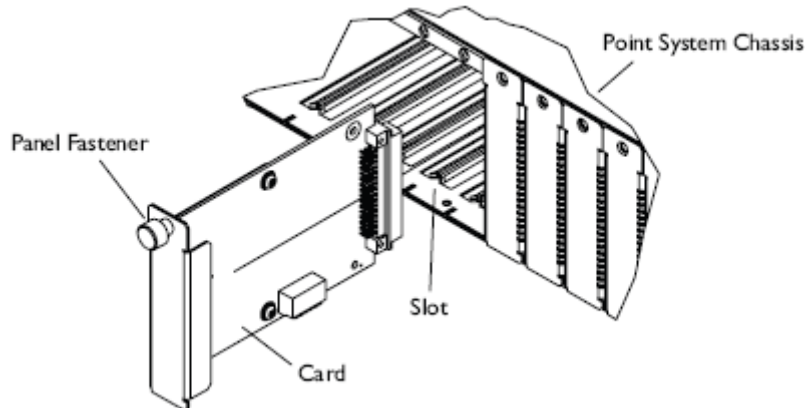
Jumper J11 is on the top daughter board of the two-board set. Software mode is set when the 2-position shunt is positioned on Pins 2 and 3 of Jumper J11. Software mode is the C4TEF10xx-1xx factory default setting.



## Install the C4TEF10xx-1xx

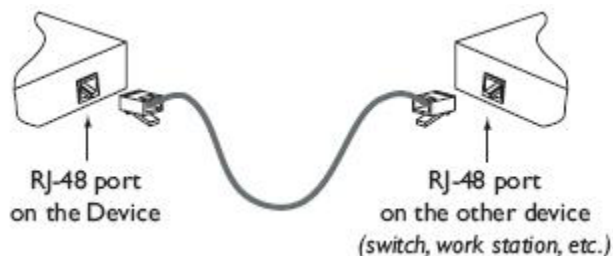
**CAUTION:** Wear a grounding device and observe electrostatic discharge precautions when installing the C4TEF10xx-1xx Device. Failure to observe this caution could result in damage to, and subsequent failure of the Device.

1. Carefully slide the Device into two adjacent installation slots, aligning the module with the installation guides.
2. Ensure that the module is firmly seated inside the chassis.
3. Push in and rotate the panel fastener screw clockwise to secure the module to the chassis front.



## Install the T1/E1/J1 cable

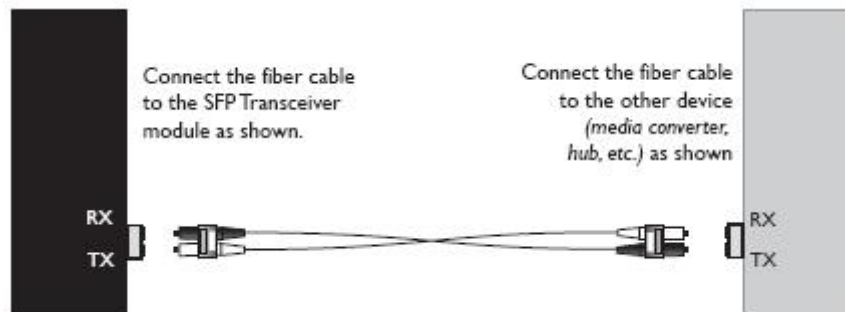
1. Locate or build an ITU-compliant copper cable with straight-through RJ-48 connectors installed at both ends. (See Cable Specifications section for your network application.)
2. Connect the RJ-48 connector at one end of the cable to one of the T1/E1/J1 ports on the C4TEF10xx-1xx Device.
3. Connect the RJ-48 connector at the other end of the cable to the T1/E1/J1 port on the other device.





## Install the fiber cable

1. Locate or build ITU-compliant fiber cable with male, two-stranded TX to RX connectors installed at both ends.
2. Connect the fiber cables to the local Device as described:
  - Connect the male TX cable connector to the female TX port.
  - Connect the male RX cable connector to the female RX port.
3. Connect the fiber cables to the remote Device as described:
  - Connect the male TX cable connector to the female RX port.
  - Connect the male RX cable connector to the female TX port.

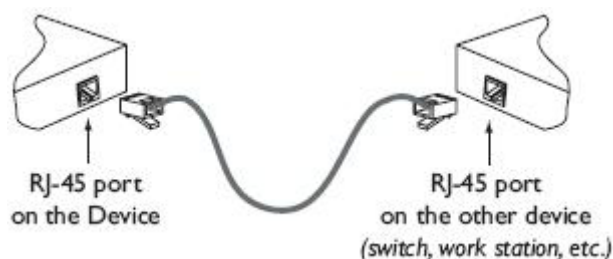


## Install the Ethernet cable

Ensure that the correct cable type is installed to support the highest speed and mode of operation to be selected.

1. Locate or build an IEEE 803.2™ compliant 10Base-T or 100Base-TX cables with straight-through RJ-45 connectors installed at both ends.
2. Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the C4TEF10xx-1xx Device.
3. Connect the RJ-45 connector at the other end of the cable to the RJ-45 port on the other device (switch, workstation, etc.).

**Note:** The MDI (straight-through) or MDI-X (crossover) cable connection is configured automatically, according to the network conditions.



## Operation

### ***Fiber network LEDs***

Use the status LEDs next to the fiber port to monitor the Device and the fiber network connections.

- Top, Power: Green - Power
- Middle, Fiber #2 Link: Green - ON link, Active interface  
Amber - ON link, Standby mode
- Bottom, Fiber #1 Link: Green - ON link, Active interface  
Amber - ON link, Standby mode

### ***T1/E1/J1 LEDs***

Each T1/E1/J1 link has a pair of LEDs embedded in the RJ-48 connector that monitors the status of the link.

- |                 |   |
|-----------------|---|
| LNK LED (green) | On = T1/E1/J1 link detected<br>Off = T1/E1/J1 signal lost or no signal                            |
| AIS LED (amber) | On = AIS (Alarm Indication Signal) detected failure of the device connected to the T1/E1/J1 port. |

### Ethernet LEDs

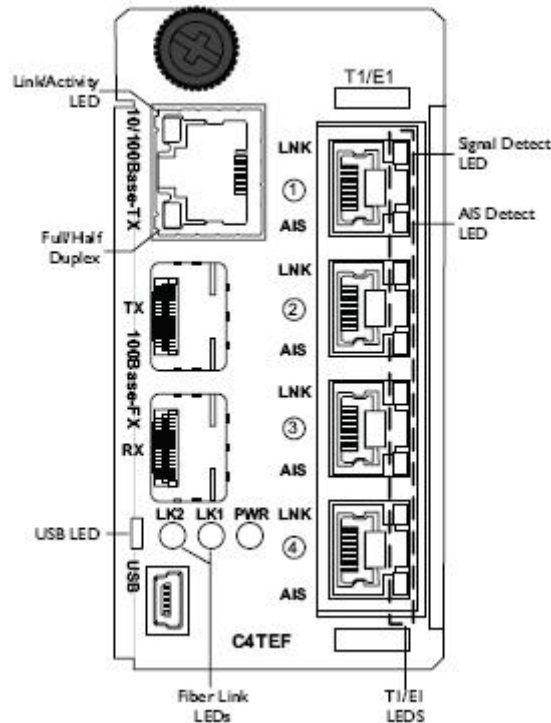
Use the bi-color status LEDs (embedded in the 10/100Base-TX RJ-45 connector) to monitor the Ethernet connections.

#### Speed/Link LED

- Amber = A link on the 10 twisted-pair copper link
- Flashing Amber = Activity on the 10 copper link
- Green = A link on the 100 twisted-pair copper link
- Flashing Green = Activity on the 100 copper link

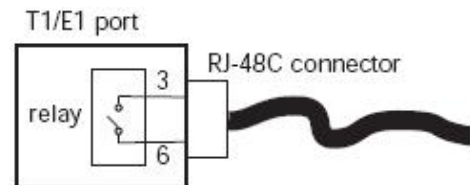
#### Duplex LED

- Amber = Half duplex
- Green = Full duplex



### Dry-contact relay

All four T1/E1/J1 ports are equipped with an RJ-48 dry-contact relay. The relay closes if the power is lost or if any of the individual T1/E1/J1 links are lost. The operational rating on pins 3 and 6 are 0-30 VDC, 100 mA (maximum).



## Accessing the maintenance interface

1. Make sure that the Device is configured for accessing the maintenance interface via the USB port (*baud rate is (57600), data bit (8), parity is (none), stop bit (1)*).
2. Connect a USB cable from the terminal to the USB connector on the Device.
3. In a Windows environment, click Start/All Programs/Accessories/Communications/HyperTerminal to launch the program.
4. Press the ENTER key and the following Device options display:

```
l - Download FPGA firmware using XMODEM
o - Upgrade remote FPGA
p - Upgrade remote PIC
q - FPGA firmware version & status
```

**Note:** If you have questions about the FPGA firmware download, [Contact Us](#).

## Firmware download to local via XModem

5. Locate the FPGA firmware file.
6. At the prompt, press the “L” key and then the ENTER key: the screen displays  
*Erasing backup image. . . .*
7. When “Start file download using XMODEM” appears, send the FPGA file. This process will take a couple of minutes. When the FPGA download is complete, the screen displays:

```
DOWNLOAD: Version compare:
Current : 0.2.1
New : 0.2.1
DOWNLOAD: Continue?(Y/N)
```

8. If you press the “N” key, the screen displays:

```
DOWNLOAD: Version compare:
Current : 0.2.1
New : 0.2.1
DOWNLOAD: Continue?(Y/N)
DOWNLOAD: User cancelled
%-
```

9. Press the “Y” key to copy the backup to the primary on the local device. When completed, the screen displays:

```
DOWNLOAD: Restart FPGA
FPGA detected revision 0.2.1

DOWNLOAD: Complete
```

10. To download the image to the remote from the local automatically, enable “Automatic FPGA Upgrade to remote” via the Web.

11. Press the “Y” key and the screen shows that the remote is detected and the download has started.

```
DOWNLOAD: Remote detected, download to remote?(Y/N)
.....
DOWNLOAD: Sending file to remote
#####
```

When the process is finished, the screen displays:

```
DOWNLOAD: Restart FPGA
FPGA detected revision 0.2.1
DOWNLOAD: Complete
%
```

12. To verify FPGA firmware version and status, press “Q” and then ENTER: the device will check the primary and backup versions (this takes about a minute) and when completed, the screen displays:

```
Primary image:
Version - 0.2.1
CRC - .....PASSED
Backup image:
Version - 0.2.1
CRC - .....PASSED
%FPGA rx_packet: Timeout data
MRX_DATA_STAT=0000
MRX_MDATA_COUNT=2F85
%
```

## **AutoCross™**

The AutoCross feature allows either straight-through (MDI) or crossover (MDI-X) cables to be used when connecting to devices such as hubs, transceivers, or network interface cards (NICs). AutoCross determines the characteristics of the cable connection and automatically configures the unit to link up, regardless of the cable configuration. (Ethernet port only.)

## **Remote management function**

The stand-alone version of this Device, the S4TEF10xx-1xx, can be remotely managed when connected via fiber cable to a local C4TEF10xx-1xx Device that is installed in a managed PointSystem™ chassis. (See the list of SNMP commands below.) For more details, see the online S4TEF10xx-1xx user guide at: [www.transition.com](http://www.transition.com) and click on Product/Product Finder.

## **SNMP**

See the on-line documentation that comes with Transition Networks FocalPoint™ software for applicable commands and usage.

Use SNMP at an attached terminal or at a remote location to monitor the Device by monitoring:

- Device power
- Fiber link status
- Copper link status for each T1/E1/J1 (*AIS, link*)
- Copper link status for Ethernet (*link, speed, duplex*)
- All hardware switch settings
- AIS detected copper link and fiber link
- Model #, serial #, PIC revision/FPGA version
- HW revision, group string, connectors

Also, use SNMP to enter network commands that:

- Local and remote fiber loopback
- Local and remote T1/E1/J1 loopback for each channel
- T1/E1/J1 line options (*DS1, DSX-1, J1, D1, AIS*)
- Ethernet settings (*Auto-Negotiation, speed, duplex, Link Pass-Through*)
- T1/E1/J1 monitor modes and loopback modes

The local (*auxiliary*) factory maintenance interface via the USB connector supports the following:

- Download FPGA firmware using XModem
- Upgrade remote FPGA (from chassis device only)
- Upgrade remote PIC (from chassis device only)
- FPGA firmware version and status

## Cable Specifications

The physical characteristics must meet or exceed ITU and IEEE802.3 specifications.

### ***Fiber cable***

Bit Error Rate: <10<sup>-9</sup>

Single mode fiber (*recommended*):

9 μm

Multimode fiber (*recommended*):

62.5/125 μm

Multimode fiber (*optional*):

100/140, 85/140, 50/125 μm

C4TEF1011-120/125

1300 nm multimode

Fiber Optic Transmitter Power:

min: -19.0 dBm

max: -14.0 dBm

Fiber Optic Receiver Sensitivity:

min: -30.0 dBm

max: -14.0 dBm

Link Budget:

11.0 db

C4TEF1013-120/125

1300 nm multimode

Fiber Optic Transmitter Power:

min: -19.0 dBm

max: -14.0 dBm

Fiber Optic Receiver Sensitivity:

min: -30.0 dBm

max: -14.0 dBm

Link Budget:

11.0 db

C4TEF1014-120/125

1310 nm single mode

Fiber-optic Transmitter Power:

min: -15.0 dBm

max: -8.0 dBm

Fiber-optic Receiver Sensitivity:

min: -31.0 dBm

max: -8.0 dBm

Link Budget:

16.0 db

C4TEF1015-120/125 (long haul)

1310 nm single mode

Fiber-optic Transmitter Power:

min: -8.0 dBm

max: -2.0 dBm

Fiber-optic Receiver Sensitivity:

min: -34.0 dBm

max: -7.0 dBm

Link Budget:

26.0 db

C4TEF1016-120/125 (extra long haul)

1310 nm single mode

C4TEF1017-120/125 (long wave length)

1550 nm single mode

Fiber-optic Transmitter Power:

min: -5.0 dBm

max: 0.0 dBm

Fiber-optic Receiver Sensitivity:

min: -34.0 dBm

max: -7.0 dBm

Link Budget: 29.0 db

C4TEF1029-120/125

1310 nm TX/1550 nm RX simplex

C4TEF1029-121/126

1550 nm TX/1310 nm RX simplex

Fiber-optic Transmitter Power:

min: -13.0 dBm

max: -6.0 dBm

Fiber-optic Receiver Sensitivity:

min: -32.0 dBm

max: -3.0 dBm

Link Budget:

19.0 db

C4TEF1029-122/127

1310 nm TX/1550 nm RX simplex

C4TEF1029-123/128

1550 nm TX/1310 nm RX simplex

Fiber-optic Transmitter Power:

min: -8.0 dBm

max: -3.0 dBm

Fiber-optic Receiver Sensitivity:

min: -33.0 dBm

max: -3.0 dBm

Link Budget:

25.0 db

C4TEF1035-120/125

1550 nm single mode

Fiber-optic Transmitter Power:

min: 0.0 dBm

max: 5.0 dBm

Fiber-optic Receiver Sensitivity:

min: -36.0 dBm

max: -3.0 dBm

Link Budget:

36.0 db

## Ethernet cable

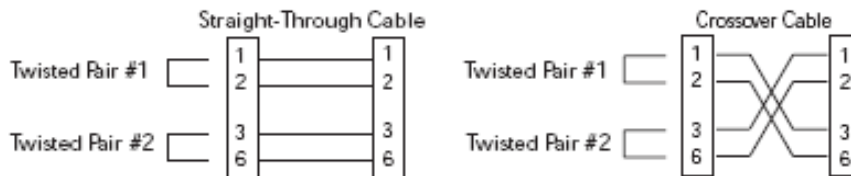
**Category 3:** (minimum requirement for 10 Mb/s operation)

Gauge 24 to 22 AWG  
 Attenuation 11.5 dB/100m @ 5-10 MHz  
 Maximum cable distance 100 meters

**Category 5:** (minimum requirement for 100 Mb/s operation)

Gauge 24 to 22 AWG  
 Attenuation 22.0 dB /100m @ 100 MHz  
 Maximum cable distance 100 meters

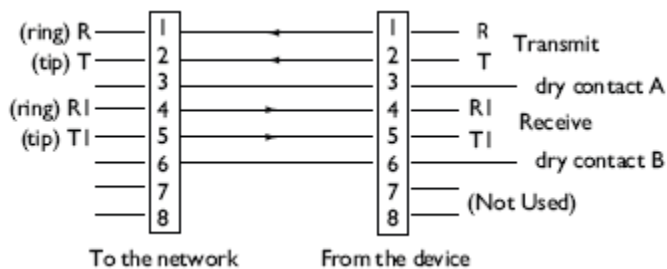
- Straight-through (MDI) or crossover (MDI-X) cable can be used.
- Shielded (STP) or unshielded (UTP) twisted-pair cable may be used.
- Pins 1&2 and 3&6 are the two active pairs in an Ethernet network.
- Use only dedicated wire pairs for the active pins: (e.g., blue/white & white/blue, orange/white & white/orange, etc.)
- Do not use flat or silver satin wire.



## T1/E1/J1 cable

**Category 3:** (minimum requirement)

USOC: RJ-48C  
 Electrical network connection: Single 4-wire (Tip/Ring - Tip1/Ring1)  
 Mechanical arrangement: 8-position miniature modular jack  
 Usage: 1.544 Mb/s access lines  
 Interface codes: 04DU9 (any applicable)  
 Cable type:  
 Long Haul T1: 0db, -7.5db, -15db, -22db  
 E1: E1 3.0V, 120 ohm  
 J1: 0-655', 120 ohm  
 DSX-1: 0-133', 133-266', 266-399', 399-533', 533-655', 100 ohm





### USB mini cable pinouts

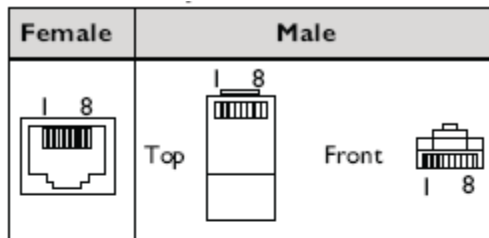


Pin	Name	Color	Description
1	VBus	Red	+5V
2	D-	White	Data-
3	D+	Green	Data+
4	ID	None	Permits distinction of A plug form B plug - A plug: Connected to signal ground - B plug: Not Connected
5	GND	Black	Signal ground

Maximum cable length: 5 meters (16.4 feet).

### RJ-45 cable pinouts

RJ-45 Pinouts



Pin	Name	Description	One Side	Another Side
1	TX_D1+	Transceive data +		
2	TX_D1-	Transceive data -		
3	RX_D2+	Receive data +		
4	B1_D3+	Bi-directional Data +		
5	BX_D3-	Bi-directional Data -		
6	RX_D2-	Receive data -		
7	B1_D4+	Bi-directional Data +		
8	BX_D4-	Bi-directional Data -		

## Technical Specifications

For use with Transition Networks Model C4TEF10xx-1xx or equivalent.

Data Rate - Copper:	10 Mb/s, 100 Mb/s (Mbps)	
Data Rate - Fiber:	155 Mb/s (Mbps)	
Dimensions	3.4" x 5.0" x 1.75" (86 mm x 182 mm x 43 mm)	
Weight	6 oz. (181g approximately)	
Power Consumption	4.4 watts	
Packet Size	Memory: 288 K bytes Maximum packet size: 1536 bytes Unicast MAC addresses: 1000	
Environment	Operating Temperature:	-40 to 70°C (-40 to 158°F)
	Storage Temperature:	-40 to 85°C (-40 to 185°F)
	Humidity:	5 to 95% non condensing
Warranty	Lifetime	

\*Manufacturer's rated ambient temperature: Tmra range for this Device depends on the physical characteristics and the installation configuration of the Transition Networks' PointSystem™ chassis in which this Device will be installed.

Product is certified by the manufacturer to comply with DHHS Rule 21/CFR, Subchapter J applicable at the date of manufacture.

**CAUTION:** Visible and invisible laser radiation when open. Do not stare into beam or view directly with optical instruments. Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

**CAUTION:** Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intrabuilding (*inside plant*) link segments that are not subject to lightening transients or power faults. Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to interbuilding (*outside plant*) link segments that are subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

## Troubleshooting

If the Device fails, isolate and correct the failure by determining the answers to the following questions and then taking the indicated action:

1. Is the “PWR” LED illuminated?  
NO
  - Ensure that the power adapter is the proper type (voltage and frequency) for the outlet.
  - Ensure the power adapter is properly installed in the Device and in the grounded outlet.
  - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.YES
  - Proceed to step 2.
2. Is the fiber “LK 1 or 2” LED illuminated?  
NO
  - Check the fiber cables for proper connection.
  - Verify that the TX and RX cables on the local Device are connected to the RX and TX ports, respectively, on the remote Device.
  - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.YES
  - Proceed to step 3.
3. Is the “Duplex/Link” LED illuminated?  
NO
  - Check the copper cables for proper connection.
  - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.YES
  - Amber = The Device has selected half-duplex mode.
  - Green = The Device has selected full-duplex mode.
  - If the mode is not correct, disconnect and reconnect the twisted pair cable to restart the initialization process.
  - Proceed to step 4.
4. Is the “Speed” LED illuminated?  
NO
  - Check the copper cables for proper connection.
  - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.YES
  - Amber = The Device has selected 10Mb/s operation.
  - Green = The Device has selected 100Mb/s operation.
  - If the speed is not correct, disconnect and reconnect the twisted pair cable to restart the initialization process.
  - Proceed to step 5.
5. Is the “LNK” on a T1/E1/J1 port (with a copper cable installed) illuminated?  
NO
  - Check the copper cable connected to that T1/E1/J1 port for proper connection.
  - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.YES
  - Proceed to step 6.
6. Is the “AIS” on a T1/E1/J1 port (with a copper cable installed) illuminated?  
YES
  - The Device connected to the T1/E1/J1 port has failed. Correct the device failure.
  - Contact Tech Support: 1-800-260-1312, Int'l: 00-1-952-941-7600.NO
  - Proceed to step 7.

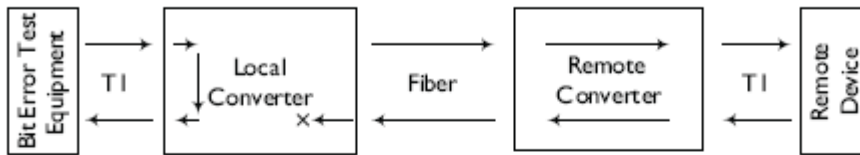
## Manual loopback test

**Note:** Use Focal Point or the GUI to configure loopbacks.

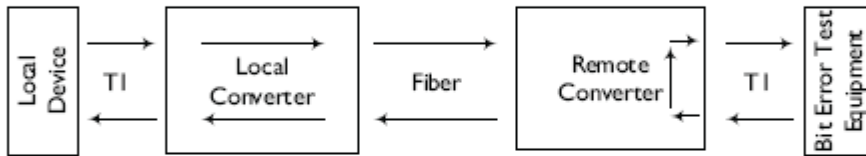
7. Is data transfer failing on one of the T1/E1/J1 ports?

YES

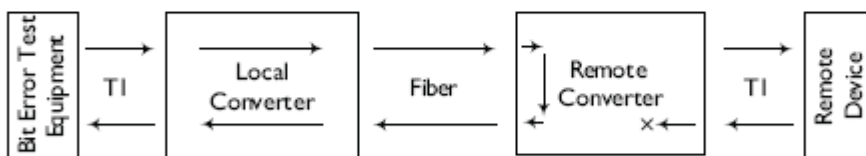
- In software mode only, verify the local T1/E1/J1 connection of the local Converter, by entering the TDM to TP loopback command at the local converter. See drawing below.



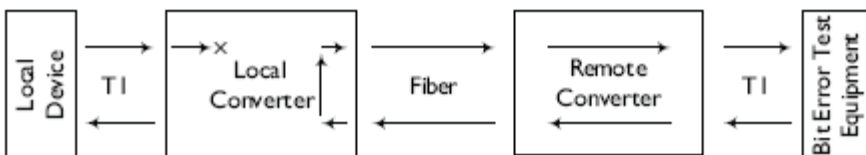
- In software mode only, verify the remote T1/E1/J1 connection of the remote Converter, by entering the TDM to TP loopback command at the local Converter. See drawing below.



- Verify the local T1/E1/J1 connection at the remote Converter:
  - In hardware mode, on SW set "1," set the remote Converter SW positions 5, 6, 7, 8 down (*enabled*).
  - In software mode, use the TDM to fiber loopback command at the remote Converter. In both cases, see drawing below.



- Verify the remote Converter T1/E1/J1 connection at the local Converter:
  - In hardware mode: on SW set "1," set the local Converter SW positions 5, 6, 7, 8 down (*enabled*).
  - In software mode: enter the TDM to fiber loopback command at the local Converter. In both cases, see drawing below.



## In-band loopback code detection

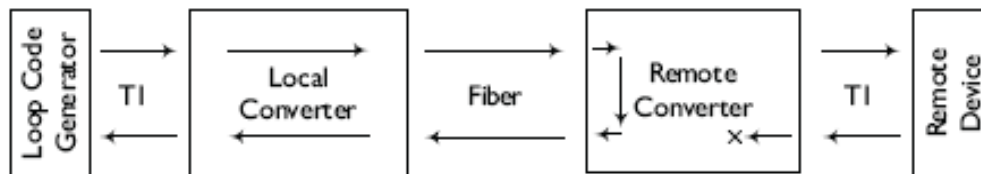
Enables detection and loopback of the fiber interface based on NIU Facility 2 (FAC2) loopback codes. Certain testers, e.g., T-BERD 2310 can send in-band loopback codes into the local TP interface, which are transmitted to the remote Device through the fiber. The remote Device can detect and react to this activity and de-activate the loopback codes. For detection, these codes must be sent for 5 seconds minimum.

### Loopback Codes

FAC = Facility	Up	Down	# of Bits
FAC 1	1100	1110	4
FAC 2	11000	11100	5
FAC 3	1000000	000100	6

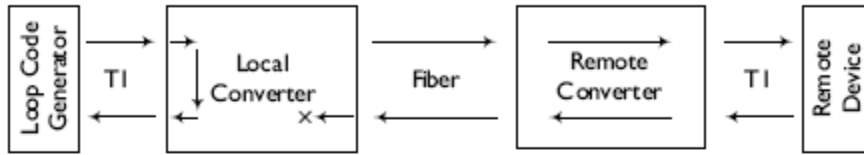
**Note:** Bit patterns are user selectable (all loop codes are generated at the local converter).

- Using the GUI, verify the local Converter T1/E1/J1 connection at the remote Converter:
  - In hardware mode, set loop code generator to FAC 2. On the remote Converter SW set “2,” set SW position 6 down (in-band loopback detection enabled).
  - In software mode, enter the TDM in-band to fiber loopback command at the local Converter for the remote device. In both cases, see drawing below.

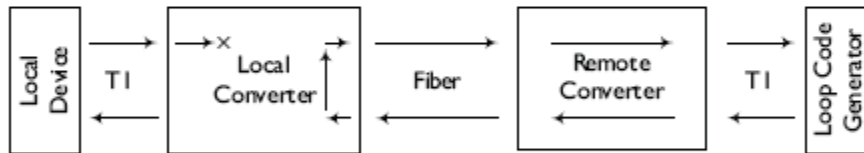


**In-band loopback code detection — continued**

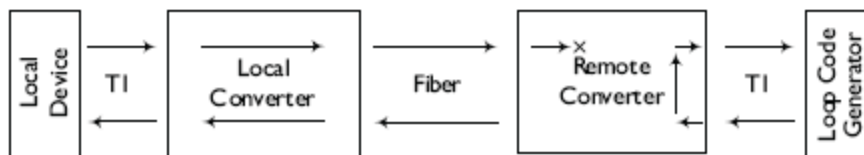
- Verify the local Converter T1/E1/J1 connection at the local Converter:
  - In software mode only, enter the TDM in-band to TP loopback command at the local Converter. See drawing below.



- Verify the remote Converter T1/E1/J1 connection on the local Converter with loop codes generated at the remote converter:
  - In hardware mode, set loop code generator to FAC 2. On the local Converter SW set “2,” set SW position 6 down (*in-band loopback detection enabled*).
  - In software mode: enter the TDM in-band to fiber loopback command at the local Converter. Select a FAC loop code from the drop-down menu on the interface: FAC 1, 2, 3, or FACU use selectable (*5, 6, 7, or 8 bits*). In both cases, see drawing below.



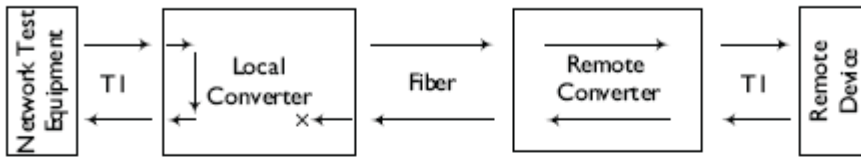
- Verify the remote Converter T1/E1/J1 connection on the remote Converter with loop codes generated at the remote converter:
  - In software mode only: Enter the remote TDM in-band to TP loopback command at the local Converter’s user interface. See drawing below.



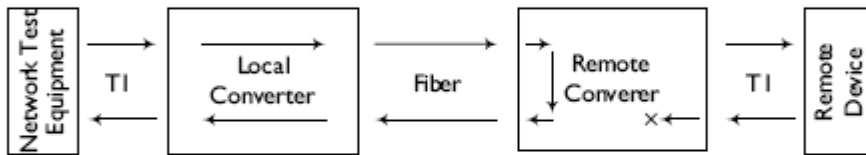
8. Is data transfer failing on the Ethernet port?

YES

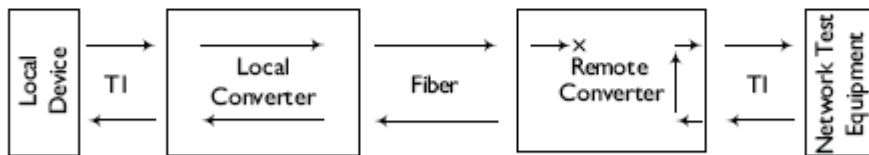
- In software mode only, verify the local Ethernet connection on the local Converter, by entering the Ethernet to TP loopback command at the local Converter. See drawing below.



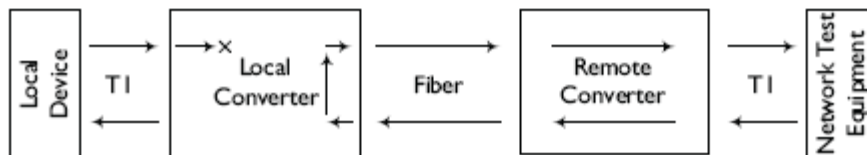
- In software mode only, verify the local fiber and RJ-45 connections on the remote Converter, by entering the Ethernet to fiber loopback command at the local Converter's user interface. See drawing below.



- In software mode only, verify the remote Ethernet connection on the remote Converter, by entering the Ethernet to TP loopback command on the remote converter's tab of the local Converter's user interface. See drawing below.



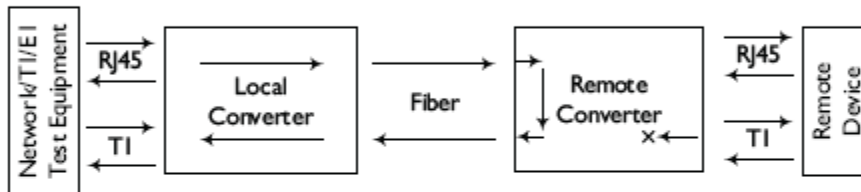
- In software mode only, verify the remote fiber and RJ-45 connections on the remote Converter, by entering the Ethernet to fiber loopback command on the remote converter's tab of the local Converter's user interface. See drawing below.



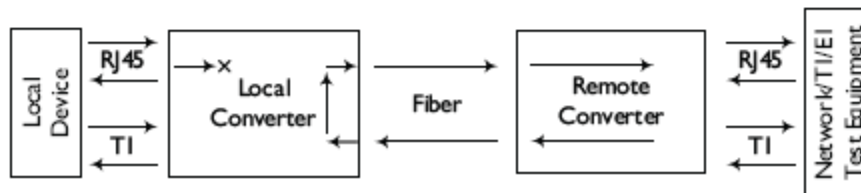
## 9. Is data transfer failing on the T1/E1/J1 ports or Ethernet port?

YES

- Verify the full fiber channel T1/E1/J1 and Ethernet connections on the local Converter from the remote Converter:
  - In hardware mode, on SW set “2,” set the local Converter SW position 5 down (*fiber loopback enabled*).
  - In software mode, use the TDM to fiber loopback command at the local Converter (*all channels*). In both cases, see drawing below.



- Verify the full fiber channel T1/E1/J1 and Ethernet connections on the remote Converter from the local Converter:
  - In hardware mode, on SW set “2,” set the remote Converter’s SW position 5 down (*fiber loopback enabled*).
  - In software mode, use the TDM to fiber loopback command at the remote Converter (*all channels*). In both cases, see drawing below.



## Troubleshooting Notes

1. DS1 circuit recovery from a failed fiber link: The switch from primary to secondary port averages 1.4ms (milliseconds) in tests. The same is true from secondary to primary switching.
2. Protection switching is not provisionable, but failover is bi-directional between the two devices.
3. Wait-To-Restore time: In revertive mode, the switchover back to the primary happens as soon as the primary link is seen as up. In non-revertive mode, there is no switchover; the links will only switch on link failure.
4. There is no manual command to invoke a protection switch for testing or troubleshooting purpose. The only way to test would be to unplug the fiber.



## Contact Us

### Technical support

Technical support is available 24-hours a day

US and Canada: 1-800-260-1312

International: 00-1-952-941-7600

### Transition now

Chat live via the Web with Transition Networks Technical Support.

Log onto [www.transition.com](http://www.transition.com) and click the **Transition Now** link.

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Transition Networks provides seminars via live web-based training.

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### E-Mail

Ask a question anytime by sending an e-mail to our technical support staff:

[techsupport@transition.com](mailto:techsupport@transition.com)

### Address

#### Transition Networks

10900 Red Circle Drive

Minnetonka, MN 55343, U.S.A.



telephone: 952-941-7600

toll free: 800-526-9267

fax: 952-941-2322

## Compliance Information

### Declaration of Conformity

		<b>Declaration of Conformity</b>
Name of Mfg:	<b>Transition Networks</b> 10900 Red Circle Drive, Minnetonka MN 55343 U.S.A.	
Model:	C4TEF10xx-1xx Series Devices	
Part Number(s):	C4TEF1011-120/125, C4TEF1013-120/125, C4TEF1014-120/125, C4TEF1015-120/125, C4TEF1016-120/125, C4TEF1017-120/125, C4TEF1029-120/125, C4TEF1029-121/126, C4TEF1029-122/127, C4TEF1029-123/128, C4TEF1035-120/125, C4TEF1040-120/125, C4TEF1040-140/145	
Purpose: To declare that the C4TEF10xx-1xx to which this declaration refers is in conformity with the following directive(s) and standard(s).		
EMC Directive 2004/108/EC; EN 55022:2006+A1:2007 Class A; EN55024: 1998+A1:2001+A2:2003; EN61000-3-2; EN61000-3-3; CFR Title 47 Part 15 Subpart B Class A; CFR Title 21 Section 1040.10 Class I		
I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).		
 Stephen Anderson, Vice-President of Engineering		December, 2011 Date

### CE Mark

### 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.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

## 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.

**Achtung!** Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in diesem Fall ist der Benutzer für Gegenmaßnahmen verantwortlich.

**Attention!** Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risqué de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.



In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Transition Networks will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.

## VCCI Class 1 compliance

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas. When used in a residential area or in an adjacent area thereto, interference may be caused to radio and TV receivers, etc. Read the instructions for correct handling.

## Record of Revisions

Rev	Date	Notes
A	21/21/11	Initial release.
B	09/19/12	Updated with switch time, WTR, recovery time information.
C	04/23/13	Added J11 default mode information.

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