S3280-TST Carrier Ethernet
Network Interface Device (NID)
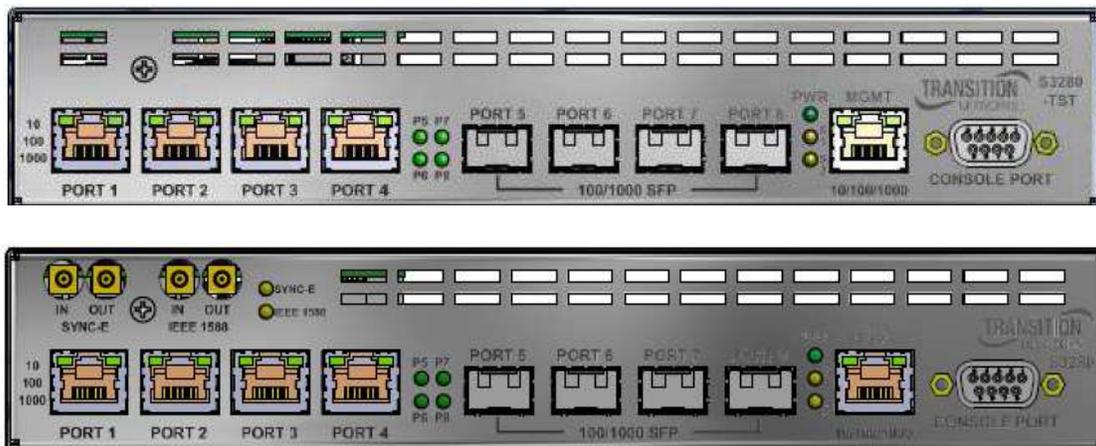
Install Guide

33520 Rev. B

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S3280- TST Carrier Ethernet NID Install Guide, 33520 Rev. B

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Revision History

Rev	Date	Description
A	12/12/12	Updated for software v 1.3 and FPGA v 1.1. Added Peripheral Device Firmware Update function.
B	09/16/13	Updated for software v 1.6 support.

Cautions and Warnings

Definitions

Cautions indicate that there is the possibility of poor equipment performance or potential damage to the equipment. Warnings indicate that there is the possibility of injury to a person.

Cautions and Warnings appear here and may appear throughout this manual where appropriate. Failure to read and understand the information identified by this symbol could result in poor equipment performance, damage to the equipment, or injury to persons.

Cautions

Do not ship or store devices near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

Caution: When handling chassis Network Interface Devices (NIDs) observe electrostatic discharge precautions. This requires proper grounding (i.e., wear a wrist strap).

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 intra-building *(inside plant)* link segments that are not subject to lightening transients or power faults. They are **not** to be connected to inter-building *(outside plant)* link segments that are subject to lightening.

Caution: **Do not** install the NIDs in areas where strong electromagnetic fields (EMF) exist. Failure to observe this caution could result in poor NID performance.

Caution: Read the installation instructions before connecting the chassis to a power source. Failure to observe this caution could result in poor performance or damage to the equipment.

Caution: Only trained and qualified personnel should install or perform maintenance on the S3280. Failure to observe this caution could result in poor performance or damage to the equipment.

Caution: Do not let optical fibers come into physical contact with any bare part of the body since they are fragile, and difficult to detect and remove from the body.

Caution: Do not bend any part of an optical fiber/cable to a diameter that is smaller than the minimum permitted according to the manufacturer's specification (usually about 65 mm or 2.5 in)!

Warnings

Warning: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Warning: Visible and invisible laser radiation when open. **Do not** look into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

Warning: DO NOT connect the power supply module to external power before installing it into the chassis. Failure to observe this warning could result in an electrical shock or death.

Warning: Select mounting bracket locations on the chassis that will keep the chassis balanced when mounted in the rack. Failure to observe this warning could allow the chassis to fall, resulting in equipment damage and/or possible injury to persons.

Warning: Do not work on the chassis, connect, or disconnect cables during a storm with lightning. Failure to observe this warning could result in an electrical shock or death.

See "Electrical Safety Warnings" on page 48 for Electrical Safety Warnings translated into multiple languages.

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Tables

1. Introduction

The S3280-TST is an 8 port carrier grade NID (Network Interface Device) with built-in Traffic Generator. The S3280-TST has triple speed SFP ports (1Gbps / 100Mbps / SGMII) and the copper RJ-45 ports are 10/100/1000 Mbps. The S3280-TST is a 1RU high fanless product that can be mounted via desktop, wall-mount or 19" rack mount.

The S3280-TST model has an FPGA Assist / External Timing (ET) board built in to offload processing for certain functions specific to the S3280-TST (i.e., functions not available on S3280 models). The functions in this section can only be used with the S3280-TST model. These S3280-TST functions include:

- EtherSAT (Ethernet Service Activation)Testing
- Peripheral Device Firmware Update

The managed S3280-TST NID provides advanced packet performance metering and service creation directly at customer premises and cell sites. S3280-TST application environments include Mobile Backhaul, Ethernet Backhaul (EBH), Business Ethernet delivery, Ethernet First Mile (EFM), Fiber to the Premise (FTTP), EPL & EVPL services, Enterprise markets, SLA enforcement with advanced diagnostic tools, migration to Packet, Switched Networks, and QoS for differentiated services.

Product Description

An FPGA/ET board allows the S3280-TST to provide or source external timing. The supported timing interface is IEEE 1588 PPS (pulses-per-second).

The FPGA/ET board also integrates the FPGA assist hardware which offloads EtherSAT loopback functions from the switch CPU.

Key S3280-TST features include:
- Loopback:
  - MAC SA-DA swap; swap the source and destination before sending back out source port
  - MAC SA to DA fixed SA; put the SA into the DA field then used a pre-programmed SA
  - Per EVC
  - Per VLAN
- IEEE 1588 interfaces:
  - 1-PPS to 25Mhz
  - 1500VAC isolated

Models

The S3280-TST models are defined below.

Table 1: S3280-TST Model Numbers

Model	Description
S3280-TST	Base S3280 with EtherSAT / FPGA assist board (no external timing).
S3280-19RM	19" Rack Mount Kit for S3280.

The S3280-TST provide a demarcation point in a carrier Ethernet network. The demarcation point is the 'handoff' point of the service provider to the subscriber/customer network.
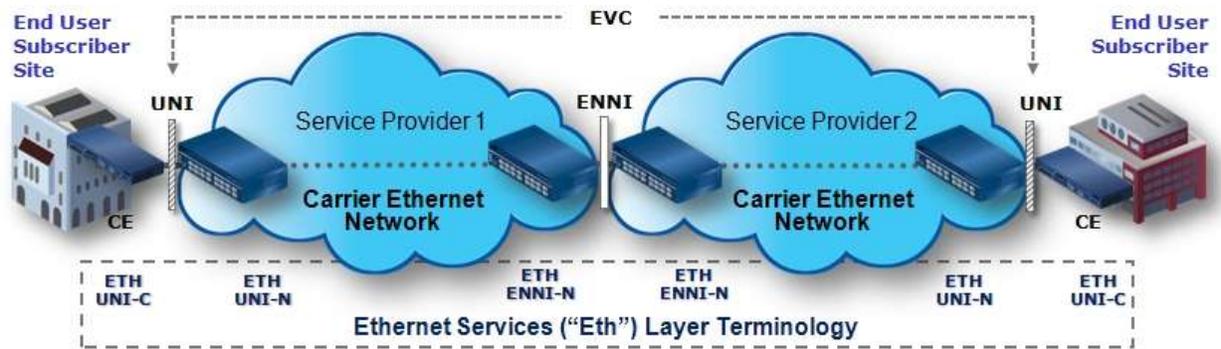
Figure 1: S3280-TST Deployment

The figure above shows the deployment of a typical NID device. It is deployed at the subscriber's premise and is the first point of the entry into the carrier network. The S3280-TST provides a remote management interface via the carrier network.

The following sections detail the S3280-TST features, specifications, and documentation.

Features

The S3280-TST provides MEF compliant services for deploying in a Carrier Ethernet network as a first point of entry into the provider network. The main services offered by the S3280-TST are:

- Various physical media support to help in deployments in most networks.
- Support of several management interfaces such as CLI, Telnet, WEB, SNMP, etc. and security options such as SSH, SSL, HTTPS, ACL, etc to satisfy most provider requirements.
- Provides protection on any pair of ports and the operation will be switched transparently to the customer / providers using G.8031/G.8032.
- Multiple ports can be used to provide a high-speed pipe using link aggregation.
- Spanning tree protocols STP, RSTP, and MSTP help avoid loops in the network.
- A rich set of VLAN management per IEEE 802.1Q.
- True provider bridging per IEEE802.1ad to support transparent handling of subscriber traffic over carrier Ethernet network.
- Support of Ethernet OAM protocols such as Link OAM (LOAM) and Service OAM (SOAM) enrich the fault monitoring and isolation capability in a provider network.
- A variety of counters like RMON and other performance monitoring per Y.1731.
- Remote backup and restore of configuration and firmware upgrade.
- A rich set of QoS, traffic management and bandwidth profiling for maintaining service level agreements (SLAs) suited for deployment in a carrier network.
- EtherSAT Loopback Testing (SAT functions are a subset of the MEF latching loopback draft) (S3280-TST model)

All of the S3280-TST features closely follow standard recommendations (IEEE, ITU, IETF and MEF).

- Configuration: four 100/1000 SFP ports; four 10/100/1000BASE-T ports; any port can be network or client
- High level feature overview:
  – SNMP v1, v2c, and v3
  – IPv6
  – VLAN with Q-in-Q
  – Bandwidth allocation
  – QoS
  – 802.3ah, 802.1ag, Y.1731
  – Ring protection
  – IEEE 1588 v2 PTP
  – 2.5GB SFP ports support (two of the SFP ports support a proprietary 2.5 Gigabit mode
  – MRP (Media Redundancy Protocol)
  – Static IP Routing (SIR)
  – HQoS (Hierarchical Quality of Service)
  – Latching Loopback tests
  – Y.1564 subset
  – MEF CE 2.0 certification
  – BWP per CoS/per EVC/per UNI option for ordering of policers

The S3280-TST is a second generation Multi-Port NIDs for service providers needing MEF (Metro Ethernet Forum) compliance. Key S3280-TST features include:
- Full bandwidth 1000Mbps switching, non-blocking
- Four 10/100/1000Mbps TP interfaces
- Four triple-speed SFP interfaces with DMI support (100FX, 1000X, SGMII)
- Dual leaky bucket policing per queue and per port
- Eight priorities and eight queue per port
- Last gasp / Dying gasp
- Dedicated DB-9 serial port for CLI (Command Line Interface)
- Dedicated 10/100/1000BaseT port for management
- Ethernet Services
- DMI (Diagnostic Maintenance Interface)
- Diagnostics functions (Ping, Link OAM MIB Retrieve, Ping6, VeriPHY)
- Maintenance functions (Restart device, Reset to factory defaults, Software Upload/Image Select)
- Backup / Restore (binary)
- Auto refresh option for Configuration, Monitor, Diagnostics, and Maintenance functions
- Power Options:
  - AC
  - AC and DC with redundancy (AC is primary)
  - DC and DC with redundancy
- DC Option:
  - Primary: Barrel 12VDC
  - Secondary: Terminal block 20-57VDC
  - 2100VDC isolation to prevent ground loops

Applications

The S3280-TST is designed for these applications:

- Mobile Backhaul
- Business Ethernet delivery
- Ethernet First Mile (EFM)
- Fiber to the Premise (FTTP)
- EPL & EVPL services
- Enterprise markets
- SLA enforcement with advanced diagnostic tools
- Migration to Packet Switched Networks
- QoS for differentiated services

Standards Compliance

The S3280-TST complies with the following industry standards.

Table 2: Standards Compliance

Standard	Title
IEEE 802.1AB	Station and Media Access Control Connectivity Discovery
IEEE 802.1D	Media Access Control (MAC) Bridges
IEEE 802.1s	Multiple Spanning Trees
IEEE 802.1w	Media Access Control (MAC) Bridges - Amendment 2 Rapid Reconfiguration
IEEE 802.1x	Port Based Network Access Control
IEEE 802.1Q	Virtual Bridged Local Area Networks
IEEE 802.1ad	Amendment 4 Provider Bridges
IEEE 802.1ag	Connectivity Fault Management. (SOAM)
IEEE 802.1ak	Amendment 7 Multiple Registration Protocol
IEEE 802.3	CSMACD Access Method and Physical Layer
IEEE 802.3af	Amendment Data Terminal Equipment (DTE) Power via the Media Dependent Interface (MDI) Enhancements
IEEE 802.3at	Amendment 3 Data Terminal Equipment (DTE) Power via the Media Dependent Interface (MDI) Enhancements
IEEE 802.3az	Amendment 5 Media Access Control Parameters, Physical Layers, and Management Parameters for Energy-Efficient Ethernet
IEEE 1588v2	Precision Clock Synchronization Protocol for Networked Measurement and Control Systems
IEEE 1588™-2008	Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems (PTP)
ITU Y.1731	Ethernet OAM
ITU G.8031	Ethernet Protection Switching
ITU G.8032v2	Ethernet Ring Protection
ITU G.8264	Distribution of timing information through packet networks
ITU-T G.781	Synchronization layer function (06/1999)
ITU-T G.813	Timing Characteristics of SDH equipment slave clocks (SEC) (08/1996)
ITU-T G.823	The Control of Jitter and Wander within Digital Networks which are Based on the 2048 kbit/s Hierarchy (03/2000)
ITU-T G.824	The Control of Jitter and Wander within Digital Networks which are Based on the 1544 kbit/s Hierarchy (03/2000)
ITU-T G.8260	Definitions and Terminology for Synchronization in Packet Networks (08/2010)
ITU-T G.8261	Timing and synchronization aspects in packet networks (04/2008)
ITU-T G.8261 Amendment 1	Network Jitter Limits for the Synchronous Ethernet Equipment Clock Interface and Other Clarifications
ITU-T G.8262	Timing characteristics of a Synchronous Ethernet equipment slave clock (07/2010)
ITU-T G.8264	Distribution of timing through packet networks (10/2008)
ITU-T G.8265	Architecture and Requirements for Packet Based Frequency Delivery (10/2010)
ITU-T G.8265.1	Precision Time Protocol Profile for Frequency Synchronization (10/2010)
MEF 6.1	Ethernet Services Definitions 2
MEF 9	Test suite for Ethernet Services
MEF 10.2	Ethernet Service Attributes 2
MEF 14	Test Suite for Traffic Management
MEF 20	User Network Interface (UNI) Type 2 Implementation Agreement (IA)
MEF 21	Test Suite for Link Operation Administration and Maintenance (OAM)
MEF 25	Test Suite for Service Operation Administration and Maintenance (SOAM)

MEF 22.1	Mobile Backhaul Implementation Agreement Phase 2 Technical Specification
IETF	
RFC 768	User Datagram Protocol
RFC 791	Internet Protocol
RFC 792	Internet Control Message Protocol
RFC 793	Transmission Control Protocol
RFC 826	Address Resolution Protocol
RFC 854	Telnet
RFC 1112	Internet Group Management Protocol, version 1
RFC 1157	Simple Network Management Protocol
RFC 1213	MIB-II
RFC 1350	Trivial File Transfer Protocol
RFC 2030	Simple Network Time Protocol
RFC 2131	Dynamic Host Configuration Protocol
RFC 2236	Internet Group Management Protocol, version 2
RFC 2460	Internet Protocol, Version 6
RFC 2674	VLAN Bridge MIB
RFC 2818	HTTP over TLS
RFC 2819	RMON MIB
RFC 2863	Interfaces Group MIB
RFC 2933	IGMP MIB
RFC 3046	DHCP Relay Agent Information Option
RFC 3376	Internet Group Management Protocol, version 3
RFC 3411	An Architecture for Describing SNMP Management Frameworks
RFC 3414	User-based Security Model MIB
RFC 3415	View-based Access Control Model MIB
RFC 3416	Simple Network Management Protocol, version 2
RFC 3635	Ethernet-Like MIB
RFC 3636	IEEE 802.3 Medium Attachment Unit MIB
RFC 4133	Entity MIB
RFC 4188	Bridge MIB
RFC 4668	RADIUS Authentication Client MIB
RFC 4670	RADIUS Accounting Client MIB

* MEF certifications and safety certifications pending.

Transition Networks Carrier Ethernet products are managed by Converge EMS, a standards-based, fully integrated service and resource manager for MEF CE 2.0 services designed to simplify provisioning and management of your network.

Physical Specifications

The S3280-TST meets the following industry specifications.

Table 3: Specifications

Specification	Description
Switch Specifications	Fully non-blocking wire-speed switching performance for all frame sizes. Maximum frame size = 9,600 bytes (9.6K) Maximum MAC addresses = 8K Shared buffer memory = 4Mbit
Data Rate	Copper ports (RJ-45): 10/100/1000 Mbps SFP ports (empty): 100/1000 Mbps or SGMII
Safety Compliance	UL listed, CE, EN55022 Class A, EN55024
Power Consumption	Primary: 20VDC, 700mA, 8.4W Secondary: 20VDC, 620mA, 11.1W
Input Power	AC: 12 VDC via barrel connector using 100-240VAC Redundant DC: 20-57VDC via terminal block
Dimensions	9.775 w x 6.5 d x 1.75 h (inches) 248.23 w x 165.00 d x 44.45 h (mm)
Weight	2 lb., 14 oz. (46 oz.) 1304.07 Grams (1.30 Kg)
Operating Temperature	-20 to +65 deg. C
Storage Temperature	-40 to 85 deg. C
Operating Humidity	5% to 95% (non-condensing)
Altitude	0-10,000 feet (with de-rating)

Document Overview

The purpose of this manual is to provide the information needed to install the S3280-TST to the point of operation. This manual documents all of the S3280-TST models, and notes differences where they apply.

This manual includes four chapters, three appendixes, a table of contents, a glossary and an Index.

A printed Product Documentation postcard is shipped with each S3280-TST device. A substantial set of technical documents, white papers, case studies, etc. are available on the Transition Networks web site at www.transition.com. Note that this manual may provide links to third party web sites for which Transition Networks, Inc. is not responsible.

Related Manuals and Online Help

This manual is one of several S3280-TST related manuals which include:

- Product Documentation Postcard, 33504
- S3280-TST Install Guide, 33520 (this manual)
- S3280 Web Interface User Guide, 33506
- S3280 Command Line Interface (CLI) User Guide, 33507
- RFC2544 User Guide, 33540
- MRP (Media Redundancy Protocol) User Guide, 33541
- Static IP User Guide, 33542
- Converge™ EMS Install Guide (33543), Admin Guide (33533), Admin Procedures (33544)
- Release Notes (version specific)
- Readme file

Context-sensitive Help screens are built into the Web interface (click) and the CLI (type **?** or **Help**).

Check the TN web site at http://www.transition.com/ for additional white papers, application notes, etc.

Check the S3280 landing page at http://www.transition.com/TransitionNetworks/Landing/s3280/s3280.aspx for Product Information, Application Notes, etc.

Check the S3280 product page at http://www.transition.com/TransitionNetworks/Products2/Family.aspx?Name=S3280 for access to the latest S3280 datasheet, features, applications, specs, SKUs, etc.

When the procedures in this manual are successfully completed, refer to the *S3280 Web Interface User Guide* or the *S3280 CLI Reference* for configuration, monitoring, diagnostics, and maintenance information.

2. Installation

This section describes how to install the S3280-TST hardware and software, and the procedures to access and initially set up the S3280-TST through either a local serial interface (USB) or a remote Ethernet connection (Telnet session or Web interface).

Safety

Before installing the S3280, read the "Safety Cautions and Warnings" on pages 3-4 of this manual and ensure that the requirements noted are met. During installation and maintenance, avoid direct exposure to laser beams. Specifically, do not look into laser ports. Ensure that each SFP port at which laser beams are (or will be) present is occupied by an SFP that is locked in position. See the related SFP manual for details. See "Electrical Safety Warnings" on page 48 for Electrical Safety Warnings translated into multiple languages.

Unpacking

1. Carefully unpack all S3280-TST contents.

2. Verify receipt of all S3280-TST components; see "Ship Kit Contents" on page 16.

3. Place the S3280-TST and related materials in the desired install location (e.g., Rack-mount, Table top, or Wall mount). See "Installing S3280-TST Hardware" on page 20.

Figure 3: S3280-TST Unpacking

4. Save the S3280-TST shipping carton and packing materials for future use.

Ship Kit Contents

The S3280-TST is shipped with some standard and some optional components. Make sure you have received the following standard items:

- One S3280-TST Multi-Port NID
- One AC Power Supply (External AC-DC power supply: TNPN: 25025; 100-240 VAC 50-60 Hz. or country-specific)
- One 20-57 VDC Power Block (DC Supply option)
- One printed Product Documentation postcard
- Four Rubber feet

The S3280-TST ships with Dust Caps for protecting the connectors from intrusions. A Dust Cap is usually made from flexible plastic. When placing a Dust Cap over a connector, avoid pressing it against the fiber ferula surface in the connector so as to prevent contamination. Leave the Dust Cap(s) in place until making the actual fiber connection. Save the Dust caps for future use (reconfiguration, equipment moves, spares, returns, etc.).

Other / Optional Items

Additional items used during installation may include one or more SFPs, SGMII device(s), a USB cable, Ethernet CAT 5 cable(s) and/or Fiber cable(s), and wall mount brackets or rack mount brackets.

Tools Required

Installation may require a #4 Phillips screwdriver.

Additional tools and equipment required for cleaning connectors may include dust caps, isopropyl alcohol (solvent for contaminants), and tissues (soft multi-layered fabric made from non-recycled cellulose).

Use industry standard procedures for cleaning connectors. If applicable, follow your organizations process and procedure for copper and fiber cable cleaning and maintenance.

Installation Overview

1. ☐ Review the Safety section above (see Safety on page 15).

2. ☐ Unpack the S3280-TST (see Unpacking on page 15).

3. ☐ Perform desktop install (see Desktop / Tabletop Installation on page 21) <u>or</u>
    perform wall-mount install procedure (see Wall Mount Installation on page 22) <u>or</u>
    perform rack mount install procedure (see Rack Mount Installation on page 20).

4. ☐ Connect PORT 1 - PORT 4 (see Front Panel S3280-TST Connectors on page 18).

5. ☐ Install SFPs (see Installing SFPs on page 23).

6. ☐ Connect PORT 5 - PORT 8 (see Front Panel S3280-TST Connectors on page 18).

7. ☐ Connect the MGMT port to a PC's Ethernet NIC port (see S3280-TST Connectors on page 18).

8. ☐ Connect the CONSOLE PORT (see S3280-TST Connectors on page 18).

9. ☐ Perform grounding (see Grounding the S3280-TST (Rack Mount) on page 26).

10. ☐ Connect Power (see Installing - Connecting to 20-57 VDC Power on page 25 or
    see Installing - Connecting to 12 VDC INPUT Power on page 26).

11. ☐ Monitor the LEDs (see "Front Panels" on page 19).

12. ☐ Install the Software (see Software Install Process on page 27).

13. If the install was successful, continue with the *S3280 User Guide* or the *S3280 CLI Reference* manual.
    If the install was unsuccessful, refer to section 4. Messages and Troubleshooting on page 37.

Front Panels

S3280-TST Front Panel

The S3280-TST front panel connectors and LEDs are shown and described below.
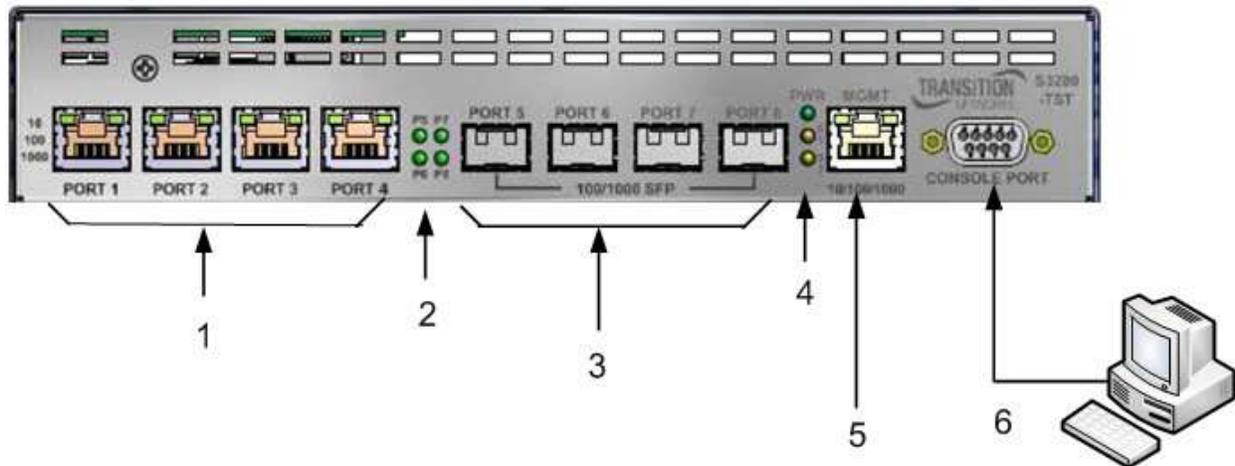
Figure 4: S3280-TST Front Panel Connections

S3280-TST Connectors

1. **PORT 1 - PORT 4**: Four Ethernet 10/100/1000 Base-T Connections. Four RJ-45 connectors with two LEDs each for twisted pair (copper) connections.

- Use a straight-through, twisted 4-pair, Category 5 to connect to servers, workstations, access points, and routers.
- Use a cross-over, twisted 4-pair, Category 5 cable to connect to switches, hubs or repeaters.
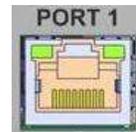
3. **PORT 5 - PORT 8**: Four Ethernet 10/100/1000 SFP Connections. Four SFP cages / ports; Port 5 and Port 6 support 1G bps SFPs, and Ports 7 and 8 support SFPs for Fiber connections.

5. **MGMT** 10/100/1000 Port: One Ethernet RJ-45 connection for out-of-band management over the IP network the RJ-45 port is provided to keep management traffic totally isolated from data traffic. Connect the MGMT port to a PC's Ethernet NIC port to use this management function.
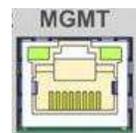
6. **CONSOLE PORT** (device port) - a DB9 RA female connector for connection to a computer for console control / administration (shown below). The DB-9 console port can be used for accessing the S3280-TST CLI (command line interface) for out-of-band management. The COM port can be connected at 115k baud with 8/N/1/None connection setting. See the "Software Install Process" on page 27 for more information.

S3280-TST LEDs

See Figur 4 above for S3280-TST front panel LED layout and call-outs.

1. TP - Left LED per port:
Half duplex TP Link / Activity: Yellow ON = link, Blinking = activity
Full duplex TP Link / Activity: Green ON = link, Blinking = activity
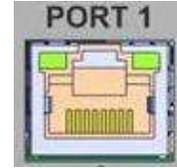
When first connected, the Port 1-4 LEDS turn yellow while a link is established. After about 15 seconds, the LED turns green when the S3280-TST and the target device have established a copper link. If this LED remains Off, the target device may not be powered on, or there may be a cable problem, or a problem with the adapter installed in the target device. See the "General S3280-TST Troubleshooting" section on page 37 for more information.

1. TP - Right LED per port:
10 Mbps   OFF
100 Mbps   Yellow
1000 Mbps   Green

2. **P5 - P8 Fiber LEDs**:
Half duplex TP Link / Activity: Yellow ON = link, Off = no link, Blinking = activity
Full duplex TP Link / Activity: Green ON = link, Off = no link, Blinking = activity

When first connected, the Port 5-8 LEDS turn yellow while a link is established. After about 15 seconds, the LED turns green when the S3280-TST and the target device have established a fiber link. If this LED remains Off, the target device may not be powered on, or there may be a cable problem, or a problem with the adapter installed in the target device. See the "General S3280-TST Troubleshooting" section on page 37 for more information.

4. PWR (Power) LED: Green ON = power on to device;
Primary   Green
Secondary   Green

4. System LEDs

S1 - System Status LED. During normal boot up this LED will be amber. Once the device is fully booted it will turn green. During firmware upgrade this LED will flash green. When a fatal condition is logged, S1 flashes amber.

S2 - Power Source LED.
Green: Primary power source active.
Amber: Secondary power source active.

With both AC and DC connected, LED S2 is green and AC is Primary. If AC is removed, LED S2 becomes AMBER indicating that the S3280-TST is operating with a Secondary power supply and will send out the trap as "*entConfigChange*".

Installing S3280-TST Hardware

The S3280-TST can be installed in any of the following ways.

- Rack mounted
- Desktop / table top
- Wall mounted

Desktop mount is standard.

Rack Mount Installation

The S3280-TST enclosure has three holes on each side for rack mounting. Rack mount uses SKU # S3280-19RM - 19" Rack Mount Kit for S3280-TST mounted in 1RU of a 19" rack.

Din Rail Brackets allow stand-alone media converters to be mounted to a Din Rail, common in industrial environments, in either a flat mount against the Din Rail or in a vertical mount in which the device mounts on its edge.

Figure 5: Rack Mount Installation

The S3280-TST can be mounted into a Transition Networks E-MCR-05 media converter rack, which can be installed on a tabletop or in a standard site rack.

Desktop / Tabletop Installation

The S3280-TST is shipped with four rubber feet for optional installation on a table or other flat, stable surface in a well-ventilated area.

1. Remove the rubber feet from the card.

2. On the bottom of the NID, place one foot in each corner of the device.
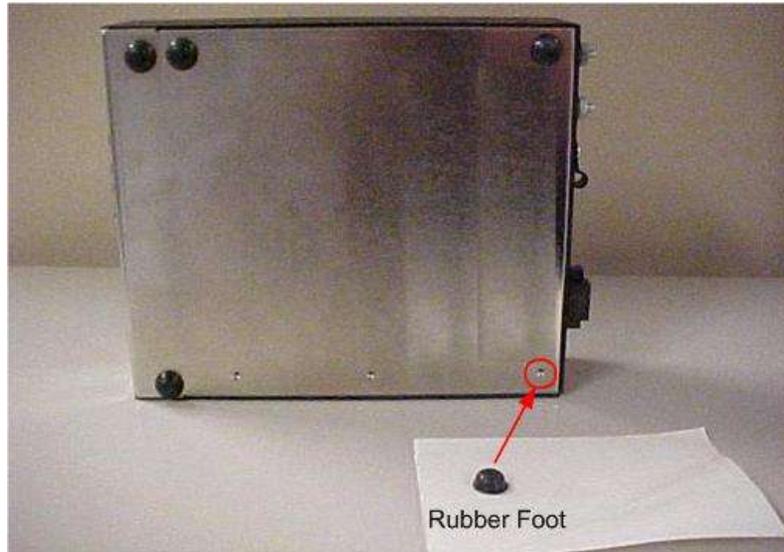
Figure 6: Tabletop Installation

3. Set the NID in place and connect the power adapter (see "Installing - Connecting to 20-57 VDC Power" on page 25).

Wall Mount Installation

Wall Mount Brackets are small simple "L-shaped" tabs that allow a single S3280-TST to be mounted anywhere needed. The brackets are sold in pairs and are available in several sizes. For wall mounting, use two WMBL models.

Mini wall mount brackets allow a mini media converter to be securely mounted to a wall or any other flat surface.

1. Remove the four #4 Philips head screws securing the cover to the device and orient the device as shown in Figure 6 below.
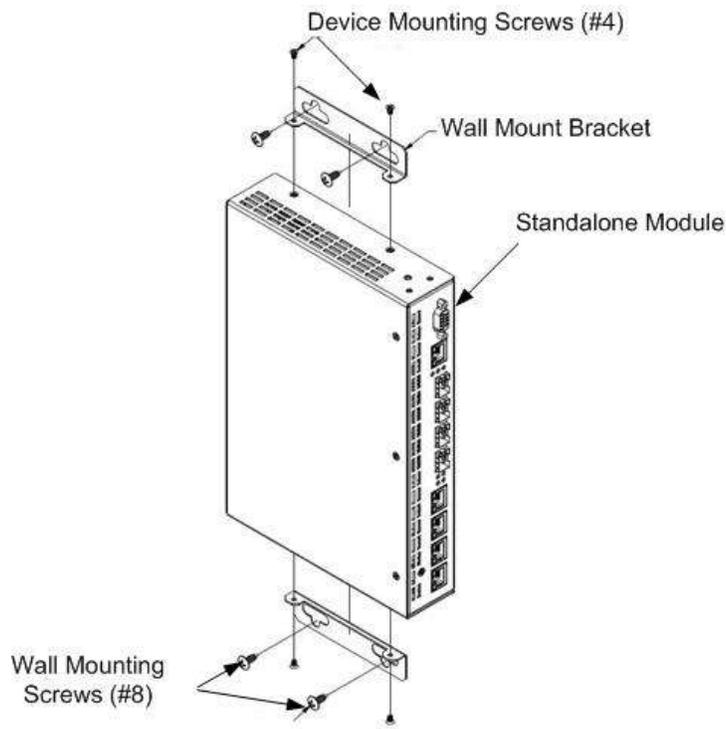
Figure 7: Wall Mount Installation

2. Mount one of the bracket assemblies to the device using two of the #4 Philips head screws.

3. Mount the other bracket assembly to the other side of the device using the other two #4 Philips head screws.

4. Position the device on the mounting surface.

5. Use the four #8 screws to mount the bracket to the mounting surface.

6. Connect the AC power adapter (see "Installing - Connecting to 20-57 VDC Power" on page 25).

SFP / XFP / GBIC Optical Transceivers

Transition Networks SFPs and XFPs are small form factor, hot-pluggable transceivers which allow for a single piece of network equipment to be connected to a multitude of interfaces, protocols, and transmission media via the SFP/XFP port. Our Small Form Pluggables offer a cost effective and flexible means to accommodate for network modifications and growth, while still using existing network devices.

All Transition Networks SFPs and XFPs are compliant with the Multi-Sourcing Agreement (MSA) ensuring interoperability with all other MSA compliant networking devices. **Note:** DMI option support requires an SFP that supports DMI.

Installing SFPs

The S3280-TST allows you to install one to four Small Form-Factor Pluggable (SFP) devices of your choice in order to make a fiber connection.
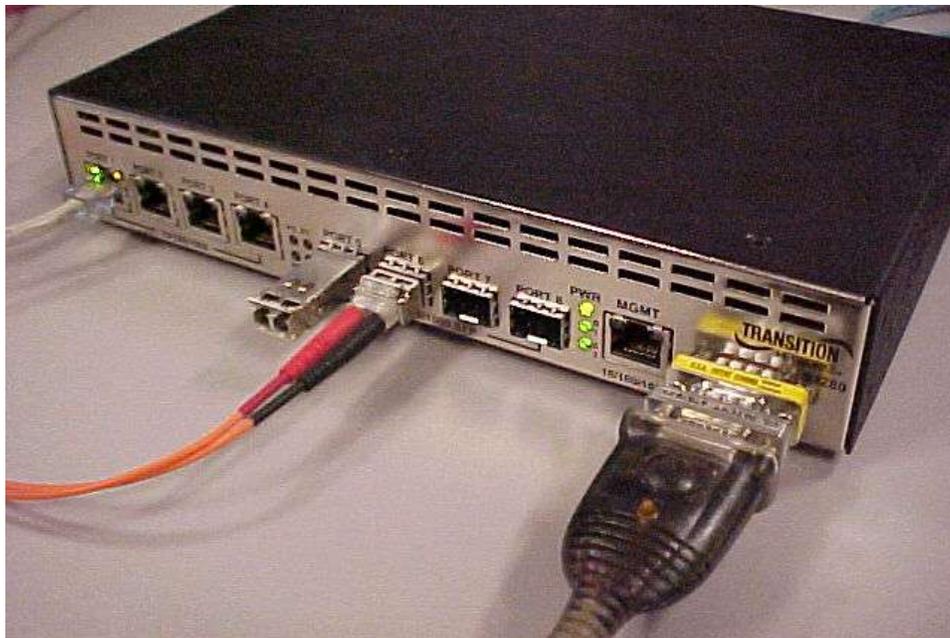
Figure 8: SFP Installation (S3280-TST)

1. Position the SFP device at either installation slot, with the label facing up.

2. Carefully slide the SFP device into the slot, aligning it with the internal installation guides.

3. Ensure that the SFP device is firmly seated against the internal mating connector.

4. Connect the fiber cable to the fiber port connector of the SFP device.

5. Make sure the SFP release latch is in the up (closed) position when you insert the cable connector into the SFP at PORT 5 - PORT 8.

6. Attach an appropriate cable into the SFP module port.

7. Attach the other end of the cable into the other device.

Note: Do not remove and replace the SFP modules more often than necessary; excessive SFP removing/replacing can shorten the SFPs useful life.

Back Panel

The S3280-TST back panel connectors and LEDs are shown and described below.
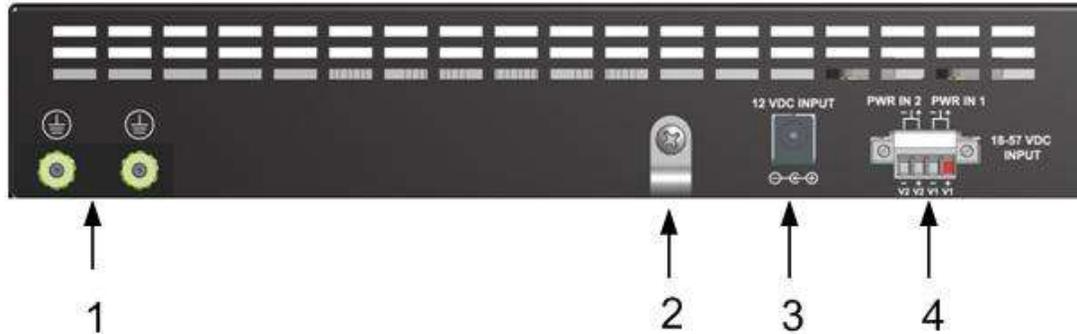
Figure 9: Back Panel (S3280-TST)

Connections

The S3280-TST back panel connectors are described in the table below.

Table 4: S3280-TST Back Panel Connector Descriptions

Item	Connector	Description
1	**C. GND** Common Ground connections	Two optional threaded common ground (C. GND) connections.
2	**Strain Relief**	Optional connection for offloading cable weight.
3	**12 VDC INPUT**	Primary 12 Volt DC power connection via a 12-volt DC barrel connector. Connects to External AC-DC power supply: TN#25090 100-240 VAC 50-60 Hz.
4	**20-57 VDC INPUT POWER INPUT 2** (-**V2 / +V2**)	DC Power input - Provides 20–57 VDC input power to the S3280. Secondary 4-pin terminal block 18-57VDC. One of two DC inputs. Isolated 2250 VDC. Provides 18 - 57 Volt DC power connection via an 20-57 volt DC BMI. Power is available via this **POWER INPUT 2** connection <u>or</u> the **POWER INPUT 1** connection (but not both).
4	**20-57 VDC INPUT POWER INPU 1** (-**V1 / +V1**)	DC Power input - Provides 20–57 VDC input power to the S3280. Secondary 4-pin terminal block 18-57VDC. One of two DC inputs. Isolated 2250 VDC. Provides 18 - 57 Volt DC power connection via 20-57 volt DC BMI. Power is available via this **PWR IN 1** connection <u>or</u> the **POWER INPUT 2** connection (but not both).

Installing - Connecting to 20-57 VDC Power

After the S3280-TST or - S NID has been installed, connect it to AC power.
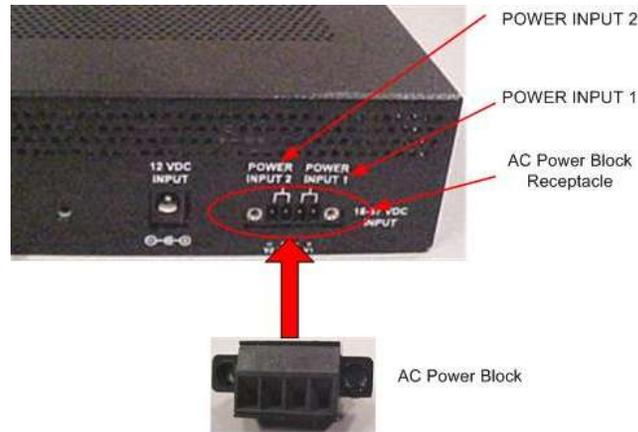
Figure 10: AC Power Connection

Warning: Risk of electrical shock.

1. Unplug S3280-TST or - S POWER, CONSOLE and PORT connections.

2. Insert the DC Power Block into the DC Power Block receptacle (power inlet).

3. Fasten the DC Power Block with the two slotted retaining screws.

4. Insert the power plug / wires of the DC power adapter into the **-V2** and **+V2** power inlet (**PWR IN 2**) on the back of the NID.
   OR
   Insert the power plug / wires of the DC power adapter into the -**V1** and **+V1** power inlet (**PWR IN 1**) on the back of the NID.

5. Insert the power plug / wires of the DC power adapter into the -V1 and +V1 power inlet (POWER INPUT 1) on the back of the S3280-TST NID.

6. Plug the Power adapter plug into AC power at an appropriate AC outlet. Note that the S3280-TST NID's front Power LED lights.

7. Refer to the "Grounding the S3280" section below.

Grounding the S3280-TST (Rack Mount)

The S3280-TST back panel provides two common ground (C. GND) connections and a strain relief bracket.

Warning: Risk of electrical shock.

C. GND (Chassis Ground) Note: a device bonded to metallic shelf that houses S3280-TST jacks should be bonded directly by either **1)** and independent conductor to the central office ground via rack ground bar, or **2)** connection to the rack itself, or **3)** other metal-to-metal bond to ground.

Figure 11: C. GND (Chassis Ground)

To connect the S3280-TST to a ground point on the rack, follow your organization's or IT department's standard procedure or the US NFPA 70$^{®}$: National Electrical Code.

Installing - Connecting to 12 VDC INPUT Power

Use the procedure below to connect the S3280-TST to the provided DC power supply (refer to Figures 8 and 9).

Warning: Risk of electrical shock.

1. Insert the barrel connector of the provided Power Supply (TNPN: 25090) into the power inlet (**12 VDC INPUT**) on the NID back panel.

2. Plug the AC power plug into a live AC outlet.

3. Note that the NID's front **P** (power) LED lights, and a startup sequence of LEDs light momentarily. When the sequence stops, only the **P**ower LED remains lit.

4. Continue with "Installing – Connecting CONSOLE and PORTS" below.

Software Install Process

The next sections cover the S3280-TST installation process, which includes:

1. Configure and login in to the NID via Telnet (page 26), PuTTY (page 27) or HT (page 29).
2. Log in to the NID via the Web Interface (page 31).
3. Register at My TN Access (page 32).
4. Take our TN Customer Satisfaction Survey (page 32).

Web Browser Support

The S3280-TST is compatible with the following web browsers:

- Firefox (Mozilla Firefox) 3 - 13

- Internet Explorer 6 - 9

- Google Chrome 3 - 13

Telnet Client Support

The S3280-TST CLI is compatible with several telnet clients: Absolute Telnet, Microsoft Telnet Client, PuTTY, TeraTerm, Van Dyke SecureCRT, ZOC, Zephyr Passport, and Zugg TeSSH.

Terminal Emulation Package Support

The S3280-TST and - S CLI is compatible with several terminal emulators: Absolute Telnet, HyperTerminal, HTPE, Java Hyper Terminal, PuTTY, SecureCRT, TeraTermPro (open source), Windows Phone & Modem options, and Windows Remote Shell (CLI).

Login In to the NID via Telnet

1. Use the Windows Start > Command Prompt menu path to open a command prompt.
2. At the prompt type **telnet 192.168.0.1** and press the **Enter** key.
3. Enter the S3280-TST Username (the default is **admin** in lowercase letters) and press the **Enter** key.
4. Enter the S3280-TST password (no default - just press the **Enter** key.
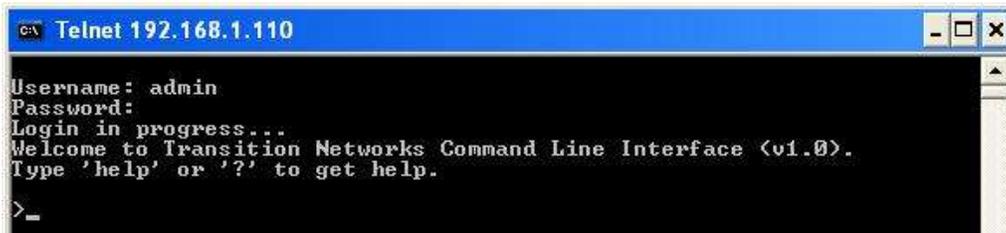
5. At the command prompt, enter a command and press the Enter key. For example, type Help (or ?) and press Enter to display the S3280-TST Help screen:

6. Continue to enter S3280-TST CLI commands. See the S3280 CLI Reference manual for more information.

Log In to the NID via PuTTY

1. Start PuTTY. If the PuTTY "Open File - Security Warning: dialog displays, click the Run button.
2. At the PuTTY Configuration dialog box, in the "Host Name [or IP Address]" field, enter the S3280-TST IP address (the default is 192.168.0.1).
3. In the Port field, enter 22.
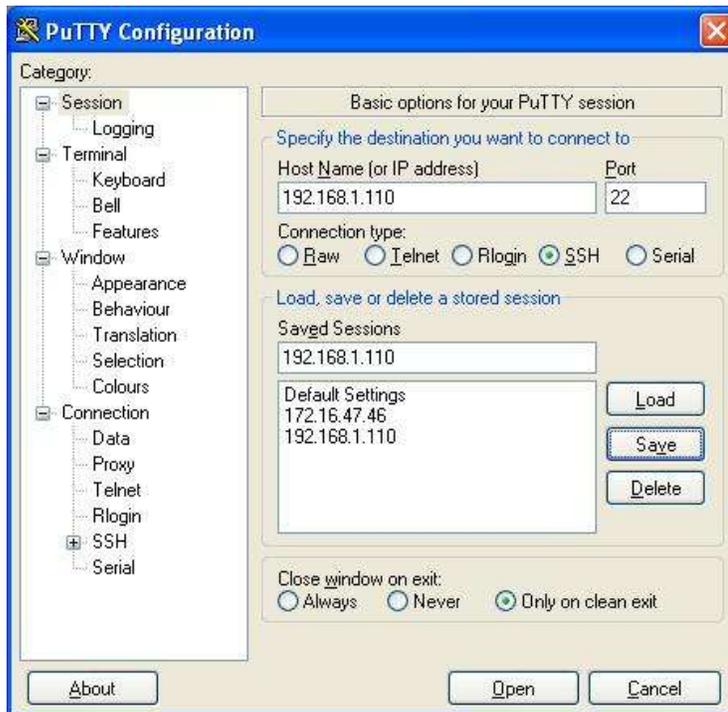
4. Save and Load the saved session as desired.
5. Click the **Open** button. The S3280-TST PuTTY login screen displays.

6. Enter the S3280-TST Username (the default is **admin** in lowercase letters) and press the **Enter** key.
7. Enter the S3280-TST password (no default - just press the **Enter** key).
8. At the PuTTY command prompt, enter a command and press the Enter key. For example, type **Help** or **?** a space, and press Enter to display the S3280-TST Help screen:

9. Continue to enter S3280-TST CLI commands. See the S3280 CLI Reference manual for more information.

Log In to the NID via HyperTerminal (HT)

1. Open the HyperTerminal (HT) program.
2. Create a new connection by selecting File > New Connection.
3. Enter a name for the session, choose an icon, and click the OK button.
4. At the Connect To dropdown select "COM7" and click the **OK** button.

5. At the COM 7 Properties > Port Settings tab, select:
      Bits per second: 115,200
      Data bits: 8
      Parity: None
      Stop bits: 1
      Flow Control: None
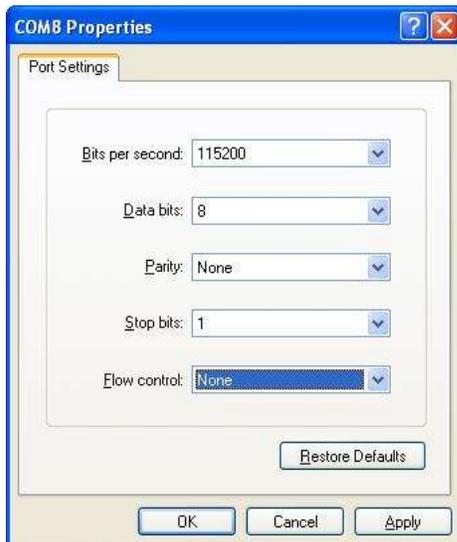
6. Click the **OK** button.
7. Press the Enter key twice.
8. At the Username prompt enter **admin** and press the Enter key. The TN CLI Welcome screen displays.
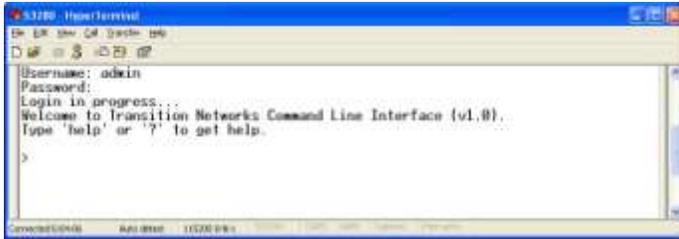
9. At the HT command prompt, enter a command and press the Enter key. For example, type **Help** (or **?**) and press Enter to display the S3280-TST Help screen:
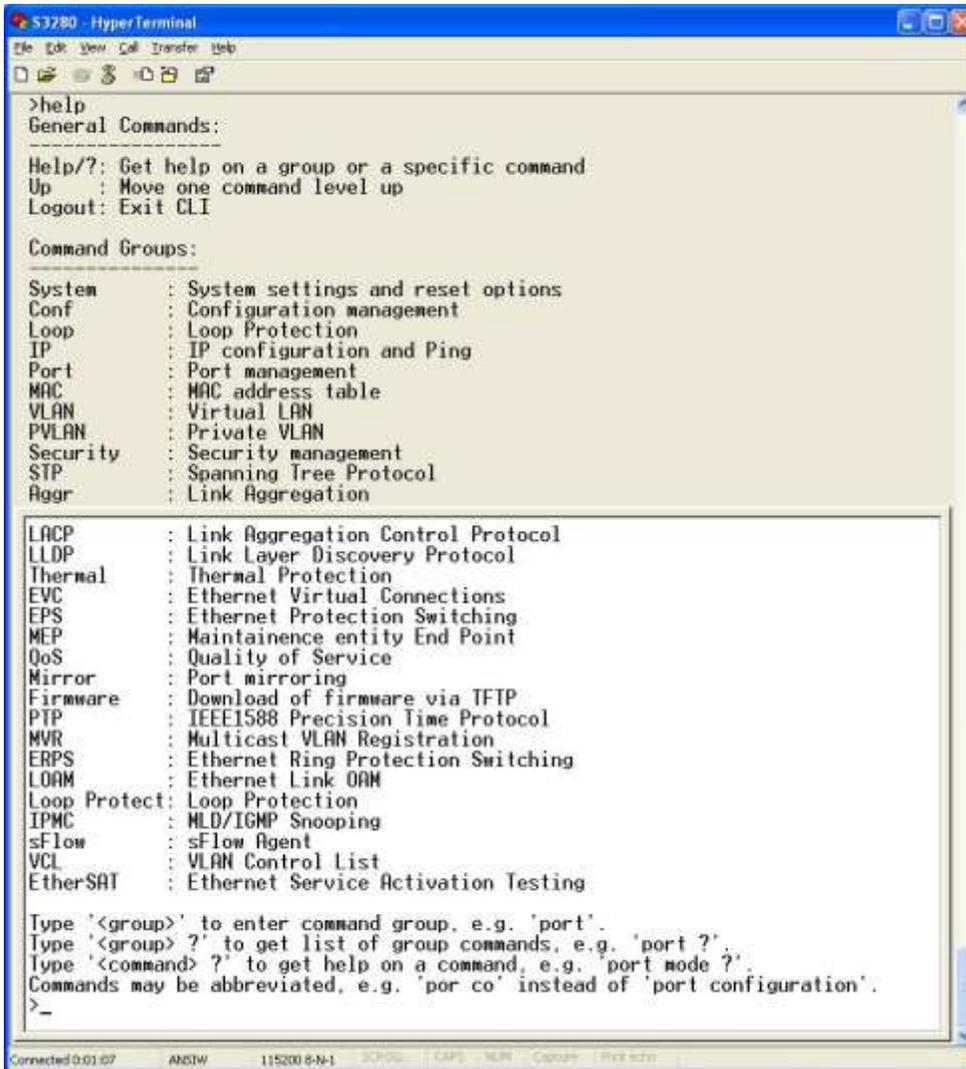
10. Continue to enter S3280-TST CLI commands. See the S3280 CLI Reference manual for more information.

Log In to the NID via the Web Interface

This procedure assumes that the previous steps are successfully completed.

1. Open a supported web browser.
2. Type in the default URL (e.g., 192.251.144.129) and press the **Enter** key. The 'Connect to' screen displays in IE (or the 'Authentication Required' screen in Google Chrome or Mozilla Firefox).

3. At the User Name field / dropdown enter or select your user name (e.g., admin).
4. In the Password field enter your password or just click **OK**.
5. At the "Remember my password" checkbox, follow your organizations policy on password protection.
6. Click the **OK** button. The S3280-TST Web interface main screen displays.
7. We recommend registering your S3280-TST online, and ask you to take the TN customer survey.
8. Continue to Section 3 below for more information on the S3280-TST Web interface menu system.

When you access the web interface, by default, the DHCP client is enabled and the static IP address is 192.168.0.1.

If a DHCP server is available on the network, the following steps are recommended:
1. Setup the system name using the "system name" command, e.g. "system name my-switch".
2. Delete the static IP address using "ip setup 0.0.0.0".
3. Renew the DHCP address using "ip dhcp enable"

The DHCP client will include the system name as host name in the DHCP request.
Web access to the switch can then be done using the system name, e.g. "my-switch".

If a DHCP server is not available, the following steps are recommended:
1. Disable DHCP using "ip dhcp disable"
2. Setup the IP configuration using the "ip setup" command.

The default web login is "admin" and password is an empty string "".

Log Out of the S3280-TST Web Interface

1. Click the logout ( ) button located in the top right corner of each web interface screen.
The message "*Do you want to logout the web site?*" displays.

2. Click the **OK** button to clear the webpage message, or click the **Cancel** button to continue.

3. If you click the **OK** button, the **Connect to** ... dialog displays again to let you log back in if you want.
The web interface also displays the message "*Authorization required to access this URL.*"
You can either log back in or click the **Cancel** button to clear the **Connect to** ... dialog.

Display S3280-TST Web Interface Help

Click the Help (**?**) button from any web interface menu to display the related online Help.

Register at My TN Access

Register your TN product at http://www.transition.com/TransitionNetworks/MyTNAccess/.
Registering for an account is free and will unlock product installation manuals, software upgrades, drivers and various support files related to specific products.

TN Customer Satisfaction Survey

You are invited to participate in our Customer Satisfaction Survey at
http://www.transition.com/TransitionNetworks/Landing/customer/customerweb.aspx.

3. Web Interface and CLI

When the previous steps are successfully completed, you can continue with the S3280-TST web interface menu system and/or the CLI (Command Line Interface. Refer to the related manual below for additional information:

- S3280 Web Interface User Guide, 33506
- S3280 Command Line Interface (CLI) User Guide, 33507

Web Interface Menu System

The S3280-TST Web interface menu system is shown below in terms of its sub-menus and functions.

Main Menu	Configuration sub-menu	Monitor sub-menu	Diagnostics sub-menu	Maintenance sub-menu
Configuration ▶ Configuration ▶ Monitor ▶ Diagnostics ▶ Maintenance	▼ Configuration ▶ System ▪ Thermal Protection ▶ Ports ▶ Security ▶ Aggregation ▶ Link OAM ▪ Loop Protection ▶ Spanning Tree ▪ MVR ▶ IPMC ▶ LLDP ▪ EPS ▪ MEP ▪ ERPS ▪ MAC Table ▶ VLAN Translation ▶ VLANs ▶ Private VLANs ▶ VCL ▶ Ethernet Services ▶ QoS ▪ Mirroring ▪ PTP ▪ sFlow ▶ Service Activation	▼ Monitor ▶ System ▪ Thermal Protection ▶ Ports ▶ Link OAM ▶ Security ▶ LACP ▪ Loop Protection ▶ Spanning Tree ▶ MVR ▶ IPMC ▶ LLDP ▶ Ethernet Services ▪ PTP ▪ MAC Table ▶ VLANs ▶ VCL ▪ sFlow	▼ Diagnostics ▪ Ping ▶ Link OAM ▪ Ping6 ▪ VeriPHY ▶ Service Activation	▼ Maintenance ▪ Restart Device ▪ Factory Defaults ▼ Software 　▪ Upload 　▪ Image Select 　▪ Peripheral Device 　　Upload ▪ Ethernet SAT ▶ Configuration

The four Main Menu selections are:

➢ **Configuration** - lets you define system operating parameters for the available S3280-TST features.

➢ **Monitor** - lets you view and track the S3280-TST operating functions. See the S3280 User Guide.

➢ **Diagnostics** - provides access to the full set of S3280-TST tests and verification functions. See the S3280 User Guide.

➢ **Maintenance** - supports the S3280-TST troubleshooting and service functions. See the S3280 User Guide.

Each of these sub-menus and their functions are described in the S3280 User Guide manual.

Command Line Interface (CLI)

This S3280-TST CLI is for experienced network administrators who are responsible for configuring and maintaining the S3280. The CLI offers a comprehensive set of management features for use during initial setup (set IPs, etc.) and troubleshooting, as well as for day-to-day management (device management, firmware upgrades, managing security features, etc.).

The S3280-TST offers a rich set of commands through its CLI for performing configuration and status monitoring. The CLI is accessible through the RS-232 serial console, telnet and SSH. The CLI incorporates user authentication for security purposes.

The CLI interface can be accessed via Secure Shell (SSH) interface. This provides a more secure interface as SSH uses public-key cryptography for authentication. When the SSH server is enabled, normal telnet access can be enabled or disabled to avoid potential security holes.

All of the CLI commands and their functions are described in the S3280 CLI Reference Guide manual.

4. Messages and Troubleshooting

This section provides general and specific S3280-TST problem solving suggestions, general error recovery steps, and specific web interface messages, meanings, examples, and possible recovery steps.

Ethernet SAT (Service Activation Testing)

The MEF SAT (Service Activation Testing) is implemented early in the Ethernet Service lifecycle; when a new customer order is received, MEF SAT (along with MEF LLB and ITU Y.1564) can be used to provision and turn up the circuit in order to verify the performance to the SLA (via FM and PM). Ethernet Service Activation Test (EtherSAT) methodology involves:

- Verify a new service after provisioning is complete, but before it is turned over to the customer.
- Check that the configuration is correct.
- Verify performance meets the Service Acceptance Criteria (SAC) to ensure CoS Performance Objectives are attained.

The EtherSAT loopback test can be run via the Web interface or the CLI. See the related manual for detailed information.

General S3280-TST Troubleshooting

1. Check the S3280-TST Back Panel Connections (see page 30)
2. Verify the Installation. Check the Operating System, Web Browser, Telnet Client, and/or Terminal Emulation package support (see page 32).
3. Make sure your particular model supports the function attempted.
4. Check the S3280-TST Front Panel Connectors (see page 24) and LEDs (see page 25).
5. Respond to any S3280-TST error messages (see "S3280-TST Error Recovery" below).
6. Run the S3280-TST Diagnostics tests and verification functions (e.g., Ping, Link OAM MIB Retrieve, Ping6, VeriPHY). See the "Diagnostics" section of the S3280 User Guide manual.
7. Perform the S3280-TST troubleshooting and service functions (e.g., Restart Device, reset to Factory Defaults, Software Upload, Image Select). See "4. Messages and Troubleshooting" on page 37.
8. Check the S3280-TST operating parameters (e.g., Information, CPU Load, Log, Detailed Log). See the "Operation" section of the S3280 User Guide manual.
9. If you can access the S3280-TST via PuTTY or HyperTerminal but not via the web interface, enter the **restore default keep_ip** CLI command and try accessing the S3280-TST web interface again.
10. If you have problems displaying the S3280-TST web interface in IE, try displaying in Compatibility View from the IE **Tools** > **Compatibility View** menu path.
11. Use the EtherSAT loopback test to verify that an S3280-TST is ready for network turn up before adding it to a network. See the S3280 User Guide or the S3280 CLI Reference manual.

S3280-TST Error Recovery

The S3280-TST displays error and information messages from the CLI and Web interface. This section lists the messages, provides an example, and discusses the message meaning of and possible recovery steps.

As a general troubleshooting step for problems encountered using the S3280-TST web interface, try the related CLI command. For many messages, recovery involves reviewing the command/function description and verifying the entry selection/syntax. For example, for many CLI messages, the first recovery step would be to refer to the "S3280 CLI Reference Guide" manual.

For any error condition, you can check the TN Tech Support web site for possible solutions. For any problem that persists, contact TN Tech Support in the US or Canada at 1-800-260-1312, International at 00-1-952-941-7600; via fax at +1 952-941-2322; or via Email at techsupport@transition.com.

Generic Message Recovery (e.g., you tried a function, but the operation failed or is still in process):
1. Wait for a few moments for the operation to complete.
2. Use the **Help** or **?** command to get assistance (help) on a group of commands or on a specific command.
3. Make sure this is the function you want and that the device/port/configuration supports this function.
4. Verify the parameters entered and re-try the function. See the related section of this manual for specifics.
5. Try using the CLI to perform the function. See the "S3280 CLI Reference Guide" manual.
6. If the "*continue y(es) n(o) prompt*" displays, type **y** and press **Enter** to continue.
7. Use the Monitor sub-menu functions (System, Ports, Link OAM, MAC Table, VLANS) to view related status, statistics, events, etc. related to a specific function.
8. Use the Diagnostics sub-menu functions (Ping, Link OAM MIB Retrieval, VeriPHY) to test a general functionality.
9. Use the Maintenance sub-menu functions (Restart the S3280, Reset the S3280-TST to factory defaults, Upgrade the S3280-TST firmware).
10. If the problem persists, contact TN Tech Support. US/Canada: 1-800-260-1312, International: 00-1-952-941-7600; TN Tech Support web; fax: +1 952-941-2322; Email: techsupport@transition.com.

Specific Messages Recovery:
1. For messages (e.g., ACL messages) that result from an S3280-TST memory shortage:

   a. Reduce other system activity to ease memory demands.

   b. Use a less complicated configuration that requires less memory.

   c. Modify the ACL configuration to use fewer resources, or rename the ACL with a name or number that alphanumerically precedes the other ACL names or numbers.

   d Reduce the number of IP or MAC access lists to be applied to interfaces.

   e. Reduce other system activity to ease memory demands (e.g., remove ACLs that are defined but not used; use simpler ACLs with fewer ACEs; use fewer VLANs / remove unneeded VLANs from the VLAN database).

2. For messages that indicate the configuration is too complicated for the ACL code to support, there is likely too many separate access lists in a single VLAN map or policy map. Reduce the number of IP or MAC access lists separately) in any one VLAN or policy map to fewer than the number of levels. Or try to use the same ACLs on multiple interfaces if possible.

3. For messages that indicate an illegal configuration, reconfigure the port / device, removing the illegal configuration.

4. For messages that indicate the temperature is high reduce the temperature in the room.

5. For messages that indicate that the number of MAC address entries for the VLAN exceeds the maximum number allowed, have your system administrator configure an action.

6. For messages that indicate that an unauthorized device attempted to connect on a secure port, identify the device that attempted to connect on the secure port and notify your network system administrator of the condition.

7. For messages that indicate that the amount of traffic detected on the interface has exceeded the configured threshold values, determine and fix the root cause of the excessive traffic on the interface.

8. For messages that indicate an unrecoverable software error has occurred, copy the message exactly as it appears on the console or in the system log and contact TN Support.

See "S3280-TST Error Recovery" on page 38 for specific messages and the recommended recovery steps.

For More Error Message Information

For specific messages resulting from S3280-TST web interface operation, see the "Web Interface Messages" section of the S3280 Web Interface User Guide, 33506.

For specific messages resulting from S3280-TST CLI operation, see the "CLI Messages" section of the S3280 CLI Reference Guide, 33507.

For functional level troubleshooting for S3280-TST web interface operation, see the "Web Interface Messages" section of the S3280 Web Interface User Guide, 33506. Topics there include EPS Troubleshooting, ERPS Troubleshooting, IPv6 Troubleshooting, Troubleshooting High CPU Load Conditions, etc.

Appendix A - Cables and Connectors

Cable Types

The cabling specifications are provided for troubleshooting purposes.

Copper (TP / UTP) CAT 1 – CAT 7 Cabling

ANSI/EIA Standard 568 is one of several standards that specify "categories" (each a "CAT") of twisted pair cabling systems. Assigned by the American National Standards Institute/Electronic Industries Association, these standards categories include CAT 1 – CAT 7, as shown below.

Category	Max Data Rate	Typical Application
CAT 1	Up to 1 Mbps (1 MHz)	Analog voice (POTS), ISDN BRI
CAT 2	4 Mbps	IBM Token Ring network cabling systems
CAT 3	16 Mbps	Voice (analog mainly); 10BASE-T Ethernet
CAT 4	20 Mbps	Used in 16 Mbps Token Ring, but not much else.
CAT 5	100 MHz	100 Mbps TPDDI. 155 Mbps ATM. No longer supported; replaced by 5E. 10/100BASE-T.
CAT 5E	100 MHz	100 Mbps TPDDI, 155 Mbps ATM, Gigabit Ethernet. Offers better near-end crosstalk than CAT 5.
CAT 6	Up to 250 MHz	Minimum cabling required for data centers in TIA-942. CAT 6 is quickly replacing CAT 5e.
CAT 6E	Up to 500 MHz	Field-tested to 500 MHz. Supports 10 Gigabit Ethernet (10GBASE-T). May be either shielded (STP, ScTP, S/FTP) or unshielded (UTP). Standard published in Feb. 2008. The minimum requirement for Data Centers in the ISO Data Center standard.
CAT 7 (ISO Class F)	600 MHz, 1.2 GHz in pairs with Siemon connector	Full-motion video, Teleradiology, Government and manufacturing environments. Fully Shielded (S/FTP) system using non-RJ45 connectors but backwards compatible with hybrid cords. Standard published in 2002. Until Feb. 2008, the only standard to support 10GBASE-T for a full 100m.

CAT 7A/Class FA and Category 6A/Class EA specifications were published in February, 2008.

Fiber (10/100/1000BASE-xx) Cabling

The IEEE recommends the maximum fiber cable distances shown below.

Standard	Data Rate (Mbps)	Cable Type	IEEE Standard Distance
10BASE-FL	10	850nm Multimode 50/125 µm or 62.5/125 µm	2 km
100BASE-FX	100	1300nm Multimode 50/125 µm or 62.5/125 µm	2 km
100BASE-SX	100	850nm Multimode 50/125 µm or 62.5/125 µm	300 m
1000BASE-SX	1000	850nm Multimode 50/125 µm 850nm Multimode 62.5/125 µm	550 m 220 m
1000BASE-LX	1000	1300nm Multimode 50/125 µm or 62.5/125 µm 1310nm Single mode 9/125 µm	550 m 5 km
1000BASE-LH	1000	1550nm Single mode 9/125 µm	70 km

Appendix B: Application Notes

S3280-TST Applications Support

The S3280-TST targets the CPE (Customer Premise Equipment) or the PE (Provider Edge) equipment and can be used to implement the access functions in these devices. The S3280-TST provides the required set of UNI features in a cost-effective manner, including:

- Map customer frame formats into Provider frame formats.
  - Classify frames and map to appropriate QoS profiles.
  - Apply Provider Bridge (Q-in-Q) encapsulations.
- Meter the customer traffic and ensure that the customer SLA (Service Level Agreement) is met.
  - Polices using MEF-defined Dual Leaky Bucket algorithm.
  - Mark frames as Committed (Green) or Discard Eligible (Yellow).
  - Provide correct QoS treatment (traffic management).
  - Provide traffic statistics per Customer in a manner consistent with the SLA.
- Enable end to end Service OAM (SOAM) by the customer, if allowed.
- Implement the Service as defined by the SLA.
  - E-LINE for point-to-point or backhaul services.
  - E-LAN for multi-point/bridged services.
  - E-Tree for video distribution or backhaul services.
- Enable management and protection schemes as required by the Provider.
  - Link Aggregation or other port protection schemes if used for access.
  - OAM at the Operator and Service Provider levels for remote management, fault diagnosis, and protection switching.
- Support network timing and synchronization requirements as required.
- Provide Sync-E (Synchronous Ethernet) and IEEE 1588 functionality.

Available TN S3280-TST Application Notes

Application notes on certain specific functions / environments are available from your TN Technical Support specialist. See the "Service" section on page 42 for contact information. Topics include:

1. Service OAM (SOAM)
2. IEEE 1588 Precision Time Protocol (PTP)
3. EVC - MEF Service Configuration (MEF E-Line - E-LAN - E-Tree Services)
4. Ethernet Ring Protection Switching (ERPS)
5. EVC Behavior - ELAN Configuration

Not Intended for Use in Life Support Products: S3280-TST products are not intended for use in life support products, systems, or environments where failure of an S3280-TST product could reasonably be expected to result in death or personal injury. Anyone using an S3280-TST product in such an application without express written consent of an officer of Transition Networks, Inc. does so at their own risk, and agrees to fully indemnify Transition Networks, Inc. for any damages that may result from such use or sale.

Appendix C: Service, Warranty & Compliance Information

Service

Direct Contact Numbers:

Domestic: + 1 800-260-1312
International: + 1 952-358-3601
Fax   +1 952-941-2322
Email: techsupport@transition.com

Service Hours:

USA: 7 AM until 8 PM CST Monday to Friday.
China: 8 AM until 4 PM China Central Standard Time Monday to Friday.

Out of Hours the calls will be answered by an on-call engineer.

Live Help Online Support: Chat live with a Transition Networks representative at
http://www.livehelpnow.net/lhn/lcv_custom.aspx?d=0&ms=&zzwindow=0&lhnid=4085&custom1=&custom2=&custom3=&time=9/19/2011%202:07:14%20PM.

Warranty

This warranty is your only remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Transition Networks is not liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory. Authorized resellers are not authorized to extend any different warranty on transition networks' behalf.

5 Year Limited Warranty	Transition Networks' labeled S3280 series products, purchased after September 30, 2013, are warranted to be free from defects in material and workmanship for a period of 5 years beyond the Transition Networks shipment date.This warranty covers the original user only and is not transferable.
What the Warranty Does Not Cover	This warranty does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including over-voltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components. If the user is unsure of the proper means of installing or using the equipment, contact Transition Networks' free technical support services.

Establishing Original Ownership

To establish original ownership and provide date of purchase, please complete and return the registration card accompanying the product or register the product on-line on our product registration page.

Transition Networks will at its option:

- Repair the defective product to functional specifications at no charge
- Replace the product with an equivalent functional product
- Refund the purchase price of a defective product

Who to Contact for Returns

To return a defective product for warranty coverage, contact Transition Networks' technical support department for a return authorization number. Transition's technical support department can be reached through any of the following means:

Service Hours

Mon thru Fri 7 AM - 6 PM CST:
Contact Tech Support via telephone at 800-260-1312 or 952-941-7600
Fax 952-941-2322

Email techsupport@transition.com
Live web chat: Transition Now

Any Other Time:

Voice Mail 800-260-1312 x 579 or 952-941-7600 x 579

How and Where to Send Returns

Send the defective product postage and insurance prepaid to the following address:

Transition Networks, Inc.

10900 Red Circle Drive

Minnetonka, MN 55343 USA

Attn: RETURNS DEPT: CRA/RMA # _____

Failure to properly protect the product during shipping may void this warranty. The return authorization number must be written on the outside of the carton to ensure its acceptance. We cannot accept delivery of any equipment that is sent to us without a CRA or RMA number.

CRA's are valid for 60 days from the date of issuance. An invoice will be generated for payment on any unit(s) not returned within 60 days.

Upon completion of a demo/ evaluation test period, units must be returned

or purchased within 30 days. An invoice will be generated for payment on any unit(s) not returned within 30 days after the demo/ evaluation period has expired.

The customer must pay for the non-compliant product(s) return transportation costs to Transition Networks for evaluation of said product(s) for repair or replacement. Transition Networks will pay for the shipping of the repaired or replaced in-warranty product(s) back to the customer (any and all customs charges, tariffs, or/and taxes are the customer's responsibility).

Before making any non-warranty repair, Transition Networks requires a $200.00 charge plus actual shipping costs to and from the customer. If the repair is greater than $200.00, an estimate is issued to the customer for authorization of repair. If no authorization is obtained, or the product is deemed 'not repairable', Transition Networks will retain the $200.00 service charge and return the product to the customer not repaired. Non-warranted products that are repaired by Transition Networks for a fee will carry a 180-day limited warranty. All warranty claims are subject to the restrictions and conventions set forth by this document.

Transition Networks reserves the right to charge for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found."

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. TRANSITION NETWORKS IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY. AUTHORIZED RESELLERS ARE NOT AUTHORIZED TO EXTEND ANY DIFFERENT WARRANTY ON TRANSITION NETWORKS'S BEHALF.

Customer Pays Non-Compliant Return Costs

The customer must pay the non-compliant product(s) return transportation cost to Transition Networks for evaluation of said product(s) for repair or replacement. Transition Networks will pay for shipping the repaired or replaced in-warranty product(s) back to the customer (any and all customs charges, tariffs, or/and taxes are the customer's responsibility).

Non-Warranty Repair Costs

Before making any non-warranty repair, Transition Networks requires a $200 charge, plus actual shipping costs to and from the customer. If the repair is greater than $200, an estimate is issued to the customer for authorization before making the repair. If no authorization is obtained, or the product is deemed not repairable, Transition Networks will retain the $200 service charge and return the product to the customer not repaired.

Repaired Non-Warranty Products

Non-warranted products repaired by Transition Networks for a fee will carry a 180-day limited warranty. All warranty claims are subject to the restrictions and conventions set forth by this document.

Transition Networks reserves the right to charge for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found."

Compliance Information

Standards: CISPR22/EN55022 Class A, CE Mark

FCC Regulations:
NOTE: 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.

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numériqué de la classe A est conformé à la norme NMB-003 du Canada.

CE Marking
This is a Class A product. In a domestic environment, this product could cause radio interference; as a result, the customer may be required to take adequate preventative measures.

UL Recognized
Tested and recognized by the Underwriters Laboratories, Inc.

European Regulations
WARNING:

This is a Class A product. In a domestic environment, this product could 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 Fäll ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures 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.

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 öffentlickes Telekommunikationsnetz in den EG-Mitgliedstaaten verstösst gegen die jewelligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

Declaration of Conformity

< To be supplied.>

Electrical Safety Warnings

Electrical Safety
IMPORTANT: This equipment must be installed in accordance with safety precautions.

Elektrische Sicherheit
WICHTIG: Für die Installation dieses Gerätes ist die Einhaltung von Sicherheitsvorkehrungen erforderlich.

Elektrisk sikkerhed
VIGTIGT: Dette udstyr skal _nstallers I overensstemmelse med sikkerhedsadvarslerne.

Elektrische veiligheid
BELANGRIJK: Dit apparaat moet in overeenstemming met de veiligheidsvoorschriften worden geïnstalleerd.

Sécurité électrique
IMPORTANT : Cet équipement doit être utilisé conformément aux instructions de sécurité.

Sähköturvallisuus
TÄRKEÄÄ : Tämä laite on asennettava turvaohjeiden mukaisesti.

Sicurezza elettrica

IMPORTANTE: questa apparecchiatura deve essere installata rispettando le norme di sicurezza.

Elektrisk sikkerhet

VIKTIG: Dette utstyret skal _nstallers I samsvar med sikkerhetsregler.

Segurança eléctrica

IMPORTANTE: Este equipamento tem que ser instalado segundo as medidas de precaução de segurança.

Seguridad eléctrica

IMPORTANTE: La instalación de este equipo deberá llevarse a cabo cumpliendo con las precauciones de seguridad.

Elsäkerhet

OBS! Alla nödvändiga försiktighetsåtgärder måste vidtas när denna utrustning används

Safety Instructions for Rack Mount Installations

The instructions below (or similar) are intended for S3280-TST rackmount installation environments:

1. Elevated Operating Ambient: if installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may exceed room ambient. Install the equipment in an environment compatible with the maximum ambient temperature (Tma) specified.

2. Reduced Air Flow: install the equipment in a rack so that the amount of air flow required for safe operation is not compromised.

3. Mechanical Loading: Mount the equipment in the rack so that a hazardous condition does not occur due to uneven mechanical loading (weight distribution/rack balance).

4. Circuit Overloading: give consideration to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Consider all equipment nameplate ratings when addressing this concern.

5. Reliable Earthing: maintain reliable earthing of rack-mounted equipment; pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

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Transition Networks

10900 Red Circle Drive

Minnetonka, MN 55343 USA

Tel: 952- 941-7600 or 1-800-526-9267

Fax: 952-941-2322

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