# SM16TAT2DPA

## 16-Port L2 PoE Plus Managed Switch



# Install Guide

33661 Rev. B

# Safety Warnings and Cautions

These products are not intended for use in life support products where failure of a product could reasonably be expected to result in death or personal injury. Anyone using this product in such an application without express written consent of an officer of Transition Networks does so at their own risk, and agrees to fully indemnify Transition Networks for any damages that may result from such use or sale.

**Attention**: this product, like all electronic products, uses semiconductors that can be damaged by ESD (electrostatic discarge). Always observe appropriate precautions when handling.

**NOTE:**     Emphasizes important information or calls your attention to related features or instructions.

**WARNING:** Alerts you to a potential hazard that could cause personal injury.

**CAUTION:** Alerts you to a potential hazard that could cause loss of data, or damage the system or equipment.

### SM16TAT2DPA Install Guide - TN PN 33661 Rev. B

**Record of Revisions**

| Rev | Date | Description of Changes |
|-----|------|------------------------|
| A | 1/7/16 | Initial release for software v6.41. |
| B | 4/6/16 | Updated for software v 6.46. |

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Address comments on this product or manual to:
**Transition Networks Inc**.
10900 Red Circle Drive, Minnetonka, MN 55343
Telephone: +1-952-941-7600 / Toll Free: 800-526-9267 / Fax: 952-941-2322
E-Mail: customerservice@transition.com / techsupport@transition.com    sales@transition.com /
info@transition.com

# Compliance and Safety Statements

**FCC-CLASS A**: This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when 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. You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

You may use unshielded twisted-pair (UTP) for RJ-45 connections - Category 3 or better for 10 Mbps connections, Category 5 or better for 100 Mbps connections, Category 5, 5e, or 6 for 1000 Mbps connections. For fiber optic connections, you may use 50/125 or 62.5/125 micron multimode fiber or 9/125 micron single-mode fiber.

**CE MARK DECLARATION OF CONFORMANCE FOR EMI AND SAFETY (EEC)**: This equipment has been tested and found to comply with the protection requirements of European Emission Standard EN55022/EN61000-3 and the Generic European Immunity Standard EN55024.

**Declaration of Conformity**



# *EU Declaration of Conformity*

**SM16TAT2DPA**
Model/Part Number

*Transition Networks, Inc.*
*10900 Red Circle Drive, Minnetonka, Minnesota 55343 U.S.A.*
Manufacture's Name and Address

This declaration of conformity is issued under the sole responsibility of the manufacturer.

**SM16TAT2DPA** is in conformity with the relevant Union harmonisation legislation:

Electromagnetic Compatibility (EMC) Directive 2014/30/EU:     EN 55022:2010,  EN 55024:2010
Low-Voltage Directive (LVD) 2014/35/EU:    EN 60950-1:2006

And hereby is declared compliant and carries the CE marking

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standards(s).

Minnetonka, Minnesota                    April 5, 2016
Place                                            Date                                  Signature

                                        Stephen Anderson          Vice President of Engineering
                                             Full Name                          Position

EMC:

| EN55022(2006)+A1:2007 / CISPR 22:2006+A1:2006 | Class A 4K V CD, 8KV, AD |
|---|---|
| IEC61000-4-2 (2001) | 3V/m |
| IEC61000-4-3( 2002) | 1KV – (power line), 0.5KV – (signal line) |
| IEC61000-4-4(2004) | Line to Line: 1KV, Line to Earth: 2KV |
| IEC61000-4-5 (2001) | 130dBuV(3V) Level 2 |
| IEC61000-4-6 (2003) | 1A/m |
| IEC61000-4-8 (2001) | Voltage dips:>95%, 0.5period, 30%, 25periods |
| IEC61000-4-11(2001) | Voltage interruptions: >95%, 250periods |

⚠ **CAUTION:** Circuit devices are sensitive to static electricity, which can damage their delicate electronics. Dry weather conditions or walking across a carpeted floor may cause you to acquire a static electrical charge. To protect your device, always:

- Touch the metal chassis of your computer to ground the static electrical charge before you pick up the circuit device.
- Pick up the device by holding it on the left and right edges only.
- If you need to connect an outdoor device to this device with cable then you must add an arrester on the cable between outdoor device and this device.
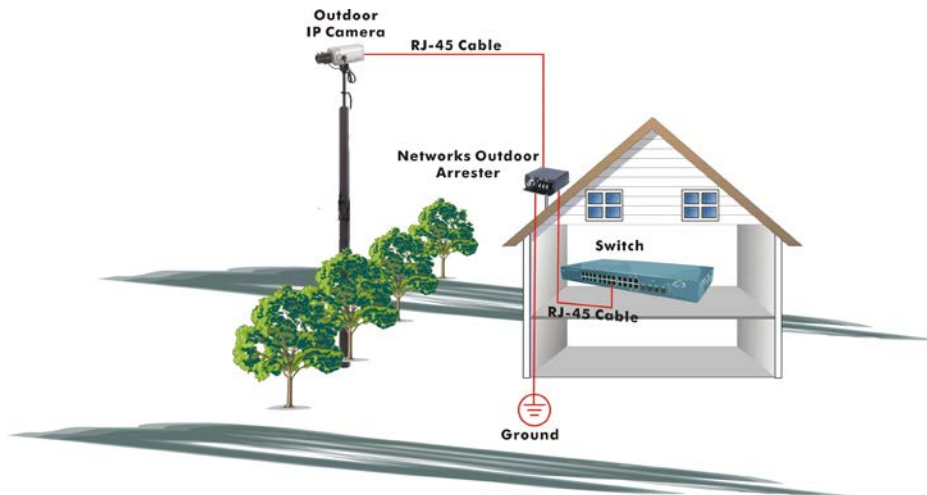


**Fig. Add an arrester between outdoor device and this switch**

ⓘ **NOTE:**   The switch is an indoor device; if it will be used in an outdoor environment or connects with some outdoor device, then it must use a lightning arrester to protect the switch.

 **WARNING:**

- Self-demolition on Product is strictly prohibited. Damage caused by self-demolition will be charged for repairing fees.
- Do not place product at outdoor or sandstorm.
- Before installation, please make sure input power supply and product specifications are compatible to each other.
- To reduce the risk of electric shock, disconnect all AC or DC power cords and RPS cables to completely remove power from the unit.
- Before importing / exporting configuration please make sure the firmware version is always the same.
- After firmware upgrade, the switch will move the configuration automatically to the latest firmware version.

## Related Manuals

The following manuals give specific information on how to use the management functions of the switch:

- SM16TAT2DPA Quick Start Guide, 33671

- SM16TAT2DPA User Guide, 33662

- SM16TAT2DPA CLI Reference, 33663

To access the manuals, firmware, datasheet or other documentation for your product, enter your model number (SM16TAT2DPA) in the "Search" box at our website at [www.transition.com](www.transition.com).

## Firmware Version Descriptions

***Firmware Version V6.46.1860***:

- Change the default configuration of Bonjour Discovery to disabled.

- Add online Help for the Bonjour Discovery.

- Sflow configuration will be reset when timeout value is counting to 0.

- The save config can not be executed during firmware upgrade to avoid flash read/write conflict.

- DHCP Server Global mode will be disabled when changing Gateway IP from DMS page.

- With DMS enabled, VLAN port role will be changed when the port state becomes link down.
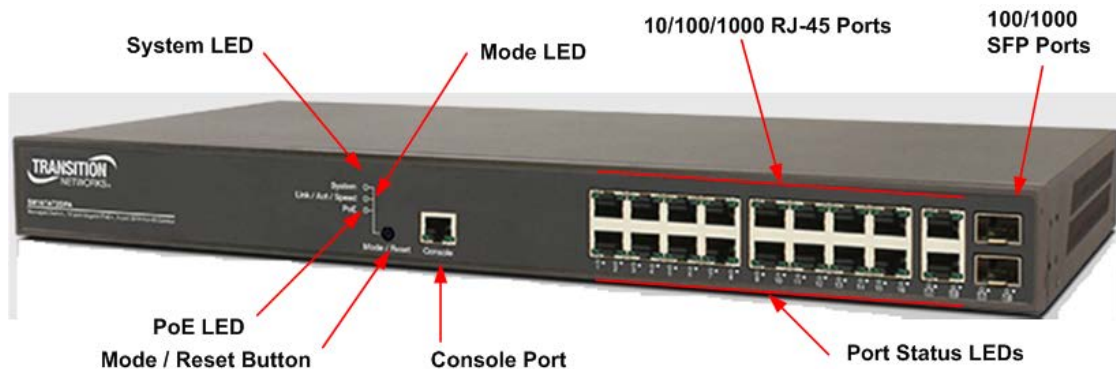
# Contents

# Introduction

## Overview

The SM16TAT2DPA Managed 18 Port Switch, Transition Networks next generation solution, is an affordable managed switch that provides a reliable infrastructure for your business network. These switches deliver more intelligent features you need to improve the availability of your critical business applications, protect your sensitive information, and optimize your network bandwidth to deliver information and applications more effectively. Easy to set up and use, it provides the ideal combination of affordability and capabilities for entry level Networking includes Small Business or enterprise application and helps you create a more efficient, better-connected workforce.

The SM16TAT2DPA provides 18 ports of Gigabit Ethernet connectivity, providing ideal flexibility to design suitable network infrastructure for business requirements. However, unlike other entry-level switching solutions that provide advance managed network capabilities only in the costliest models, this switch supports advanced security management capabilities and network features such as data, voice, security, and wireless technologies. Additionally, these switches are easy to deploy and configure, providing the stability and quality performance network services your business needs.

## Front Panel

The SM16TAT2DPA front panel is shown below.



## Back Panel

The SM16TAT2DPA back panel is shown below.



## Feature Benefits

The SM16TAT2DPA provides a flexible solution for delivering power and Ethernet services over a wide range of equipment, including Wireless Access Points, IP/PoE cameras and VoIP phones. This switch also supports DHCP per Port and Auto Power Reset (APR). The DHCP per Port feature provides the switch with the ability to assign an IP address based on the switch port that the device is connected to. With the APR feature enabled, the switch automatically pings the device, and if the device fails, the switch toggles the PoE power, automatically resetting the device. Auto Power Reset eliminates the need for a manual reset of the device, saving time and money. These features make installation and maintenance quick and easy.

**IEEE 802.3at PoE+**: Supplies up to 30 Watts per port and automatically detects PoE devices and their power class.
**Auto Power Reset**: Automatically monitors and resets PoE end devices.
**DHCP per Port**: Simplifies the installation and maintenance of powered devices, by ensuring that the same IP address is always assigned to the device connected to the same port, even if the device is replaced.
**Device Management System (DMS)**: Enables highly flexibility and scalable interactions with a large number of devices for the purposes of configuration.
**Industry Standard CLI**: Reduces training and simplifies network management.
**Static Routing**: Simple and quick to configure, minimizes network traffic and improves network performance.
**IEEE 802.3az EEE**: Lowers operating costs by reducing the power utilization of the switch and any associated cooling equipment.
**Dual Speed SFP Slot**: Allows for connectivity to the legacy 100Base network.

**Switch Architecture**

The switch performs a wire-speed, non-blocking switching fabric. This allows wire-speed transport of multiple packets at low latency on all ports simultaneously. The switch also features full-duplex capability on all ports, which effectively doubles the bandwidth of each connection.

This switch uses store-and-forward technology to ensure maximum data integrity. With this technology, the entire packet must be received into a buffer and checked for validity before being forwarded. This prevents errors from being propagated throughout the network.

**Network Management Options**

The switch can also be managed over the network with a web browser or Telnet application. The switch includes a built-in network management agent that allows it to be managed in-band using SNMP or RMON (Groups 1, 2, 3, 9) protocols. It also has an RJ45 console port connector on the front panel for out-of-band management. A PC may be connected to this port for configuration and monitoring out-of-band via a null-modem serial cable. (See Appendix B for wiring options.)

> **NOTE:**   For a detailed description of the management features, refer to the full *Web User Guide*.

# Hardware Description

**1000BASE-T Ports**

The switch contains sixteen 1000BASE-T RJ-45 ports. All RJ-45 ports support automatic MDI/MDI-X operation, auto-negotiation and IEEE 802.3x auto-negotiation of flow control, so the optimum data rate and transmission can be selected automatically.

**SFP Tranceiver Slots**

For information on the recommended standards for fiber optic cabling, see "1000 Mbps Gigabit Ethernet Collision Domain". For all related information on Transition Networks' SFPs see the Transition Networks SFP product page.

## Supported SFP Transceivers

| Media Standard | Fiber Diameter (microns) | Wavelength (nm) | Maximum Distance* |
|---|---|---|---|
| 1000BASE-SX | 50/125 | 850 | 550 m |
|  | 62.5/125 | 850 | 275 m |
| 1000BASE-LX/ LHX/ XD/ZX | 9/125 | 1310 | 10,30 km |
|  | 9/125 | 1550 | 30,50 km |
| 1000BASE-LX Single Fiber | 9/125 | TX-1310/RX-1550 | 10,20 km |
|  |  | Tx-1550/RX-1310 | 10,20 km |
| 1000BASE-T | N/A | N/A | 100 m |
| 100-FX | 62.5/125 | 1310 | 2 km |
|  | 9/125 | 1310 | 20,40,60 km |

**NOTE:** * Maximum distance may vary for different SFP vendors

**Port and System Status LEDS**

The SM16TAT2DPA switch includes a display panel for system and port LEDs that simplify installation and network troubleshooting. The LEDs are located on left hand side of the front panel for easy viewing. Details are shown below and described in the following tables.

### Port Status LEDs

| LED | Condition | Status |
| --- | --- | --- |
| TP (Link/ACT) | Green/Blink | Lit Green when TP link good. Blinks when any traffic is present. |
| TP SPEED | Green/Yellow/Off | Lit Green when TP link on 1000Mbps. Yellow when TP link on 100Mbps. Off when TP link on 10Mbps. |
| SFP (Link/ACT) | Green/Blink | Lit Green when SFP link good. Blinks when any traffic is present. |
| SFP SPEED | Blue/Green | Lit Blue when SFP link on 10Gbps. Green when SFP link on 1000Mbps. |

### System Status LED

| SYSTEM LED | Condition | Status |
| --- | --- | --- |
| System | Green OFF | Lit when power is coming up |

**POWER SUPPLY SOCKET**

There is a power socket on the rear panel of the switch. For normal power supply, the SM16TAT2DPA has a standard power socket for an AC power cord.

**MODE STATUS LEDS**

The SM16TAT2DPA provides a mode switch function. There are two modes for all LEDs of each port; they can switch between Link/ACT mode and SPEED mode by pressing the Mode button. When the switch is on Link/ACT mode, the LED of each port indicates the link or act status. The LED of each port shows the link speed of the port using different colors when the switch is on SPEED mode.

## Mode Status LEDs

| LED | Condition | Status |
| --- | --- | --- |
| Link/ACT | Green<br>OFF | Lit Green shows all LED of each port are in Link/ACT mode. Each LED of the port is lit Green when port link is good, and Blinks when any traffic is present. |
| SPEED | Blue<br>Green<br>Yellow<br>OFF | Lit Green shows all LED of each port are in SPEED mode. Each port LED is lit Blue when the link is at 10Gbps.<br>**Green** when the link on 1000Mbps.<br>**Yellow** when the link on 100Mbps.<br>**Off** when the link on 10Mbps. |

# Network Planning

## Introduction to Switching

A network switch allows simultaneous transmission of multiple packets, and it can partition a network more efficiently than bridges or routers. Therefore the switch has been recognized as one of the most important devices for today's networking technology.

When performance bottlenecks are caused by congestion at the network access point such as file server, the device can be connected directly to a switched port. And, by using full-duplex mode, the bandwidth of the dedicated segment can be doubled to maximize throughput.

When networks are based on repeater (hub) technology, the distance between end stations is limited by a maximum hop count. However, a switch can subdividing the network into smaller and more manageable segments, and linking them to the larger network than it turns the hop count back to zero and removes the limitation.

A switch can be easily configured in any Ethernet, Fast Ethernet, or Gigabit Ethernet network to significantly increase bandwidth while using conventional cabling and network cards.

## Application Examples

The SM16TAT2DPA has sixteen Gigabit Ethernet TP ports with auto MDIX and 2 Gigabit TP/SFP combo ports which support comprehensive types of fiber connection, such as LC and BiDi-LC modules. It is designed to segment your network, but also to provide a wide range of options in setting up network connections. Some typical applications are described below.

The switch is suitable for these applications.

• Connecting PC and VoIP telephony networks

• IP surveillance, suppling power and data to IP cameras

• Connecting and remotely powering wireless access points

# Installing the Switch

**Selecting a Site**

The Switch can be mounted in a standard 19-inch equipment rack (via Optional Rack mount Kit) or on a flat surface. Be sure to follow the guidelines below when choosing a location.
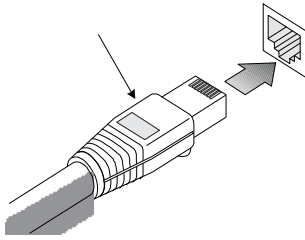
♦ The site should:
  - Be at the center of all the devices you want to link and near a power outlet.
  - Be able to maintain its temperature within 0 to 45°C (32 to 113 °F) and its humidity within 10% to 90%, non-condensing.
  - Be accessible for installing, cabling and maintaining the devices.
  - Allow the status LEDs to be clearly visible.

♦ Make sure the twisted-pair Ethernet cable is always routed away from power lines, radios, transmitters or any other electrical interference.

♦ Make sure that SM16TAT2DPA Switch is connected to a separate grounded power outlet that provides 100 to 240 VAC, 50 to 60 Hz.
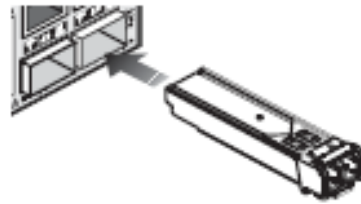
**Ethernet Cabling**

To ensure proper operation when installing the switch into a network, make sure that the current cables are suitable for 100BASE-TX or 1000BASE-T operation. Check the following criteria against the current installation of your network:

♦ Cable type: Unshielded twisted pair (UTP) or shielded twisted pair (STP) cable with RJ-45 connectors; Category 5 or Category 5e with maximum length of 100 meters is recommend 100BASE-TX, and Category 5e or 6 with a maximum length of 100 meters is recommend for 1000BASE-T.

♦ Protection from radio frequency interference emissions.

♦ Electrical surge suppression.

♦ Separation of electrical wires and data based network wiring.

♦ Safe connections with no damaged cables, connectors or shields.

**RJ-45 Connection**                                          **SFP Transceiver**

## Equipment Checklist

After unpacking this switch, please check the contents to be sure you have received all the components. Then, before beginning the installation, be sure you have all other necessary installation equipment.

## Package Contents

- SM16TAT2DPA GbE Management Switch
- Four adhesive rubber feet
- Mounting Accessory (for 19″ Rack Shelf, Optional)
- A printed Quick Start Guide
- AC Power Cord
- RS-232 to RJ-45 Console Cable

**NOTE:** Please notify your sales representative immediately if any of the above items is missing or damaged.

**WARNING:** The mini-GBICs are Class 1 laser devices. Avoid direct eye exposure to the beam coming from the transmit port.

## Mounting

The switch can be mounted in a standard 19-inch equipment rack or on a desktop or shelf. Mounting instructions for each type of site as follow.
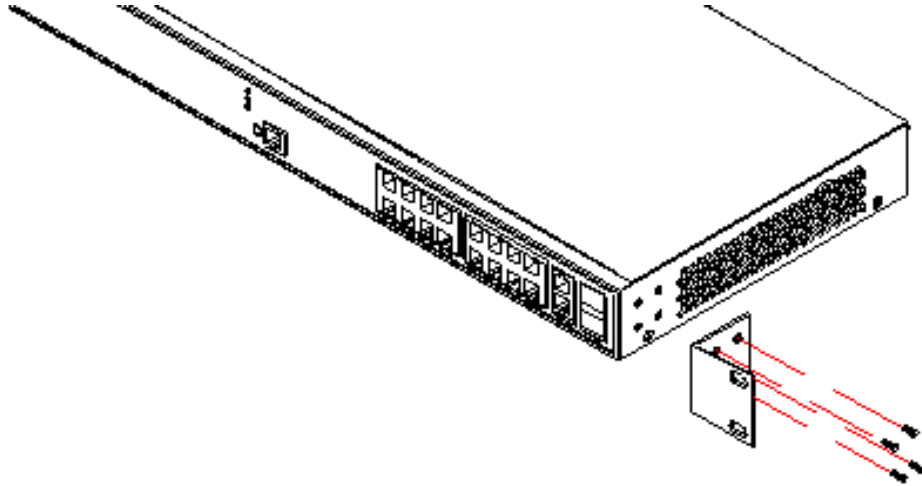
## Rack Mounting

Before rack mounting the switch, note the following factors:
- Temperature: Since the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack-environment temperature is within the specified operating temperature range (0 to 45 °C).
- Mechanical Loading: Do not place any equipment on top of a rack-mounted unit.
- Circuit Overloading: Be sure that the supply circuit to the rack assembly is not overloaded.
- Grounding: Rack-mounted equipment should be properly grounded.
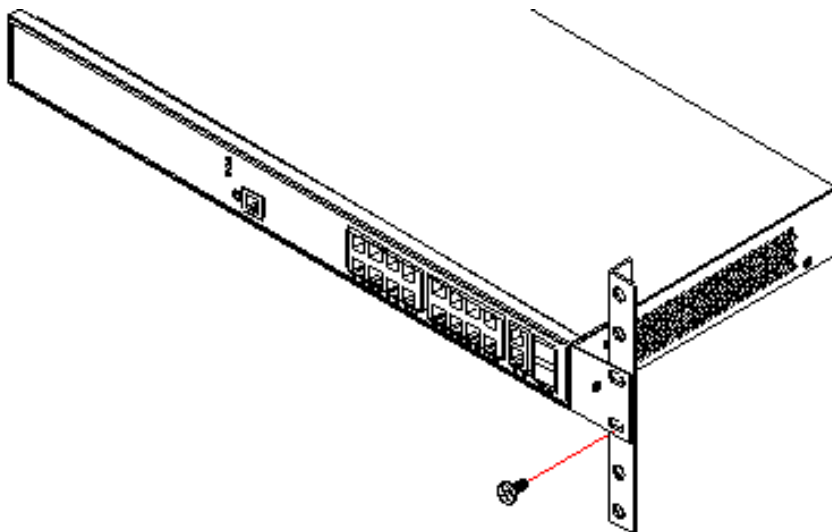
## To Rack-mount Devices

**Step1.** Attach the brackets to the device using the screws provided in the Mounting Accessory.

### Attaching the Brackets



**Step2.** Mount the device in the rack (via Optional Rack-Mount kit), using four rack-mounting screws (not provided). Be sure to secure the lower rack-mounting screws first to prevent the brackets from being bent by the weight of the switch.

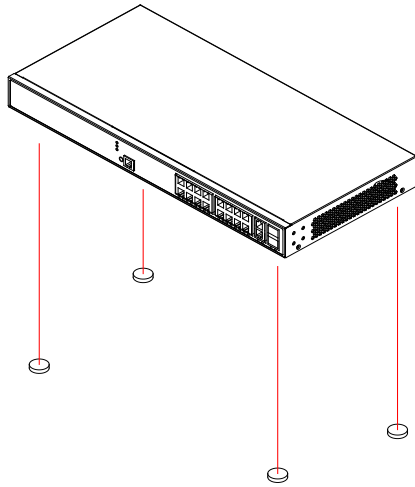### Installing the switch in a Rack



**Step3.** If installing a single switch only, turn to "Connection to a Power Source" at the end of this chapter.

**Step4.** If installing multiple switches, mount them in the rack, one below the other, in any order.

## Desktop or Shelf Mounting

**Step1.** Attach the four adhesive rubber feet to the bottom of the first switch.

### Attaching the Adhesive Rubber Feet



**Step2.** Set the device on a flat surface near an AC power source, making sure there are at least two inches of space on all sides for proper air flow.

**Step3.** If installing a single switch only, go to "Connecting to a Power Source" at the end of this Chapter.

**Step4.** If installing multiple switches, attach four adhesive feet to each one. Place each device squarely on top of the one below, in any order.
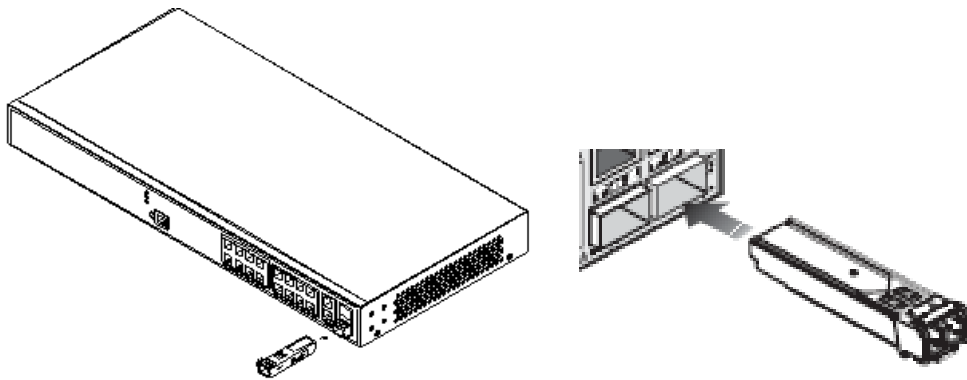
## Installing an Optional SFP Transceiver

You can install or remove a mini-GBIC SFP from a mini-GBIC slot without having to power off the switch.

> **NOTE:**
> ■ The mini-GBIC slots are shared with the two 10/ 100/ 1000Base-T RJ-45 ports. If a mini-GBIC is installed in a slot, the associated RJ-45 port is disabled and cannot be used
> ■ The mini-GBIC ports operate only at full duplex. Half duplex operation is not supported.
> ■ Ensure the network cable is NOT connected when you install or remove a mini-GBIC.

**Inserting an SFP Transceiver into a Slot**



## To Install an SFP transceiver:

**Step1.** Consider network and cabling requirements to select an appropriate SFP transceiver type.

**Step2.** Insert the transceiver with the optical connector facing outward and the slot connector facing down. Note that SFP transceivers are keyed so they can only be installed in one orientation.

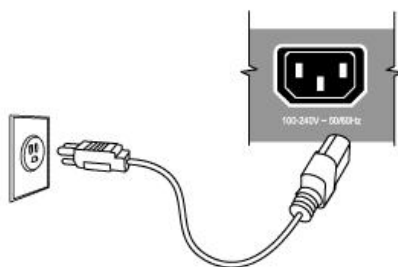**Step3.** Slide the SFP transceiver into the slot until it clicks into place.

> **NOTE:** SFP transceivers are not provided in the switch package.

## Connecting to a Power Source

You can plug or remove power cord from AC power socket, to switch the power on and off.

**Inserting the Power Cord to AC Power Socket**



**Step1.** Insert the power cable plug directly into the AC Socket at the back of the switch.

**Step2.** Plug the other end of the cable into a grounded, 3-Pin, AC power source.

**Step3.** Check the front-panel LEDs as the device is powered on to be sure the SYSTEM LED is lit. If not, check that the power cable is correctly plugged in.
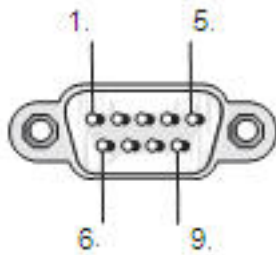
> **WARNING:** For International use, you may need to change the AC line cord. You must use a line cord set that has been approved for the socket

type in your country.

## Connecting to the Console Port

The DB-9 serial port on the switch's back panel is used to connect to the switch for out-of-band console configuration. The command-line-driven configuration program can be accessed from a terminal or a PC running a terminal emulation program. The pin assignments used to connect to the serial port are provided in the following table.

**Serial Port (DB-9 DTE) Pin-Out**



**Wiring Map for SerialL Cable**

The DB-9 cable is used for connecting a terminal or terminal emulator to the Managed Switch's RS-232 port to access the command-line interface.

The table below shows the pin assignments for the DB-9 cable.

**Serial Cable Wiring**

| Function | Mnemonic | Pin |
|---|---|---|
| Carrier | CD | 1 |
| Receive Data | RXD | 2 |
| Transmit Data | TXD | 3 |
| Data Terminal Ready | DTR | 4 |
| Signal Ground | GND | 5 |
| Data Set Ready | DSR | 6 |
| Request To Send | RTS | 7 |
| Clear To Send | CTS | 8 |

**NOTE:** No other pins are used.

**Plug in the Console Port**



The terminal Console port default values for the SM16TAT2DPA are listed below. The serial port's configuration requirements are as follows:

- ◆ Default Baud rate—115,200 bps
- ◆ Character Size—8 Characters
- ◆ Parity—None
- ◆ Stop bit—One
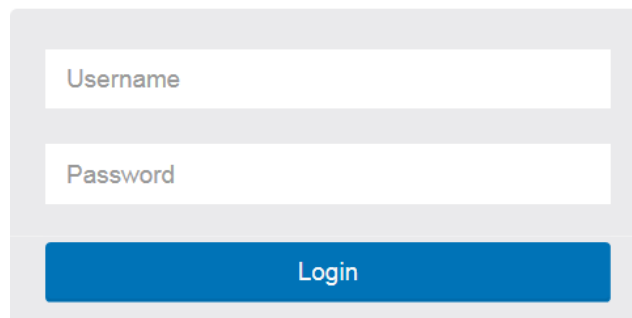- ◆ Data bits—8
- ◆ Flow control—none

Transition Networks                                    SM16TAT2DPA Install Guide

# Operation of Web-based Management

The default values of the managed switch are listed in the table below:

| IP Address | 192.168.1.77 |
|---|---|
| Subnet Mask | 255.255.255.0 |
| Default Gateway | 192.168.1.254 |
| Username | admin |
| Password | admin |

After the switch has been configured in the CLI via the switch's serial interface, you can browse it. For instance, type http://192.168.1.77 in the address row in a browser; the login screen dislays asking you to enter a username and password in order to login and access authentication. The default username is **"admin"** and password is **"admin"**. For first time use, enter the default username and password, and then click the **Enter** button. The login process now is completed.

SM16TAT2DPA web interface login:

> Username
>
> Password
>
> **Login**

> (i) **NOTE:** **T**o configure a function or parameter, refer to the full Web User Guide. You can click the "help" under the web GUI and the switch will pop-up the simple help content to show you how to set the parameters.

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The SM16TAT2DPA web help function is shown below:

# Making Network Connections

**Connecting Network Devices**

The switch is designed to be connected to 10, 100 or 1000Mbps network cards in PCs and servers, as well as to other switches and hubs. It may also be connected to remote devices using optional SFP transceivers.

**Twisted-Pair Devices**

Each device requires an unshielded twisted-pair (UTP) cable with RJ-45 connectors at both ends. Use Category 5, 5e or 6 cable for 1000BASE-T connections, Category 5 or better for 100BASE-TX connections.

## Cabling Guidelines

The RJ-45 ports on the switch support automatic MDI/MDI-X pinout configuration, so you can use standard straight-through twisted-pair cables to connect to any other network device (PCs, servers, switches, routers, or hubs).

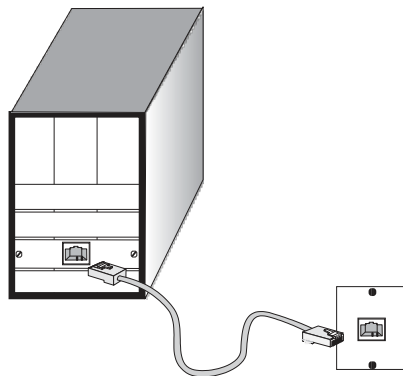See Appendix B for further information on cabling.

> ⚠️ **CAUTION:** Do not plug a phone jack connector into an RJ-45 port. This will damage the switch. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards.

## Connecting to PCs, Servers, Hubs and Switches

**Step1.** Attach one end of a twisted-pair cable segment to the device's RJ-45 connector.

**Making Twisted-Pair Connections**

**Step2.** If the device is a network card and the switch is in the wiring closet, attach the other end of the cable segment to a modular wall outlet that is connected to the wiring closet. (See the section "Making Network Connections" on page 25.) Otherwise, attach the other end to an available port on the switch.

Make sure each twisted pair cable does not exceed 100 meters (328 ft) in length.

> **NOTE:**  Avoid using flow control on a port connected to a hub unless it is actually required to solve a problem. Otherwise back pressure jamming signals may degrade overall performance for the segment attached to the hub.

**Step3.** As each connection is made, the Link LED (on the switch) corresponding to each port will light green (1000 Mbps) or amber (100 Mbps) to indicate that the connection is valid.

## Network Wiring Connections

Today, the punch-down block is an integral part of many of the newer equipment racks. It is actually part of the patch panel. Instructions for making connections in the wiring closet with this type of equipment follows.

**Step1.** Attach one end of a patch cable to an available port on the switch, and the other end to the patch panel.

**Step2.** If not already in place, attach one end of a cable segment to the back of the patch panel where the punch-down block is located, and the other end to a modular wall outlet.

**Step3.** Label the cables to simplify future troubleshooting. See "Cable Labeling and Connection Records".

.

**Network Wiring Connections**

**Fiber Optic SFP Devices**

An optional Gigabit SFP transceiver can be used for a backbone connection between switches, or for connecting to a high-speed server.

Each single-mode fiber port requires 9/125 micron single-mode fiber optic cable with an LC connector at both ends. Each multimode fiber optic port requires 50/125 or 62.5/125 micron multimode fiber optic cabling with an LC connector at both ends.

> **WARNING:** This switch uses lasers to transmit signals over fiber optic cable. The lasers are inherently eye safe in normal operation. However, user should never look directly at a transmit port when it is powered on.
> **WARNING:** When selecting a fiber SFP device, considering safety, please make sure that it can function at a temperature that is not less than the recommended maximum operational temperature of the product. You must also use an approved Laser SFP transceiver.

**Step 1.** Remove and keep the LC port's rubber plug. When not connected to a fiber cable, the rubber plug should be replaced to protect the optics.

**Step 2.** Check that the fiber terminators are clean. You can clean the cable plugs by wiping them gently with a clean tissue or cotton ball moistened with a little ethanol. Dirty fiber terminators on fiber optic cables will impair the quality of the light transmitted through the cable and lead to degraded performance on the port.

**Step 3.** Connect one end of the cable to the LC port on the switch and the other end to the LC port on the other device. Since LC connectors are keyed, the cable can be attached in only one orientation.

**Making Fiber Port Connections**



**Step 4.** As a connection is made, check the Link LED on the switch corresponding to the port to be sure that the connection is valid.

The fiber optic ports operate at 1 Gbps. The maximum length for fiber optic cable operating at Gigabit speed will depend on the fiber type as listed under "1000 Mbps Gigabit Ethernet Collision Domain".

## Connectivity Rules

When adding hubs to your network, please note that because switches break up the path for connected devices into separate collision domains, you should not include the switch or connected cabling in your calculations for cascade length involving other devices.

**1000BASE-T Cable Requirements**

All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. However, it is recommended that for all critical connections, or any new cable installations, Category 5e or Category 6 cable should be used. The Category 5e and 6 specifications include test parameters that are only recommendations for Category 5. Therefore, the first step in preparing existing Category 5 cabling for running 1000BASE-T is a simple test of the cable installation to be sure that it complies with the IEEE 802.3-2005 standards.

# Cable Labeling and Connection Records

When planning a network installation, it is essential to label the opposing ends of cables and to record where each cable is connected. This will allow user to easily locate inter-connected devices, isolate faults and change your topology without need for unnecessary time consumption.

To best manage the physical implementations of your network, follow these guidelines:

- ◆ Clearly label the opposing ends of each cable.
- ◆ Using your building's floor plans, draw a map of the location of all network-connected equipment. For each piece of equipment, identify the devices to which it is connected.
- ◆ Note the length of each cable and the maximum cable length supported by the switch ports.
- ◆ For ease of understanding, use a location-based key when assigning prefixes to your cable labeling.
- ◆ Use sequential numbers for cables that originate from the same equipment.
- ◆ Differentiate between racks by naming accordingly.
- ◆ Label each separate piece of equipment.
- ◆ Display a copy of your equipment map, including keys to all abbreviations at each equipment rack.

# Troubleshooting

## Basic Troubleshooting Tips

Most problems are caused by the following situations. Check for these items first when starting your troubleshooting:

■ **Connecting to devices that have a fixed full-duplex configuration.**

The RJ-45 ports are configured as "Auto", that is, when connecting to the attached devices, the switch will operate in one of two ways to determine the link speed and the communication mode (half duplex or full duplex):

♦ If the connected device is also configured to Auto, the switch will automatically negotiate both link speed and communication mode.

♦ If the connected device has a fixed configuration, for example 100Mbps, at half or full duplex, the switch will automatically sense the link speed, but will default to a communication mode of *half* duplex.

Because the SM16TAT2DPA Switch devices behave in this way (in *compliance with the IEEE802.3 standard*), if a device connected to the switch has a fixed configuration at full duplex, the device will not connect correctly to the switch. The result will be high error rates and very inefficient communications between the switch and the device.

Make sure all devices connected to the SM16TAT2DPA Switch devices are configured to auto negotiate, or are configured to connect at half duplex (all hubs are configured this way, for example).

■ **Faulty or loose cables.** Look for loose or obviously faulty connections. If they appear to be OK, make sure the connections are snug. If that does not correct the problem, try a different cable.

■ **Non-standard cables.** Non-standard and miswired cables may cause network collisions and other network problems, and can seriously impair network performance. Use a new correctly-wired cable.
A Category 5 cable tester is a recommended tool for every 100Base-TX and 1000Base-T network installation.

■ **Improper Network Topologies.** It is important to make sure you have a valid network topology. If you no longer experience the problems, the new topology is probably at fault. In addition, you should make sure that your network topology contains ***no data path loops.***

■ **Check the port configuration.**

A port on your Switch may not be operating as you expect because it has been put into a "blocking" state by Spanning Tree, GVRP (automatic VLANs), or LACP (automatic trunking). (Note that the normal operation of the Spanning Tree, GVRP, and LACP features may put the port in a blocking state.) Or, the port just may have been configured as disabled through software.

**Troubleshooting Chart**

| Symptom | Action |
|---|---|
| SYSTEM LED is Off | ◆ Check connections between the switch, the power cord and the wall outlet. |
| | ◆ Contact your dealer for assistance. |
| Link LED is Off | ◆ Verify that the switch and attached device are powered on. |
| | ◆ Be sure the cable is plugged into the switch and corresponding device. |
| | ◆ If the switch is installed in a rack, check the connections to the punch-down block and patch panel. |
| | ◆ Verify that the proper cable type is used and its length does not exceed specified limits. |
| | ◆ Check the adapter on the attached device and cable connections for possible defects. Replace the defective adapter or cable if necessary. |

# Power and Cooling Problems

**Installation**

If the System indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply. However, if the unit powers off after running for a while, check for loose power connections, power losses or surges at the power outlet. If you still cannot isolate the problem, the internal power supply may be defective. Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (such as the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

**In-Band Access**

You can access the management agent in the switch from anywhere within the attached network using Telnet or a web browser. However, you must first configure the switch with a valid IP address, subnet mask, and default gateway. If you have trouble establishing a link to the management agent, check to see if you have a valid network connection. Then verify that you entered the correct IP address. Also, be sure the port through which you are connecting to the switch has not been disabled. If it has not been disabled, then check the network cabling that runs between your remote location and the switch.

**NOTE:** The management agent accepts up to four simultaneous Telnet sessions. If the maximum number of sessions already exists, an additional Telnet connection will not be able to log into the system.

# Cables

## Twisted-Pair Cable and Pin Assignments

For 10/100BASE-TX connections, the twisted-pair cable must have two pairs of wires. For 1000BASE-T connections the twisted-pair cable must have four pairs of wires. Each wire pair is identified by two different colors. For example, one wire might be green and the other, green with white stripes. Also, an RJ-45 connector must be attached to both ends of the cable.
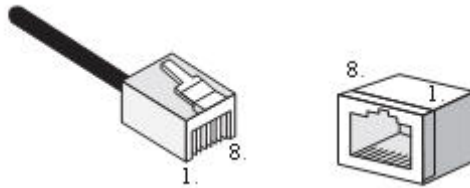
> **CAUTION:** DO NOT plug a phone jack connector into any RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform with FCC standards.
> **CAUTION:** Each wire pair must be attached to the RJ-45 connectors in a specific orientation.

The figure below illustrates how the pins on the RJ-45 connector are numbered. Be sure to hold the connectors in the same orientation when attaching the wires to the pins.

**RJ-45 Connector Pin Numbers**



## 10BASE-T/ 100BASE-TX Pin Assignments

Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100-ohm Category 3 or better cable for 10 Mbps connections, or 100-ohm Category 5 or better cable for 100 Mbps connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

The RJ-45 ports on the switch base unit support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs. In straight-through cable, pins 1, 2, 3, and 6, at one end of the cable, are connected straight through to pins 1, 2, 3, and 6 at the other end of the cable. When using any RJ-45 port on this switch, you can use either straight-through or crossover cable.

**10/100BASE-TX MDI and MDI-X Port Pinouts**

| Pin | MDI Signal Name | MDI-X Signal Name |
|-----|-----------------|-------------------|
| 1 | Transmit Data plus (TD+) | Receive Data plus (RD+) |
| 2 | Transmit Data minus (TD-) | Receive Data minus (RD-) |
| 3 | Receive Data plus (RD+) | Transmit Data plus (TD+) |
| 6 | Receive Data minus (RD-) | Transmit Data minus (TD-) |
| 4, 5, 7, 8 | Not used | Not used |

> **NOTE:** The "+" and "-" signs represent the polarity of the wires that make up each wire pair.

# Straight-Through Wiring

If the twisted-pair cable is to join two ports and only one of the ports has an internal crossover (MDI-X), the two pairs of wires must be straight-through. (When auto-negotiation is enabled for any RJ-45 port on this switch, you can use either straight-through or crossover cable to connect to any device type.)

You must connect all four wire pairs as shown in the following diagram to support Gigabit Ethernet.

## Straight-through Wiring

**EIA/TIA 568B RJ-45 Wiring Standard**
**10/100BASE-TX Straight-through Cable**



# Crossover Wiring

If the twisted-pair cable is to join two ports and either both ports are labeled with an "X" (MDI-X) or neither port is labeled with an "X" (MDI), a crossover must be implemented in the wiring. (When auto-negotiation is enabled for any RJ-45 port on this switch, you can use either straight-through or crossover cable to connect to any device type.)

You must connect all four wire pairs as shown in the following diagram to support Gigabit Ethernet.

## Crossover Wiring

**EIA/TIA 568B RJ-45 Wiring Standard**
**10/100BASE-TX Crossover Cable**

## 1000BASE-T Pin Assignments

All 1000BASE-T ports support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs.

The table below shows the 1000BASE-T MDI and MDI-X port pinouts. These ports require that all four pairs of wires be connected. Note that for 1000BASE-T operation, all four pairs of wires are used for both transmit and receive.

Use 100-ohm Category 5, 5e or 6 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for 1000BASE-T connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

### 1000BASE-T MDI and MDI-X Port Pinouts

| Pin | MDI Signal Name | MDI-X Signal Name |
|-----|-----------------|-------------------|
| 1 | Bi-directional Pair A Plus (BI_DA+) | Bi-directional Pair B Plus (BI_DB+) |
| 2 | Bi-directional Pair A Minus (BI_DA-) | Bi-directional Pair B Minus (BI_DB-) |
| 3 | Bi-directional Pair B Plus (BI_DB+) | Bi-directional Pair A Plus (BI_DA+) |
| 4 | Bi-directional Pair C Plus (BI_DC+) | Bi-directional Pair D Plus (BI_DD+) |
| 5 | Bi-directional Pair C Minus (BI_DC-) | Bi-directional Pair D Minus (BI_DD-) |
| 6 | Bi-directional Pair B Minus (BI_DB-) | Bi-directional Pair A Minus (BI_DA-) |
| 7 | Bi-directional Pair D Plus (BI_DD+) | Bi-directional Pair C Plus (BI_DC+) |
| 8 | Bi-directional Pair D Minus (BI_DD-) | Bi-directional Pair C Minus (BI_DC-) |

## Cable Testing for ExistingCAT 5 Cable

Installed Category 5 cabling must pass tests for Attenuation, Near-End Crosstalk (NEXT), and Far-End Crosstalk (FEXT). This cable testing information is specified in the ANSI/TIA/EIA-TSB-67 standard. Additionally, cables must also pass test parameters for Return Loss and Equal-Level Far-End Crosstalk (ELFEXT). These tests are specified in the ANSI/TIA/EIA-TSB-95 Bulletin, "The Additional Transmission Performance Guidelines for 100 Ohm 4-Pair Category 5 Cabling."

**NOTE:** That when testing your cable installation, be sure to include all patch cables between switches and end devices.

## Adjusting Existing CAT 5 Cabling to Run 1000BASE-T

If your existing Category 5 installation does not meet one of the test parameters for 1000BASE-T, there are basically three measures that can be applied to try and correct the problem:

1. Replace any Category 5 patch cables with high-performance Category 5e or Category 6 cables.

2. Reduce the number of connectors used in the link.

3. Reconnect some of the connectors in the link.

## Fiber Standards

The International Telecommunication Union (ITU-T) has standardized various fiber types for data networks, as summarized in the following table.

**Fiber Standards**

| ITU-T Standard | Description | Application |
|---|---|---|
| G.651 | **Multimode Fiber** 50/125-micron core | Short-reach connections in the 1300- nm or 850-nm band |
| G.652 | **Non-Dispersion-Shifted Fiber** Single-mode, 9/125-micron core | Longer spans and extended reach. Optimized for operation in the 1310- nm band. but can also be used in the 1550-nm band |
| G.652.C | **Low Water Peak Non-Dispersion-Shifted Fiber** Single-mode, 9/125-micron core | Longer spans and extended reach. Optimized for wavelength-division multiplexing (WDM) transmission across wavelengths from 1285 to 1625 nm. The zero dispersion wavelength is in the 1310-nm region. |
| G.653 | **Dispersion-Shifted Fiber** Single-mode, 9/125-micron core | Longer spans and extended reach. Optimized for operation in the region from 1500 to 1600-nm. |
| G.654 | **1550-nm Loss-Minimized Fiber** Single-mode, 9/125-micron core | Extended long-haul applications. Optimized for high-power transmission in the 1500 to 1600-nm region, with low loss in the 1550-nm band. |
| G.655 | **Non-Zero Dispersion-Shifted Fiber** Single-mode, 9/125-micron core | Extended long-haul applications. Optimized for high-power dense wavelength-division multiplexing (DWDM) operation in the region from 1500 to 1600-nm. |

# Specifications

## Physical Characteristics

| | |
|---|---|
| **Ports** | 16 10/100/1000Mbps PoE Plus copper<br>2 100/1000 SFP/RJ45 Combo |
| **Network Interface** | Ports 1-16: RJ-45 connector, auto MDI/X |
| | 10BASE-T: RJ-45 (100-ohm, UTP cable; Category 3 or better) |
| | 100BASE-TX: RJ-45 (100-ohm, UTP cable; Category 5 or better) |
| | 1000BASE-T: RJ-45 (100-ohm, UTP or STP cable; Category 5, 5e or 6) |
| | *Maximum Cable Length - 100 m (328 ft) |
| | Ports 17-18: RJ-45 connector/ (100/1000M) SFP |
| **Buffer Architecture** | 512KB on-chip frame buffer |
| **Aggregate Bandwidth** | 36 Gbps for SM16TAT2DPA |
| **Switching Database** | 8K MAC address entries |
| **LEDs** | System: POWER |
| | TP Port: status (LINK/ACT), 10/100/1000M |
| | SFP Port: status (LINK/ACT/SPD), 100/1000M |
| **Weight** | 3.3 kg (12.57 lbs) |
| **Dimensions** | Width: 17.4" [442 mm] x Depth: 8.31" [211 mm] x Height: 1.73" [44 mm] |
| **Temperature** | Operating: 0°C to 45°C (32°F to 113°F) |
| **Humidity** | Operating: 10% to 90% (non-condensing) |
| **Power Input** | 100~240VAC, 50~60Hz |
| **MTBF** | Reliability Model Telcordia Issue 1<br>Temperature 50'C<br>MTBF (hr) 175,511 |

Power-over-Ethernet      Maximum PoE budget 370 Watts 30 w for 12 ports
                         simultaneously 30 w for 8 ports and 15.4w for 8 ports
                         simultaneously

| | |
|---|---|
| **Power Supply** | For SM16TAT2DPA: Internal: 100 to 240 VAC, 50 to 60 Hz |
| **Power Consumption** | 20 Watts maximum |

## Switch Features

| | |
|---|---|
| **Forwarding Mode** | Store-and-forward |
| **Throughput** | 26.8 Mpps |
| **Flow Control** | Full Duplex: IEEE 802.3x<br>Half Duplex: Back pressure |

## Management Features

| | |
|---|---|
| **In-Band Management** | SSH/SSL, Telnet, SNMP, or HTTP |
| **Out-of-Band Management** | RJ-45 console port |
| **Software Loading** | HTTP, TFTP in-band, Console out-of-band |
| **Standards** | EEE 802.3 => 10Base-T Ethernet (Twisted-pair Copper)<br>IEEE 802.3u => 100Base-TX Ethernet (Twisted-pair Copper)<br>IEEE 802.3ab => 1000Base-TX Ethernet (Twisted-pair Copper)<br>IEEE 802.3z => 1000Base-X Ethernet<br>IEEE 802.3x => Flow Control Capability<br>ANSI/IEEE 802.3 => Auto-negotiation<br>IEEE 802.1Q => VLAN<br>IEEE 802.1p => Class of Service<br>IEEE 802.1X => Access Control<br>IEEE 802.1D => Spanning Tree<br>IEEE 802.1w => Rapid Spanning Tree<br>IEEE 802.1s => Multiple Spanning Tree<br>IEEE 802.3ad => ink Aggregation Control Protocol (LACP)<br>IEEE 802.1AB => Link Layer Discovery Protocol (LLDP)<br>IEEE 802.3at => Compliant with 802.3at in Environment A when using an isolated power supply. For 802.3at Environment B applications, use mid-span injector (s), e.g. MIL-L100i, L1000i-at, between this switch's PSE port and link partner PD port. |

## Compliances

**Emissions**            EN55022 (CISPR 22) Class A EN 61000-3

                         FCC Class A

                         CE Mark

**Immunity**             EN 61000-4-2/3/4/5/6/8/11

                         EN 55024

# Service, Warranty & Tech Support

## 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 7:00 AM to 6:00 PM CST
Chat live via the Web with Transition Networks Technical Support.
Log onto www.transition.com and click the Tech Support/Transition Now link.

**Web-Based Seminars**
Transition Networks provides seminars via live web-based training.
Log onto www.transition.com and click the Learning Center link.

**E-Mail**
To ask a question anytime, send an e-mail to our technical support staff at
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

## Warranty

**Limited Lifetime Warranty**

Effective for Products Shipped May 1, 1999 and After. Every Transition Networks labeled product purchased after May 1, 1999, and not covered by a fixed-duration warranty will be free from defects in material and workmanship for its lifetime. This warranty covers the original user only and is not transferable.

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 of the product's specified rating, or normal wear and tear of mechanical components. If the user is unsure about the proper means of installing or using the equipment, contact Transition Networks's free technical support services.
Transition Networks will, at its option:

• Repair the defective product to functional specification at no charge
• Replace the product with an equivalent functional product
• Refund a portion of purchase price based on a depreciated value

## Return Authorization

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

## Service Hours

USA: 8:00 PM Sunday through 8:00 PM Friday CST

After Hours: Calls will be answered by an on call engineer.

## Direct Contact Numbers

Domestic: + 1 800-260-1312

International: + 1 952-358-3601

Fax: +1 952-941-2322

Email: techsupport@transition.com    Online Support

Live Help: Chat live with a Transition Networks representative.

## Return Instructions

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."

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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

Printed in the U.S.A.

SM16TAT2DPA Install Guide 33661 Rev. B