

SmartNode™ 4980 & 4990 Series **Multi-Port T1 / E1 / PRI VoIP Gateway-Router and IAD**

User Manual



Important

This is a Class A device and is not intended for use in a residential environment.

If a copper module is used, it may void the CE Certification. This product is intended for Fiber SFP modules only.

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Important Information

To use virtual private network (VPN) and/or AES/DES/3DES encryption capabilities with the SmartNode 4980 and 4990 Series, you may need to purchase additional licenses, hardware, software, network connection, and/or service. Contact sales@patton.com or +1 (301) 975-1000 for assistance.

Warranty Information

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license. For information about the license, see [Appendix F, "End User License Agreement"](#) on page 61 or go to www.patton.com.

Patton Electronics warrants all SmartNode components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of the shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If the product fails to perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall Patton Electronics be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. Patton Electronics specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

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About This Guide

This guide describes the SmartNode 4980 and 4990 Series hardware, installation and basic configuration. For detailed software configuration information refer to the *SmartWare Software Configuration Guide* and the available Configuration Notes.

Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters and appendices:






- [Chapter 1](#) on page 13 provides information about SmartNode features and capabilities
- [Chapter 2](#) on page 22 contains an overview describing SmartNode operation and applications
- [Chapter 3](#) on page 24 provides hardware installation procedures
- [Chapter 4](#) on page 30 provides quick-start procedures for configuring the SmartNode
- [Chapter 5](#) on page 35 contains information on contacting Patton technical support for assistance
- [Appendix A](#) on page 38 contains compliance information for the SmartNode
- [Appendix B](#) on page 42 contains specifications for the SmartNodes
- [Appendix C](#) on page 49 provides cable recommendations
- [Appendix D](#) on page 54 describes the SmartNode's ports and pin-outs
- [Appendix E](#) on page 58 lists the factory configuration settings for the SmartNode
- [Appendix F](#) on page 61 provides license information that describes acceptable usage of the software provided with the SmartNode

For best results, read the contents of this guide *before* you install the SmartNode.

Precautions

Notes, cautions, and warnings, which have the following meanings, are used throughout this guide to help you become aware of potential problems. **Warnings** are intended to prevent safety hazards that could result in personal injury. **Cautions** are intended to prevent situations that could result in property damage or impaired functioning.

Note A note presents additional information or interesting sidelights.

- | | |
|--|---|
| 
IMPORTANT | The alert symbol and IMPORTANT heading calls attention to important information. |
| 
CAUTION | The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage. |
| 
CAUTION | The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock. |
| 
WARNING | The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury. |
| 
WARNING | The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock. |

Safety when working with electricity



- Do not open the device when the power cord is connected. For systems without a power switch and without an external power adapter, line voltages are present within the device when the power cord is connected.
- For devices with an external power adapter, the power adapter shall be a listed *Limited Power Source*. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker in compliance with local regulatory requirements.
- For AC powered devices, ensure that the power cable used meets all applicable standards for the country in which it is to be installed.
- For AC powered devices which have 3 conductor power plugs (L1, L2 & GND or Hot, Neutral & Safety/Protective Ground), the wall outlet (or socket) must have an earth ground.
- For DC powered devices, ensure that the interconnecting cables are rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.
- WAN, LAN & PSTN ports (connections) may have hazardous voltages present regardless of whether the device is powered ON or OFF. PSTN relates to interfaces such as telephone lines, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voice, etc. These are known as "hazardous network voltages" and to avoid electric shock use caution when working near these ports. When disconnecting cables for these ports, detach the far end connection first.
- Do not work on the device or connect or disconnect cables during periods of lightning activity



This device contains no user serviceable parts. This device can only be repaired by qualified service personnel.



This device is NOT intended nor approved for connection to the PSTN. It is intended only for connection to customer premise equipment.



In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.



Always follow ESD prevention procedures when removing and replacing cards.

Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground.

To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

General observations

- Clean the case with a soft slightly moist anti-static cloth
- Place the unit on a flat surface and ensure free air circulation
- Avoid exposing the unit to direct sunlight and other heat sources
- Protect the unit from moisture, vapors, and corrosive liquids


Typographical Conventions Used in this Document

This section describes the typographical conventions and terms used in this guide.

General conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the Go to Previous View button  in the Adobe® Acrobat® Reader toolbar to return to your starting point.
Futura bold type	Commands and keywords are in boldface font.
Futura bold-italic type	Parts of commands, which are related to elements already named by the user, are in boldface italic font.
Italicized Futura type	Variables for which you supply values are in <i>italic</i> font
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.
< >	Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on.
[]	Elements in square brackets are optional.
{ a b c }	Alternative but required keywords are grouped in braces ({ }) and are separated by vertical bars ()
screen	Terminal sessions and information the system displays are in <i>screen font</i> .
node	The leading IP address or nodename of a SmartNode is substituted with node in boldface italic font.
SN	The leading SN on a command line represents the nodename of the SmartNode
#	An hash sign at the beginning of a line indicates a comment line.

Chapter 1 **General Information**

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SmartNode 4980 and 4990 Series Overview

The SmartNode 4980 and 4990 T1/E1 PRI VoIP Router (see Figure 1) combines Universal SIP Trunking, IP routing, VPN/Security, and Quality of Service with high-quality Voice over IP (VoIP) delivered on 1 to 4 Primary Rate Interfaces (PRI T1/E1). This combination paves the way for enterprises' migration to unified communications by integrating legacy telephone systems with PSTN and VoIP networks.



Figure 1. SmartNode 4980 (left) and SmartNode 4990 (right)

The SmartNode 4980 Gateway-Router and SmartNode 4990 IAD perform the following major functions:

- **Up to 120 VoIP Calls**—Up to 120 simultaneous voice or T.38 fax calls with one to four T1/E1/PRI ports and dual Gigabit Ethernet ports. Use any CODEC or fax on any port, any time.
- **Unified Communications Agent™**—Provides any-to-any multi-path switching with VoIP and data survivability, VoIP-over-VPN security with AES/DES strong encryption, Internet Key Exchange (IKE), and SIP Registrar
- **Universal SIP and T.38 Support**—Softswitch-certified signaling support between all T1 RBS CAS, ISDN PRI, Q.SIG, SIP and H.323.
- **Secure Toll-Quality VoIP**—Patton's DownStreamQoS™ and Voice-over-VPN with adaptive traffic management and shaping for maximum voice quality and secure voice communication.
- **IP Routing**—RIP v1/v2, VRRP, policy-based routing, and loopback interface
- **Transparent Telephony Features**—Complex number manipulation and mapping for seamless integration with existing infrastructures, CLIP, CLIR, hold, transfer and much more.
- **Management & Provisioning**—Web-based management, SNMP, Command Line Interface. Automated provisioning for easy large-scale deployments.
- **Optional High Precision Clock**—Delivers DECT PBX interoperability with reliable fax performance.
- **G.SHDSL, ADSL, X.21 or Fiber Broadband Access**—Complete Access Router with integrated G.SHDSL.bis WAN interface delivers symmetrical throughput up to 11.4 Mbps over four wires or up to 5.7 Mbps over two wires, 14 Mbps ADSL WAN interface, up to 2 Mbps X.21 interface or 100 Mbps / 1000 Mbps Fiber interface. Supports ATM QoS with multiple PVCs and outstanding DSLAM interoperability.

SN4980 Series model codes

The SmartNode 4980 series consists of several models. They differ in the number of PRI ports and voice channels supported. All models come equipped with two 10/100/1000Base-T Ethernet ports. The SmartNode 4980 PRI ports and voice channels are listed in [Table 2](#), and high precision clock models are listed in [Table 3](#).

Table 2. SmartNode 4980 PRI Ports and Voice Channels

Model	PRI Ports	Voice Channels	Relay	Internal Power	High Precision Clock
SN4980/1E15V/EUI	1	15	–	–	–
SN4980/1E24V/EUI	1	24	–	–	–
SN4980/1E30V/EUI	1	30	–	–	–
SN4980/4E15VR/EUI	4	15	✓	–	–
SN4980/4E24VR/EUI	4	24	✓	–	–
SN4980/4E30VR/EUI	4	30	✓	–	–
SN4980/4E48VR/EUI	4	48	✓	–	–
SN4980/4E60VR/EUI	4	60	✓	–	–
SN4980/4E96VR/EUI	4	96	✓	–	–
SN4980/4E120VR/EUI	4	120	✓	–	–
SN4980/4E30V120R/EUI	4	30	✓	–	–
SN4980/4E30V120R/UI	4	30	✓	✓	–

The high precision SmartNode 4981 models have a Stratum III clock that provides a clock source of < 5 ppm. The SN4981 can provide a PSTN-equivalent clock for PBXs that used to rely on PSTN for an accurate clock source. The popular DECT PBX needs such high precision clocks.

Table 3. SmartNode 4981 PRI Ports and Voice Channels

Model	PRI Ports	Voice Channels	Relay	Internal Power	High Precision Clock
SN4981/1E15V/EUI	1	15	–	–	✓
SN4981/1E24V/EUI	1	24	–	–	✓
SN4981/1E30V/EUI	1	30	–	–	✓
SN4981/4E15VR/EUI	4	15	✓	–	✓
SN4981/4E24VR/EUI	4	24	✓	–	✓
SN4981/4E30VR/EUI	4	30	✓	–	✓
SN4981/4E48VR/EUI	4	48	✓	–	✓
SN4981/4E60VR/EUI	4	60	✓	–	✓
SN4981/4E96VR/EUI	4	96	✓	–	✓
SN4981/4E120VR/EUI	4	120	✓	–	✓
SN4981/4E30V120R/EUI	4	30	✓	–	✓
SN4981/4E30V120R/UI	4	30	✓	✓	✓

SN4990 Series model codes

The SmartNode 4990 series consists of several models. They differ in the number of PRI ports and voice channels supported. All SN4991 models come equipped with two 10/100/1000Base-T Ethernet ports and a high precision clock. The SmartNode 4991 models are listed in [Table 4](#), [Table 5](#), [Table 6](#) and [Table 7](#).

For SN4991 models, the Stratum III high precision clock provides a clock source of < 5 ppm. For PBXs that used to rely on PSTN for accurate clock source, the SmartNode 4991 can provide a PSTN-equivalent high precision clock. The popular DECT PBX needs such high precision clocks.

Table 4. SmartNode 4991 G.SHDSL Models: PRI Ports and Voice Channels

Model	PRI Ports	Voice Channels	Relay	G.SHDSL	High Precision Clock
SN4991/1E15V2GS/EUI	1	15	–	✓	✓
SN4991/1E24V2GS/EUI	1	24	–	✓	✓
SN4991/1E30V2GS/EUI	1	30	–	✓	✓
SN4991/4E15VR2GS/EUI	4	15	✓	✓	✓
SN4991/4E24VR2GS/EUI	4	24	✓	✓	✓
SN4991/4E30VR2GS/EUI	4	30	✓	✓	✓
SN4991/4E48VR2GS/EUI	4	48	✓	✓	✓
SN4991/4E60VR2GS/EUI	4	60	✓	✓	✓
SN4991/4E96VR2GS/EUI	4	96	✓	✓	✓
SN4991/4E120VR2GS/EUI	4	120	✓	✓	✓
SN4991/4E30V120R2GS/EUI	4	30	✓	✓	✓

Table 5. SmartNode 4991 Fiber Model: PRI Ports and Voice Channels

Model	PRI Ports	Voice Channels	Relay	X.21	High Precision Clock
SN4991/1E15VF/EUI	1	15	–	✓	✓
SN4991/1E24VF/EUI	1	24	–	✓	✓
SN4991/1E30VF/EUI	1	30	–	✓	✓
SN4991/4E120VRF/EUI	4	120	✓	✓	✓
SN4991/4E24VRF/EUI	4	15	✓	✓	✓
SN4991/4E24VRF/EUI	4	24	✓	✓	✓
SN4991/4E30V120RF/EUI	4	120	✓	✓	✓
SN4991/4E30VRF/EUI	4	30	✓	✓	✓
SN4991/4E48VRF/EUI	4	48	✓	✓	✓
SN4991/4E60VRF/EUI	4	60	✓	✓	✓
SN4991/4E96VRF/EUI	4	96	✓	✓	✓

Table 6. SmartNode 4991 ADSL Models: PRI Ports and Voice Channels

Model	PRI Ports	Voice Channels	Relay	ADSL	High Precision Clock
SN4991/1E15VA/EUI	1	15	–	✓	✓
SN4991/1E30VA/EUI	1	30	–	✓	✓
SN4991/4E15VRA/EUI	4	15	✓	✓	✓
SN4991/4E30VRA/EUI	4	30	✓	✓	✓

Table 7. SmartNode 4991 X.21 Models: PRI Ports and Voice Channels

Models	PRI Ports	Voice Channels	Relay	X.21	High Precision Clock
SN4991/1E15VD/EUI	1	15	–	✓	✓
SN4991/1E24VD/EUI	1	24	–	✓	✓
SN4991/1E30VD/EUI	1	30	✓	✓	✓
SN4991/4E15VRD/EUI	4	15	✓	✓	✓
SN4991/4E24VRD/EUI	4	24	✓	✓	✓
SN4991/4E30VRD/EUI	4	30	✓	✓	✓
SN4991/4E48VRD/EUI	4	48	✓	✓	✓
SN4991/4E60VRD/EUI	4	60	✓	✓	✓
SN4991/4E96VRD/EUI	4	96	✓	✓	✓
SN4991/4E120VRD/EUI	4	120	✓	✓	✓
SN4991/4E30V120RD/EUI	4	30	✓	✓	✓

SmartNode 4980 and 4990 Series Rear Panels

The SmartNode 4980 and 4990 rear panel ports are described in Table 8 on page 19.

SN4980 Series rear panel

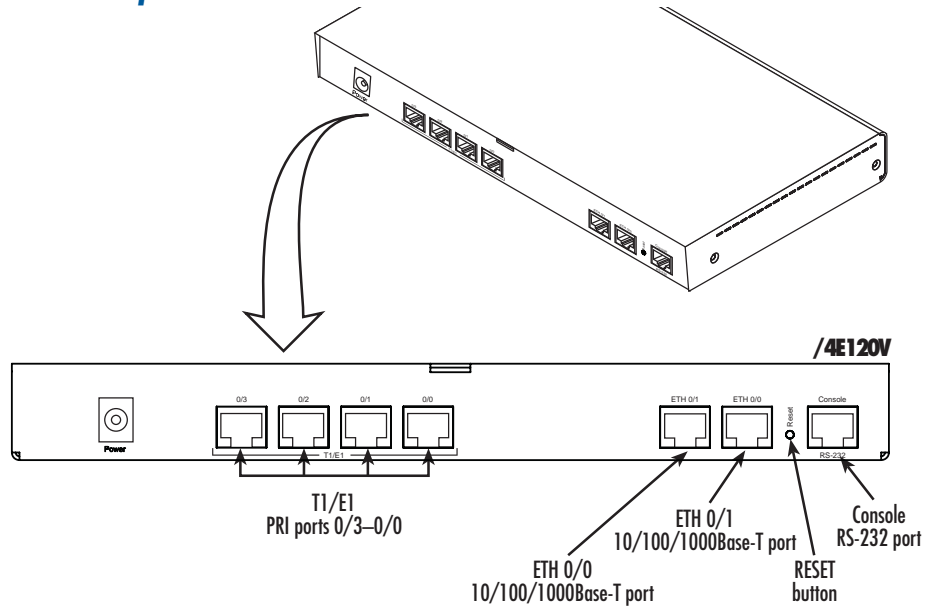


Figure 2. SN4980/SN4981 Rear Panel

SN4990 Series rear panel

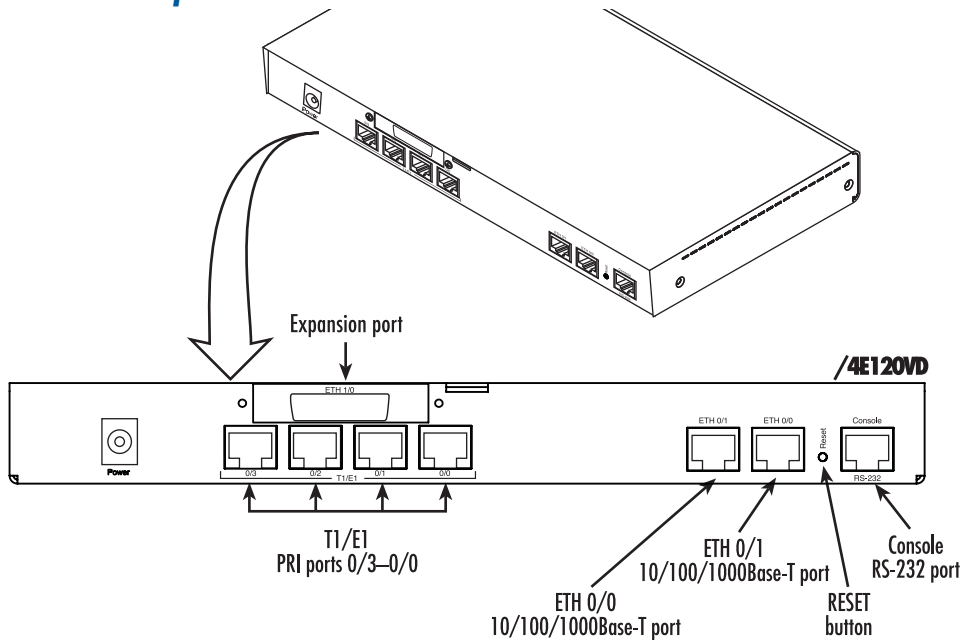


Figure 3. SN4991 Rear Panel

Table 8. Rear panel ports

Port	Description
ETH 0/0-0/1 (SN4991 models only)	Auto-MDX Gigabit-Ethernet port, RJ-45 (see Figure 2), connects the unit to an Ethernet Expansion device (for example, a cable modem, DSL modem, or fiber modem). Note: Only full duplex modes are supported.
LAN ETH 0/1-0/1 (SN4980/4981 models only)	Auto-MDX Gigabit-Ethernet port, RJ-45 (see Figure 2), connect the unit to an Ethernet LAN (for example, a PC, printer, or wireless bridge). Note: Only full duplex modes are supported.
PRI 0/0-0/3	RJ-45 connector providing E1 (2.048Mbps) or T1 (1.533 Mbps) PRI interface, meeting all requirements of ITU-T recommendations for G.703. Use a shielded E1 or T1 interface cable for 120 Ohm balanced connections to connect the SmartNode with an NT or ET, e.g. a PBX or LE.
Expansion Port G.SHDSL, ADSL, SFP or X.21 (SN4991 /2GS models only)	The G.SHDSL, ADSL, SFP or X.21 LEDs are located on either side of the DSL port. ACT (when lit or blinking) shows Activity, and LINK (when lit) shows that the DSL port is connected.
Console	Used for service and maintenance, the Console port (see Figure 2), an RS-232 RJ-45 connector, connects the product to a serial terminal such as a PC or ASCII terminal (also called a dumb terminal).
12V DC, 1.0A	Electricity supply socket. (see Figure 2).
Reset	The reset button (see Figure 2) has three functions: <ul style="list-style-type: none"> • Restart the unit with the current startup configuration—Press (for less than 1 second) and release the <i>Reset</i> button to restart the unit with the current startup configuration. • Restart the unit with factory default configuration—Press the <i>Reset</i> button for 5 seconds until the <i>Power</i> LED starts blinking to restart the unit with factory default configuration. • Restart the unit in bootloader mode (to be used only by trained SmartNode technicians)—Starting with the unit powered off, press and hold the <i>Reset</i> button as you apply power to the unit. Release the <i>Reset</i> button when the <i>Power</i> LED starts blinking so the unit will enter bootloader mode.

SmartNode 4980 and 4990 Series Front Panel

Figure 4 shows the SmartNode’s front panel LEDs. The LED definitions are listed in Table 9.

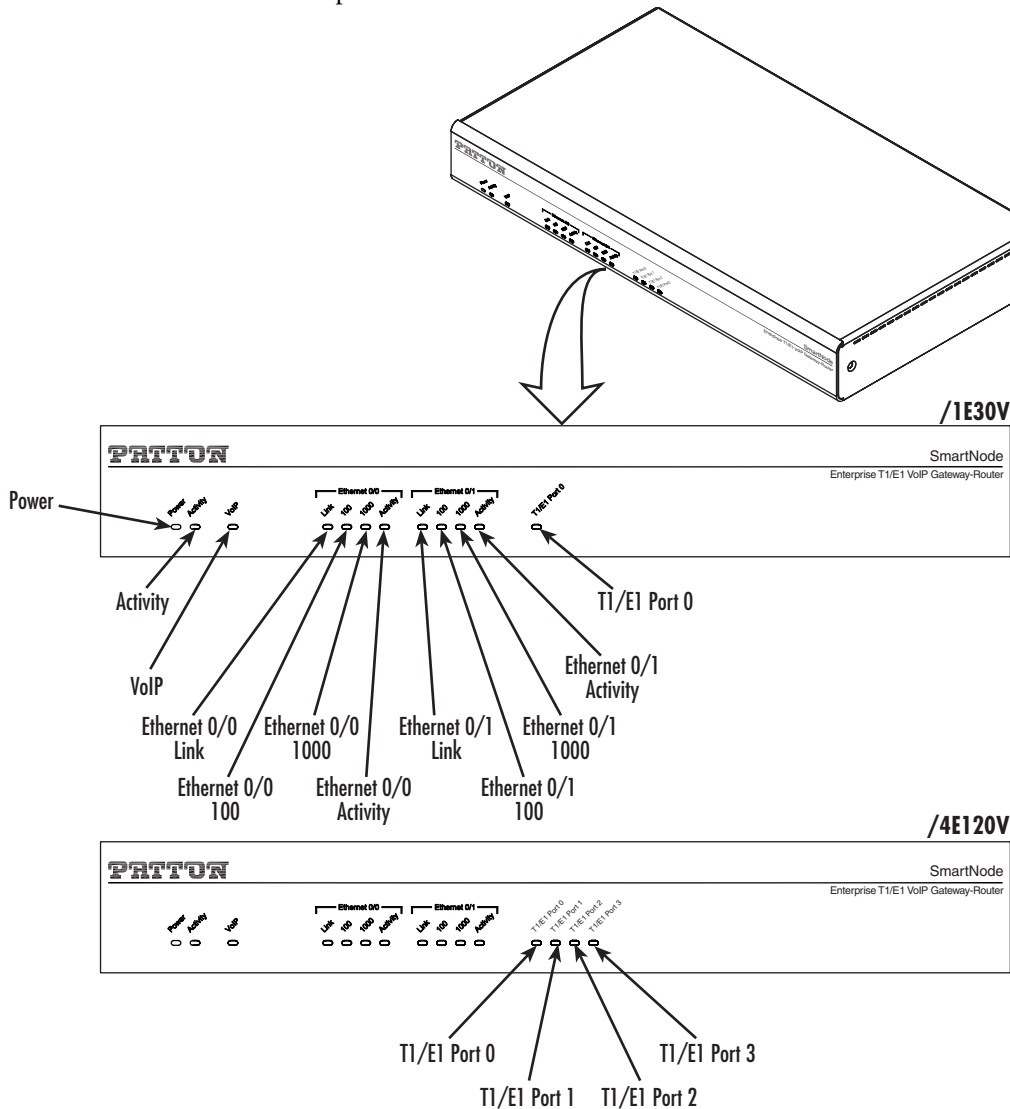


Figure 4. SmartNode 4980/4990 front panel

Table 9. LED Definitions

LED	Description
Note	If an error occurs, all LEDs will flash once per second.
Power	When lit, indicates power is applied.
Run	When lit, the unit is in normal operation; flashes once per second during boot (start-up).

Table 9. LED Definitions

LED	Description
VoIP Link	<ul style="list-style-type: none"> • On indicates the gateway is registered to an H.323 gatekeeper/SIP server, or, in the case of direct routing, has at least one active VoIP connection. • Off indicates the unit is not configured or registered, or has no active direct-routed VoIP connection. • Flashing green indicates that the unit is attempting to register or has failed to register.
Ethernet Link	<ul style="list-style-type: none"> • On when the Ethernet connection on the corresponding port has a link indication.
Ethernet Speed 10/100	<p>When the Ethernet Link LED is on, then:</p> <ul style="list-style-type: none"> • On when the Ethernet is connected to a 100Mb network. • Off when the Ethernet is connected to a 10Mb network.
Ethernet Speed 1000	<ul style="list-style-type: none"> • On when the Ethernet is connected to a 1000Mb network.
Ethernet Activity	<ul style="list-style-type: none"> • Flashes when data is received or transmitted at the corresponding Ethernet port.
PRI Link/Status	<ul style="list-style-type: none"> • On = in frame, no errors • Flash = Error • Fast Flash = Signal detected but no frame synchronization or acquisition is in process • Slow Flash = Framing synchronized, Signaling not established
G.SHDSL ACT (Rear panel)	<ul style="list-style-type: none"> • Flashes when data is received or transmitted • Off = No activity
G.SHDSL Link (Rear panel) *note: SFP, ADSL or X.21	<ul style="list-style-type: none"> • On when the G.SHDSL connection on the corresponding port has a link indication. • Off = No G.SHDSL connection

Chapter 2 **Applications Overview**

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Typical Application

IP-enable legacy PBX systems with an Enterprise-class SmartNode 4980 VoIP Gateway-Router or SmartNode 4990 Integrated Access Device. The SN4980 and SN4990 support up to 120 concurrent VoIP calls.

The SN4980 with built-in IP Router enables Enterprises to connect existing PBX systems with advanced IP telephony services and the PSTN. With built-in G.SHDSL, ADSL, Fiber or X.21, the SN4990 enables Broadband Providers to connect existing PBX systems with advanced IP telephony services and the PSTN.

Combining a VoIP gateway with an IP router, the SmartNode 4980 and 4990 Series adds QoS and VPN security, making it the ideal solution for secure prioritized communications.

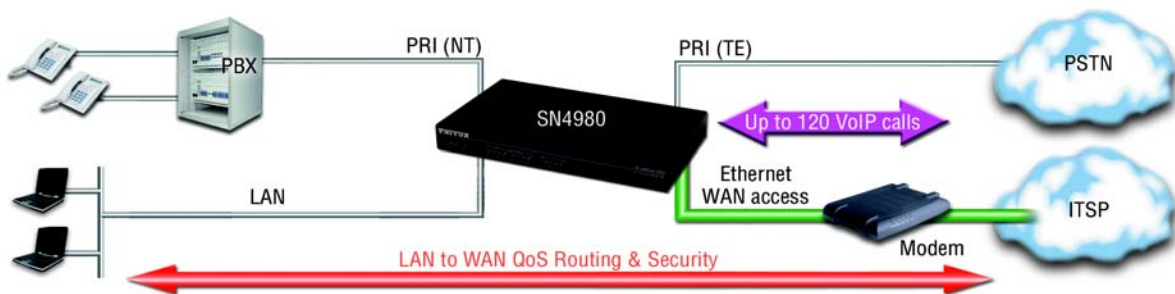


Figure 5. SN4980 application

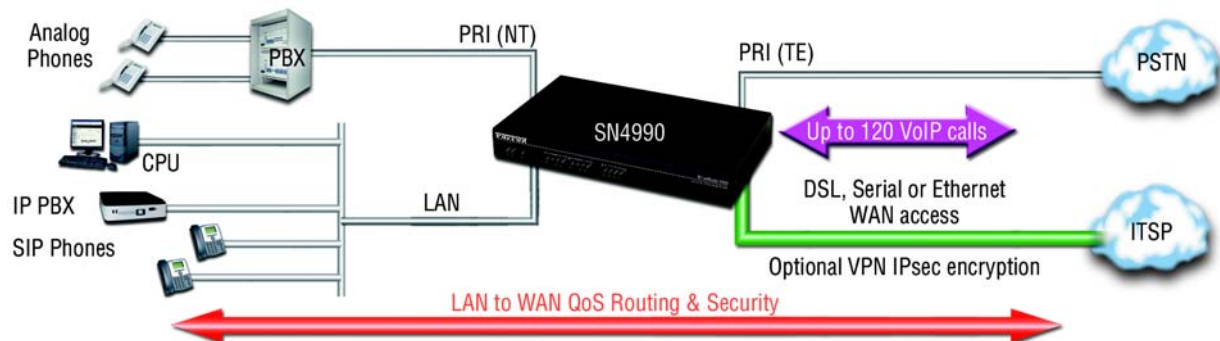


Figure 6. SN4990 application

Chapter 3 **SmartNode Installation**

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Planning the Installation

Before installing the SmartNode, the following tasks should be completed:

- **Create a network diagram** (see section “[Network information](#)” on page 25)
- **Gather IP related information** (see section “[IP related information](#)” on page 25 for more information)
- **Install the hardware and software needed to configure the SmartNode.** (See section “[Software tools](#)” on page 26)
- **Verify power source reliability** (see section “[AC Power Mains](#)” on page 26).

After you have finished preparing for installation, go to the section “[Installing the SmartNode](#)” on page 26 to install the device.

Site log

Patton recommends that you maintain a site log to record all actions relevant to the system, if you do not already keep such a log. Site log entries should include information such as listed in [Table 10](#).

Table 10. Sample site log entries

Entry	Description
Installation	Make a copy of the installation checklist and insert it into the site log
Upgrades and maintenance	Use the site log to record ongoing maintenance and expansion history
Configuration changes	Record all changes and the reasons for them
Maintenance	Schedules, requirements, and procedures performed
Comments	Notes, and problems
Software	Changes and updates to SmartWare software

Network information

Network connection considerations that you should take into account for planning are provided for several types of network interfaces are described in the following sections.

Network Diagram

Draw a network overview diagram that displays all neighboring IP nodes, connected elements and telephony components.

IP related information

Before you can set up the basic IP connectivity for your SmartNode, you should have the following information:

- IP addresses used for Ethernet LAN and WAN ports
- Subnet mask used for Ethernet LAN and WAN ports

- IP addresses of central H.323 gatekeeper (if used)
- IP addresses and/or URL of SIP servers or Internet telephony services (if used)
- Login and password for PPPoE Access
- Login and password for SIP or H.323 based telephony services
- IP addresses of central TFTP server used for configuration upload and download (optional)

Software tools

You will need a PC (or equivalent) with Windows Telnet or a program such as *Tera Term Pro Web* to configure the software on your SmartNode.

AC Power Mains

If you suspect that your AC power is not reliable, for example if room lights flicker often or there is machinery with large motors nearby, have a qualified professional test the power. Patton recommends that you include an uninterruptible power supply (UPS) in the installation to ensure that VoIP service is not impaired if the power fails. Refer to “[Connecting the SmartNode to the power supply](#)” on page 29.

Location and mounting requirements

The SmartNode is intended to be placed on a desktop or similar sturdy, flat surface that offers easy access to the cables. Allow sufficient space at the rear of the chassis for cable connections. Additionally, you should consider the need to access the unit for future upgrades and maintenance.

Note Under the rack mount option, the chassis can be equipped with rack mount ears that allow for use in a 19” rack.

Installing the SmartNode

SmartNode hardware installation consists of the following:

- Placing the device at the desired installation location (see section “[Placing the SmartNode](#)” on page 26)
- Connecting the interface and power cables (see section “[Installing cables](#)”)

When you finish installing the SmartNode, go to chapter 4, “[Initial Configuration](#)” on page 30.

Placing the SmartNode

Place the unit on a desktop or similar sturdy, flat surface that offers easy access to the cables. The unit should be installed in a dry environment with sufficient space to allow air circulation for cooling.

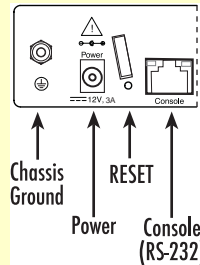
Note For proper ventilation, leave at least 2 inches (5 cm) to the left, right, front, and rear of the unit.

Ground Connection



IMPORTANT

To be compliant with safety regulations (EN60950-1, UL60950-1 and CAN/CSA-C22.2 No 60950), the ground terminal must be connected to a reliable ground.



Installing cables



WARNING

Do not work on the system or connect or disconnect cables during periods of lightning activity.

Connect the cables in the following order:



CAUTION

The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

1. Connect the T1/E1 cables to the PRI T1/E1 ports (see [Appendix C on page 49](#) and [Appendix D on page 54](#)).
2. Connect the 10/100/1000Base-T Ethernet LAN and WAN (see section “[Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables](#)” on page 27)
3. Connect the power mains cable (see section “[Connecting the SmartNode to the power supply](#)” on page 29)

Connecting the PRI

The SmartNode comes with one or four PRI ports. These ports are usually connected to a PBX or switch (local exchange (LE)). Each PRI T1/E1 port is a RJ-48C receptacle. In most cases, a straight-through RJ-45 can be used to connect the PRI. Each port can be configured as NT (clock master) or TE (clock slave).

For details on the PRI port pin-out and ISDN cables, refer to Appendix C, “Cabling” on page 43 and Appendix D, “port pin-outs” on page 47.

Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables

The SmartNode has automatic MDX (auto-crossover) detection and configuration on all Ethernet ports. Any of the ports can be connected to a host or hub/switch with a straight-through or cross-over wired cable.

1. Connect to the subscriber port of the broadband access modem (DSL, cable, WLL) to *ETH 0/0*.

Note The SmartNode Ethernet ports operate in Full Duplex mode only. Do not connect to Half Duplex ports. For best results, use auto-negotiation. Auto negotiation is mandatory when using 1000BaseT (Gigabit) Ethernet.

2. Connect port ETH 0/1 to your LAN.

For details on the Ethernet port pinout and cables, refer to [Appendix C, “Cabling”](#) on page 49 and [Appendix D, “Port Pin-outs”](#) on page 54.

Installation cable requirements for the DSL WAN cable (SN4991 /2GS Models)

The SmartNode Model 4991 comes with an option for a G.SHDSL or ADSL WAN interface. Use a straight-through RJ-45 cable to connect the G.SHDSL port.

For details on the G.SHDSL port pinout, refer to [“G.SHDSL Port \(/2GS models only\)”](#) on page 56.

Installation cable requirements for the X.21 WAN cable (SN4991 /D Models)

The SmartNode Model 4991 comes with an option for an X.21 serial interface. Insert the X.21 WAN cable’s DB-15 male end into the DB-15 connector on the SN4991. Plug the other end of the cable into the X.21 device.

For details on the X.21 interface pinout, refer to [“X.21 DB-15 Connector \(/D models only\)”](#) on page 57.

Installation cable requirements for the SFP for Fiber WAN module (SN4991)

The SmartNode Model 4991 comes with an option for an SFP for Fiber WAN module. For details about the tested and compatible SFP modules see <http://www.patton.com/products/sfpmodules.asp>.

Connecting the SmartNode to the IP network

The SmartNode comes with four 10/100 Base-Tx Ethernet ports for connection to an IP network. The Ethernet WAN interface is factory-configured as a DHCP client, so you must connect the SmartNode to an IP network that provides a DHCP server.

The Ethernet port (ETH) includes an automatic MDX (auto-crossover) feature that automatically detects the cable configuration and adjusts accordingly. The feature allow you to use a straight-through Ethernet cable to connect to an Ethernet hub or switch. Typically the hub or switch will connect to a router that provides the the local-residential IP network with broadband Internet access.

Using the included black Ethernet cable, connect the RJ-45 Ethernet WAN port on your SmartNode (labeled ETH), to an Ethernet hub or switch on the same network as your PC.

For details on the Ethernet port pinout and cables, refer to [Appendix C, “Cabling”](#) on page 48 and [Appendix D, “Port Pin-outs”](#) on page 51.

Connecting the SmartNode’s DSL or Fiber port (SN4670 series only)

The SmartNode Models 4670 and 4671 come with a G.SHDSL, ADSL or Fiber interface. Use a straight-through RJ-45 cable to connect the DSL port or a fiber optic cable to connect to the SFP port.

Connecting the SmartNode to the power supply



- Do not connect power to the AC Mains at this time.
- The external power adapter shall be a listed Limited Power Source.
- The 4980 external power supply automatically adjusts to accept an input voltage from 100 to 240 VAC (50/60 Hz). Verify that the proper voltage is present before plugging the power cord into the receptacle. Failure to do so could result in equipment damage.



- The external power supply automatically adjusts to accept an input voltage from 100 to 240 VAC (50/60 Hz).
- Verify that the proper voltage is present before plugging the power cord into the receptacle. Failure to do so could result in equipment damage.

1. Insert the barrel type connector end of the AC power cord into the *12V DC, 1.0A* port (see [Figure 7](#)).
2. Insert the female end of the power cord into the internal power supply connector.

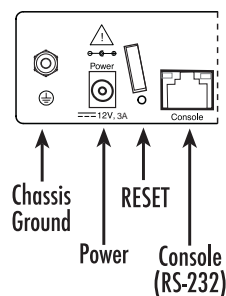


Figure 7. Power connector location on rear panel

3. Verify that the AC power cord included with your SmartNode is compatible with local standards. If it is not, refer to chapter 5, “[Contacting Patton for Assistance](#)” on page 35 to find out how to replace it with a compatible power cord.
4. Connect the male end of the power cord to an appropriate power outlet.
5. Verify that the green *Power* LED is lit (see [Figure 7](#)).

Chapter 4 **Initial Configuration**

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Introduction

This chapter leads you through the basic steps to set up a new SmartNode and to download a configuration. Setting up a new SmartNode consists of the following main steps:

Note If you haven't already installed the SmartNode, refer to chapter 3, “SmartNode Installation” on page 24.

- Connecting the SmartNode to your laptop PC
- Configuring the desired IP address
- Connecting the SmartNode to the network
- Loading the configuration (optional)

1. Connecting the SmartNode to your Laptop PC

First the SmartNode must be connected to the mains power supply with the power cable. Wait until the *Power* LED stops blinking and stays lit constantly. Now the SmartNode is ready.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

The SmartNode 4980 and 4990 Series is equipped with Auto-MDX Ethernet ports, so you can use straight-through cables for host or hub/switch connections (see [Figure 8](#)).

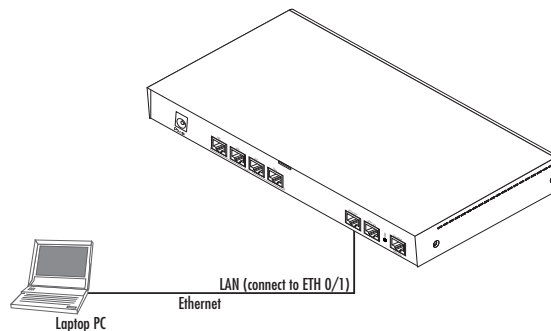


Figure 8. Connecting the SmartNode to your laptop PC

The SmartNode comes with a built-in DHCP server to simplify configuration. Therefore, to automatically configure the PC for IP connectivity to the SmartNode, the laptop PC must be configured for DHCP. The SmartNode will provide the PC with an IP address. You can check the connection to the SmartNode by executing the ping command from the PC command window as follows:

```
ping 192.168.1.1
```

2. Configuring the Desired IP Address

Factory-default IP settings

The factory default configuration for the Ethernet interface IP addresses and network masks are listed in Table 11. Both Ethernet interfaces are activated upon power-up. LAN interface *ETH 0/1 (LAN)* provides a default DHCP server, the WAN interface uses DHCP client to automatically assign the IP address and network mask.

Table 11. Factory default IP address and network mask configuration

	IP Address	Network Mask
WAN interface Ethernet 0 (ETH 0/0)	DHCP	DHCP
LAN interface Ethernet 1 (ETH 0/1)	192.168.1.1	255.255.255.0
DHCP address range	192.168.1.10–192.168.1.99	255.255.255.0

If these addresses match with those of your network, go to section “3. Connecting the SmartNode to the Network” on page 33. Otherwise, refer to the following sections to change the addresses and network masks.

Note For configuring the IP address of the integrated WAN interface (G.SHDSL), please refer to Chapter 5, “G.SHDSL Basic Configuration” on page 36.

Login

To access the SmartNode, start the Telnet application. Type the default IP address for the SmartNode into the address field: **192.168.1.1**. Accessing your SmartNode via a Telnet session displays the login screen. Type the factory default login: *administrator* and leave the password empty. Press the *Enter* key after the password prompt.

```
login:administrator
password: <Enter>
192.168.1.1>
```

After you have successfully logged in you are in the operator execution mode, indicated by > as command line prompt. With the commands *enable* and *configure* you enter the configuration mode.

```
192.168.1.1>enable
192.168.1.1#configure
192.168.1.1(cfg)#
```

Changing the WAN IP address

Select the context IP mode to configure an IP interface.

```
192.168.1.1(cfg)#context ip router
192.168.1.1(ctx-ip) [router]#
```


Now you can set your IP address and network mask for the interface *ETH 0/0* (*WAN*). Within this example a network 172.16.1.0/24 address is assumed. The IP address in this example is set to 172.16.1.99 (you should set this the IP address given to you by your network provider).

```
192.168.1.1(ctx-ip) [router] #interface WAN
192.168.1.1(if-ip) [WAN] #ipaddress 172.16.1.99 255.255.255.0
2002-10-29T00:09:40 : LOGINFO      : Link down on interface WAN.
2002-10-29T00:09:40 : LOGINFO      : Link up on interface WAN.
172.16.1.99(if-ip) [WAN] #
```

Copy this modified configuration to your new start-up configuration. This will store your changes in non-volatile memory. Upon the next start-up the system will initialize itself using the modified configuration.

```
172.16.1.99(if-ip) [WAN] #copy running-config startup-config
172.16.1.99(if-ip) [WAN] #
```

The SmartNode can now be connected to your network.

3. Connecting the SmartNode to the Network

In general, the SmartNode will connect to the network via the *WAN* (*ETH 0/0*) port. This enables the SmartNode to offer routing services to the PC hosts on *LAN* (*ETH 0/1*) port. The SmartNode 4980 and 4990 Series is equipped with Auto-MDX Ethernet ports, so you can use straight-through or crossover cables for host or hub/switch connections (see [Figure 9](#)).



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

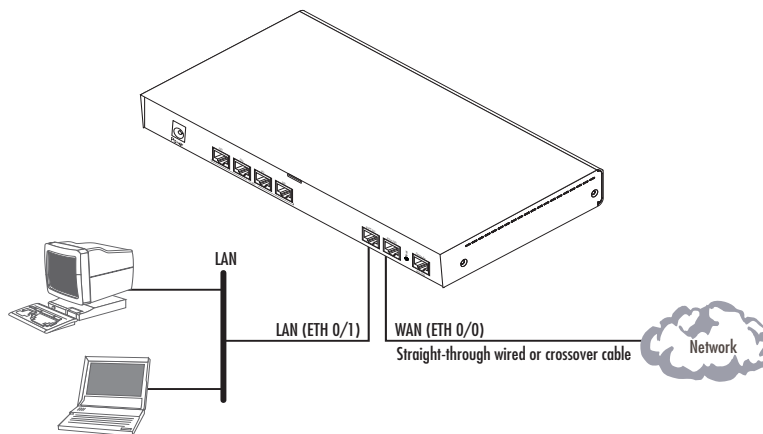


Figure 9. Connecting the SmartNode to the network

You can check the connection with the ping command from the SmartNode to another host on the network.

```
172.16.1.99(if-ip) [WAN] #ping <IP Address of the host>
```

Note If the WAN address is *not* set to DHCP, to ping a device outside your local LAN you must first configure the default gateway. (For information on configuring the default gateway, refer to section “Set IP addresses” in Appendix C, “Command Summary” of the *SmartNode Series SmartWare Software Configuration Guide*.)

4. Loading the Configuration (optional)

Patton provides a collection of configuration templates on the support page at www.patton.com/smart-node—one of which may be similar enough to your application that you can use it to speed up configuring the SmartNode. Simply download the configuration note that matches your application to your PC. Adapt the configuration as described in the configuration note to your network (remember to modify the IP address) and copy the modified configuration to a TFTP server. The SmartNode can now load its configuration from this server.

Note If your application is unique and not covered by any of Patton’s configuration templates, you can manually configure the SmartNode instead of loading a configuration file template. In that case, refer to the *SmartNode Series SmartWare Software Configuration Guide* for information on configuring the SmartNode device.

In this example we assume the TFTP server on the host with the IP address 172.16.1.11 and the configuration named *SN.cfg* in the root directory of the TFTP server.

```
172.16.1.99 (if-ip) [WAN] #copy tftp://172.16.1.11/SN.cfg startup-config
Download...100%
172.16.1.99 (if-ip) [WAN] #
```

After the SmartNode has been rebooted the new startup configuration will be activated.



When you issue the **reload** command, the SmartNode will ask if you want to copy the running configuration to the startup configuration. Since you just downloaded a configuration file to the startup configuration you must answer this question with **NO**. Otherwise, the downloaded configuration will be overwritten and lost!

```
172.16.1.99 (if-ip) [WAN] #reload
Running configuration has been changed.
Do you want to copy the 'running-config' to the 'startup-config'?
Press 'yes' to store, 'no' to drop changes : no
Press 'yes' to restart, 'no' to cancel : yes
The system is going down
```

Additional Information

For detailed information about configuring and operating guidance, set up procedures, and troubleshooting, refer to the *SmartNode Series SmartWare Software Configuration Guide* available online at www.patton.com/manuals.

Chapter 5 **Contacting Patton for Assistance**

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Introduction

This chapter contains the following information:

- “Contact Information”—describes how to contact Patton technical support for assistance.
- “Warranty Service and Returned Merchandise Authorizations (RMAs)” —contains information about the warranty and obtaining a return merchandise authorization (RMA).

Contact Information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

Patton support headquarters in the USA

- Online support: available at www.patton.com
- E-mail support: e-mail sent to support@patton.com will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from 8:00 am to 5:00 pm EST (1300 to 2200 UTC/GMT)—by calling +1 (301) 975-1007
- Fax: +1 (301) 869-9293

Alternate Patton support for Europe, Middle East, and Africa (EMEA)

- Online support: available at www.patton-inalp.com
- E-mail support: e-mail sent to support@patton-inalp.com will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from 9:00 am to 5:30 pm CET (0800 to 1630 UTC/GMT)—by calling +41 (0)31 985 25 55
- Fax: +41 (0)31 985 25 26

Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

Note If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

Warranty coverage

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

Out-of-warranty service

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

Returns for credit

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

Return for credit policy

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

RMA numbers

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at **www.patton.com**
- By calling **+1 (301) 975-1007** and speaking to a Technical Support Engineer
- By sending an e-mail to **returns@patton.com**

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

Shipping instructions

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

Patton Electronics Company

RMA#: xxxx

7622 Rickenbacker Dr.

Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

Appendix A **Compliance Information**

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Compliance

EMC

- FCC Part 15, Class A
- EN55022, Class A
- EN55024

Safety

- UL 60950-1/CSA C22.2 N0. 60950-1
- IEC/EN60950-1
- AS/NZS 60950-1

PSTN Regulatory

- FCC Part 68
- CS-03
- TBR 4
- TBR 12 & 13
- AS/ACIF S016
- AS/ACIF S038
- AS/ACIF S043 (G.SHDSL card)
- NZ ISDN Layer 3 Supplement

Radio and TV Interference

The SmartNode router generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer’s instructions—may cause interference to radio and television reception. The SmartNode router has been tested and found to comply with the limits for a Class A computing device in accordance with specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the SmartNode router does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

FCC Part 68 (ACTA) Statement

This equipment complies with Part 68 of FCC rules and the requirements adopted by ACTA. On the bottom side of this equipment is a label that contains—among other information—a product identifier in the format US: AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

The method used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact our company. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

Industry Canada Notice

This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

This Declaration of Conformity means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.

CE Declaration of Conformity

This equipment conforms to the requirements of Council Directive 1999/5/EC on the approximation of the laws of the member states relating to Radio and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

The safety advice in the documentation accompanying this product shall be obeyed. The conformity to the above directive is indicated by CE sign on the device.

The signed Declaration of Conformity can be downloaded at www.patton.com/certifications.

Authorized European Representative

D R M Green

European Compliance Services Limited.

Oakdene House, Oak Road

Watchfield,

Swindon, Wilts SN6 8TD, UK

Appendix B **Specifications**

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Note Refer to the software feature matrix for the most up-to-date specifications.

Voice Connectivity

1 or 4 PRI T1/E1 ports on RJ48C connectors

Net/User configurable per port

Each port can be slave or master clock

Each port can be used to synchronize to an external clock master

Failover relay between ports 0/0 and 0/1 for specific models

Data Connectivity

Two 10/100/1000Base-Tx Gigabit Ethernet ports

All ports full duplex, autosensing, auto-MDX

Voice Processing (signaling dependent)

Up to 120 full-duplex channels with Voice CODECS:

- G.711 A-Law/ -Law (64 kbps)
- G.726 (ADPCM 16, 24, 32, 40 kbps)
- G.723.1 (5.3 or 6.3 kbps)
- G.729ab (8 kbps)
- Transparent ISDN data

G.168 echo cancellation (128 ms)

Up to 120 simultaneous voice or T.38 fax calls

DTMF detection and generation

Carrier tone detection and generation

Silence suppression and comfort noise

Adaptive and configurable dejitter buffer

Configurable tones (dial, ringing, busy)

Configurable transmit packet length

RTP/RTCP (RFC 1889)

Fax and Modem Support

Automatic fax and modem detection

Codec fallback for modem-bypass

T.38 Fax-Relay (Gr. 3 Fax, 9.6 k, 14.4 k)

G.711 Fax-Bypass

Voice Signalling

SIPv2

H.323v4

SIP call transfer, redirect

Overlap or en-bloc dialing

DTMF in-band, out-of-band

Configurable progress tones

Voice Routing—session router

Local switching (hairpinning)

Least cost routing

Interface huntgroups

Call-Distribution groups

Number blocking

Call Routing Criteria:

- Interface
- Calling/called party number
- Time of day, day of week, date
- ISDN bearer capability
- Various other information elements (IEs) of the ISDN setup
- Wildcard and regular expression matching

Regular expression number manipulation functions:

- Replace numbers
- Add/remove digits
- Pattern matching and replacement

IP Services

IPv4 router; RIPv1, v2 (RFC 1058 and 2453)

Programmable static routes

ICMP redirect (RFC 792); Packet fragmentation

DiffServe/ToS set or queue per header bits

Packet Policing discards excess traffic

802.1p VLAN tagging

IPSEC AH & ESP Modes

Manual Key; IKE

AES/DES/3DES Encryption

Management

Web-based GUI

Industry standard CLI with local console (RJ-45, RJ-231, 9600 bps, 8, N, 1) and remote Telnet access, fully documented

HTTP web management and firmware loading

TFTP configuration & firmware loading

SNMP v1 agent (MIB II and private MIB)

Built-in diagnostic tools (trace, debug)

Secure Auto-provisioning

System

CPU Motorola MPC8360 series operating at 400 MHz

Memory:

- 256 Mbytes RAM (DDR, 400MHz)
- 32 Mbytes Flash

Physical

Dimensions: 11.9W x 1.71H x 7.16D inch (302W x 44H x 182mm)

Weight: <21 oz. (<600g)

Power Consumption: < 16W

Operating temperature: 32–104°F (0–40°C)

Operating humidity: up to 90%, non condensing

WAN Daughter Card (if applicable)

Note For information on configuring the WAN daughter card, see Chapter 5, “G.SHDSL Basic Configuration” on page 36.

Table 12. G.SHDSL Daughter Card Specifications

Factor	Specs
DSL	<ul style="list-style-type: none"> • ITU-T G.991.2 (and Amendment 2) • ITU-T G.991.2, Annex A, B, F, G • Upgradable to ITU-T G.shdsl.bis—Annex F and G • G.991.2 2/4 (1/2 pair) operation • G.994.1 (G.hs) (per G.991.2) • ITU-T G.991.2 Section E.9 (TPS-TC for ATM transport) • ITU-T G.991.2 Section E.11 (TPS-TC for PTM transport)
DSL Connection	RJ-45
Management	<ul style="list-style-type: none"> • I.610 OAM F4/F5 • Management interfaces: GUI and Telnet • Software upgrade: GUI and TFTP
ATM Support	<ul style="list-style-type: none"> • Classical IPoA (RFC 1577/2225) • PPPoE Client (over ATM) (RFC 2516) • IPoA (RFC 2684/1483) • ATM AAL5 encapsulation • Max. 8 PVCs • User selectable VC MUX and LLC MUX (default) • Configurable auto-connection • ATM QoS: UBR (default), CBR, and VBR-rt, VBR-nrt, UBR: per VC queuing • Auto-configuration: TR-037 & ILMI 4.0
Interworking/Interoperability	<ul style="list-style-type: none"> • G.SHDSL Interoperability: <ul style="list-style-type: none"> - Alcatel - NEC - Lucent Anymedia - Lucent Stinger • BRAS Interoperability: <ul style="list-style-type: none"> - Cisco - Redback
Fiber	<ul style="list-style-type: none"> • 100Mbps and 1000Mbps Fiber SFP. <p>(For a list of tested SFP modules, please refer to http://www.patton.com/products/sfpmodules.asp)</p>

Identification of the SmartNode Devices via SNMP

All SmartNode devices have assigned sysObjectID (.iso.org.dod.internet.mgmt.mib-2.system.sysObjectID) numbers (see Table 13).

Table 13. SmartNode Models and their Unique sysObjectID

SmartNode Model	SysObjectID
SN4980/1E15V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.1 1.3.6.1.4.1.1768.100.4.22.1
SN4980/1E24V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.2 1.3.6.1.4.1.1768.100.4.22.2
SN4980/1E30V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.3 1.3.6.1.4.1.1768.100.4.22.3
SN4980/4E15V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.4 1.3.6.1.4.1.1768.100.4.22.4
SN4980/4E24V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.5 1.3.6.1.4.1.1768.100.4.22.5
SN4980/4E30V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.6 1.3.6.1.4.1.1768.100.4.22.6
SN4980/4E48V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.7 1.3.6.1.4.1.1768.100.4.22.7
SN4980/4E60V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.8 1.3.6.1.4.1.1768.100.4.22.8
SN4980/4E96V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.9 1.3.6.1.4.1.1768.100.4.22.9
SN4980/4E120V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.10 1.3.6.1.4.1.1768.100.4.22.10
SN4980/4E30V120R	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.21 1.3.6.1.4.1.1768.100.4.22.21
SN4981/1E15V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.11 1.3.6.1.4.1.1768.100.4.22.11
SN4981/1E24V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.12 1.3.6.1.4.1.1768.100.4.22.12
SN4981/1E30V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.13 1.3.6.1.4.1.1768.100.4.22.13
SN4981/4E15VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.14 1.3.6.1.4.1.1768.100.4.22.14
SN4981/4E24VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.15 1.3.6.1.4.1.1768.100.4.22.15
SN4981/4E30VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.16 1.3.6.1.4.1.1768.100.4.22.16
SN4981/4E48VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.17 1.3.6.1.4.1.1768.100.4.22.17
SN4981/4E60VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.18 1.3.6.1.4.1.1768.100.4.22.18

Table 13. SmartNode Models and their Unique sysObjectID (Continued)

SmartNode Model	SysObjectID
SN4981/4E96VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.19 1.3.6.1.4.1.1768.100.4.22.19
SN4981/4E120VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.20 1.3.6.1.4.1.1768.100.4.22.20
SN4981/4E30V120R	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.22 1.3.6.1.4.1.1768.100.4.22.22
SN4991/1E15V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.1 1.3.6.1.4.1.1768.100.4.22.11
SN4991/1E24V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.2 1.3.6.1.4.1.1768.100.4.22.12
SN4991/1E30V	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.3 1.3.6.1.4.1.1768.100.4.22.13
SN4991/4E15VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.4 1.3.6.1.4.1.1768.100.4.22.14
SN4991/4E24VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.5 1.3.6.1.4.1.1768.100.4.22.15
SN4991/4E30VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.6 1.3.6.1.4.1.1768.100.4.22.16
SN4991/4E48VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.7 1.3.6.1.4.1.1768.100.4.22.17
SN4991/4E60VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.8 1.3.6.1.4.1.1768.100.4.22.18
SN4991/4E96VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.9 1.3.6.1.4.1.1768.100.4.22.19
SN4991/4E120VR	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.10 1.3.6.1.4.1.1768.100.4.22.20
SN4991/4E30V120R	.iso.org.dod.internet.private.enterprises.patton.products.sn4970.21 1.3.6.1.4.1.1768.100.4.22.22

Note The SysObjectIDs for the SN4991 G.SHDSL, ADSL, Fiber and X.21 models are the same as the corresponding SN4991 models listed above.

According to [Table 13](#), an SNMP get request to *.iso.org.dod.internet.mgmt.mib-2.system.sysObjectID* of a SmartNode 4980/1E15V/EUI device reads out a numeric OID of *1.3.6.1.4.1.1768.100.4.22.1*, which represents a SmartNode 4980/1E15V/EUI device. The mapping of the sysObjectID to each of the SmartNode model is realized with the SmartNode product identification MIB.



The SNMP agent running in SmartWare is SNMP version 1 (SNMPv1) compliant. SNMP version 2 (SNMPv2) and SNMP version 3 (SNMPv3) are not currently supported.

Appendix C **Cabling**

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Introduction

This section provides information on the cables used to connect the SmartNode and the interface cards to the existing network infrastructure and to third party products.

Console

The SmartNode can be connected to a serial terminal over its serial console port, as depicted in [Figure 10](#).



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

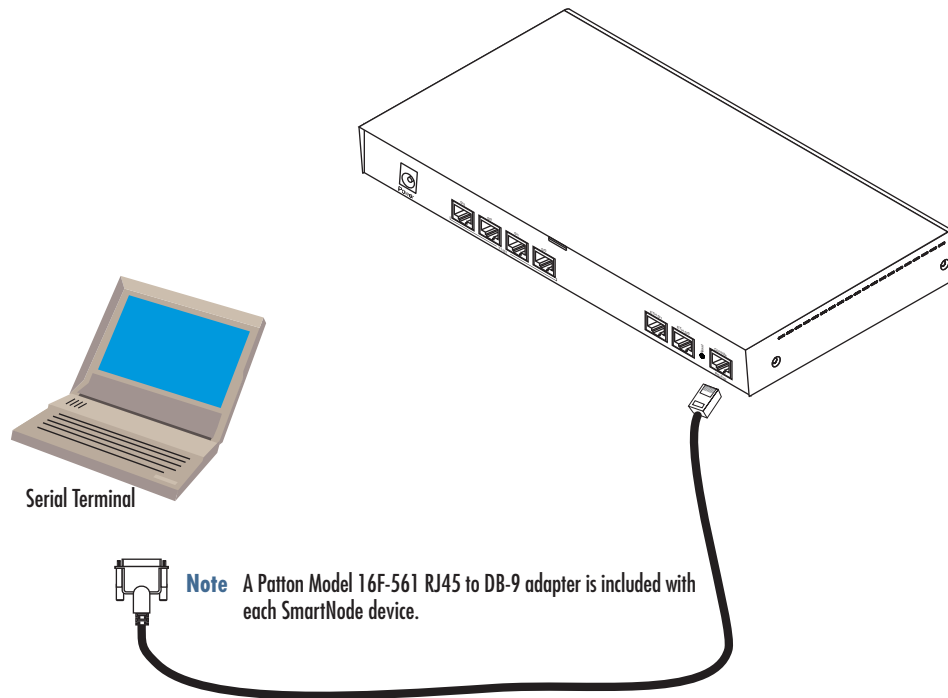


Figure 10. Connecting a serial terminal

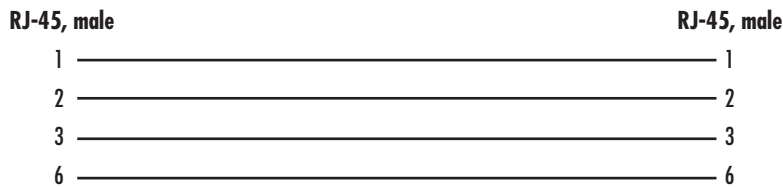
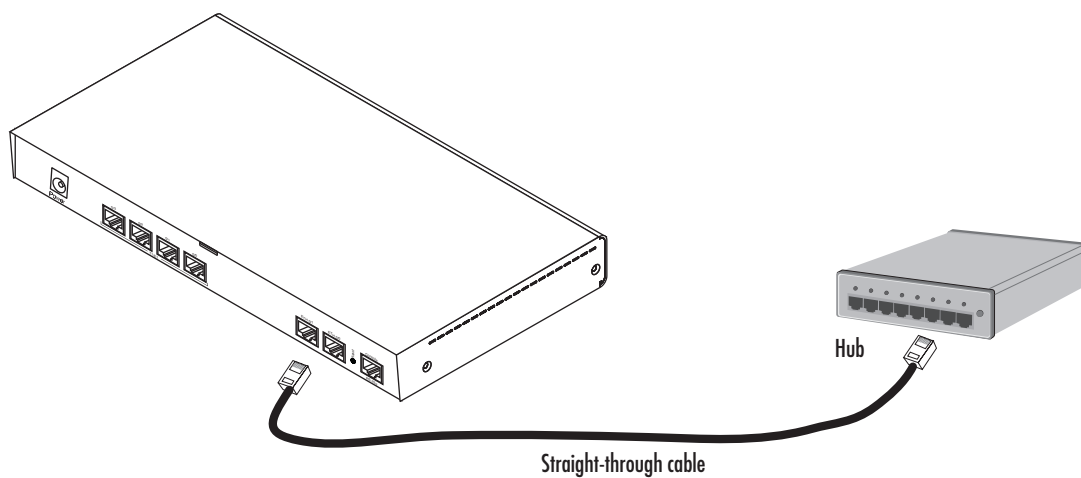
Note See section “Console Port” on page 55 for console port pin-outs.

Ethernet

Ethernet devices (10Base-T/100Base-T/1000Base-T) are connected to the SmartNode over a cable with RJ-45 plugs. All Ethernet ports on the SmartNode are Auto-MDX use any straight or crossover cable to connect to hubs, switches, PCs or other devices.



The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.



Note: Other pins are not used.

Figure 11. Typical Ethernet straight-through cable diagram for 10/100Base-T

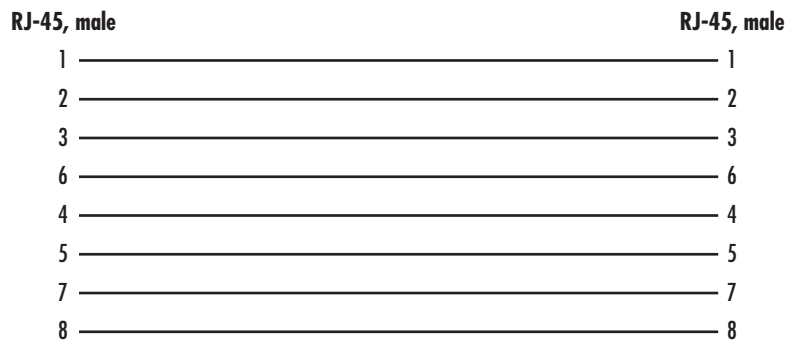


Figure 12. Typical Ethernet straight-through cable diagram for 1000Base-T

E1 PRI

The E1 PRI is usually connected to a PBX or switch—local exchange (LE). Type and pin outs of these devices vary depending on the manufacturer. In most cases, a straight-through RJ-45 to RJ-45 can be used to connect the PRI with a PBX. A cross-over cable is required to connect to an NT device, as illustrated in [Figure 13](#) on page 52.



Hazardous network voltages are present in the PRI cables. If you detach the cable, detach the end away from the SmartNode or interface card first to avoid possible electric shock. Network hazardous voltages may be present on the device in the area of the PRI port, regardless of when power is turned OFF.



To prevent damage to the system, make certain you connect the PRI cable to the PRI port only and not to any other RJ-45 socket.

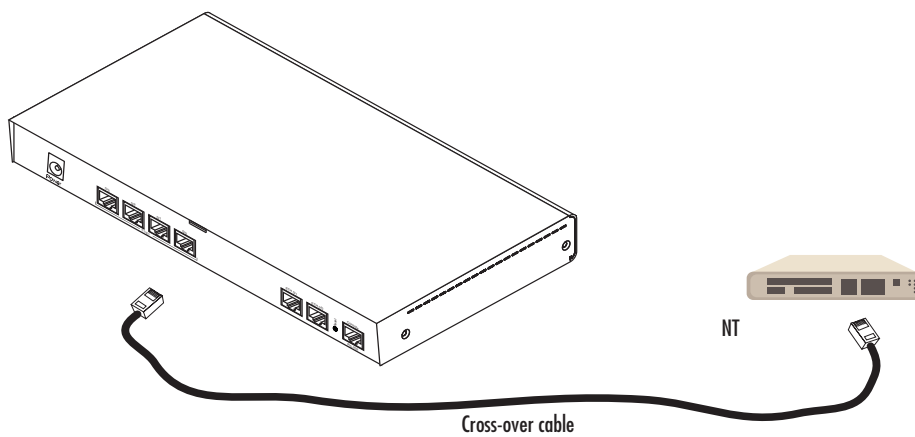


Figure 13. Connecting an E1 PRI port to an NT1

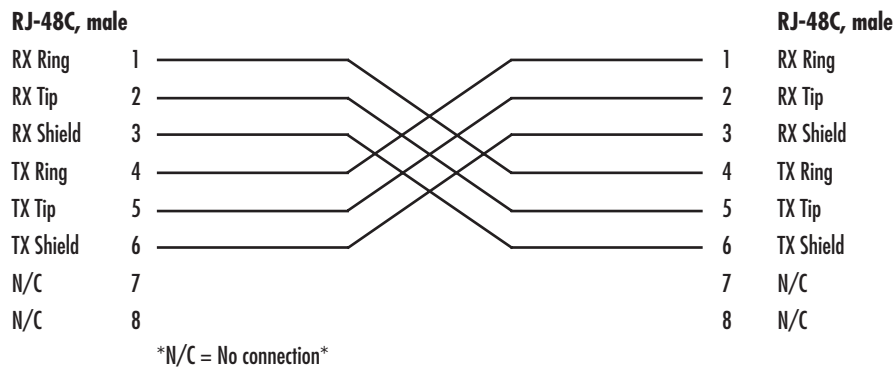


Figure 14. E1 PRI port crossover cable

T1 PRI

The T1 PRI is usually connected to a PBX or switch—local exchange (LE). Type and pin outs of these devices vary depending on the manufacturer. In most cases, a straight-through RJ-45 to RJ-45 can be used to connect the PRI with a PBX. A cross-over cable is required to connect to an NT device, as illustrated in [Figure 15](#) on page 53.



Hazardous network voltages are present in the PRI cables. If you detach the cable, detach the end away from the SmartNode or interface card first to avoid possible electric shock. Network hazardous voltages may be present on the device in the area of the PRI port, regardless of when power is turned OFF.



To prevent damage to the system, make certain you connect the PRI cable to the PRI port only and not to any other RJ-45 socket.

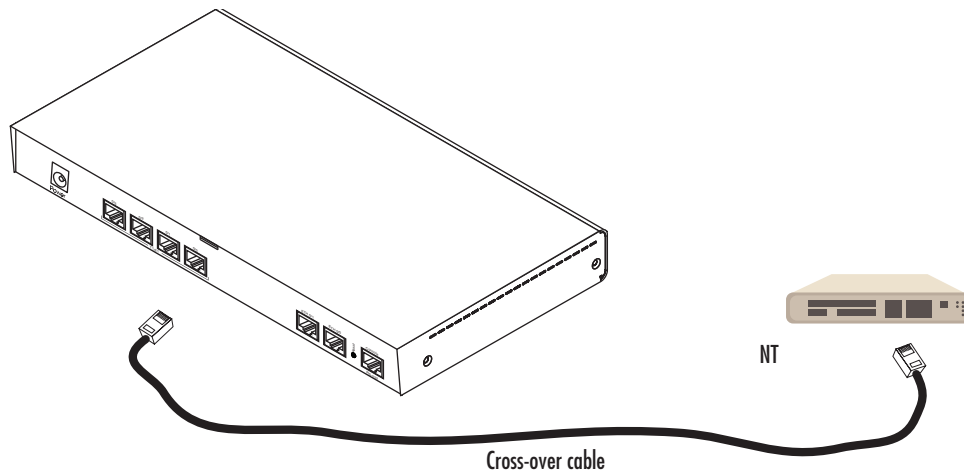


Figure 15. Connecting a T1 PRI port to an NT device

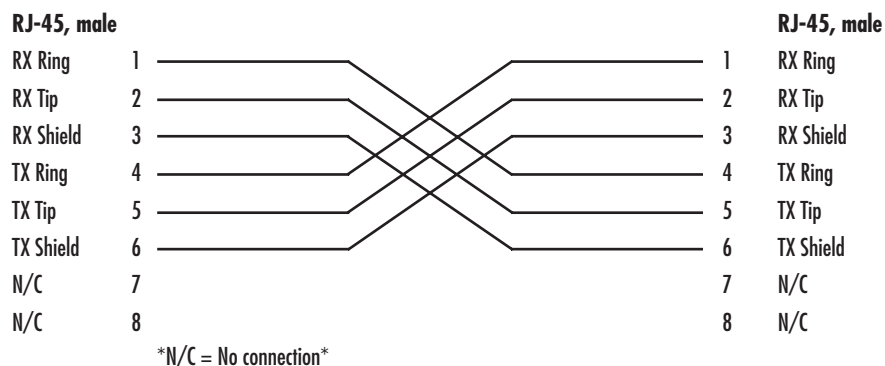


Figure 16. T1 PRI crossover cable

Appendix D **Port Pin-outs**

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Introduction

This section provides pin-out information for the ports of the SmartNode.

Console Port

Configuration settings: 9600 bps, 8 bits, no parity, 1 stop bit, no flow control

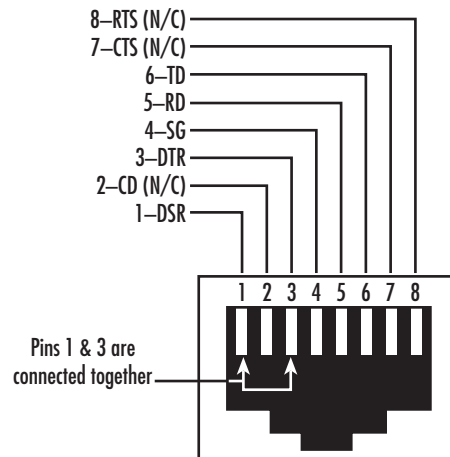


Figure 17. EIA-561 (RJ-45 8-pin) port

Note *N/C* means no internal electrical connection.

Ethernet

Table 14. RJ45 socket 10/100Base-T

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Note Pins not listed are not used.

Table 15. RJ45 socket 1000Base-T

Pin	Signal
1	TRD0+
2	TRD0-
3	TRD1+
6	TRD1-
4	TRD2+
5	TRD2-
7	TRD3+
8	TRD3-

PRI Port

Table 16. RJ-45 socket

Pin	USR
1	RX Ring
2	RX Tip
3	RX Shield
4	TX Ring
5	TX Tip
6	TX Shield

Note Pins not listed are not used.

G.SHDSL Port (/2GS models only)

Table 17. RJ-45 connector

Pin	Signal
3	Tip 2
4	Tip 1
5	Ring 1
6	Ring 2

Note Pins not listed are not used.

ADSL Port (/A models only)

Table 18. ADSL Port: RJ-45 connector

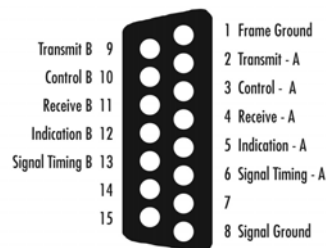
Pin	Signal
4	Tip
5	Ring

Note Pins not listed are not used

Fiber Ports (/F models only)

For tested and approved modules, please refer to the list of SFP's Patton has tested at <http://www.patton.com/products/sfpmodules.asp>

X.21 DB-15 Connector (/D models only)



Appendix E **SmartNode Factory Configuration**

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-------------------	----

Introduction

The factory configuration settings for the SmartNode 4980 and 4990 are as follows:

```
#-----#
#
# Factory configuration file
#
#-----#

dns-relay

timer PROVISIONING now + 1 minute "provisioning execute PF_PROVISIONING_CONFIG"

sntp-client

sntp-client server primary pool.ntp.org

profile provisioning PF_PROVISIONING_CONFIG

    destination configuration

    activation reload immediate

    location 1 http://redirect.patton.com/
    $(system.mac);mac=$(system.mac);serial=$(system.serial);hwMajor=$(system.hw.major);hwMi-
    nor=$(system.hw.minor);swMajor=$(system.sw.major);swMinor=$(system.sw.minor);swDate=$(s-
    ystem.sw.date);productName=$(system.product.name);cliMajor=$(cli.major);cliMinor=$(cli.
    minor);osName=$(cli.major>=4|Trinity|SmartWare);subDirTrinity=$(cli.major>=4|Trin-
    ity);subDirSmartWare=$(cli.major<4|SmartWare);dhcp66=$(dhcp.66);dhcp67=$(dhcp.67)

    location 2 $(dhcp.66)

    location 3 $(dhcp.66)/$(system.mac).cfg

    location 4 http://$(dhcp.66)/$(dhcp.67)

    location 5 http://$(dhcp.66)/$(system.mac).cfg

    location 6 tftp://$(dhcp.66)/$(dhcp.67)

    location 7 tftp://$(dhcp.66)/$(system.mac).cfg

system

    ic voice 0

profile napt NAPT_WAN

profile dhcp-server DHCP_S_LAN

    network 192.168.1.0 255.255.255.0

    include 1 192.168.1.10 192.168.1.99

    lease 2 hours

    default-router 1 192.168.1.1

    domain-name-server 1 192.168.1.1
```

```
context ip router

interface WAN
  ipaddress dhcp
  use profile napt NAPT_WAN
  tcp adjust-mss rx mtu
  tcp adjust-mss tx mtu

interface LAN
  ipaddress 192.168.1.1 255.255.255.0
  tcp adjust-mss rx mtu
  tcp adjust-mss tx mtu

context ip router
  dhcp-server use DHCP_SERVER_LAN

port ethernet 0 0
  medium auto
  encapsulation ip
  bind interface WAN router
  no shutdown

port ethernet 0 1
  medium auto
  encapsulation ip
  bind interface LAN router
  no shutdown
```

Appendix F **End User License Agreement**

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End User License Agreement

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- B) *Program(s)* shall mean all software, software documentation, source code, object code, or executable code.
- C) *End User* shall mean the person or organization which has valid title to the Designated Equipment.
- D) *Designated Equipment* shall mean the hardware on which the Program(s) have been designed and provided to operate by Patton Electronics Company.

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The term of this Agreement is from the Effective Date until title of the Designated Equipment is transferred by End User or unless the license is terminated earlier as defined in section “6. Termination” on page 63.

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- C) The End User is prohibited from disassembling; decompiling, reverse-engineering or otherwise attempting to discover or disclose the Program(s), source code, methods or concepts embodied in the Program(s) or having the same done by another party.
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- C) Upon termination for A or B above or the end of the Term, End User is required to destroy all copies of the licensed Program(s)

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- The LGPL (Lesser General Public License) open source license distributed to you pursuant to the LGPL license terms (<http://www.gnu.org/licenses/lgpl.html>).

8. SmartWare licenses

- A routing license is included at no charge.
- MGCP and VPN capabilities will require the purchase of an additional license.

RedBoot (Red Hat Embedded Debug and Bootstrap) embedded system debug/bootstrap environment from Red Hat distributed to you pursuant to the eCos license terms (<http://ecos.sourceware.org/license-overview.html>) and GNU General Public License (GPL) terms (<http://www.gnu.org/copyleft/gpl.html>). Source code is available upon request.