SmartNode™ 4660 & 4670 Series
Multiport BRI/FXS/FXO VoIP Gateway-Router, IAD

User Manual

CE This is a Class B device and is intended for use in a light industrial (commercial) or residential environment. It is not intended for use in a heavy industrial environment.

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

REGULATORY MODEL NUMBER: 13243D4-001

Sales Office: **+1 (301) 975-1000**
Technical Support: **+1 (301) 975-1007**
E-mail: **support@patton.com**
www.patton.com

Part Number: **07MSN4660-4670-UM, Rev. C**
Revised: **June 4, 2014**

Patton Electronics Company, Inc.
7622 Rickenbacker Drive
Gaithersburg, MD 20879 USA
Tel: +1 (301) 975-1000
Fax: +1 (301) 869-9293
Support: +1 (301) 975-1007
Web: www.patton.com
E-mail: support@patton.com

Trademark Statement

The term *SmartNode* is a trademark of Patton Electronics Company. All other trademarks presented in this document are the property of their respective owners.

Important Information

To use virtual private network (VPN) and/or AES/DES/3DES encryption capabilities with the SmartNode 4660 and 4670, 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 60 or go to **www.patton.com**.

Patton Electronics warrants all SmartNode 4660 and 4670 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.

Table of Contents

List of Figures

List of Tables

About This Guide

This guide describes the SmartNode 4660 and 4670 hardware, installation and basic configuration. For detailed software configuration information refer to the *SmartWare Software Configuration Guide* and the available Configuration Notes available online at **www.patton.com/smartnode**.

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 the SmartNode's features and capabilities
- Chapter 2 on page 23 contains an overview describing the SmartNode's operation and applications
- Chapter 3 on page 25 provides hardware installation procedures
- Chapter 4 on page 33 provides quick-start procedures for configuring the SmartNode 4660 and 4670
- Chapter 5 on page 40 contains information on contacting Patton technical support for assistance
- Appendix A on page 43 contains compliance information for the SmartNode 4660 and 4670
- Appendix B on page 45 contains specifications for the SmartNode 4660 and 4670
- Appendix C on page 50 provides cable recommendations
- Appendix D on page 53 describes the SmartNode's ports and pin-outs
- Appendix E on page 58 lists the factory configuration settings for the SmartNode 4660 and 4670
- Appendix F on page 60 provides license information that describes acceptable usage of the software provided with the SmartNode 4660 and 4670

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.

The alert symbol and IMPORTANT heading calls attention to important information.

Le symbole d'alerte et l'attention IMPORTANT rubrique appels à des informations importantes.

The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

Le symbole d'alerte et indiquent la position CAUTION un danger potentiel. Suivre strictement les instructions afin d'éviter des dommages matériels.

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.

Le symbole de danger de choc et la position CAUTION indique un risque de choc électrique. Suivre strictement les instructions pour éviter les dommages matériels causés par un choc électrique.

The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.

Le symbole alerte et WARNING rubrique indiquer un danger potentiel pour la sécurité. Suivre strictement les instructions d'avertissement pour éviter les blessures.

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.

Le symbole de danger de choc et la position WARNING indique un risque de choc électrique. Suivre strictement les instructions d'avertissement pour éviter les blessures causées par un choc électrique.

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.**
  Ne pas ouvrir l'appareil lorsque le cordon d'alimentation est connecté. Pour les systèmes sans un commutateur de puissance et sans un adaptateur d'alimentation externe, des tensions de ligne sont présents au sein de l'appareil lorsque le cordon d'alimentation est connecté.
- **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.**
  Pour les appareils avec un adaptateur d'alimentation externe, l'adaptateur d'alimentation doit être une source d'alimentation limitée cotée. La prise de courant qui est utilisé pour alimenter le dispositif doit être à 10 pieds (3 mètres) de l'appareil, doit être facilement accessible, et protégé par un disjoncteur en conformité avec les exigences réglementaires locales.
- **For AC powered devices, ensure that the power cable used meets all applicable standards for the country in which it is to be installed.**
  Pour les appareils alimentés par AC, veiller à ce que le câble d'alimentation utilisé respecte toutes les normes applicables pour le pays dans lequel il doit être installé.
- **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.**
  Pour les appareils alimentés en ca qui ont 3 prises de courant des conducteurs (L1, L2 et GND ou à chaud, neutre et de la sécurité / de protection au sol), la prise murale (ou socket) doit avoir une prise de terre.
- **For DC powered devices, ensure that the interconnecting cables are rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.**
  Pour les appareils alimentés par courant continu, veiller à ce que les câbles d'interconnexion sont conçus pour la tension appropriée, courant, température prévue, l'inflammabilité et d'entretien mécanique.
- **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.**
  Ports WAN, LAN et PSTN (connexions) peuvent avoir des tensions dangereuses présenter indépendamment du fait que l'appareil est allumé ou éteint. PSTN concerne des interfaces telles que les lignes téléphoniques, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voix, etc Ils sont connus comme "tensions dangereuses du réseau" et d'éviter un choc électrique preuve de prudence lorsque l'on travaille à proximité de ces ports. Lors de la déconnexion des câbles pour ces ports, détacher la connexion bout en premier.
- **Do not work on the device or connect or disconnect cables during periods of lightning activity**
  Ne pas travailler sur l'appareil ou de connecter ou déconnecter les câbles pendant les périodes d'activité de foudre.

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

Cet appareil contient des pièces n'est réparable par l'utilisateur. Ce dispositif ne peut être réparé par du personnel qualifié.

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 *italic* 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 (|)
`blue screen`	Information you enter is in `blue screen` font.
`screen`	Terminal sessions and information the system displays are in `screen` font.
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

Chapter contents

SmartNode 4660 and 4670 Series Overview

The SmartNode 4660 VoIP Gateway-Router and SmartNode 4670 VoIP IAD offer flexible combinations of ISDN BRI, analog FXS/FXO, and Ethernet/IP interfaces to deliver a unique solution allowing the Enterprise to IP-enable legacy ISDN-PBX and analog phone/fax/answering machine and audio-intercom systems. The SN4670 model also includes a G.SHDSL, ADSL, EFM or Fiber interface for broadband access to deliver a single-box CPE solution.

Providing 4 Ethernet, 2 to 8 BRI, 4 to 8 FXS, and up to 4 FXO ports, the SN4660 and SN4670 inter-connect any Ethernet switch, ISDN PBX, analog equipment or IP-data network to support 8 to 24 simultaneous VoIP calls using SIP, FXS/FXO or BRI signaling. The 10/100 Ethernet uplink provides seamless WAN access via any existing cable, ADSL, VDSL, EFM, or fiber-optic modem. Additionally, the SN4670 model's built-in 4-wire G.SHDSL (11.4 Mbps), ADSL (up to 24 Mbps), EFM (up to 22.8 Mbps) or Fiber (up to 1000 Mbps) interface provides seamless WAN access.

Figure 1. SmartNode 4660 (left) and SmartNode 4670 (right)

Like every SmartNode, the SN4660 and SN4670 support every industry-standard CODEC to deliver toll-quality voice on every call. Adding session border controller capabilities, the SmartNodes include IP transcoding for up to 12 SIP channels. The Unified Communications Agent (UCA) provides any-to-any multi-path switching (simultaneous SIP, H.323, ISDN, and POTS calls with routing and conversion between TDM/PSTN and IP/Ethernet networks—plus T.38 and SuperG3 FAX). VoIP-over-VPN with voice encryption provides secure voice and data via IPsec with AES/DES strong encryption and automated keying via Internet Key Exchange (IKE). In addition, advanced call-router functionality includes least-cost call routing with flexible dialed-number plan support.

The SmartNode survivability suite combines PSTN fallback, SIP Registrar and IP-link redundancy to ensure business continuity if the IP network fails. Patton's DownStreamQoS delivers the advantage of clear, uninterrupted voice-and-data communication. Furthermore, SmartNode's unique high-precision clock delivers first-line IP telephony service in demanding ISDN and DECT environments with reliable FAX and modem performance. In addition, SmartNode delivers a smooth transition to VoIP with strong number portability support accepting incoming calls from the PSTN throughout the VoIP service provider's number porting process.

Key Features

The SmartNode 4660 and 4670 Series perform the following major functions:

- Up to 24 channels for Voice-over-IP or Fax-over-IP (Voice Channels or VC)
- All SN4660 and SN4670 models have four 10/100BaseT Ethernet LAN/WAN ports for connection to any existing network device
- Built-in IP Router delivers up and DownStreamQoS with adaptive traffic management and shaping as well as Voice-over-VPN with AES/DES strong encryption for secure toll-quality voice communications
- Standards-compliant VoIP in accordance with SIP or H.323 protocols
- High Precision Clock (HPC)—Delivers DECT PBX interoperability with reliable fax performance. *(SN4661 & SN4671 versions only)*

The SmartNode models with a high precision clock (SN4661 and SN4771) have a Stratum III clock. The Stratum III clock provides a clock source of < 5 ppm. For PBXs that used to rely on PSTN for accurate clock source, the SmartNode can provide a PSTN-equivalent high precision clock. The popular DECT PBX needs such high precision clocks.

SmartNode 4660 Series Model Codes

Table 2. SmartNode 4660 Ports and Voice Channels

Model	BRI	FXS	FXO	Voice Channels	Ethernet	High Precision Clock
SN4660/8BIS16V/EUI	8	–	–	16	4	–
SN4660/4BIS4V/EUI	4	–	–	4	4	–
SN4660/4BIS8V/EUI	4	–	–	8	4	–
SN4661/2BIS2JS2JO8V/EUI	2	2	2	8	4	✔
SN4661/2BIS4JS8V/EUI	2	4	–	8	4	✔
SN4661/4BIS4JS12V/EUI	4	4	–	12	4	✔
SN4661/4BIS4JS4JO12V/EUI	4	4	4	12	4	✔
SN4661/4BIS4V/EUI	4	–	–	4	4	✔
SN4661/4BIS8V/EUI	4	–	–	8	4	✔
SN4661/4BIS8JS16V/EUI	4	8	–	16	4	✔
SN4661/8BIS16V/EUI	8	–	–	16	4	✔
SN4661/8BIS4JS24V/EUI	8	4	–	24	4	✔
SN4661/8BIS8V/EUI	8	–	–	8	4	✔

SmartNode 4670 Series Model Codes

Table 3. SmartNode 4670 Ports and Voice Channels

Model	BRI	FXS	FXO	VC	Ethernet	G.SHDSL	ADSL	Fiber	HPC
SN4670/4JS4JO8V[*]/EUI	–	4	4	8	4	–	–	1	–
SN4670/8JS8V[*]/EUI	–	8	–	8	4	–	–	1	–
SN4670/4BIS8V2GS/EUI	4	–	–	8	4	–	–	1	–
SN4670/4BIS8VA/EUI	4	–	–	8	4	–	–	1	–
SN4671/2BIS2JS2JO8V[*]/EUI	2	2	2	8	4	–	–	1	✔
SN4671/2BIS4JS8V[*]/EUI	2	4	–	8	4	–	–	1	✔
SN4671/2BIS2JS2JO8V[*]/EUI	–	2	2	2	4	–	–	1	✔
SN4671/4JS4JO8V[*]/EUI	–	–	4	8	4	–	–	1	✔
SN4671/4BIS4JS12V[*]/EUI	4	4	–	12	4	–	–	1	✔
SN4671/4BIS4JS4JO12V[*]/EUI	4	4	4	12	4	–	–	1	✔
SN4671/4BIS8JS16V[*]/EUI	4	8	–	16	4	–	–	1	✔
SN4671/4BIS8V[*]/EUI	4	–	–	8	4	–	–	1	✔
SN4671/4BIS8V2GS/EUI	4	–	–	8	4	–	–	1	✔
SN4671/4BIS8VA/EUI	4	–	–	8	4	–	–	1	✔
SN4671/8JS8V[*]/EUI	–	8	–	8	4	–	–	1	✔
SN4671/8BIS16V[*]/EUI	8	–	–	16	4	–	–	1	✔

[*] For **G.SHDSL** option, add **2GS** in SKU (ex: SN4671/2BIS4JS8V**2GS**/EUI);
For **ADSL** option, add **A** in SKU (ex: SN4671/2BIS2JS2JO8V**A**/EUI);
For **EFM** option, add **2G** or **4G** in SKU (ex: SN4670/4JS4JO8**2G**/EUI) or (SN4671/4BIS8V**4G**/EUI);
For **Fiber** option, add **F** in SKU (ex: SN4671/2BIS4JS8V**F**/EUI)

CodesSmartNode 4660 and 4670 Series Rear Panels

SmartNode 4660 Rear Panel

The SmartNode 4660 rear panel ports are described in Table 4.

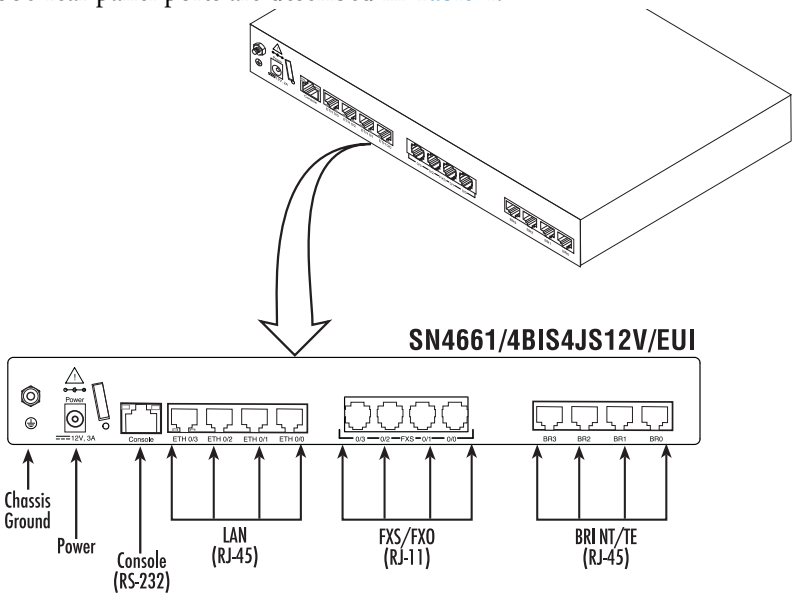


Figure 2. SmartNode 4660 rear panel (Model SN4661/4BIS4JS12V/EUI shown)

Table 4. SN4660 rear panel ports

Port	Description
ETH 0/0-0/3	Switched Auto-MDX Fast-Ethernet port, RJ-45 (see Figure 2), connect the unit to an Internet Telephony Service Provider (ITSP) [via an xDSL or cable modem] or a remote IP-PBX [via a private corporate network].
BRI 0/0-0/7	ISDN BRI TE/NT port, RJ-45 S0 (S/T) interface (see Figure 2), connects the unit to with an ISDN device over an S/T bus, e.g. a PBX or an NT. The interface may be used as fallback if connected to an NT. The port can be switched between TE and NT mode. The interface is internally terminated with 100 ohm. Point-to-point or point-to-multipoint configurable. If the port is in NT mode, a phantom power supply can be switched on to supply connected phones with power.
FXS 0/0-0/7 (Analog voice port)	FXS RJ-11 (6 position, 4 wire) ports connect the SmartNode with an analog terminal (a telephone, for example) FXO port. EuroPOTS support (ETSI EG201 188). FXS on-hook voltage is 48V for each FXS port.
FXO 0/0-0/3 (Analog voice port)	FXO RJ-11 (6 position, 4 wire) ports connect the SmartNode with an analog line (FXS port). EuroPOTS support (ETSI EG201 188).
Console	Used for service and maintenance, the Console port (see Figure 2), an RS-232 RJ-45 connector, connects the SmartNode to a serial terminal such as a PC or ASCII terminal (also called a dumb terminal).
12V DC, 1.0A	The SmartNode has a 12V DC 1A power input (see Figure 2).

Table 4. SN4660 rear panel ports (Continued)

Port	Description
Reset	The reset button (see Figure 2) has three functions: • Restart the unit with the current startup configuration—Press (for less than 1 second) and release the *Reset* button to restart the unit with the current startup configuration. • Restart the unit with factory default configuration—Press the *Reset* button for 5 seconds until the *Power* LED starts blinking to restart the unit with factory default configuration. • Restart the unit in bootloader mode (to be used only by trained SmartNode 4660 technicians)—Starting with the unit powered off, press and hold the *Reset* button as you apply power to the unit. Release the *Reset* button when the *Power* LED starts blinking so the unit will enter bootloader mode.

Table 5. SmartNode SN4660 LED Definitions

LED	Description
Pwr	Is on after 10sec when power is applied to the unit. Flashes once per second during boot (startup).
Run	When lit, the unit is in normal operation.
ETH 0/0 -0/3 Green LED	Flashes when data is received or transmitted at the corresponding Ethernet port.
ETH 0/0 -0/3 Orange LED	On when the Ethernet connection on the corresponding port has a link indication.
BRI 0/0 - 0/7 Act LED	On when Layer1 and Layer2 are active.
BRI 0/0 - 0/7 Link LED	Off indicates no active calls. Blinking when one or two B-channels are connected.

SmartNode 4670 Rear Panel

The SmartNode 4670 rear panel ports are described in Table 4.

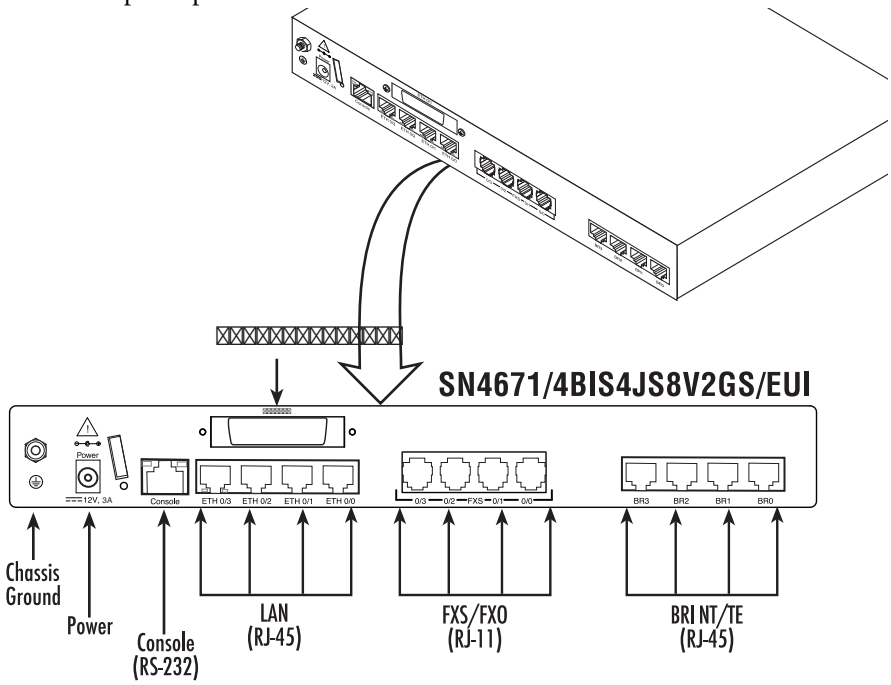


Figure 3. SmartNode 4670 rear panel (Model SN4671/4BIS4JS8V2GS/EUI shown)

Table 6. SN4670 rear panel ports

Port	Description
ETH 0/0-0/3	Switched Auto-MDX Fast-Ethernet port, RJ-45 (see Figure 2), connect the unit to an Internet Telephony Service Provider (ITSP) [via an xDSL or cable modem] or a remote IP-PBX [via a private corporate network].
BRI 0/0-0/7	ISDN BRI TE/NT port, RJ-45 S0 (S/T) interface (see Figure 2), connects the unit to with an ISDN device over an S/T bus, e.g. a PBX or an NT. The interface may be used as fallback if connected to an NT. The port can be switched between TE and NT mode. The interface is internally terminated with 100 ohm. Point-to-point or point-to-multipoint configurable. If the port is in NT mode, a phantom power supply can be switched on to supply connected phones with power.
FXS 0/0-0/7 (Analog voice port)	FXS RJ-11 (6 position, 4 wire) ports connect the SmartNode with an analog terminal (a telephone, for example) FXO port. EuroPOTS support (ETSI EG201 188). FXS on-hook voltage is 48V for each FXS port.
FXO 0/0-0/3 (Analog voice port)	FXO RJ-11 (6 position, 4 wire) ports connect the SmartNode with an analog line (FXS port). EuroPOTS support (ETSI EG201 188).

Table 6. SN4670 rear panel ports

Port	Description
Expansion port **G.SHDSL, ADSL, EFM or SFP**	**G.SHDSL** • RJ-45 connector • Provides up to 24 Mbps (G.SHDSL.bis, ATM) symmetrical throughput • Supports multiple PVC and DSLAM interoperability **ADSL** • RJ-45 connector • Provides up to 24 Mbps (ADSL2+, ATM) symmetrical throughput • Supports multiple PVC and DSLAM interoperability **EFM** • RJ-45 connector • Depending on model, supporting 4-wire (2pair) or 8-wire (4pair) EFM connection • IEEE 802.3 G.998.2 compliant. **SFP** • SFP tray supporting various Fiber to ethernet converter modules. See http://www.patton.com/products/sfpmodules.asp for tested modules.
Console	Used for service and maintenance, the Console port (see Figure 2), an RS-232 RJ-45 connector, connects the SmartNode to a serial terminal such as a PC or ASCII terminal (also called a dumb terminal).
12V DC, 1.0A	The SmartNode has a 12V DC 1A power input (see Figure 2).
Reset	The reset button (see Figure 2) has three functions: • Restart the unit with the current startup configuration—Press (for less than 1 second) and release the *Reset* button to restart the unit with the current startup configuration. • Restart the unit with factory default configuration—Press the *Reset* button for 5 seconds until the *Power* LED starts blinking to restart the unit with factory default configuration. • Restart the unit in bootloader mode (to be used only by trained SmartNode 4660 technicians)—Starting with the unit powered off, press and hold the *Reset* button as you apply power to the unit. Release the *Reset* button when the *Power* LED starts blinking so the unit will enter bootloader mode.

Table 7. SN4670 LED Definitions

LED	Definitions
Pwr	Is on after 10sec when power is applied to the unit. Flashes once per second during boot (startup).
Run	When lit, the unit is in normal operation.
ETH 0/0 -0/3 Green LED	Flashes when data is received or transmitted at the corresponding Ethernet port.

Table 7. SN4670 LED Definitions

LED	Definitions
ETH 0/0 -0/3 Orange LED	On when the Ethernet connection on the corresponding port has a link indication.
BRI 0/0 - 0/7 Act LED	On when Layer1 and Layer2 are active.
BRI 0/0 - 0/7 Link LED	Off indicates no active calls. Blinking when one or two B-channels are connected.
Expansion port Act / Link LED	On (solid) when link is up. On (blinking) when traffic is sent across the link.
SFP WAN 1000 Mbps LED	On when a 1000 Mbps (1Gbps) link is established.
EFM link LED	There are two colours in the Link light on the EFM Daughterboard. Red and Green: The Green will be showing anytime ANY Link is up and traffic can flow. The Red Link will then blink to signify specific pairs that are training/not up. (Please note that if the device is configured to use less than available pairs the non-provisioned link will not be reported as down. **Link (Green)OFF:** All pairs are DOWN, and traffic will not flow **Link (Green) ON:** At least on pair is UP, and traffic will flow Link (Red): This LED will blink with a rotating pattern to indicate ports which are still DOWN. **1 BLINK - Pair 1** **2 BLINKS - Pair 2** **3 BLINKS - Pair 3** **4 BLINKS - Pair 4**

SmartNode 4660 and 4670 Series Front Panels

SmartNode 4660 Front panel

The LED definitions are listed in Table 8.

Table 8. SmartNode 4660 LED definitions

LED	Description
Power	When lit, indicates power is applied and the unit is in normal operation. Off indicates no power applied. Flashes once per second during boot (startup).

SmartNode 4670 Front panel

The LED definitions are listed in Table 8.

Table 9. SmartNode 4670 LED definitions

LED	Description
Power	When lit, indicates power is applied and the unit is in normal operation. Off indicates no power applied. Flashes once per second during boot (startup).

Chapter 2 Applications Overview

Chapter contents

Typical Application

IP-enable legacy PBX systems while connecting fax separately with both BRI and FXS/FXO interfaces on one box. Combining a VoIP gateway with an IP router, the SmartNode 4660/4670 adds QoS and VPN security, making it the ideal solution for secure prioritized communications.

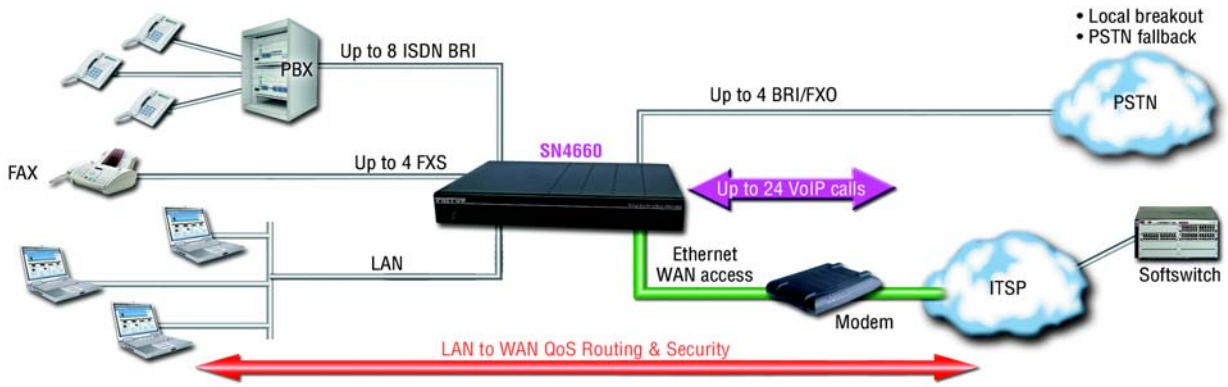


Figure 4. SN4660 application

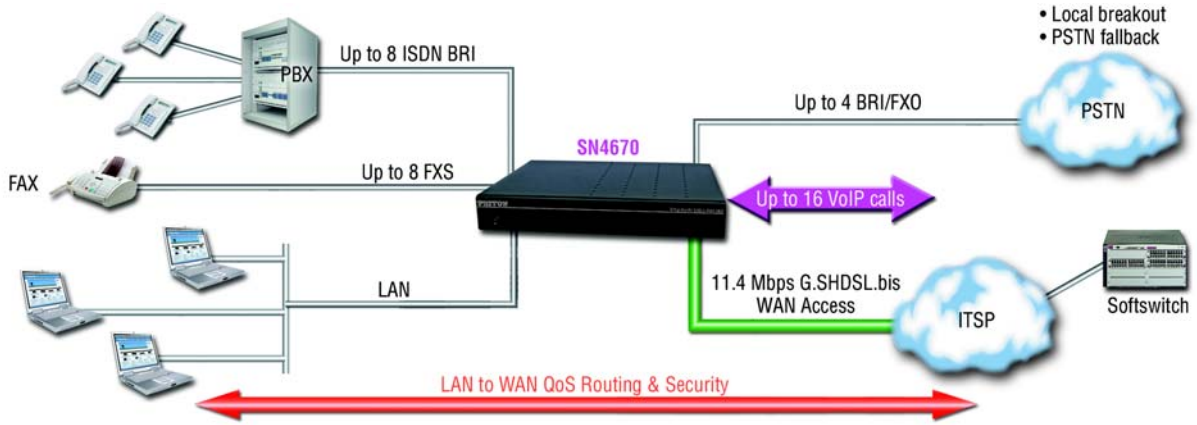


Figure 5. SN4670 application

Chapter 3 SmartNode Installation

Chapter contents

Planning the Installation

The mains outlet that is utilized to power the equipment must be within 10 feet (3 meters) of the device and shall be easily accessible.

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

- **Create a network diagram** (see section "Network Information" on page 26)
- **Gather IP related information** (see section "Connect the cables in the following order:" on page 28 for more information)
- **Install the hardware and software needed to configure the SmartNode**. (See section "Software Tools" on page 27)
- **Verify power source reliability** (see section "AC Power Mains" on page 27).

After you have finished preparing for SmartNode installation, go to section "Installing the SmartNode" on page 28 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 30.

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.

Installing the SmartNode

SmartNode hardware installation consists of the following:

- Placing the device at the desired installation location (see section "Placing the SmartNode")
- Connecting the interface and power cables (see section "Installing cables")

When you finish installing the SmartNode, go to Chapter 4, "Initial Configuration" on page 33.

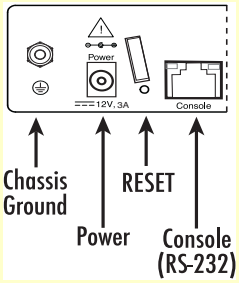
Placing the SmartNode

Place the SmartNode 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

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

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

Connect the cables in the following order:

1. Connect the ISDN terminals to the BRI ports (see section "Connecting ISDN terminals and NT to the SmartNode's ISDN BRI ports" on page 29).
2. Installing the RJ-11 voice port (FXS or FXO) cables (see section "Installing an interface cable on the SmartNode's FXS and FXO interface ports" on page 29)
3. Connect the 10/100Base-T Ethernet WAN (see section "Connecting the SmartNode to the IP network" on page 30)

4. For SN4671 models, connect the DSL cable (see section "Connecting the SmartNode's DSL, EFM or Fiber port (SN4670 series only)" on page 30)
5. Connect the power supply (see section "Verify that the green Power LED is lit (see Figure 7)." on page 31)

Installing an interface cable on the SmartNode's FXS and FXO interface ports
Some models of the SmartNode include two to four FXS or FXO analog ports—or a combination of FXS and FXO ports—located on the back of the unit (see Figure 2 on page 17). The FXS interfaces are connected to analog devices via cables (see Figure 6) terminated with RJ-11 connectors. The FXO interface connects the SmartNode with analog lines via cables terminated with RJ-11 connectors.

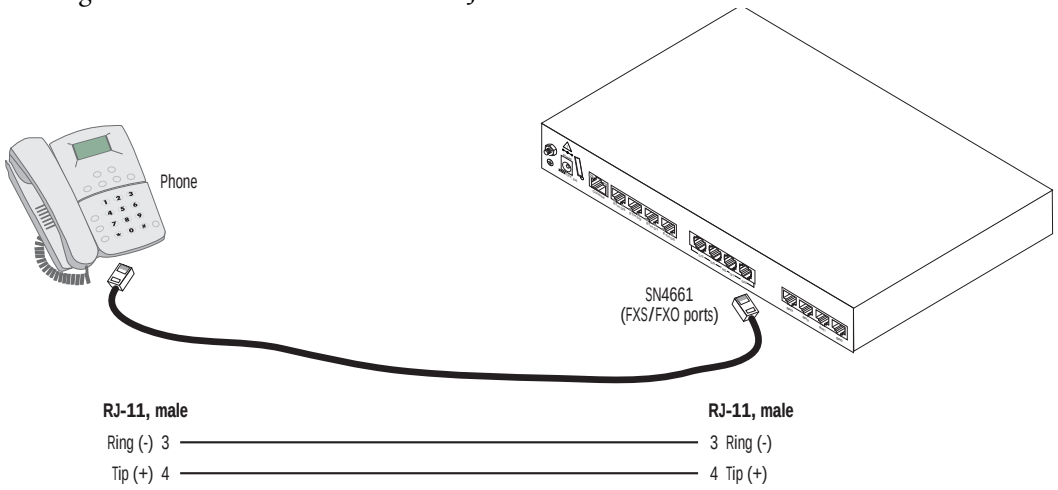


Figure 6. Connecting the FXS/FXO interface

Connecting ISDN terminals and NT to the SmartNode's ISDN BRI ports
The SmartNode comes with two to eight (depending on the model) ISDN BRI ports located on the rear panel (see Figure 2 on page 17). All ports can be connected to the PSTN (ISDN NT) or terminals

For details on the BRI port pinout and ISDN cables, refer to Appendix C, "Cabling" on page 50 and Appendix D, "Port Pin-outs" on page 53.

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 50 and Appendix D, "Port Pin-outs" on page 53.

Installation cable requirements for the DSL WAN cable (SN4670 only)

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

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 50 and Appendix D, “Port Pin-outs” on page 53.

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

The SmartNode Models 4670 and 4671 come with a G.SHDSL, ADSL, EFM 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.

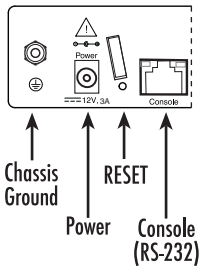


Figure 7. Power connector location on rear panel

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 40 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).

Using the ferrite clamp. A ferrite clamp and two wire ties are included with all FXS units that have more than four FXS ports (/8JS models).

CAUTION

The ferrite clamp that is shipped with the unit must be used as detailed in the following instructions in order to meet EMC requirements.

Install the ferrite clamp on the 12V DC power cable two inches away from the edge of the chassis. There are two options available for installing the ferrite clamp (see Figure 8 below):

- **Option 1:** Wrap one wire tie around the power wire coming out of the end of the ferrite clamp. **Do not** tighten and secure the tie yet. Take the second wire tie and loop it through the first wire tie *and* through the inside of the ferrite clamp. Then, you may tighten and secure both wire ties. Trim the ends off of the wire ties once they are securely attached.

- **Option 2:** Loop a wire tie around the power wire coming out of the end of the ferrite clamp. Repeat the process with the other wire tie on the other end of the clamp. Do not trim the end off of the wire ties.

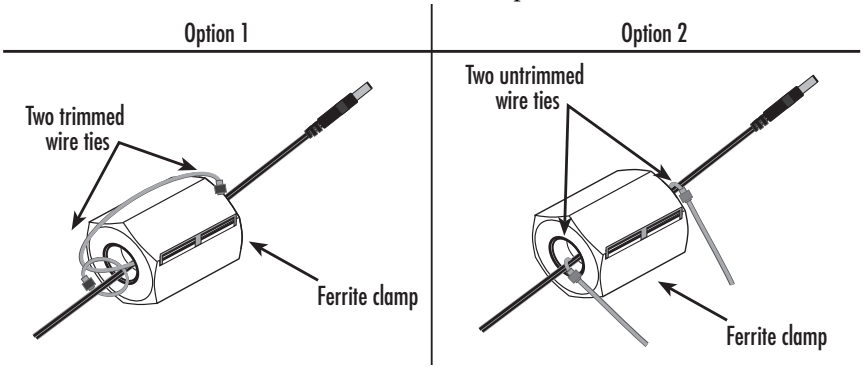


Figure 8. Ferrite clamp installation

External S-Bus power supply

Do not use an external power supply for ISDN terminals connected to the SmartNode. The SmartNode supplies S-Bus line power to ISDN terminals connected to the BRI port, so external power supplies are not required for the ISDN terminals.

Chapter 4 Initial Configuration

Chapter contents

Introduction

This chapter leads you through the basic steps to set up a new SmartNode:

- Start the SmartNode Discovery Tool (see section "Start the SmartNode Discovery Tool" on page 34)
- Access the Web Browser (GUI) Interface (see section "Access the Web Browser (GUI) Interface" on page 35)
- Configuring your SmartNode (see section "Configuring your SmartNode" on page 37)

This section describes how to quickly access the configuration interface of a SmartNode and give an overview of the different elements you can configure. For detailed information on all configuration parameters refer to the SmartWare software configuration guide.

Start the SmartNode Discovery Tool

The SmartNode discovery tool provides a quick and easy way to access the management interfaces residing within your SmartNode. The tool identifies any Patton VoIP devices installed on your network and displays the model number, IP address and MAC address of each unit.To use the discovery tool, do the following:

1. Open a web browser and go to www.patton.com/SNDiscovery. A list of SmartNode utilities displays. Identify the **SmartNode Discovery Tool** item in the list. Click the **Download** link and agree to the service terms to save the file to your PC.
2. At your PC, double-click the *SNDiscovery.exe* filename to activate the tool. The SmartNode Discovery Tool window will display the IP Address, MAC Address, Device Type (model number) and Build (software release) of your SmartNode.

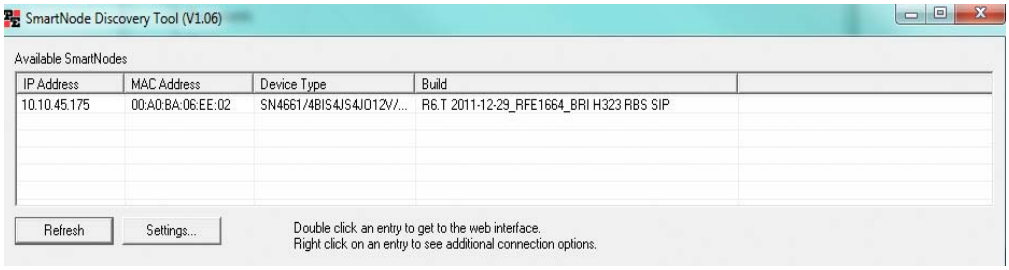


Figure 9. SmartNode Discovery Tool window

If your SmartNode does not appear:

- Make sure the SmartNode and your PC are on the same routed subnet
- Make sure any firewall programs on your PC are disabled

Access the Web Browser (GUI) Interface

The SmartNode provides a web-browser-based graphical user interface (GUI) that makes it easy to configure, monitor and manage your SmartNode. To access the web-browser interface, do the following:

1. In the SmartNode Discovery Tool window, select the line that displays the IP address of your SmartNode.

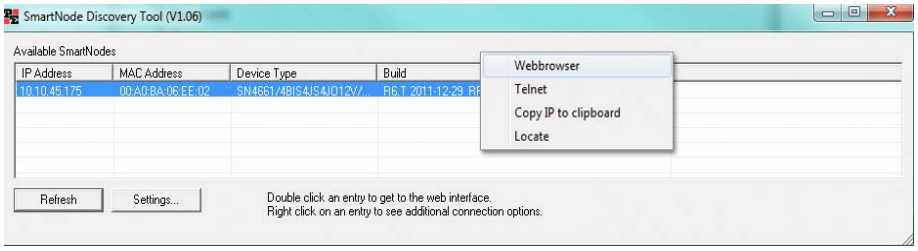


Figure 10. SmartNode Discovery Tool window with webbrowser selected

2. Right-click the selected line, and select *Webbrowser*. The Login window will display.

Figure 11. Login window

3. Enter the username *administrator*. Do not enter a password. Instead simply click OK. Your web browser will display the SmartNode home page (see Figure 12).

Figure 12. SmartNode 4661 home page

The SmartNode home page displays three action buttons that allow you to store the current configuration state, reload the device, and restore to factory defaults. The home page also displays certain basic system information. You can always return to the home page by clicking Home in the navigation bar.

Figure 13. Main GUI elements

The GUI consists of the following main elements (see Figure 13):

- The “Navigation Bar” on the left edge presents you with a menu listing giving access to the various configuration and status pages of the SmartNode.
- At the top of the page you see the “Current System Path” which displays the location and element currently presented in the main area.
- The rest of the page displays the configuration and status information for the different features of the SmartNode.

Configuring your SmartNode

Once you have logged in you can use the browser-based graphical user interface (GUI) to configure and manage your SmartNode. The information in this section is intended to introduce the configuration tools and get you started. For more detailed information about configuring your SmartNode, please refer to the *SmartWare Configuration Guide* available online at **www.patton.com/smartnode**.

CAUTION

The SmartNode immediately applies your changes whenever you modify the configuration. However, your new settings ARE NOT PERMANENTLY SAVED in non-volatile memory [RAM]. To survive power failure or manual reload you must store your new settings in non-volatile memory. To save your changes: return to the home page and press the Save Current Configuration button.

You may find the following hints helpful when configuring your SmartNode:

For each box containing an "Apply" button, fill in the required fields and press "apply" once. The settings are applied immediately after the button is pressed. If there are several boxes with an "Apply" button on one page, fill in the information per box and press the button for each box separately. This saves the new configuration parameters in volatile memory (RAM) only.

The "alert" symbol shows you that somewhere a user input is missing for correct functionality. In the case of the present WAN page, you can ignore them, because the respective title bullet ("PPP over Ethernet") is not selected.

The "info" symbol denotes hints to ease configuration or to avoid pitfalls. Read them whenever you encounter them!

Accessing the Internet

The SmartNode supports two types of WAN (Internet or corporate-Private) access:

- DHCP (factory default)
- Fixed IP address

To modify the WAN access configuration, go to the SmartNode Home page:

1. In the configuration menu pane, click *IP/DNS*. In the *Interfaces* section, click on **eth0**. The Configuration screen for the Ethernet port displays (Figure 14).

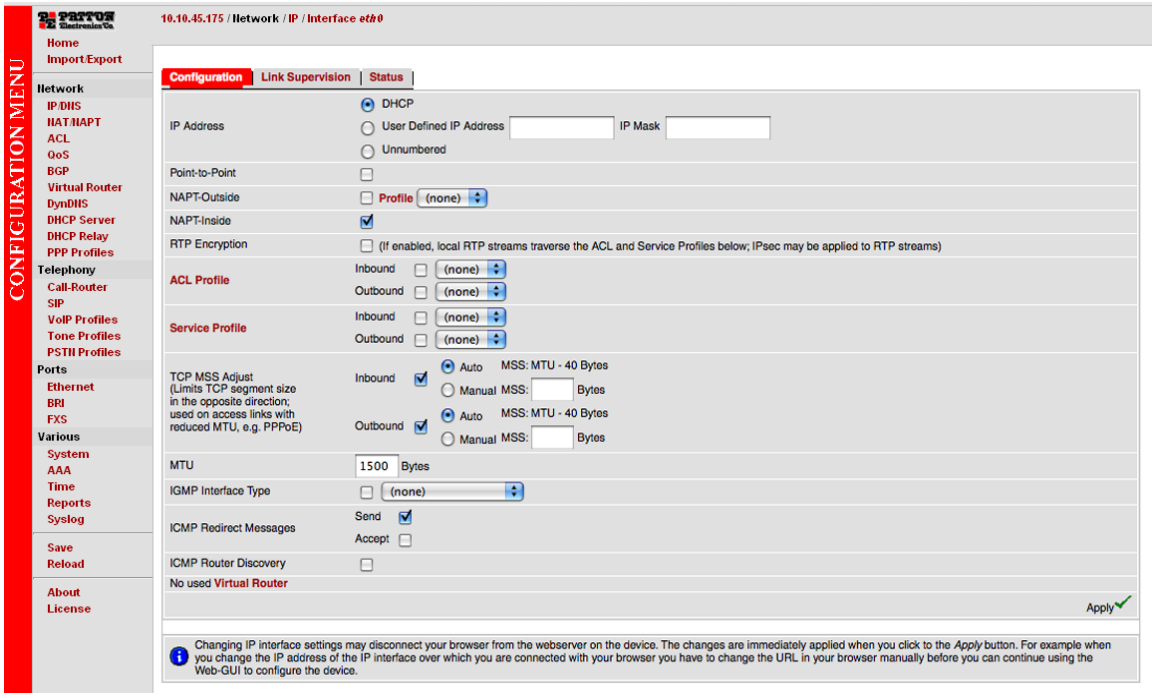


Figure 14. Ethernet Configuration page

The SmartNode supports two configuration options for the Ethernet connection (see Figure 14), as described in the following paragraphs:

- **DHCP (client—factory default).** The SmartNode's WAN port has a DHCP client enabled that uses an established Internet connection to get the Internet connectivity parameters (IP address, default gateway) automatically from a DHCP server. Use this option when connecting the SmartNode to a DSL router, a cable modem, or to a company LAN (with a DHCP server). This is the factory default configuration so no configuration is required, only the LAN and WAN Ethernet connections should be made to access the Internet immediately.
- **User Defined Address.** The SmartNode uses an existing internet connection which does not provide an upstream DHCP server. In this case, you need to set the IP address, subnet mask, default gateway and DNS servers manually.
  - **IP Address**—The IP address of the WAN Ethernet port.
  - **IP Mask**—The mask for the WAN port's IP address.

Click the **Apply** icon to activate the new configuration.

Configuring the default gateway

To configure the default gateway on the SmartNode:

1. In the configuration menu pane, click *IP/DNS*. Click on the **Routes** tab. The Configuration screen for Static Routes displays (Figure 15).

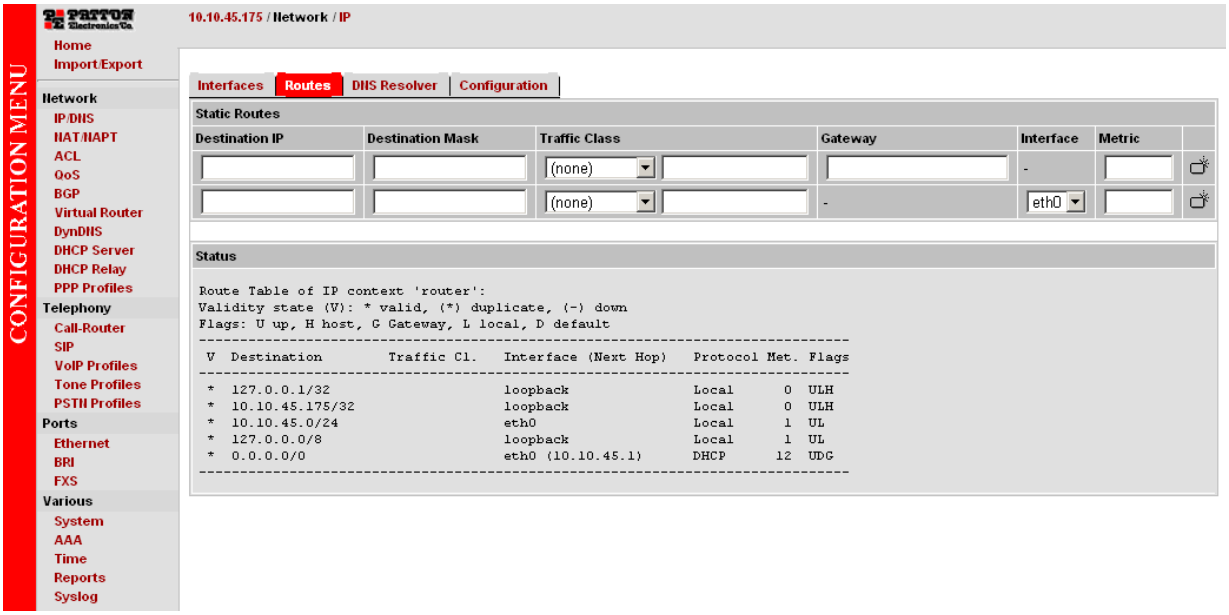


Figure 15. Default Gateway Configuration

2. Enter details for the following fields:

   Destination IP—Enter *0.0.0.0* as the destination IP address for forwarding all traffic.

   Destination Mask—Enter *0.0.0.0* as the destination netmask for forwarding all traffic.

   Gateway—Enter the IP address of the upstream router.

3. Click the **Apply** icon to save your settings.

Chapter 5 Contacting Patton for Assistance

Chapter contents

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 RAS 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.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 **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**

Chapter contents

Compliance

EMC Compliance

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

Low Voltage Directive (Safety) Compliance

- UL60950-1/CSA C22.2 No. 60950-1
- IEC/EN60950-1 2nd Edition
- AS/NZS60950-1

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 have been tested and found to comply with the limits for a Class B 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).

CE Declaration of Conformity

Patton Electronics, Inc declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and Directive 2011/65/EC relating to RoHS compliance. The Declaration of Conformity may be obtained from Patton Electronics, Inc at www.patton.com/certifications.

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

Authorized European Representative

D R M Green
European Compliance Services Limited.
Greyfriars Court
Paradise Square
Oxford, OX1 1BE, UK

Appendix B **Specifications**

Chapter contents

DSP

Up to three 8/12 channel DSPs

Voice Connectivity

2/4/8 ISDN BRI S0 ports, RJ-45. NT/TE configurable per port

Point-to-point, point-to-multipoint configurable

BRI port provides ISDN line power to connected terminals

Data Connectivity

Four 10/100Base-TX Ethernet LAN/WAN ports

Full duplex, autosensing, auto-MDX

Voice Processing (Signaling Dependent)

Up to 36 full-duplex channels of Voice CODECS:

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

G.168 echo cancellation

DTMF detection and generation

Carrier tone detection and generation

Silence suppression and comfort noise

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 Signaling

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

Interface huntgroups

Call-Distribution groups

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

Number manipulation functions:

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

IP Services

DiffServe/ToS set or queue per header bits

802.1p VLAN tagging

IPSEC AH & ESP Modes

Manual Key; IKE optional

AES/DES/3DES Encryption

Note To use the IPSec VPN capabilities including AES/DES/3DES encryption with the SmartNode, you may need to purchase additional license keys.

Management

Industry standard CLI with remote Telnet and SSH access

HTTP web management and firmware loading

TFTP configuration & firmware loading

SNMP v1 agent (MIB II and private MIB)

Built-in diagnostic tools (trace, debug)

Broadband Access (if applicable)

G.SHDSL: 4-wire G.SHDSL ITU-T G.991.2, Annex A,B, F, G; Up to 11.4 Mbps

ADSL2+: ITU-T G.992.5, Annex A, M, B; Up to 24 Mbps

EFM: ITU-T G.991.2, Annex A, B, D, F; Up to 22.8 Mbps

Fiber: 100 bT and GigE support, 100Mbps and 1000Mbps fiber SFP. See list of tested modules at http://www.patton.com/products/sfpmodules.asp

PPPoE, PPPoA, IPoA

8 PVCs, each UBR, CBR or VBR-rt selectable

I.610 OAM F4/F5 support

G.994.1

Operating Environment

Operating temperature

32–104°F (0–40°C)

Operating humidity

Up to 90% (non condensing)

System

CPU Motorola MC875 operating at 133 MHz

Memory:

- 128 Mbytes SDRAM
- 32 Mbytes Flash

Dimensions

11.9W x 1.8H x 7.1D in. (30.1W x 4.5H x 18.1D cm)

Weight and Power Dissipation

Table 11. SmartNode weight and maximum power specifications

SmartNode model	Weight	Maximum power dissipation
SN4660/SN4661/SN4670/SN4671	<30 oz./1850 g	15W

Appendix C **Cabling**

Chapter contents

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.

Ethernet

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

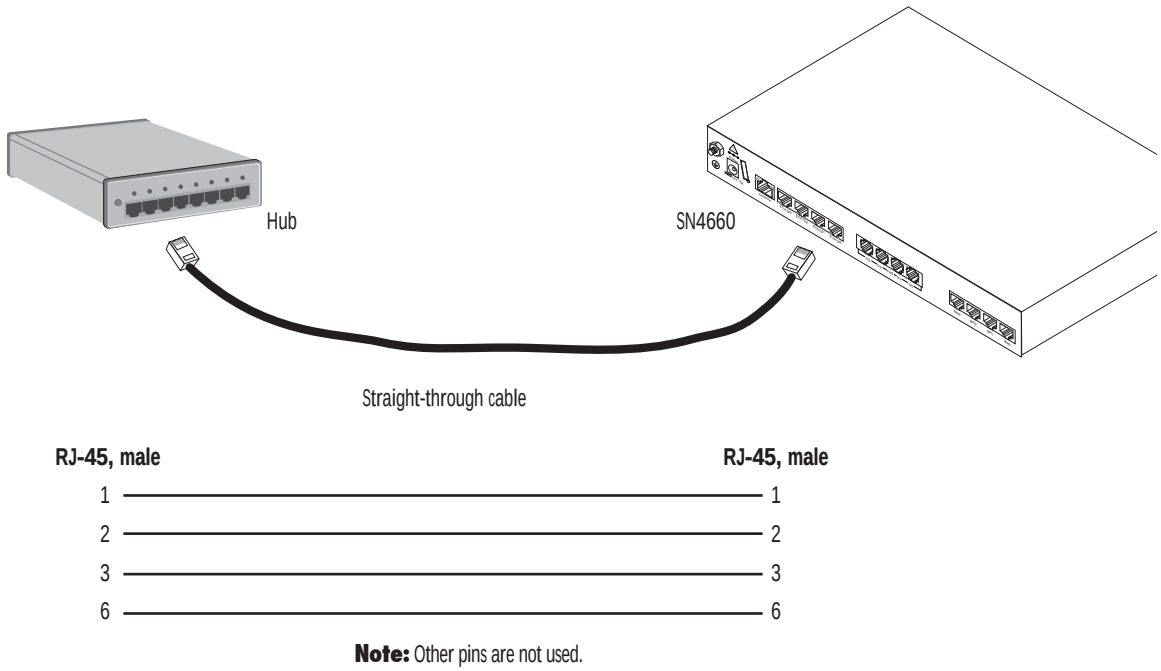
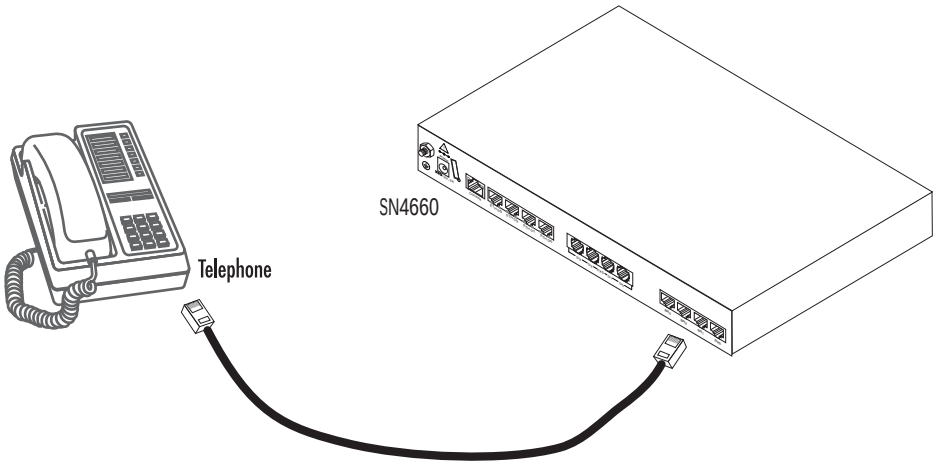
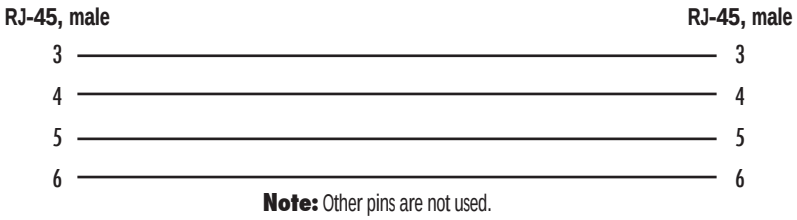


Figure 16. Typical Ethernet straight-through cable diagram

ISDN BRI

The ISDN port connects to ISDN terminals (phones, PBXs) or an ISDN S-BUS using cables terminated with RJ-45 connectors. Use straight-though cables to connect to the TE port of your phone, PBX, or residential S-BUS.





Note: Other pins are not used.

Figure 17. Connecting an ISDN device

Appendix D **Port Pin-outs**

Chapter contents

Console

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

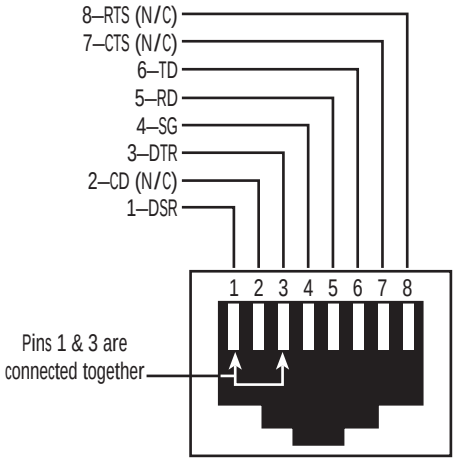


Figure 18. Console Port: EIA-561 (RJ-45 8-pin) port

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

Ethernet

Table 12. Ethernet Port: RJ-45 socket

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

Note Pins not listed are not used.

ISDN BRI NT (Net)

The BRI phone port uses an 8-pin RJ-45 connector (the pinout is shown in Table 13).

Table 13. ISDN BRI NT Port: RJ-45 socket

Pin	Signal
3	Rx+
4	Tx+
5	Tx-
6	Rx-

Note Pins not listed are not used.

ISDN BRI TE (User)

The BRI *TE* port uses an 8-pin RJ-45 connector (the pinout is shown in Table 13).

Table 14. ISDN BRI TE Port: RJ-45 socket

Pin	Signal
3	Tx+
4	Rx+
5	Rx-
6	Tx-

Note Pins not listed are not used.

Note All pins between the *NT* and *TE* ports are connected during power failure. Fallback relay operation:

- When the unit is not powered, the fallback relay connects pins 3, 4, 5, and 6 of the BRI 0/0 and BRI 0/1 ports together. This enables you to place calls to the PSTN even if the unit is powered down.

FXS

The FXS ports use an RJ-11 connector with 6 positions. The middle two positions, 3 and 4, are used according to Table 13.

Table 15. FXS Port: RJ-11 socket

Pin	Signal
3	Ring (-)
4	Tip (+)

Note Pins not listed are not used.

FXO

The FXO ports use an RJ-11 connector with 6 positions. The middle two positions, 3 and 4, are used according to Table 16.

Table 16. FXO Port: RJ-11 socket

Pin	Signal
3	Ring (-)
4	Tip (+)

Note Pins not listed are not used.

G.SHDSL

Table 17. G.SHDSL Port: 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

Table 18. ADSL Port: RJ-45 connector

Pin	Signal
4	Tip
5	Ring

Note Pins not listed are not used.

EFM

Table 19. EFM Port

Pin	Signal	Pair
1	Tip	1
2	Ring	1
3	Tip	2
4	Tip	0
5	Ring	0

Table 19. EFM Port

Pin	Signal	Pair
6	Ring	2
7	Tip	3
8	Ring	3

Fiber

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

Appendix E **SmartNode Factory Configuration**

Chapter contents

Introduction

The factory configuration settings for the SN4660 are shown below.

```
#-----------------------------------------------------------------#
#                                                                 #
# 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

profile dhcp-server DHCP
 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 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

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

Appendix F **End User License Agreement**

Chapter contents

End User License Agreement

By opening this package, operating the Designated Equipment or downloading the Program(s) electronically, the End User agrees to the following conditions:

1. Definitions

A) *Effective Date* shall mean the earliest date of purchase or download of a product containing the Patton Electronics Company Program(s) or the Program(s) themselves.

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.

2. Title

Title to the Program(s), all copies of the Program(s), all patent rights, copyrights, trade secrets and proprietary information in the Program(s), worldwide, remains with Patton Electronics Company or its licensors.

3. Term

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 62.

4. Grant of License

A) During the term of this Agreement, Patton Electronics Company grants a personal, non-transferable, non-assignable and non-exclusive license to the End User to use the Program(s) only with the Designated Equipment at a site owned or leased by the End User.

B) The End User may copy licensed Program(s) as necessary for backup purposes only for use with the Designated Equipment that was first purchased or used or its temporary or permanent replacement.

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.

D) Should End User transfer title of the Designated Equipment to a third party after entering into this license agreement, End User is obligated to inform the third party in writing that a separate End User License Agreement from Patton Electronics Company is required to operate the Designated Equipment.

5. Warranty

The Program(s) are provided *as is* without warranty of any kind. Patton Electronics Company and its licensors disclaim all warranties, either express or implied, including but not limited to the implied warranties of merchantability, fitness for a particular purpose or non-infringement. In no event shall Patton Electronics Company or its licensors be liable for any damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or inability to use the Program(s), even if Patton Electronics Company has been advised of the possibility of such damages. Because some states do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

If the Program(s) are acquired by or on behalf of a unit or agency of the United States Government, the Government agrees that such Program(s) are *commercial computer software* or *computer software documentation* and that, absent a written agreement to the contrary, the Government's rights with respect to such Program(s) are limited by the terms of this Agreement, pursuant to Federal Acquisition Regulations 12.212(a) and/or DEARS 227.7202-1(a) and/or sub-paragraphs (a) through (d) of the "Commercial Computer Software - Restricted Rights" clause at 48 C.F.R. 52.227-19 of the Federal Acquisition Regulations as applicable.

6. Termination

A) The End User may terminate this agreement by returning the Designated Equipment and destroying all copies of the licensed Program(s).

B) Patton Electronics Company may terminate this Agreement should End User violate any of the provisions of section "4. Grant of License" on page 61.

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)

7. Other licenses

The Program may be subject to licenses extended by third parties. Accordingly, Patton Electronics Company licenses the Programs subject to the terms and conditions dictated by third parties. Third party software identified to the Programs includes:

- 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.