For Quick Start Installation
see page 31

PATTON Electronics Co.

SmartNode 4520 & 4110 Series
VoIP Gateway Routers

Getting Started Guide

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Contents

Compliance information

Radio and TV interference

The SmartNode Series 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 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 Series 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 notice

The CE symbol on your Patton Electronics equipment indicates that it is in compliance with the Electromagnetic Compatibility (EMC) directive and the Low Voltage Directive (LVD) of the European Union (EU).

Service

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Services at:

- Tel: **+1 (301) 975-1007**
- Email: **support@patton.com**
- URL: **www.patton.com**

Note Packages received without an RMA number will not be accepted.

About this guide

This guide describes the SmartNode 4110 and 4520 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 router features and capabilities
- Chapter 2 on page 23 contains an overview describing router operation and applications
- Chapter 3 on page 31 provides quick start hardware installation procedures
- Chapter 4 on page 43 describes getting started with the SmartNode router
- Chapter 5 on page 51 contains definitions for the LED status indicators
- Chapter 6 on page 57 contains information on contacting Patton technical support for assistance
- Appendix A on page 61 contains specifications for the routers
- Appendix B on page 67 provides cable recommendations
- Appendix C on page 73 describes the router's ports and pin-outs
- Appendix D on page 77 lists the factory configuration settings for SmartNode 4110 Series devices
- Appendix E on page 81 lists the factory configuration settings for SmartNode 4520 Series devices
- Appendix F on page 85 lists the tasks for installing a SmartNode 4520 or 4110 Series router

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

Precautions

Notes and cautions, which have the following meanings, are used throughout this guide to help you become aware of potential Router problems. *Warnings* relate to personal injury issues, and *Cautions* refer to potential property damage.

Note Calls attention to important information.

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.

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

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.

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

Safety when working with electricity

Mains Voltage: Do not open the case when the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.

Hazardous network voltages are present in WAN ports regardless of whether power to the SmartNode is ON or OFF. To avoid electric shock, use caution when near WAN ports. When detaching cables, detach the end away from the SmartNode first.

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

Before opening the chassis, disconnect the telephone network cables to avoid contact with telephone line voltages.

Ultimate disposal of this equipment must be handled according to all applicable national laws and regulations.

Preventing electrostatic discharge damage

When starting to install interface cards place the interface card on its shielded plastic bag if you lay it on your bench.

Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Do the following to prevent ESD:

- 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 aggressive 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 Series VoIP routers overview

The SmartNode 4520 and 4110 Series VoIP Gateway Routers (see figure 1) combine IP routing, VPN/Security, and Quality of Service for up to 8 transparent voice and FAX calls over any IP or PSTN network. Leverage low-cost IP services with packet-voice for complete branch office voice and data connectivity.

Figure 1. SmartNode Router (SmartNode 4524 shown)

The SmartNode 4520 Series Gateway Routers are equipped with two 10/100Base-T Ethernet ports, providing IP network connectivity plus prioritized Ethernet switching, IP routing, Firewall functions, LAN data services and extensive IP QoS functions.

The SmartNode 4110 Series Media Gateways are equipped with a single 10/100Base-T Ethernet port that provides IP network connectivity.

A SmartNode Gateway performs the following major functions:

- Voice termination and switching via two to eight analog interfaces (FXS voice ports).
- Voice over IP (VoIP) conversion of telephone circuits into Internet Protocol (IP) data streams. VoIP is supported in accordance with standard H.323, SIP[1] or MGCP[1] protocols.
- IP Routing (4520 Series only) with IP layer Quality of Service (QoS) support for mixed voice and data traffic.
- Ethernet Switching (4520 Series only) with Ethernet layer Quality of Service (QoS) support for mixed voice and data traffic.

Section "SmartNode 4520 Series router" on page 16 provides more information on the SmartNode 4520 Series ports and LEDs. Section "SmartNode 4110 Series router" on page 19describes the SmartNode 4110 Series ports and LEDs.

1. May require special software loads and/or configuration. Contact Patton Technical Support for details.

SmartNode 4520 Series router

The SmartNode 4520 Series is a compact VoIP Gateway Router, which supports two to eight voice channels. The following models (each equipped with two 10/100Base-T Ethernet ports) are available (see figure 2):

- SmartNode 4522 (2 FXS voice ports)
- SmartNode 4524 (4 FXS voice ports)
- SmartNode 4526 (6 FXS voice ports)
- SmartNode 4528 (8 FXS voice ports)

Note The SmartNode 4526 and 4528 are available with external power only.

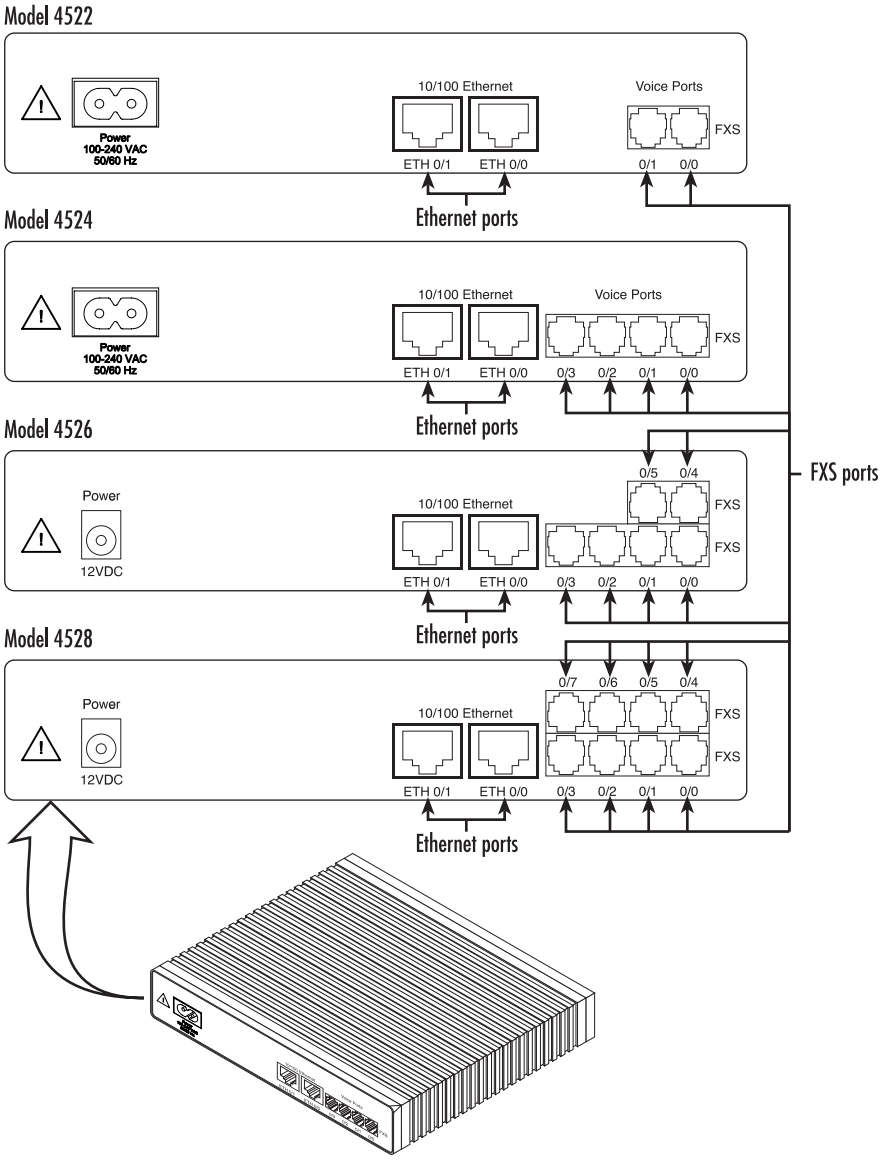


Figure 2. 4520 Series rear panels

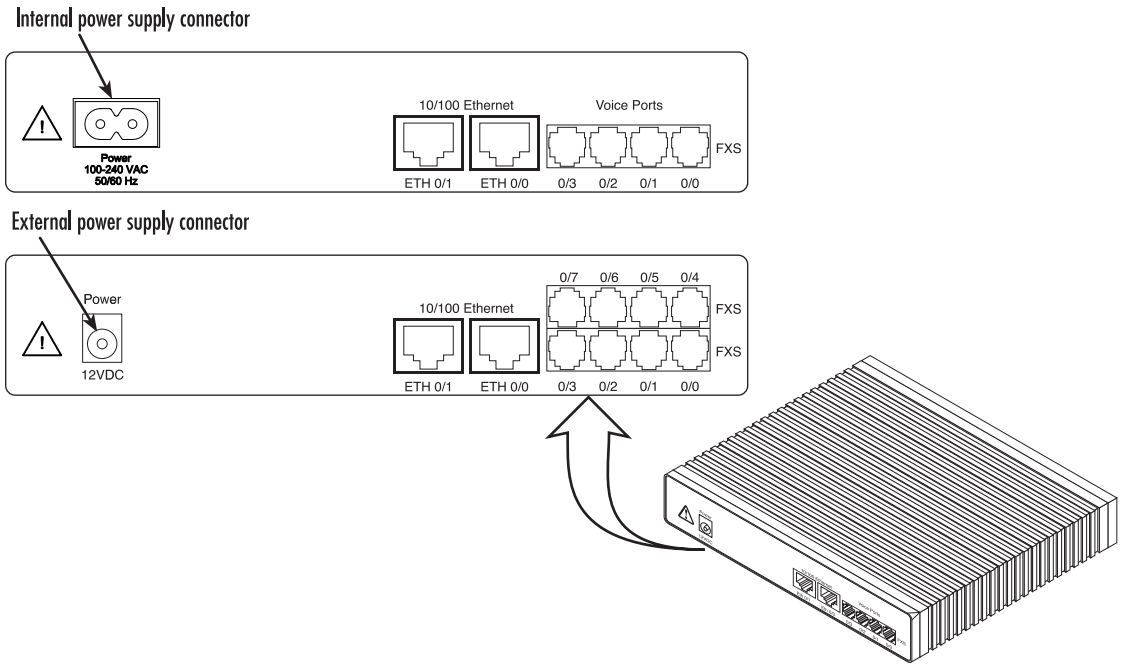


Figure 3. SmartNode 4520 Series power input connectors

Ports descriptions

The SmartNode 4520 Series rear panel ports are described in table 2.

Table 2. Rear panel ports

Port	Location	Description
10/100 Ethernet ETH 0/0 & ETH 0/1	Rear panel	RJ-45 connectors (see figure 2 on page 16) that connect the router to an Ethernet device (e.g., a cable or DSL modem, LAN hub or switch).
Voice Ports, FXS	Rear panel	FXS RJ-11/12 connectors (see figure 2 on page 16) that connect the router with an FXO port (a telephone for example). EuroPOTS support (ETSI EG201 188). Configured per model as follows: • SmartNode 4522—0/0, 0/1 • SmartNode 4524—0/0, 0/1, 0/2, 0/3 • SmartNode 4526—0/0, 0/1, 0/2, 0/3, 0/4, 0/5 • SmartNode 4528—0/0, 0/1, 0/2, 0/3, 0/4, 0/5, 0/6, 0/7
Power	Rear panel	The gateway is available in a DC or AC power input version (see figure 3), labeled as follows: • AC version (Internal power supply): 100–240 VAC, 50/60 Hz • AC version (External power supply): 100–240 VAC, 50/60 Hz • DC version: 12 VDC
Console	Front panel	Used for service and maintenance, the Console port (see figure 4 on page 18), an RS-232 RJ-45 connector, connects the router to a serial terminal such as a PC or ASCII terminal (also called a dumb terminal).

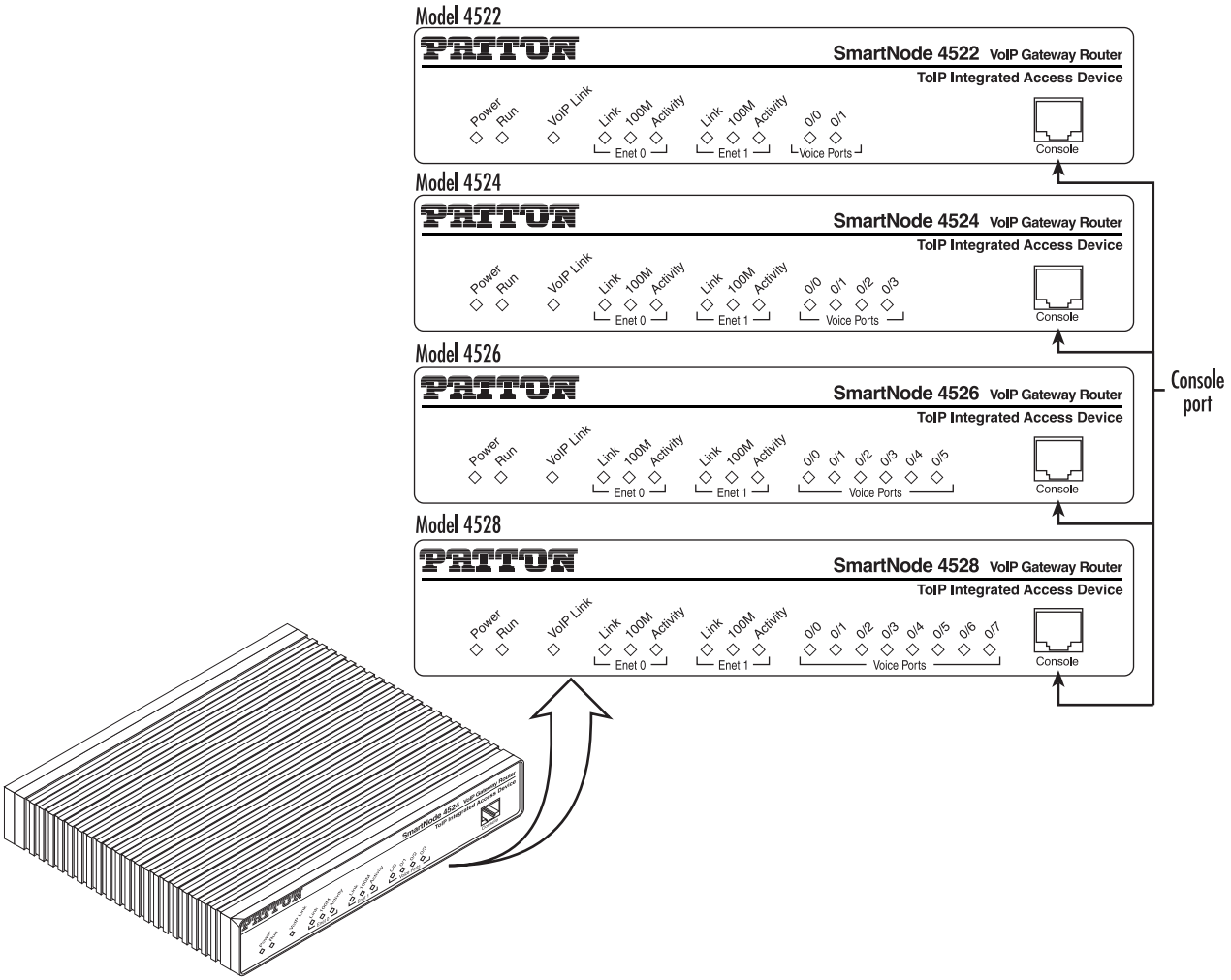


Figure 4. SmartNode 4520 Series front panels

LED descriptions

This section describes the SmartNode 4520 Series front panel LEDs (see figure 4).

Note If an error occurs, all LEDs will flash once per second.

- **Power**—When lit, indicates power is applied. Off indicates no power applied.
- **Run**—When lit, indicates normal operation. Flashes during boot (startup).
- **VoIP Link**—When lit, indicates the gateway is registered on a gatekeeper, media gateway controller, associated to a remote unit, or has an active VoIP connection. Off indicates the unit is not configured or registered and has no active VoIP connection. Flashing green indicates that the unit is trying or has failed to associate/register.
- **FXS** (each port)—Off indicates on-hook condition. Solid green when off-hook. Flashes to follow ring cadence.
- **Ethernet** (each port):
  - **Link**: Lit when Ethernet link is up.
  - **100M**: On when 100-Mbps Ethernet is selected.
  - **Activity**: Flashes when data is received or transmitted from the unit to the LAN.

SmartNode 4110 Series router

The SmartNode 4110 Series is a compact VoIP gateway, which supports two to eight voice channels. The following models (each equipped with one 10/100Base-T Ethernet port) are available (see figure 5):

- Model 4112 (2 FXS voice ports)
- Model 4114 (4 FXS voice ports)
- Model 4116 (6 FXS voice ports)
- Model 4118 (8 FXS voice ports)

Note The SmartNode 4116 and 4118 are available with external power only.

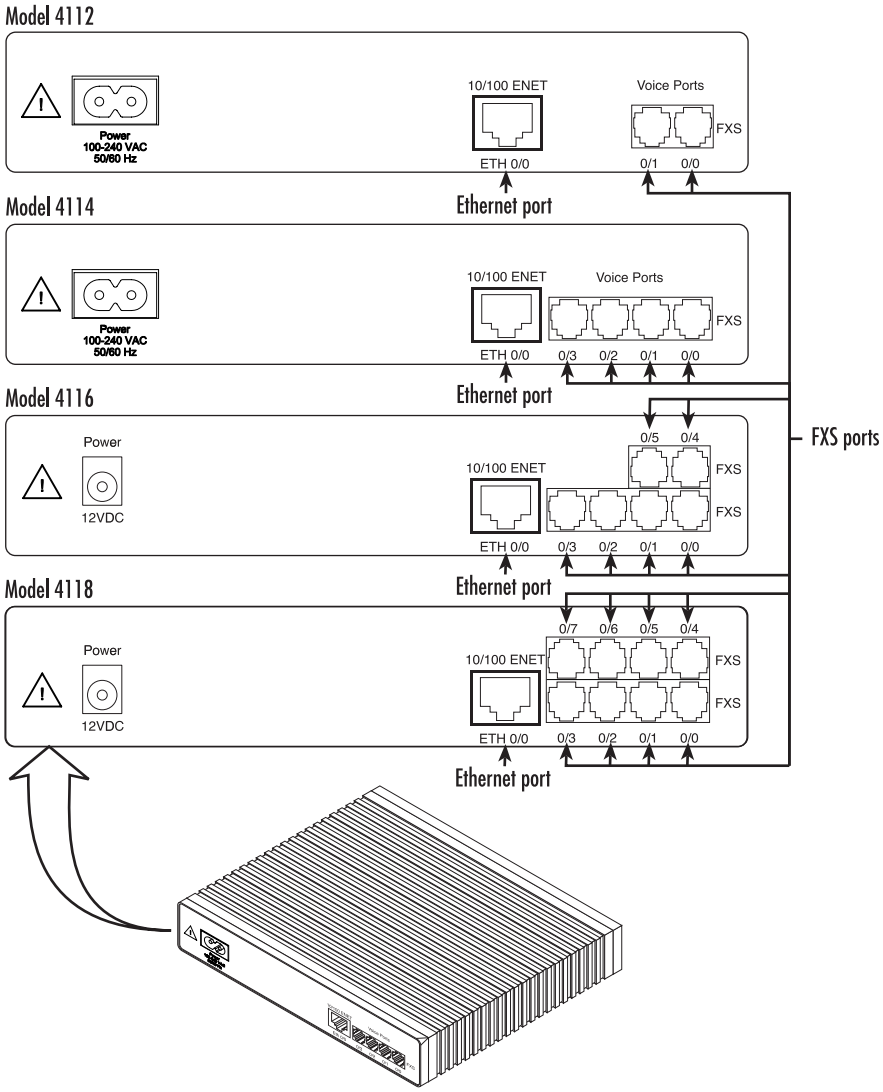


Figure 5. 4110 Series rear panels

Ports descriptions

The SmartNode 4110 Series rear panel ports are described in table 3.

Table 3. Rear panel ports

Port	Location	Description
10/100 Ethernet ETH 0/0	Rear panel	RJ-45 connector (see figure 5 on page 19) that connects the router to an Ethernet device (a cable or DSL modem, LAN hub or switch, for example).
Voice Ports, FXS	Rear panel	FXS RJ-11/12 connectors (see figure 5 on page 19) that connect the router with an FXO port (a telephone for example). EuroPOTS support (ETSI EG201 188). Configured per model as follows: • Model 4112—0/0, 0/1 • Model 4114—0/0, 0/1, 0/2, 0/3 • Model 4116—0/0, 0/1, 0/2, 0/3, 0/4, 0/5 • Model 4118—0/0, 0/1, 0/2, 0/3, 0/4, 0/5, 0/6, 0/7
Power	Rear panel	The gateway is available in a DC or AC power input version (see figure 6), labeled as follows: • AC version (Internal power supply): 100–240 VAC, 50/60 Hz • AC version (External power supply): 100–240 VAC, 50/60 Hz • DC version: 12 VDC
Console	Front panel	Used for service and maintenance, the Console port (see figure 7 on page 21), an RS-232 RJ-45 connector, connects the router to a serial terminal such as a PC or ASCII terminal (also called a dumb terminal).

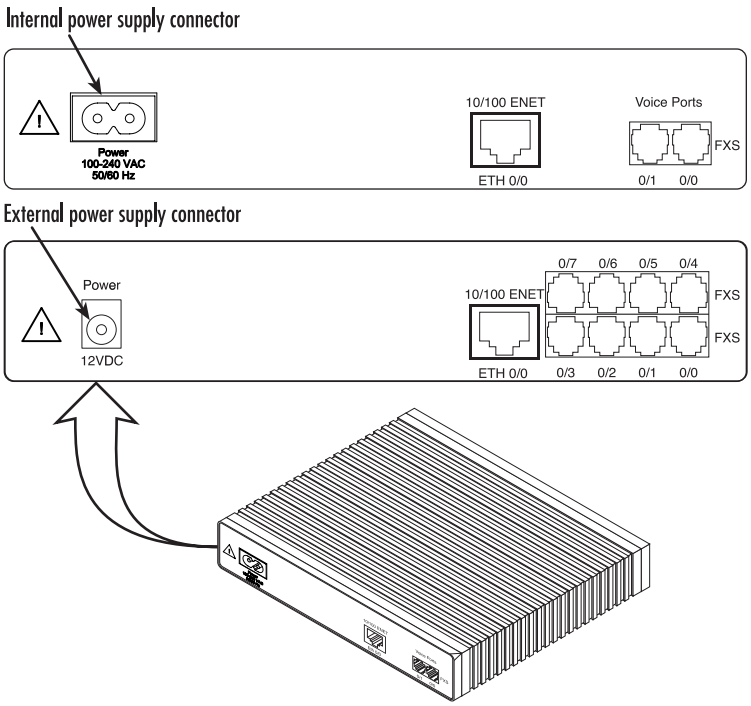


Figure 6. SmartNode 4110 Series power input connectors

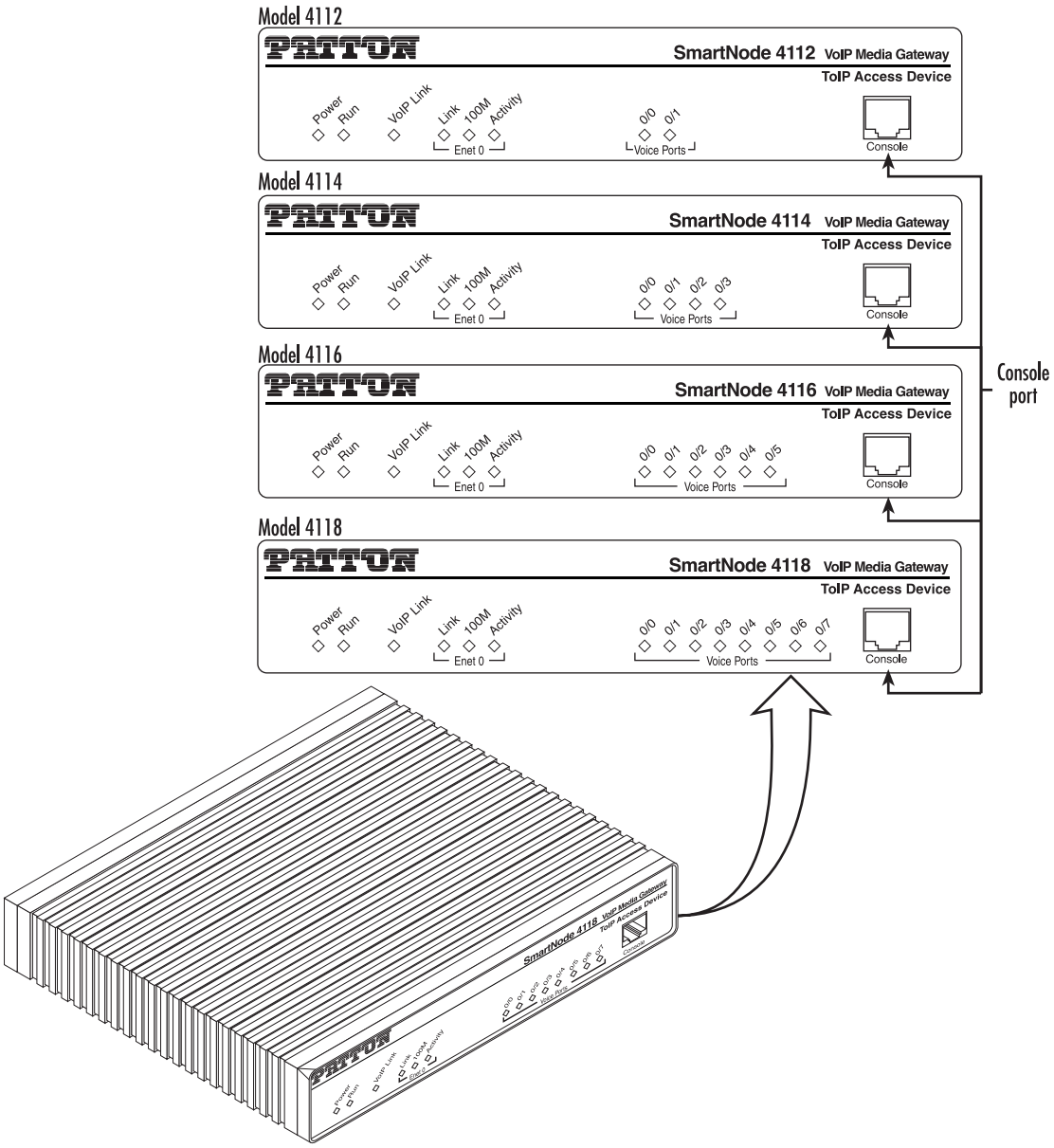


Figure 7. SmartNode 4110 Series front panels

LED descriptions

This section describes the SmartNode 4110 Series front panel LEDs.

Note If an error occurs, all LEDs will flash once per second.

- **Power**—When lit, indicates power is applied. Off indicates no power applied.
- **Run**—When lit, indicates normal operation. Flashes once per second during boot (startup).

- **VoIP Link**—When lit, indicates the gateway is registered on a gatekeeper, media gateway controller, associated to a remote unit, or has an active VoIP connection. Off indicates the unit is not configured or registered and has no active VoIP connection. Flashing green indicates that the unit is trying or has failed to associate/register.
- **FXS** (each port)—Off indicates on-hook condition. Solid green when off-hook. Flashes to follow ring cadence.
- **Ethernet** (each port):
  - **Link**: Lit when Ethernet link is up.
  - **100M**: On when 100-Mbps Ethernet is selected.
  - **Activity**: Flashes when data is received or transmitted from the unit to the LAN.

Chapter 2 Applications overview

Chapter contents

Introduction

Patton's SmartNode Media Gateway Routers deliver all the features for advanced multiservice voice and data network applications. They combine high quality voice over IP with powerful Quality of Service routing and switching functions to make professional and reliable VoIP networks. This chapter describes typical applications for which the routers are uniquely suited.

Note Detailed configuration information for various applications can be found on the CD-ROM that was included with your SmartNode device or at Patton's Inalp web server (http://www.inalp.ch/en/support/confignotes/).

Applications for SmartNode 4110 Series

The SmartNode 4110 Series, equipped with a single Ethernet port, provide gateway and over-IP line extension services.

H.323 terminal media gateway

All models provide *voice over IP* and *FAX over IP* services for integration into a gateway/gatekeeper network (see figure 8). The SmartNode 4110 Series router supports automatic registration to a gatekeeper as part of a PBX call manager and offers regular extension services.

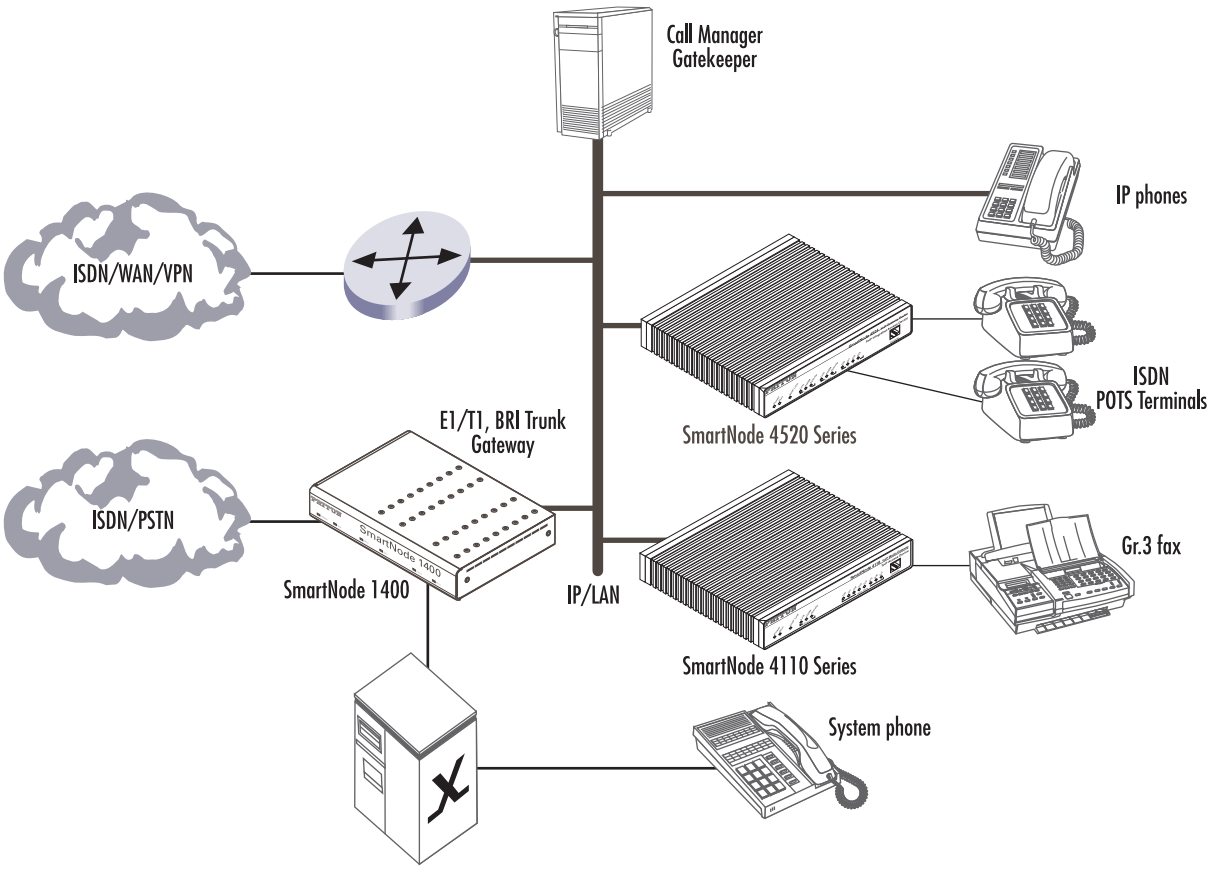


Figure 8. H.323 terminal gateways

A very simple installation for this application requires only the configuration of extension numbers for each port. The rest (IP address through DHCP and GK discovery through RAS) is automatic.

Application—Private line automatic ringdown (PLAR)

A private hot-line can be created by using two FXS models back-to-back (see figure 9). These can be found in use as courtesy phones at ATM's, information kiosks, and emergency assistance pedestals. In this application, when one handset is picked-up, the remote handset immediately begins ringing. When the remote handset is picked-up, the speech path is completed. The end-to-end link supports voice, fax Gr.3 (2.4–14.4 kbps) with T.38 or fax bypass, or modem connections using a G.711 codec.

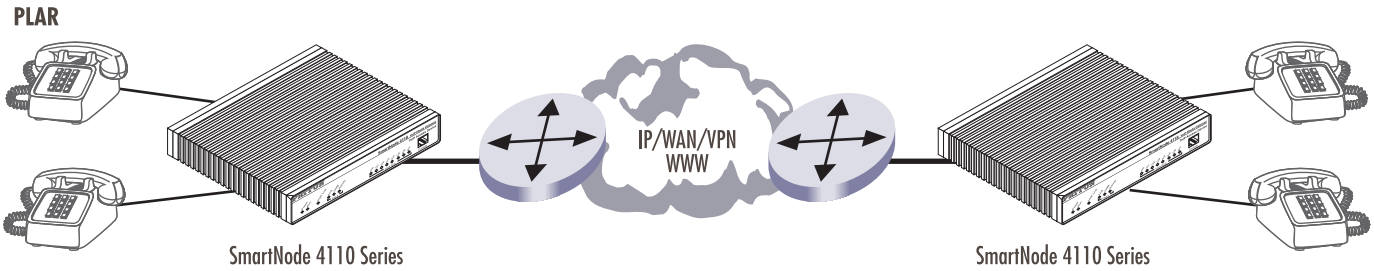


Figure 9. FXS to FXS extension

Application—Enterprise campus BRI to FXS telephony extension

In combination with the Patton SmartNode 1000 and 2000 Series models the FXS gateways provide ISDN BRI to FXS extensions over IP (see figure 10).

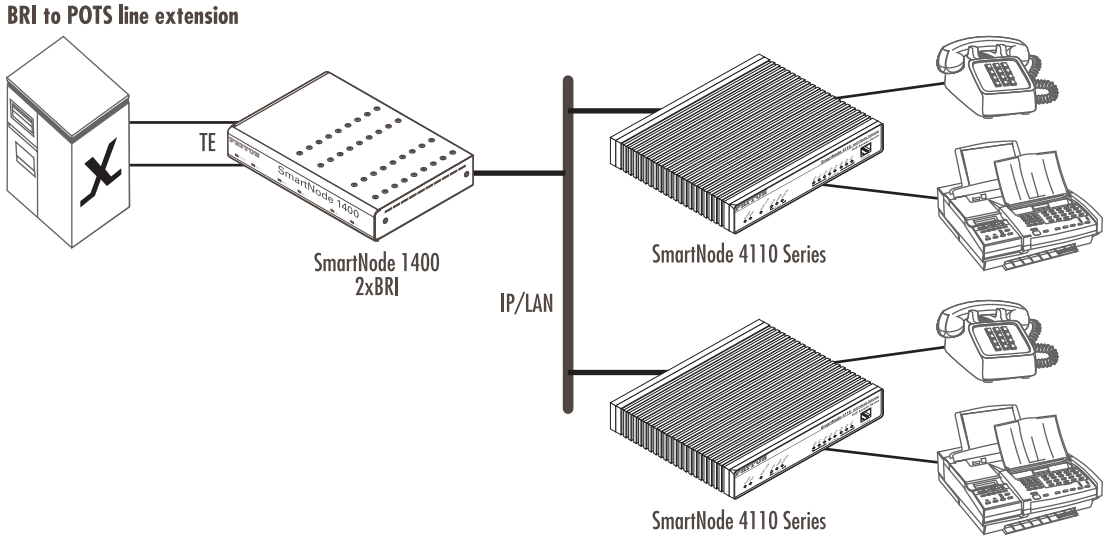


Figure 10. BRI to FXS extension

Application—PBX toll bypass gateway

The gateways can be used to provide toll bypass over an IP WAN (see figure 11). The call routing in this case is provided by the PBX systems. A call routed to the FXS gateway can be relayed on a port-to-port basis to the remote gateway or on a dialled number basis.

Note With the use of FXS ports extension dialing on the secondary side must be done through two stage dialling (DTMF relay).

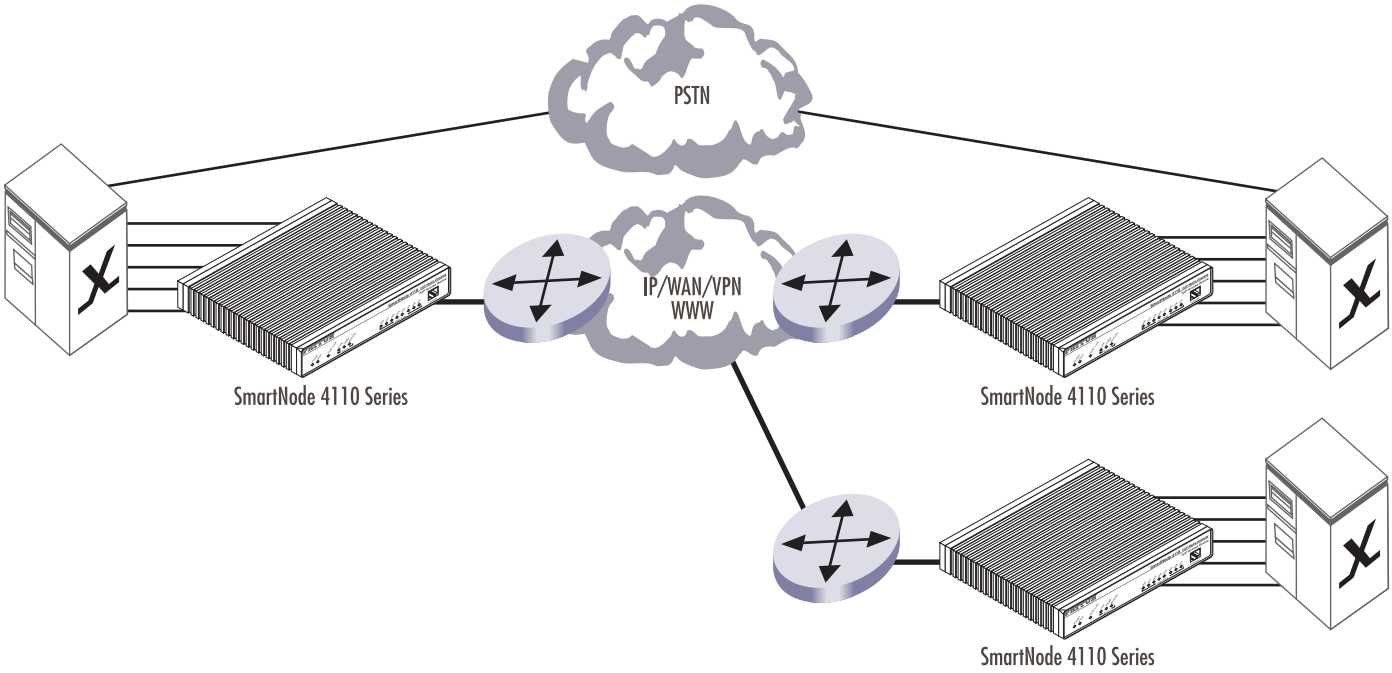


Figure 11. Toll bypass

Applications for SmartNode 4520 Series

These models have dual 10/100Base-T Ethernet ports. The second Ethernet port provides Ethernet and IP layer QoS services. Voice prioritization and rate limitation to avoid network congestion and the respective voice quality degradation.

Application—Desktop or LAN segment QoS

These models can be used by the network administrator to provide QoS tagging and management for individual desktops or LAN segments.

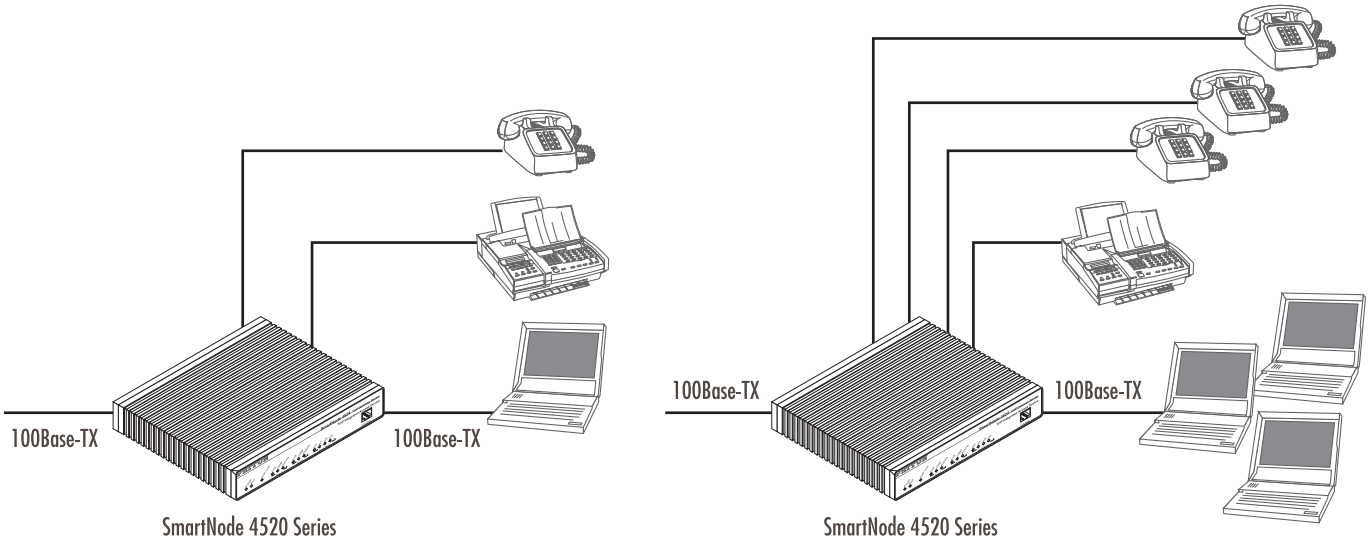


Figure 12. Desktop/Segment QoS Switch/GW

Application—Point-to-point WAN QoS Switch

The 4520 Series router can be used by the network administrator to provide QoS tagging and management point-to-point WAN links (see figure 12). The following data forwarding modes are supported:

- Ethernet switching: applicable for wire-speed switching at 10 or 100 Mbps useful in LAN segmentation, LAN extension (VDSL, fiber) or fiber access. In this mode hardware 802.1p prioritization is available but no software based queuing or rate limiting features.[1]
- Bridging: useful for speeds less than 10 Mbps (DSL, leased-line bridges) where network administration and routing can be simplified by inserting a bridge instead of a router (e.g. in combination with VPN-Firewall). Software based QoS mechanisms such as rate limiting and queuing can be applied in this mode.[1]
- Routing: useful for speeds less than 10 Mbps where the SmartNode provides routing service such as NAT, ACL, DHCP, PPPoE etc. and the full software based QoS functionality of SmartWare.

Note The layer 2 QoS switch cannot provide downstream QoS for networks connected to an IP WAN where various sources can congest the downstream.

1. Availability depending on SmartWare release and configuration.

Applications in combination with FXO models

The FXO models will enable the provisioning of POTS (FXS to FXO) extension over any existing Ethernet/IP network. The FXS ports will allow a standard POTS handset to seamlessly connect to a remote PSTN line or PBX extension port over a packet network. Following the model of extension, all of PBX functions are transparently carried over the network end-to-end (hook flash, CLID, DTMF, etc.).

Application—SOHO off-premise extension

For a SOHO/telecommuter the SmartNode 4520 Series router can provide an off-premise extension to the corporate network. Now the remote user will appear to be local and enjoy all of the services available to local telephony users—such as station-to-station dialing, outside trunk access, and voice mail. Additionally, the home user can take advantage of corporate dialing rates. This deployment does not require modification to the PBX/infrastructure.

Chapter 3 Hardware installation

Chapter contents

Planning the installation

Before you start the actual installation, it is strongly recommended that you gather all the information needed to install and setup the device. See table 4 for an example of what pre-installment checks you might need to carry out. Having carried out the pre-installation checks enables you to install and set up your gateway router into an existing infrastructure with confidence.

Note When setting up your gateway router consider cable length limitations, and potential electromagnetic interference (EMI) as defined by the applicable local and international regulations. Ensure that your site is properly prepared before beginning installation.

Before installing the gateway router device, the following tasks should be completed:

- **Create a network diagram** (see section "Network information" on page 35)
- **Gather IP related information** (see section "IP related information" on page 35 for more information)
- **Install the hardware and software needed to configure the SmartNode**. (See section "Software tools" on page 35)
- **Verify power source reliability** (see section "Power source" on page 35).

When you finish preparing for gateway router installation, go to section "Installing the gateway router" on page 36 to install the device.

Installation checklist

The installation checklist (see table 4) lists the tasks for installing a SmartNode 4520 or 4110 Series router. Make a copy of this checklist and mark the entries as you complete each task. For each SmartNode 4520 or 4110 Series router, include a copy of the completed checklist in your site log.

Table 4. Installation checklist

Task	Verified by	Date
Network information available & recorded in site log		
Environmental specifications verified		
Site power voltages verified		
Installation site pre-power check completed		
Required tools available		
Additional equipment available		
All printed documents available		
SmartWare release & build number verified		
Rack, desktop, or wall mounting of chassis completed		
Initial electrical connections established		
ASCII terminal attached to console port		
Cable length limits verified		
Initial configuration performed		
Initial operation verified		

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 5.

Table 5. 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 4000 series 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 of central PSTN Gateway for H.323 and/or ISoIP based calls
- IP addresses of central TFTP Server used for configuration upload and download

Software tools

You will need a PC (or equivalent) with a VT-100 emulation program (e.g. HyperTerminal) to configure the software on your SmartNode router.

Power source

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. Install a power conditioner if necessary.

Location and mounting requirements

The SmartNode router 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 gateway router

SmartNode gateway router installation consists of the following:

- Placing the device at the desired installation location (see section "Mounting the gateway router" on page 36)
- Installing the interface and power cables (see section "Connecting cables" on page 36)

When you finish installing the SmartNode, go to chapter 4, "Getting started with the SmartNode" on page 43.

Mounting the gateway router

Place the router on a desktop or similar sturdy, flat surface that offers easy access to the cables. The router 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 SmartNode gateway router.

Connecting cables

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

Installing router cables takes place in the following order:

1. Installing the RJ-11 voice port (FXS) cable or cables (see "Installing an interface cable on the router's FXS interface port")
2. Installing the 10/100 Ethernet port cable or cables (see "Installing the Ethernet cable" on page 38)
3. Installing the power input (see "Connecting to external power source" on page 40)

Installing an interface cable on the router's FXS interface port

The gateway comes with at least two FXS voice ports (see figure 13) located on the back of the router. The FXS interfaces are connected to analog devices via cables (see figure 14) terminated with RJ-11 connectors (see figure 15 and table 6 on page 38 for pin-out information).

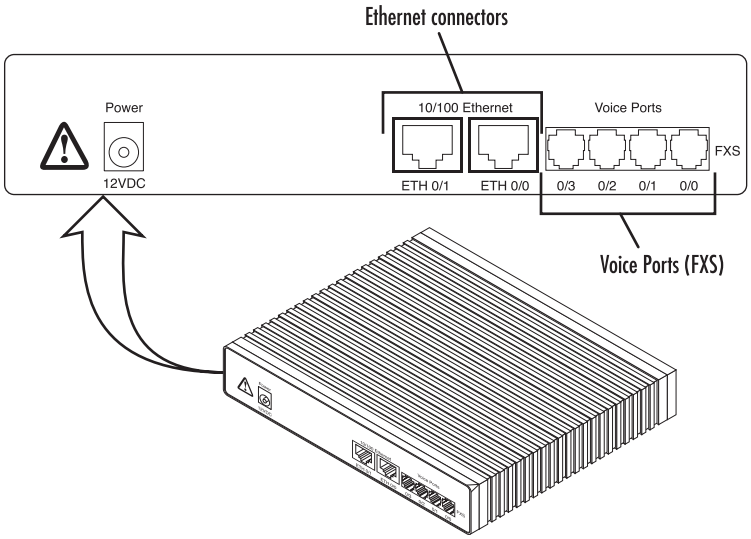


Figure 13. Rear view showing location of Ethernet and FXS connectors (SmartNode 4520 shown)

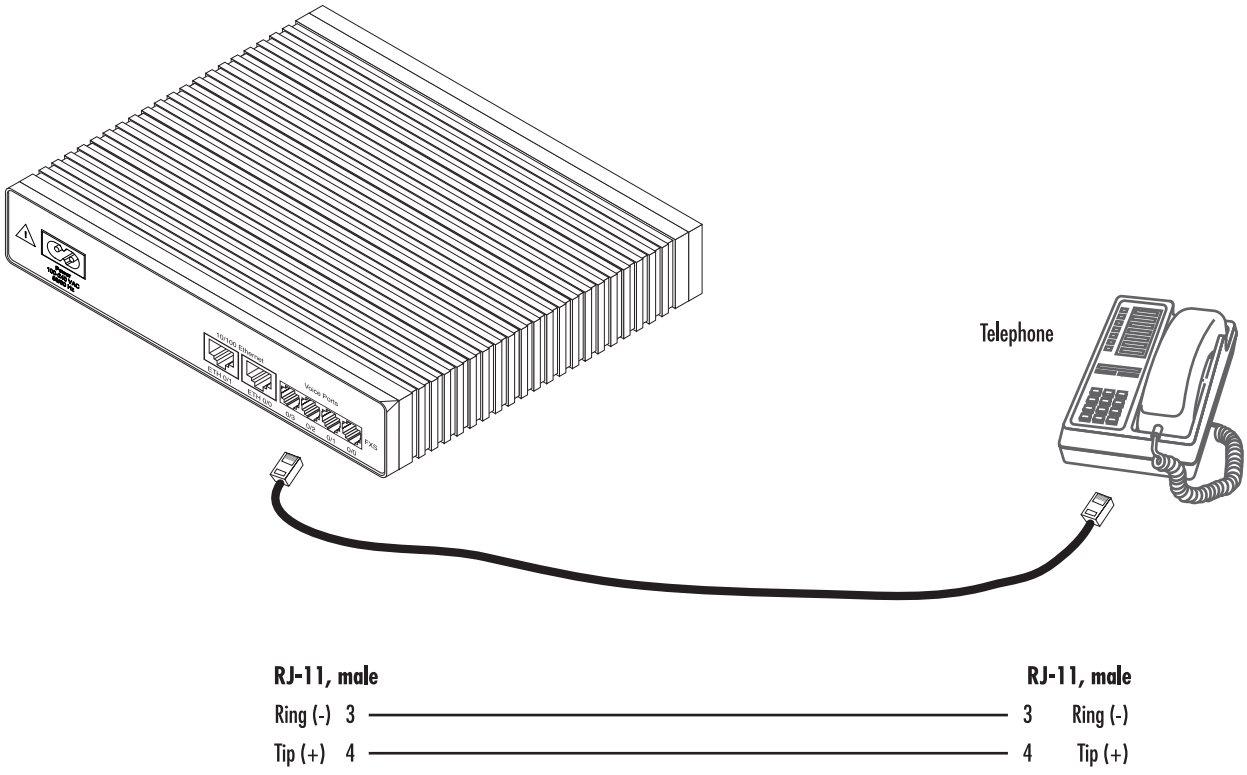


Figure 14. Analog FXS connection

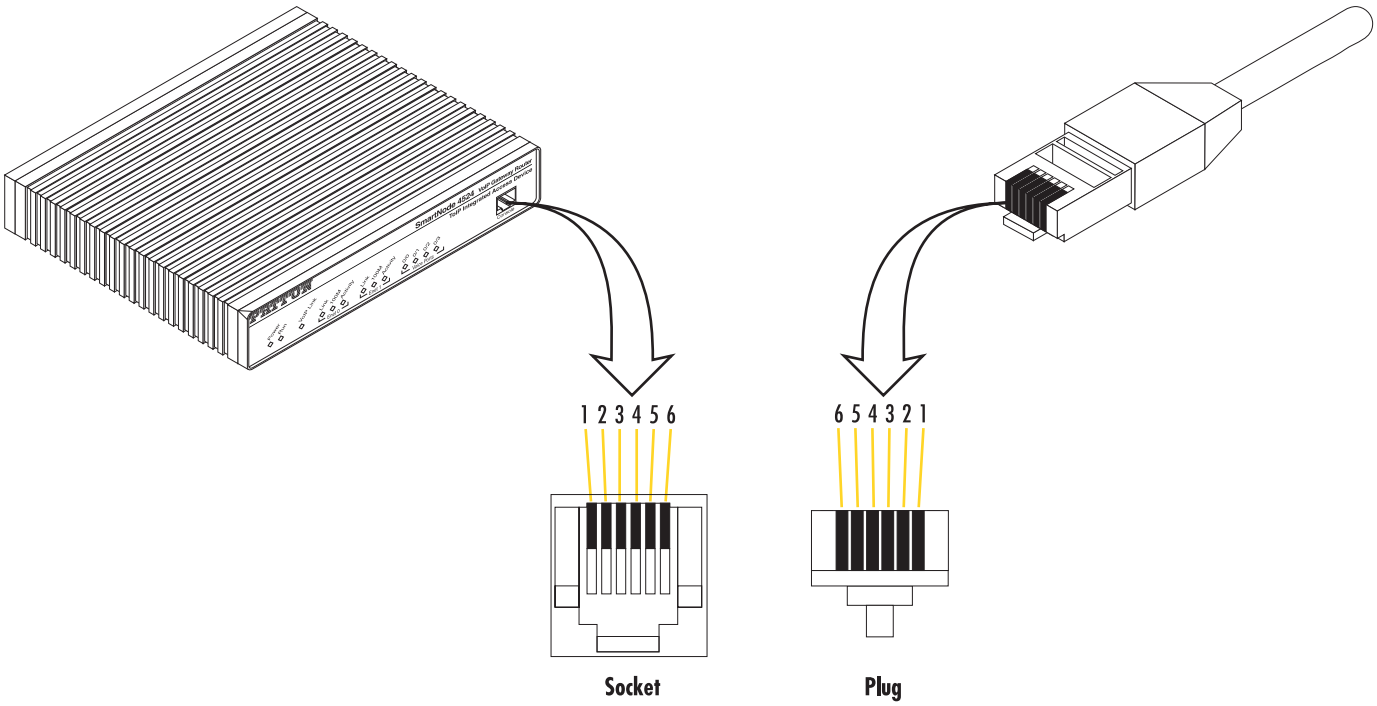


Figure 15. RJ-11 pinout diagram

Table 6. RJ-11 socket

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

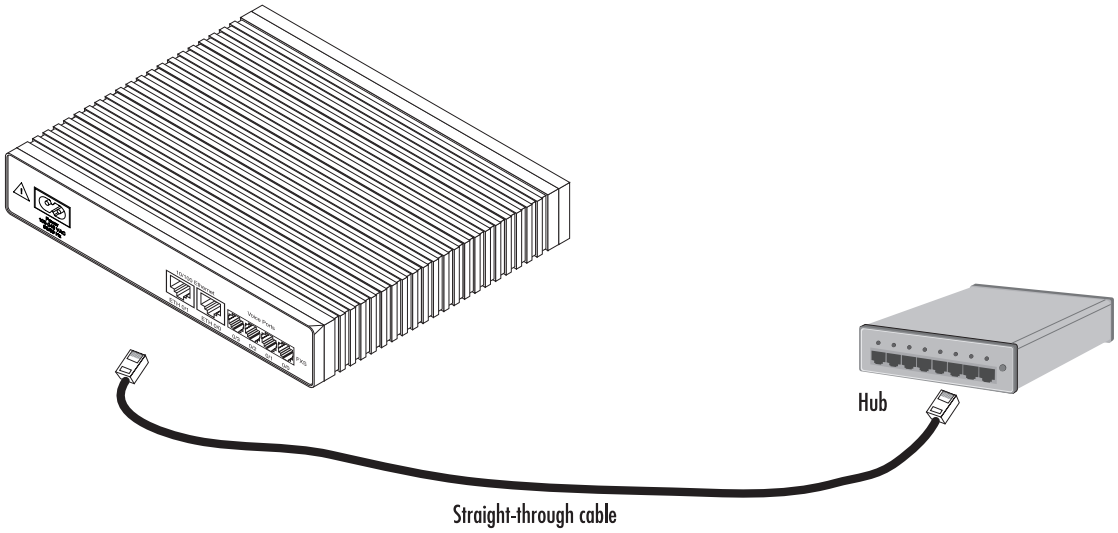
Installing the Ethernet cable

The SmartNode 4520 Series has automatic MDX (auto-cross-over) detection and configuration on the Ethernet ports. Any of the two ports can be connected to a host or hub/switch with a straight-through wired cable (see figure 16 on page 39). Ethernet devices (10Base-T or 100Base-T) are connected to the SmartNode's Ethernet ports (see table 7 for port pin-out listing) via a cable terminated with RJ-45 plugs. Because the SmartNode 4110 Series does not have the MDX feature, a cross-over cable is required when connecting SmartNode 4110 Series devices to a host (see figure 17 on page 39).

Table 7. Ethernet 10/100Base-T (RJ-45) port pin-outs (SmartNode 4110 Series)

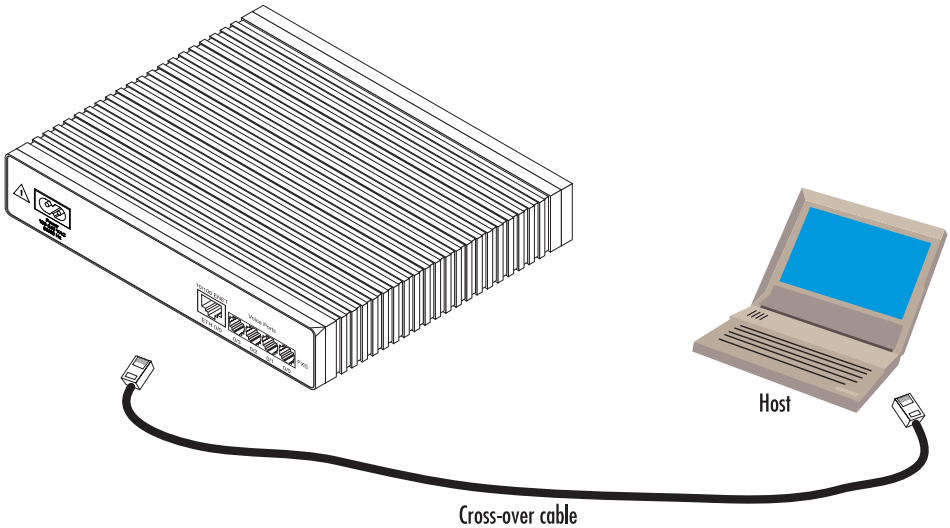
Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Note Pins not listed are not used.



RJ-45, male			RJ-45, male
Tx+	1	1	Rx+
Tx-	2	2	Rx-
Rx+	3	3	Tx+
Rx-	6	6	Tx-

Figure 16. Connecting a SmartNode 4110 Series device to a hub



	RJ-45, male		RJ-45, male
Twisted pair 1	Tx+ 1	1	TX+
	Tx- 2	2	TX-
Twisted pair 2	Rx+ 3	3	RX+
	Rx- 6	6	RX-

Figure 17. Connecting to a host (cross-over cable required for SmartNode 4110 Series only)

Connecting to external power source

The router comes with an internal or external power supply. This section describes installing the power cord into the router. Do the following:

Note ***Do not connect the power cord to the power outlet at this time.***

1. If your unit is equipped with an internal power supply, go to step 2. Otherwise, insert the barrel type connector end of the AC power cord into the external power supply connector (see figure 18).
2. Insert the female end of the power cord into the internal power supply connector (see figure 18).

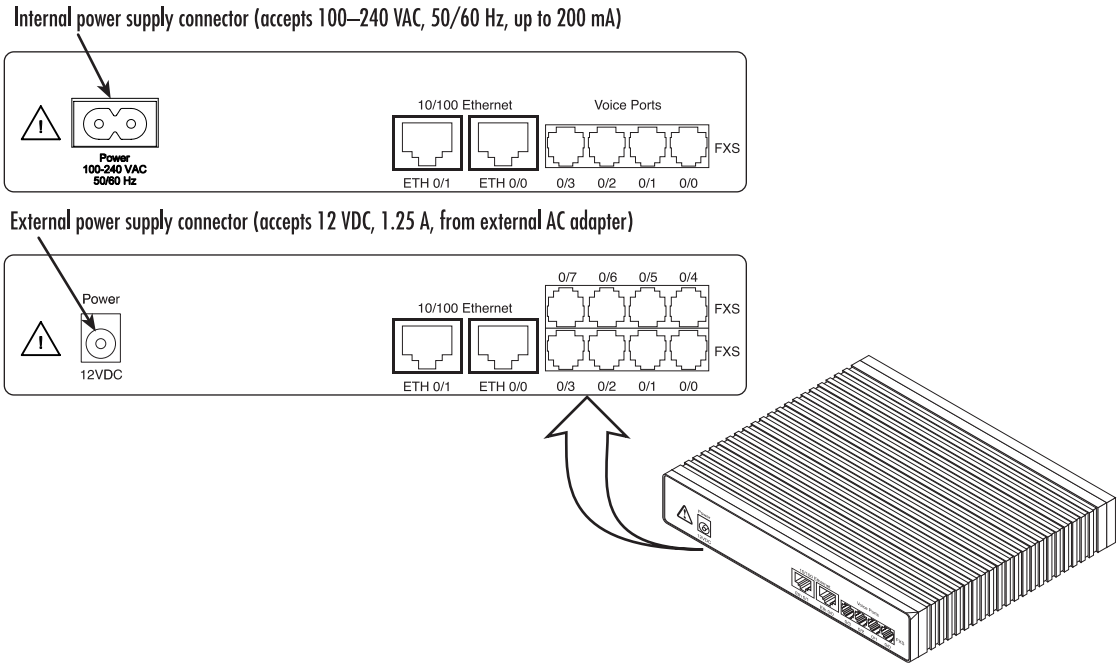


Figure 18. Power connector location on rear panel

CAUTION

The router 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.

3. Verify that the AC power cord included with your router is compatible with local standards. If it is not, refer to "Contacting Patton for assistance" on page 57 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.

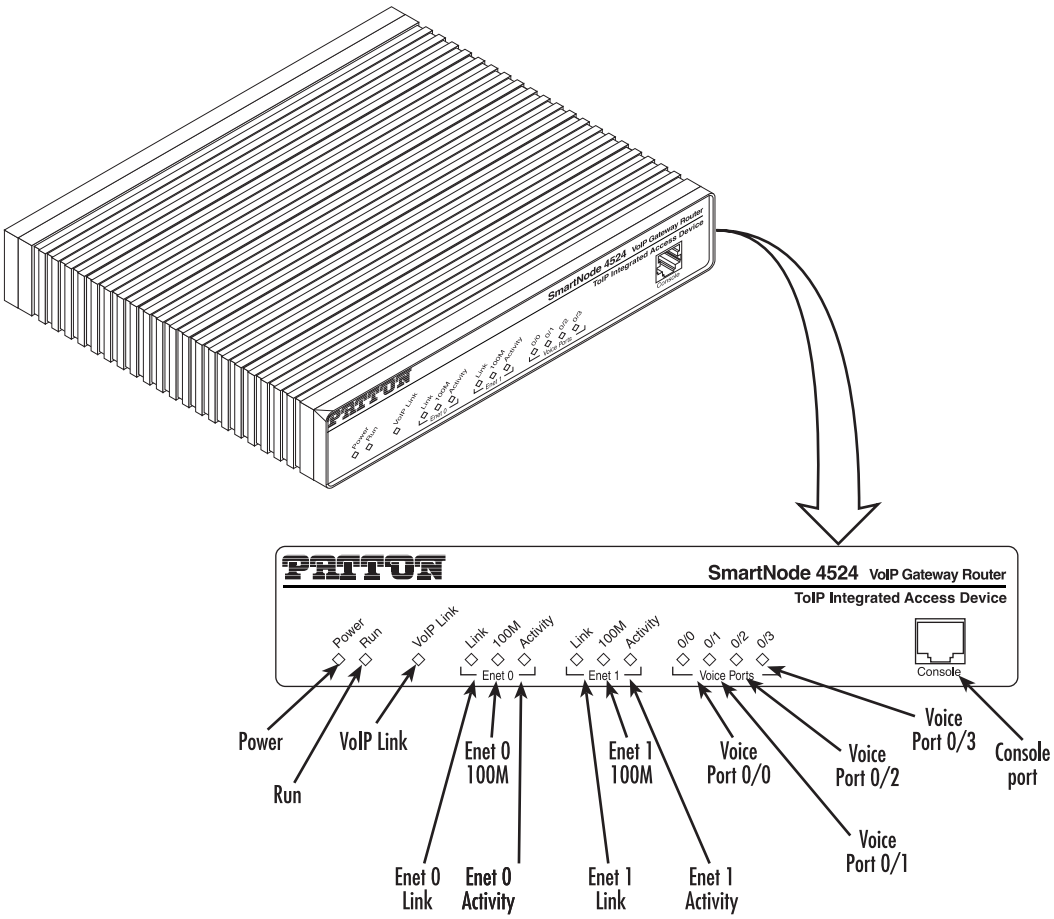


Figure 19. Router front panel LEDs and Console port locations (SmartNode 4524 shown)

5. Verify that the green *Power* LED is lit (see figure 19).

Congratulations, you have finished installing the SmartNode Gateway Router! Now go to chapter 4, "Getting started with the SmartNode" on page 43.

Chapter 4 Getting started with the SmartNode

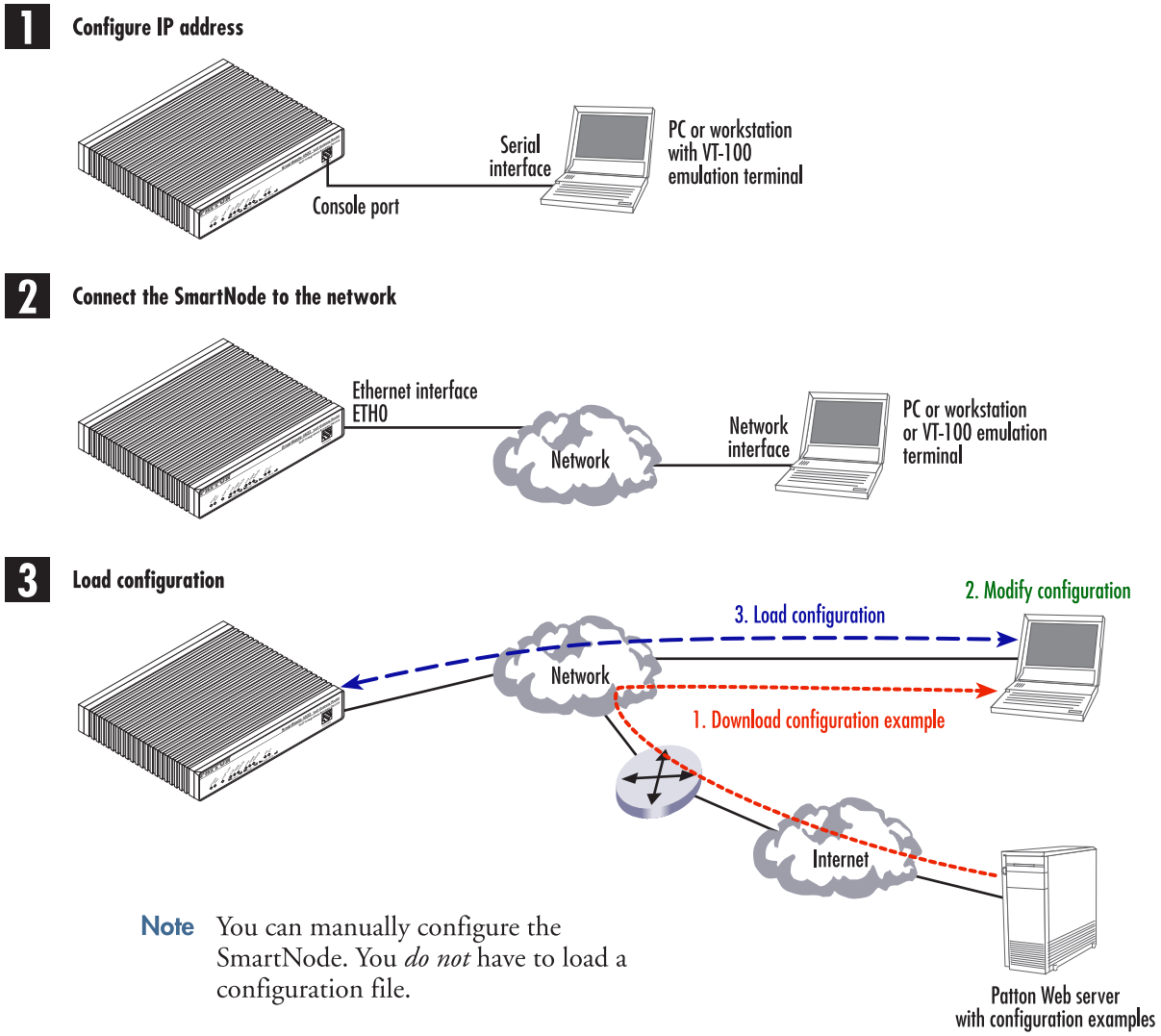
Chapter contents

Introduction

This chapter leads you through the basic steps to set up a new SmartNode and to download a configuration.

Patton SmartNodes can be used for a wide variety of IP-based network applications. To support and ease the configuration of the SmartNodes configuration, templates for the most important applications are available on the Patton server at www.patton.com/voip.

The main steps for setting up a new SmartNode (as of release 2.00 or 2.10) are shown in figure 20.



Note You can manually configure the SmartNode. You *do not* have to load a configuration file.

Figure 20. Steps for setting up a new SmartNode

1. Configure IP address

Power connection and default configuration

First the SmartNode must be connected to the mains power supply with the power cable. Wait until the 'Run' LED stops blinking and lights constantly. Now the SmartNode is ready.

The factory default configuration for the Ethernet interface IP addresses and network masks are listed in table 8.

Table 8. Factory default IP address and network mask configuration

	IP Address	Network Mask
Interface Ethernet 0 (ETH0)	172.16.40.1	255.255.0.0
Interface Ethernet 1 (ETH1)	192.168.1.1	255.255.255.0

Both Ethernet interfaces are activated upon power-up.

If these addresses match with those of your network, go to section "2. Connect the SmartNode to the network" on page 48. Otherwise, refer to the following sections to change the addresses and network masks.

Connect with the serial interface

The *Console* port is wired as an EIA-561, RS-232 port. Use the included Model 16F-561 adapter and cable (see figure 21) between the SmartNode's *Console* port and a PC or workstation's RS-232 serial interface. Activate the terminal emulation program on the PC or workstation that supports the serial interface (e.g. HyperTerm).

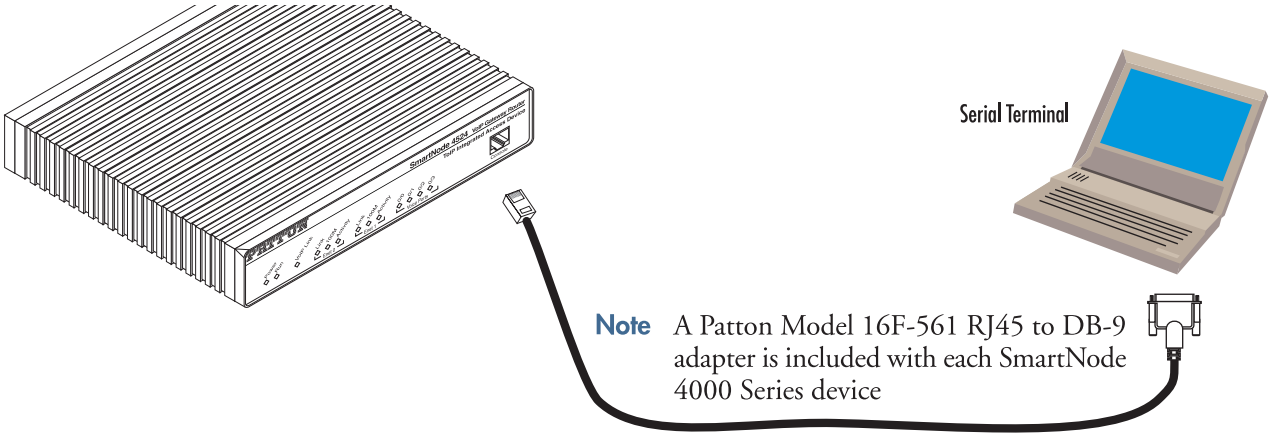


Figure 21. Connecting to the terminal

Terminal emulation program settings:

- 9600 baud
- no parity
- 8 bit
- 1 stop bit
- 1 start bit
- No flow control

Login

Accessing your SmartNode via the local console port (or via a Telnet session) causes the login screen to display. Type the factory default login: *administrator* and leave the password empty. Press the *Enter* key after the password prompt.

```
login:administrator
password: <Enter>
172.16.40.1>
```

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.

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

Changing the IP address

Select the context IP mode to configure an IP interface.

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

Now you can set your IP address and network mask for the interface *eth0*. Within this example a class C network (172.16.1.0/24) is assumed. The IP address in this example is set to *172.16.1.99* (you should set this to an unused IP address on your network).

```
172.16.40.1(ctx-ip)[router]#interface eth0
172.16.40.1(if-ip)[eth0]#ipaddress 172.16.1.99 255.255.255.0
2002-10-29T00:09:40 : LOGINFO    : Link down on interface eth0.
2002-10-29T00:09:40 : LOGINFO    : Link up on interface eth0.
172.16.1.99(if-ip)[eth0]#
```

Copy this modified configuration to your new start-up configuration. Upon the next start-up the system will initialize itself using the modified configuration.

```
172.16.1.99(if-ip)[eth0]#copy running-config startup-config
172.16.1.99(if-ip)[eth0]#
```

The SmartNode can now be connected with your network.

2. Connect the SmartNode to the network

Depending whether you connect the SmartNode to a host directly or via a hub or switch either straight-through wired or cross-over cables must be used (see figure 22).

Note The SmartNode 4520 Series is equipped with Auto-MDX Ethernet ports. Use straight-through or cross-over cables for host or hub/switch connections. The SmartNode 4110 will require the proper cable as it does not have the MDX feature.

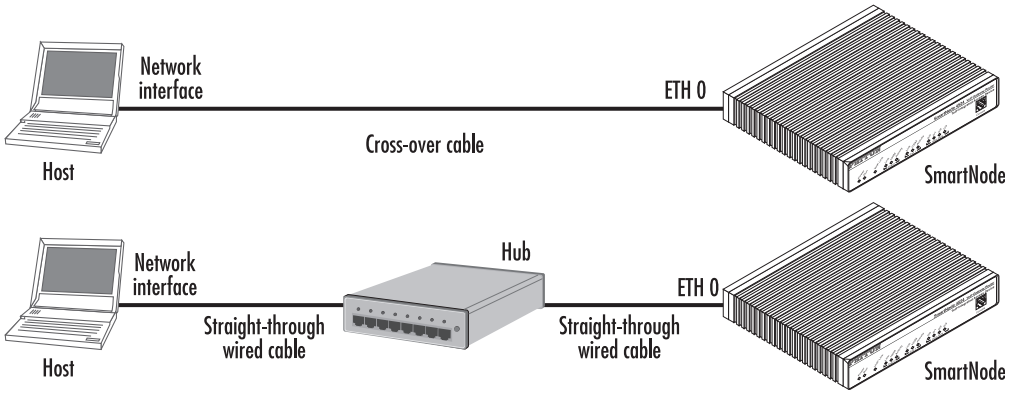


Figure 22. Connecting the SmartNode to the network

You can check the connection with the ping command to another host on the local LAN.

```
172.16.1.99(if-ip)[eth0]#ping <IP Address of the host>
```

Respectively from the host: *ping 172.16.1.99*

Note To ping outside your local LAN, you will need to configure the default gateway.

3. Load configuration

Download a configuration note to your PC from the support page of Patton's Inalp web server (http://www.inalp.ch/en/support/confignotes/) that matches your application. Adapt the configuration as described in the configuration note to your network (do not forget to modify the IP address) and copy the modified configuration to a TFTP server. The SmartNode can now load its configuration from this server.

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)[eth0]#copy tftp://172.16.1.11/SN.cfg startup-config
Download...100%
172.16.1.99(if-ip)[eth0]#
```

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

```
172.16.1.99(if-ip)[eth0]#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 *Software Configuration Guide* on the enclosed CD-ROM. On the CD you will also find a freeware TFTP server, which is also available from the http://solarwinds.net/ web site.

Chapter 5 Monitoring Status

Chapter contents

Status LEDs

This chapter describes SmartNode gateway router front panel LEDs. Figure 23 shows SmartNode 4520 Series LEDs, figure 24 on page 54 shows SmartNode 4110 Series LEDs. LED definitions are listed in table 9 on page 55.

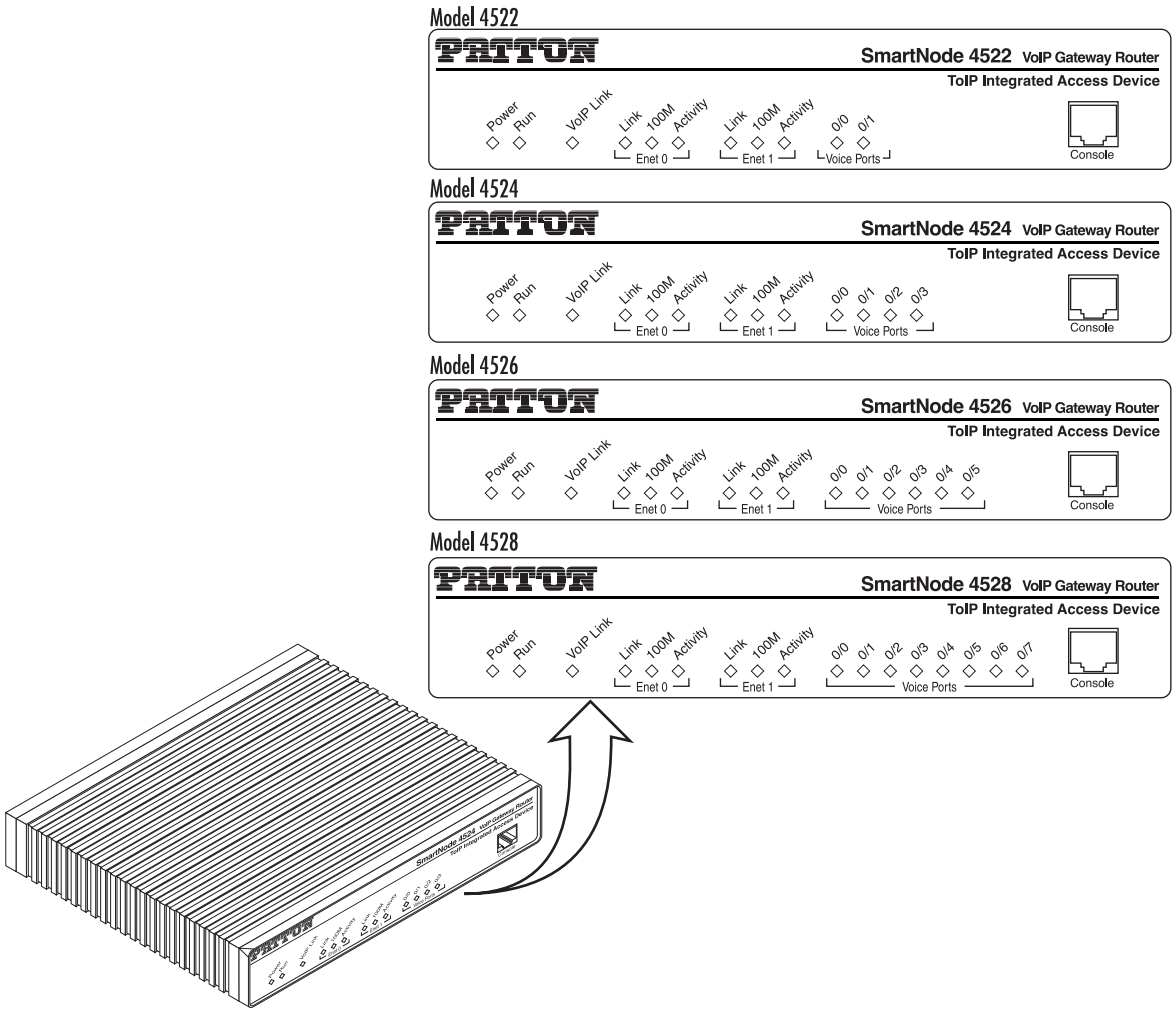


Figure 23. SmartNode 4520 Series front panels

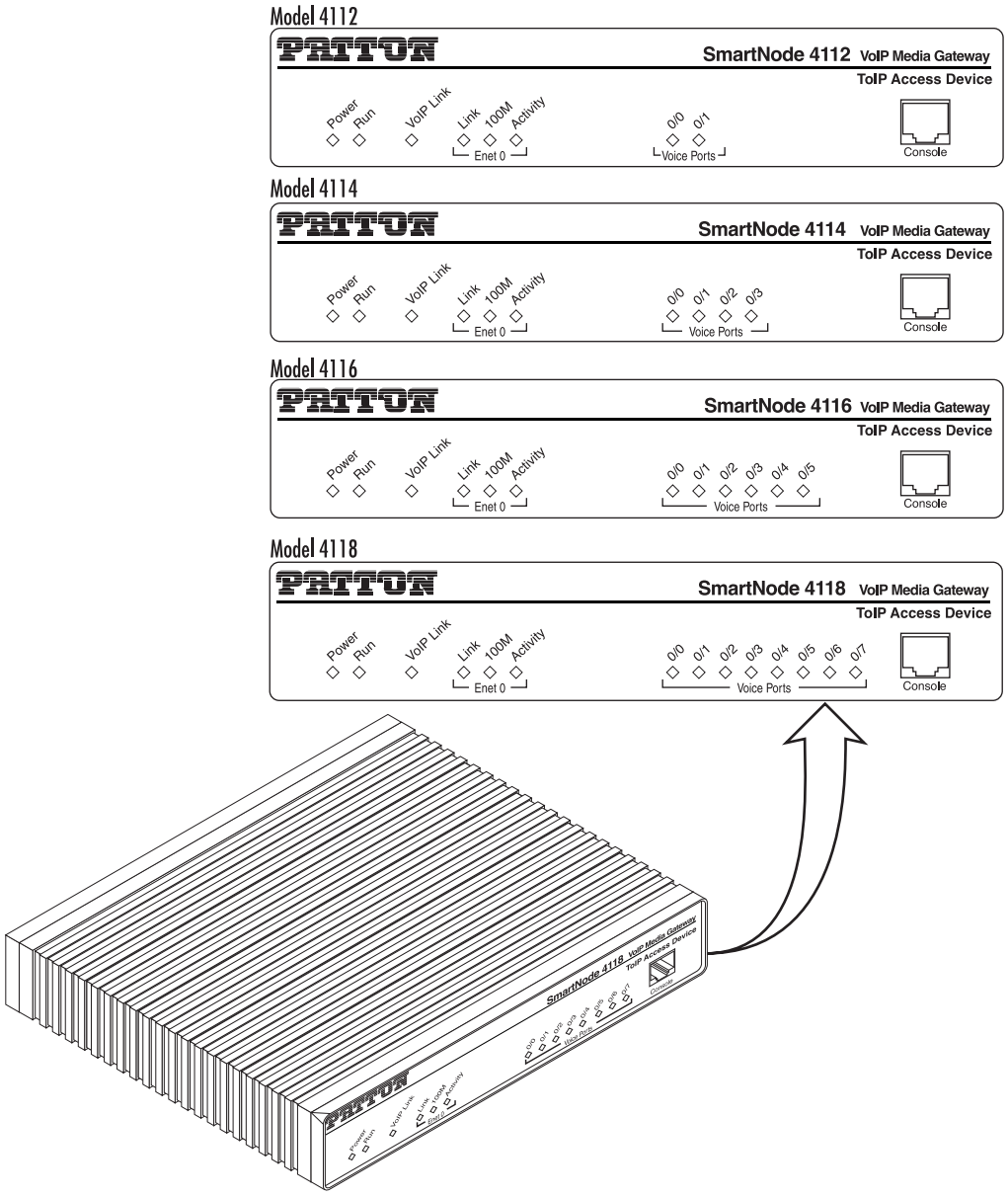


Figure 24. SmartNode 4110 Series front panels

Table 9. SmartNode LED Indications

LED	Description
Note If an error occurs, all LEDs will flash once per second.	
Power	When lit, indicates power is applied. Off indicates no power applied.
Run	When lit, indicates normal operation. Flashes once per second during boot (startup).
VoIP Link	When lit, indicates the gateway is registered on a gatekeeper, media gateway controller, associated to a remote unit, or has an active VoIP connection. Off indicates the unit is not configured or registered and has no active VoIP connection. Flashing green indicates that the unit is attempting or has failed to associate/register
FXS (each port)	Off indicates on-hook condition. Solid green when off-hook. Flashes to follow ring cadence.
Ethernet (each port)	• **Link**: Lit when Ethernet link is up. • **100M**: On when 100-Mbps Ethernet is selected. • **Activity**: Flashes when data is received or transmitted from the unit to the LAN. • **Error condition**: All LEDs flashing once per second.

Chapter 6 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:

- 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**)—by calling **+1 (301) 975-1007**

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 **Specifications**

Chapter contents

DSP

One or two 4-channel DSPs

Voice connectivity

2-wire Loopstart, RJ-11/12

Short haul loop 1.1 km @3REN

EuroPOTS (ETSI EG201 188)

Programmable AC impedance, feeding, and ring voltage; On-Hook Voltage 29VDC

Caller-ID Type-1/2 FSK and ITU V.23/Bell 202 generation

Connectivity

2 10/100 Full Duplex/Autosensing Ethernet RJ-45

Voice processing (signalling dependent)

Voice codes:

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

G.168 echo cancellation

8 parallel voice connections

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

G.711 transparent FAX

Fax over IP (FoIP)

T.38 Fax relay (9.6 k, 14.4 k)

Voice signalling

H.323v4

- RAS, H.225, H.245
- Fast-connect, early H.245
- Gatekeeper autodiscovery
- Alias registration
- Overlap sending
- Empty capability set (call transfer, hold)
- H.323v1 call transfer, hold

ISDN over IP (ISoIP)

- H.323 GW and GK compatible
- H.323 Annex M3
- ISDN/Q-SIG feature tunneling
- ISDN speech, audio and data (Fax Gr 4, UDI 64, RDI 64)

Voice routing—session router

Local switching; Interface huntgroups

Routing Criteria

- Interface
- Calling/called party number
- Time of day, day of week, date
- ISDN bearer capability

Number manipulation functions

- Replace numbers; Add/remove digits
- Multiple remote gateways; PLAR

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

Pocket Policing discards excess traffic

802.1p VLAN tagging

IPSEC AH & ESP Modes

Manual Key; IKE optional

AES/DES/3DES Encryption

Management

Industry standard CLI with local console (CRJ-45, RS-232) and remote Telnet access

TFTP configuration & firmware loading

SNMP v1 agent (MIB II and private MIB)

Built-in diagnostic tools (trace, debug)

Java™ Applet; HPOV Integration with NNM

Operating environment

Operating temperature

32–104°F (0–40°C)

Operating humidity

5–80% (non condensing)

System

CPU Motorola MPC859 operating at 50 MHz

Memory:

- 32 Mbytes SDRAM
- 4 Mbytes Flash

Compliance

EMC compliance: EN55022 and EN55024

Safety compliance: EN 50950

CE compliance

FCC Part 15 Class A

Dimensions

7.3W x 1.6H x 6.1D in. (18.5H x 4.1W x 15.5D cm)

Weight

See table 10.

Table 10. SmartNode weight and maximum power specifications

SmartNode model	Weight	Maximum power dissipation
4112/4522	30.5 oz (500 g)	6W
4114/4524	30.5 oz (500 g)	8W
4116/4526	24.4 oz (400 g[a])	12W
4118/4528	24.4 oz (400 g[a])	15W

a. Excluding external power supply

Power supply

AC version

Internal power supply 100–240 VAC, 50/60 Hz

External power supply: 100–240 VAC, 50/60 Hz

DC version

12 VDC

Power dissipation

See table 10.

Appendix B **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.

Serial console

The SmartNode can be connected to a serial terminal over its serial console port, as depicted in figure 25.

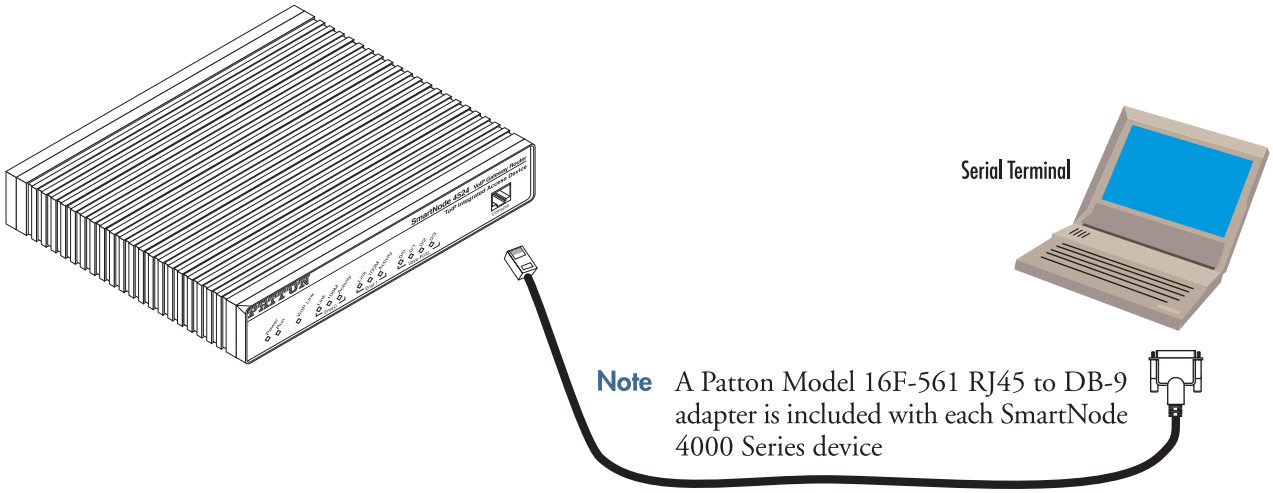


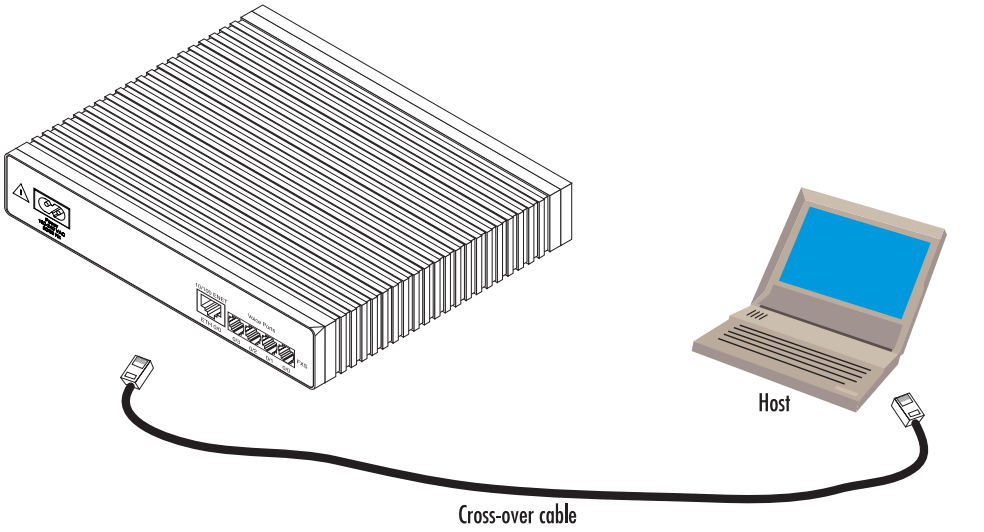
Figure 25. Connecting a serial terminal

Note See section "Console port" on page 75 for console port pin-outs.

Ethernet 10Base-T and 100Base-T

Ethernet devices (10Base-T/100Base-T) are connected to the SmartNode over a cable with RJ-45 plugs. Use a cross-over cable to a host, or a straight cable to a hub. See figure 26 (host) and figure 27 on page 71 (hub) for the different connections.

Note The SmartNode 4520 Series is equipped with Auto-MDX Ethernet ports. Use straight-through wired cables for host or hub/switch connections



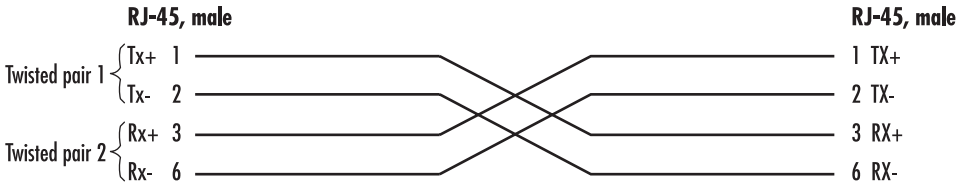
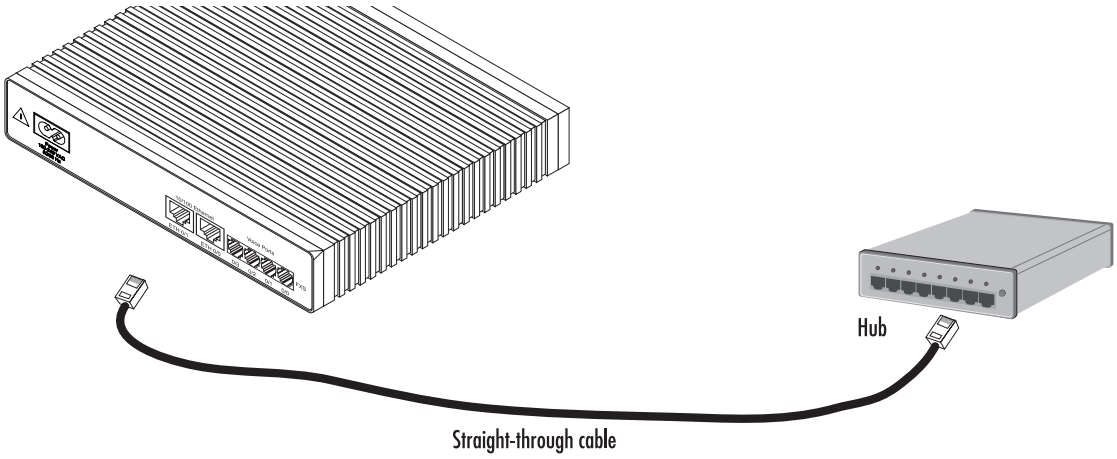


Figure 26. Ethernet cross-over

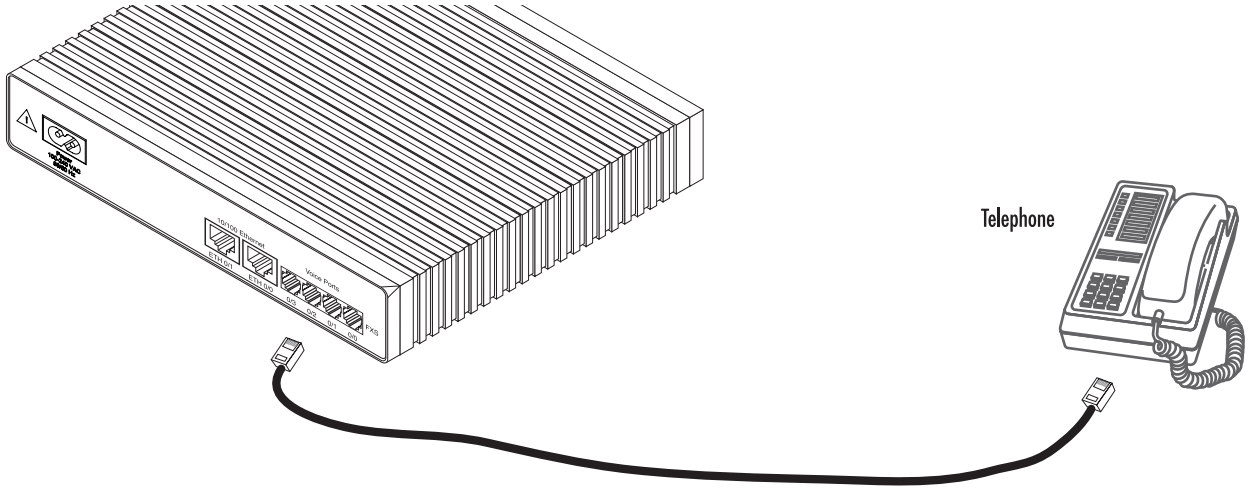


RJ-45, male			RJ-45, male
Tx+	1	1	Rx+
Tx-	2	2	Rx-
Rx+	3	3	Tx+
Rx-	6	6	Tx-

Figure 27. Ethernet straight-through

Analog FXS

The router come with at least two FXS voice ports located on the back of the router. The FXS interfaces are connected to analog devices via cables terminated with RJ-11 connectors.



RJ-11, male			RJ-11, male
Ring (-)	3	3	Ring (-)
Tip (+)	4	4	Tip (+)

Figure 28. Connecting an FXS device

Appendix C **Port pin-outs**

Chapter contents

Introduction

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

Console port

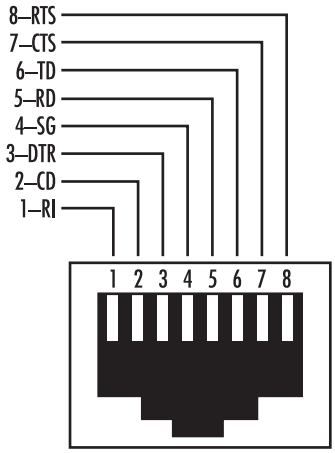


Figure 29. EIA-561 (RJ-45 8-pin) port

Note Pins not listed are not used.

Ethernet 10Base-T and 100Base-T port

Table 11. RJ-45 socket

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

Note Pins not listed are not used.

FXS port

Table 12. RJ-11 socket

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

Note Pins not listed are not used.

Appendix D SmartNode 4110 Series factory configuration

Chapter contents

Introduction

The factory configuration settings for SmartNode 4110 Series devices are as follows:

```
#------------------------------------------------------------------------#
#                                                                        #
#  SN4110 Series                                                         #
#  SmartWare R2.xx BUILDxxxxx                                            #
#  2002-08-18T12:00:00                                                   #
#  Factory configuration file                                            #
#                                                                        #
#------------------------------------------------------------------------#

context ip router

interface eth0
  ipaddress 172.16.40.1  255.255.0.0
  mtu 1500

port ethernet 0  0
  medium auto
  encapsulation ip
  bind interface eth0 router
  no shutdown
```

Appendix E SmartNode 4520 Series factory configuration

Chapter contents

Introduction

The factory configuration settings for SmartNode 4520 Series devices are as follows:

```
#------------------------------------------------------------------------#
#                                                                        #
#  SN4500 Series                                                         #
#  SmartWare R2.xx BUILDxxxxx                                            #
#  2002-08-18T12:00:00                                                   #
#  Factory configuration file                                            #
#                                                                        #
#------------------------------------------------------------------------#

context ip router

interface eth0
  ipaddress 172.16.40.1  255.255.0.0
  mtu 1500

port ethernet 0  0
  medium auto
  encapsulation ip
  bind interface eth0 router
  no shutdown

port ethernet 0  0
  medium auto
  encapsulation ip
  bind interface eth0 router
  no shutdown
```

Appendix F **Installation checklist**

Chapter contents

Introduction

This appendix lists the tasks for installing a SmartNode 4520 or 4110 Series router (see table 13) . Make a copy of this checklist and mark the entries as you complete each task. For each SmartNode 4520 or 4110 Series router, include a copy of the completed checklist in your site log.

Table 13. Installation checklist

Task	Verified by	Date
Network information available & recorded in site log		
Environmental specifications verified		
Site power voltages verified		
Installation site pre-power check completed		
Required tools available		
Additional equipment available		
All printed documents available		
SmartWare release & build number verified		
Rack, desktop, or wall mounting of chassis completed		
Initial electrical connections established		
ASCII terminal attached to console port		
Cable length limits verified		
Initial configuration performed		
Initial operation verified		