

SmartNode 5570 Enterprise Session Border Controller (eSBC)

User Manual



SmartNode SN5570 eSBC and IAD



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

REGULATORY MODEL NUMBER: 13269D4-001

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

Part Number: **07MSN5570-UM, Rev. D**
Revised: **January 17, 2019**

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 trademarks of Patton Electronics Company. All other trademarks presented in this document are the property of their respective owners.

Copyright © 2015–2018, Patton Electronics Company. All rights reserved.

The information in this document is subject to change without notice. Patton Electronics assumes no liability for errors that may appear in this document.

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.

Patton Electronics warrants all SmartNode extender 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.

Summary Table of Contents

- 1 General Information 14
- 2 Applications Overview 21
- 3 SmartNode Installation 25
- 4 Initial Configuration 31
- 5 Contacting Patton for Assistance 36
- A Compliance Information 39
- B Specifications 42
- C Cabling 48
- D Port pin-outs 53
- E SmartNode 5570 Factory Configuration 57
- F Reset Button Functions 59
- G End User License Agreement 63

Table of Contents

Summary Table of Contents	3
Table of Contents	4
List of Figures	7
List of Tables	8
About this guide.....	9
Audience.....	9
Structure.....	9
Precautions	10
Safety when working with electricity	10
Deutsch	11
General observations	12
Typographical conventions used in this document.....	12
General conventions	12
1 General Information	14
SmartNode 5570 Overview	15
Model Code Conventions	16
Rear panel ports	17
Front panel LEDs	19
2 Applications Overview	21
Introduction.....	22
Application—Edge Intelligence of Enterprise Communication	22
Application—Multi-service ISDN, Secure VoIP and Data Routing Solution	23
3 SmartNode Installation	25
Planning the Installation.....	26
Site log	26
Network information	26
Network Diagram	26
IP related information	26
Software tools	27
Power source	27
Location and mounting requirements	27
Installing the Patton SmartNode eSBC	27
Placing the SmartNode	27
Installing cables	28
4 Initial Configuration	31
Introduction.....	32
Connecting the SmartNode to Your Laptop PC.....	32
Configure the Desired IP Address.....	33
Factory-default IP Settings	33

Login	33
Changing the WAN IP address	33
Connecting the SmartNode to the Network.....	34
Loading the Configuration (optional).....	35
Additional Information	35
5 Contacting Patton for Assistance	36
Introduction	37
Contact information.....	37
Contacting Patton Technical Services for Free Support	37
Warranty Service and Returned Merchandise Authorizations (RMAs).....	37
Warranty coverage	37
RMA numbers	38
A Compliance Information	39
Compliance.....	40
EMC	40
Safety	40
Radio and TV Interference (FCC Part 15)	40
EC Declaration of Conformity	40
Authorized European Representative	40
ISDN Compliance	41
B Specifications	42
DSP.....	43
Voice Connectivity.....	43
Data Connectivity	43
Voice Processing (signalling dependent)	43
Fax and modem support.....	44
WAN Interface (if applicable).....	44
Voice Signalling.....	45
Voice Routing—Session Router	46
IP Services	46
Management	47
System	47
Physical	47
Plastic Enclosure	47
Metal Enclosure	47
C Cabling	48
Introduction	49
Serial Console.....	49
Ethernet	50
ISDN PRI (E1/T1)	51
D Port pin-outs	53
Introduction	54

Console port.....	54
Ethernet	54
VDSL-ADSL Port (/A and /AVA & /AVB models only).....	55
G.SHDSL EFM & ATM port (/2G and /4G models).....	55
Fiber Ports (/F models only).....	56
ISDN PRI (E1/T1) Port Pin-outs.....	56
E SmartNode 5570 Factory Configuration	57
Introduction.....	58
F Reset Button Functions	59
Introduction.....	60
Resetting the SmartNode device when it is operating and the Power LED is lit.....	61
Resetting the SmartNode device when it is initially powered off.....	61
Very exceptional case - minimal config recovery	62
G End User License Agreement	63
End User License Agreement.....	64
1. Definitions	64
2. Title	64
3. Term	64
4. Grant of License	64
5. Warranty	65
6. Termination	65
7. Notices	65
8. Other Licenses	65
9. Unenforceable Provisions	66
10. Governing Law	66
11. Waiver	66

List of Figures

1	SmartNode 5571 eSBC and IAD (Front)	15
2	Examples of SN5570 rear panels	17
3	SmartNode SN5570 front panel LEDs	19
4	Edge intelligence of enterprise communication application	22
5	Multi-service ISDN, Secure VoIP and Data Routing Solution	23
6	Power LED	30
7	Connecting the SmartNode to your Laptop PC	32
8	Connecting the SmartNode to the network	34
9	Connecting a serial terminal	49
10	Typical Ethernet straight-through cable diagram for 10/100Base-T	50
11	Typical Ethernet straight-through cable diagram for 1000Base-T	50
12	PRI E1/T1 Cabling	52
13	PRI E1/T1 cross-over cable	52
14	EIA-561 (RJ-45 8-pin) port	54
15	SN5570 Reset button	60
16	Reset button periods (in seconds) for performing actions	61

List of Tables

1	General conventions	12
2	Rear panel ports	17
3	LED Definitions	19
4	Sample site log entries	26
5	Factory Default IP Address and Network Mask Configuration	33
6	WAN Interface Specifications	44
7	10/100 Base-T RJ-45 socket	54
8	1000Base-T RJ-45 Socket	55
9	VDSL-ADSL Port: RJ-45 connector	55
10	EFM Port	55
11	Port 0/0	56
12	Port 0/1	56
13	Results from pressing the Reset button	61
14	Using the Reset button to switch to a backup image	61
15	Using the Reset button to switch to erase flash memory	62

About this guide

This guide describes the SmartNode 5570 hardware, installation and basic configuration. For detailed software configuration information refer to the *Trinity Release 3.5.x- Command Line Reference Guide* and the available *Knowledgebase*.

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 14 provides information about eSBC features and capabilities
- [Chapter 2](#) on page 21 contains an overview describing eSBC operation and applications
- [Chapter 3](#) on page 25 provides quick start hardware installation procedures
- [Chapter 4](#) on page 31 provides quick-start procedures for configuring the SmartNode eSBC
- [Chapter 5](#) on page 36 contains information on contacting Patton technical support for assistance
- [Appendix A](#) on page 39 contains compliance and regulatory information for the eSBC
- [Appendix B](#) on page 42 contains specifications for the eSBC
- [Appendix C](#) on page 48 provides cable recommendations
- [Appendix D](#) on page 53 describes the eSBC's ports and pin-outs
- [Appendix E](#) on page 57 lists the factory configuration settings for SmartNode 5570
- [Appendix F](#) on page 59 describes the *Reset* button functions
- [Appendix G](#) on page 63 provides license information that describes acceptable usage of the software provided with the SmartNode 5570

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

Precautions

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

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



The SmartNode device contains no user serviceable parts, and is not to be opened by the user. The equipment shall be returned to Patton Electronics for repairs or repaired by qualified service personnel.



Mains Voltage: In systems without a power switch, line voltages are present in the power supply when the power cord is connected. The mains outlet used to power the SmartNode device shall be within 10 feet (3 meters) of the device, be easily accessible, and protected by a circuit breaker.



For AC powered units, ensure that the power cable used meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.



For units with an external power adapter, the adapter shall be a listed Limited Power Source.



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 the cables, detach the end away from the SmartNode first.



Before handling the device, disconnect the telephone network cables to avoid contact with telephone line voltages. When detaching the cables, detach the end away from the SmartNode device first.



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

Deutsch

Warnhinweise:



Dieses Gerät ist NICHT für den Anschluss an das Telefonnetz (PSTN) bestimmt und auch NICHT dafür zugelassen. Es ist nur für den Anschluss an Endgeräte beim Kunden vorgesehen.



- Das Gerät enthält keine austauschbaren Komponenten und ist vom Benutzer nicht zu öffnen. Bei Systemen ohne Netzschalter und ohne externes Netzteil liegt Netzspannung im Gerät an, wenn das Netzkabel angeschlossen ist.
- Bei Geräten mit externem Netzteil muss das Netzteil die Anforderungen an eine zugelassene Stromquelle mit begrenzter Leistung erfüllen. Die Steckdose, die für die Stromversorgung des Gerätes verwendet wird, sollte höchstens 3 Meter vom Gerät entfernt und leicht zugänglich sein sowie durch einen den örtlichen regulatorischen Anforderungen entsprechenden Schutzschalter abgesichert sein.
- Für mit Wechselstrom betriebene Geräte muss sichergestellt sein, dass das verwendete Netzkabel alle gültigen Normen des Landes erfüllt, in dem es eingesetzt werden soll.
- Für mit Wechselstrom betriebene Geräte, die 3-polige Netzstecker haben (L1, L2 u. GND oder Phase, Neutraleiter u. Schutzleiter), muss die Steckdose geerdet sein.
- Für mit Gleichstrom betriebene Geräte muss sichergestellt sein, dass die Verbindungskabel für Spannung, Strom, erwartete Temperatur, Entflammbarkeit und mechanische Wartbarkeit geeignet sind.
- WAN-, LAN- u. PSTN-Ports (Anschlüsse) können unter gefährlicher Spannung stehen, unabhängig davon, ob das Gerät ein- oder ausgeschaltet ist. PSTN bezieht sich auf Schnittstellen wie Telefon, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voice, usw. Diese sind als „gefährliche Netzwerkspannungen“ bekannt. Um einen elektrischen Schlag zu vermeiden, muss in der Nähe dieser Anschlüsse mit Vorsicht gearbeitet werden. Werden Kabel von diesen Anschlüssen getrennt, zuerst das Kabel am anderen Ende herausziehen.
- Während eines Gewitters darf nicht am Gerät gearbeitet werden und es dürfen keine Kabel angeschlossen oder vom Netz getrennt werden.



In Übereinstimmung mit den Anforderungen der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte (WEEE) muss sichergestellt sein, dass Altgeräte von anderem Abfall und Schrott getrennt werden und dem Sammel- und Verwertungssystem für Elektro- und Elektronik-Altgeräte in Ihrem Land zum Recycling zugeführt werden.

General observations



CAUTION

Do not stack multiple SmartNode devices directly on top of one another, and do not place items on top of the device. If you will be installing equipment above the SmartNode device, leave at least 2 inches (5 cm) of clearance between the devices.

Furthermore, leave at least 2 inches (5 cm) to the left, right, front, and rear of the SmartNode device for proper ventilation.

- 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.
Helvetica bold type	Commands and keywords are in boldface font.
Helvetica bold-italic type	Parts of commands, which are related to elements already named by the user, are in boldface italic font.
<i>Italicized Helvetica type</i>	Variables for which you supply values are in <i>italic</i> font
Helvetica 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.

Table 1. General conventions

Convention	Meaning
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 5570 Overview15
- Model Code Conventions16
- Rear panel ports17
- Front panel LEDs19

SmartNode 5570 Overview

The SmartNode 5570 Enterprise Session Border Controller (eSBC) and Integrated Access Device (IAD) (see [figure 1](#)) comes with built-in security features such as SIP TLS, SRTP, stateful firewall, and secure provisioning to protect the LAN networks from fraud strikes out of the Internet. For survivability use cases the PRI (E1/T1) ports can be used for local PSTN breakout. The PRI ports can be used to connect legacy equipment to any VOIP network as well. Like any other Trinity device, the 5570 comes with the built in WEB Wizard for ease of use.



Figure 1. SmartNode 5571 eSBC and IAD (Front)

The SmartNode 5570 series consists of several models, see the complete SKU list on the corresponding product page on www.patton.com.

All the SN5570 models come equipped with two 10/100/1000 Base-T Ethernet ports and with either 1 or 2 PRI (E1/T1) ports.

The SmartNode 5570 eSBC performs the following major functions:

- 30 channels of Voice over IP and local voice switching via 1 or 2 ISDN PRI E1/T1 ports. Each port can be switched between NT and TE per software. However the port pin-out stays always the same. Also consider the different pinout for port 0/1. Either port can be used as a clock source. All models have a Stratum 3 CO quality clock (HP) for installs where no external clock source is available.
- Depending on the model, a fallback cut-through relay between ISDN PRI ports 0/0 and 0/1 electrically connects the NT and TE port in case of power failure and enables life-line calls to the public ISDN network (PSTN-supplied ISDN line must be used).
- Standard compliant VoIP in accordance with SIPv2 protocol and SIPv2 over TLS.
- Supports 15 SIP-to-SIP calls and can be license upgraded to a total of 200* (additional cost)
- Internet access and IP Routing with IP Quality of Service (QoS) support for mixed voice and data traffic.
- SIP registrar, SIP TLS, and SRTP are available on all SN5570 models.

* Supported under ideal conditions. Transcoding, debugging, and/or IP routing reduce processing capacity

- USB 2.0 host port for 3G/4G modem support, which can be used for Survivability applications as a data backup link.
 - A list of supported USB models can be found in the release notes and in the Trinity Release 3.5.x- Command Line Reference Guide.

In addition, the IAD supports WAN access termination (VDSL2, ADSL2/2+, SHDSL, Fiber SFP)

Section “[Model Code Conventions](#)” provides more information on the device.

Model Code Conventions

The SmartNode SN5570 is a compact Enterprise Session Border Controller that supports eight VoIP or Fax calls, by using either G.711, G.722, T.38 or any other codec as indicated in section “[Voice Processing \(signaling dependent\)](#)” in Appendix B, “[Specifications](#)” on page 42. Additional calls can be enabled by loading SNSW-1B licenses (additional charge). Some IAD versions also have WAN uplink termination included, such as Fiber-SFP, ADSL/VDSL or G.SHDSL (EFM/ATM).

On the product the following model code conventions apply:

- *V* stands for number of Voice Channels
- *E* stands for PRI interface (E1/T1)
- *HP* stands for High Precision Clock (less than 5 ppm)
- *AVA* stands for VDSL / ADSL (Annex A,L,M)
- *AVB* stands for VDSL/ADSL (Annex B,J)
- *2G* stands for 2-pair G.SHDSL.bis
- *4G* stands for 4-pair G.SHDSL.bis
- *F* stands for SFP slot being used for Fiber link termination
- *EUI* stands for external universal input power supply

Note For a complete listing of available models, refer to the SmartNode VoIP page at <https://www.patton.com/products/voip-comparison.asp>

Section “[Rear panel ports](#)” on page 17 includes examples of SN5570 rear panels and descriptions of the ports.

Rear panel ports

Figure 2 shows examples of SN5570 rear panels. The ports are described in table 2.

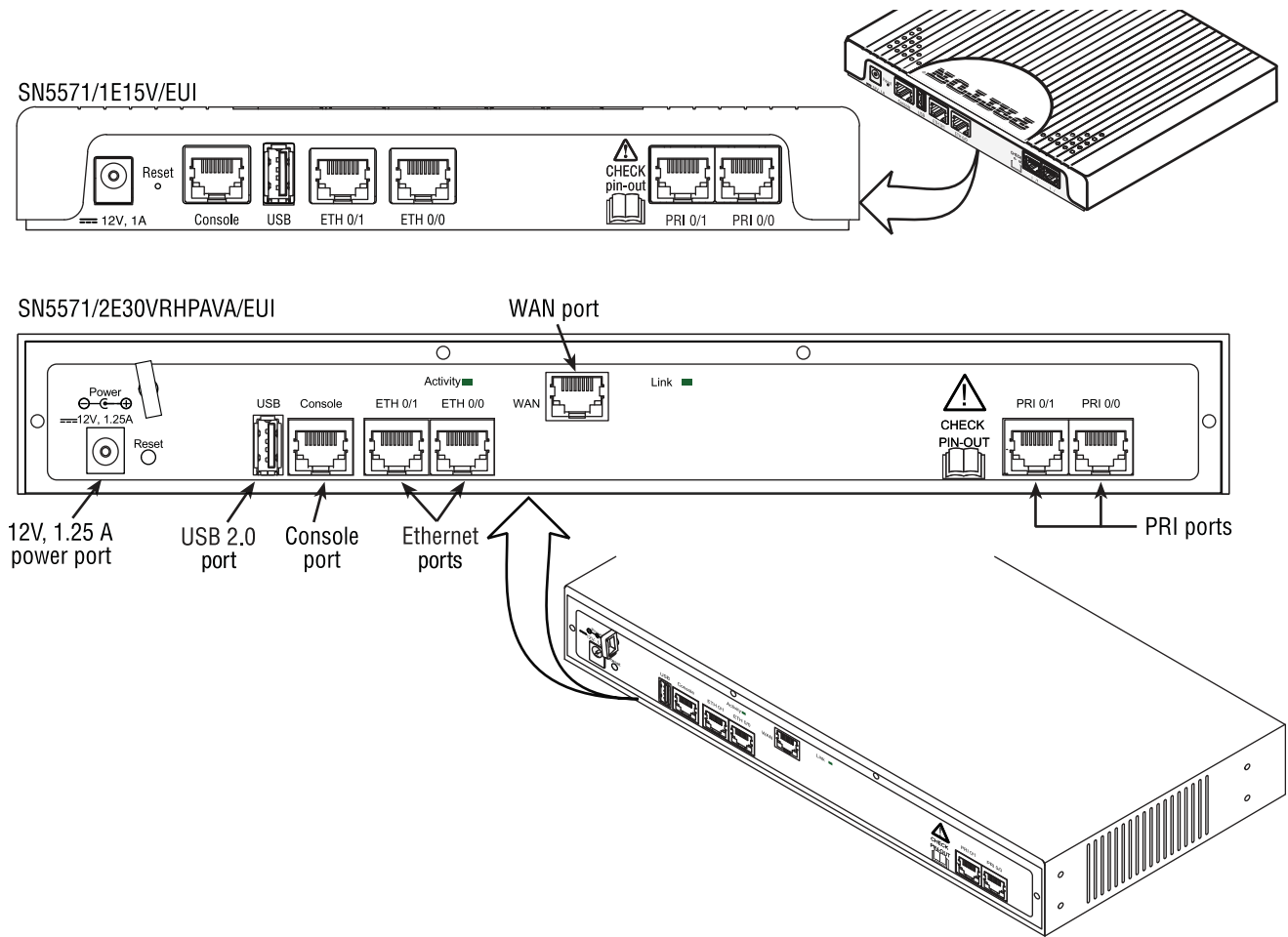


Figure 2. Examples of SN5570 rear panels

Table 2. Rear panel ports

Port	Description
ETH 0/0 & ETH 0/1	Auto-MDX Fast-/Gigabit-Ethernet port, RJ-45 (see figure 2), connects the unit to an Ethernet WAN device (for example, a cable modem, DSL modem, or fiber modem).
USB 2.0	USB 2.0 host port (see figure 2) to connect a USB 3G/4G Cellular Modem. A list of supported USB Models can be found in the release notes and in the Software Configuration Guide

Table 2. Rear panel ports (Continued)

Port	Description
PRI 0/0 - PRI 0/1	<p>RJ-45 connector providing E1 or T1 PRI interface, meeting all requirements of ITU-T recommendations for G.703. Use a shielded E1 or T1 interface cable for 120 Ohm balanced connections to connect the SmartNode with an NT or TE.</p> <p>Note Port 0/1 uses a different pin-out than 0/0. Port 0/1 is intended to be connected to a PBX and port 0/0 to the PSTN by using a straight cable for both ports. Different usage may require a PRI cross-over cable.</p> <p>Note Refer to Appendix C on page 48 for cabling and Appendix D on page 53 for pin-outs.</p>
Console	<p>Used for service and maintenance, the console port (see figure 2 on page 17) an RS-232 RJ-45 connector, connects the product to a serial terminal such as a PC or ASCII Terminal (also called a dumb terminal).</p> <p>Configuration settings:</p> <ul style="list-style-type: none"> • 19200 bps • 8 bits, no parity • 1 stop bit • flow control off
12V DC, 1A	Electricity supply socket. (see figure 2 on page 17)
Reset	The reset button has several functions, as described in appendix F, “ Reset Button Functions ” on page 59.
Expansion Port G.SHDSL,VDSL-ADSL, SFP	<p>The G.SHDSL, VDSL-ADSL, SFP or RJ45 Ethernet LEDs are located on either side of the DSL port. <i>Activity</i> (when lit or blinking) shows activity, and <i>Link</i> (when lit) shows that the DSL port is connected.</p> <p>Note On VDSL-ADSL models (/AVA and /AVB) only, the <i>Activity</i> LED has no function.</p>

Section “[Front panel LEDs](#)” on page 19 shows SN5570 front panel LEDs, and includes descriptions of the LEDs.

Front panel LEDs

Figure 3 shows SmartNode SN5570 front panel LEDs. LED definitions are listed in table 3.

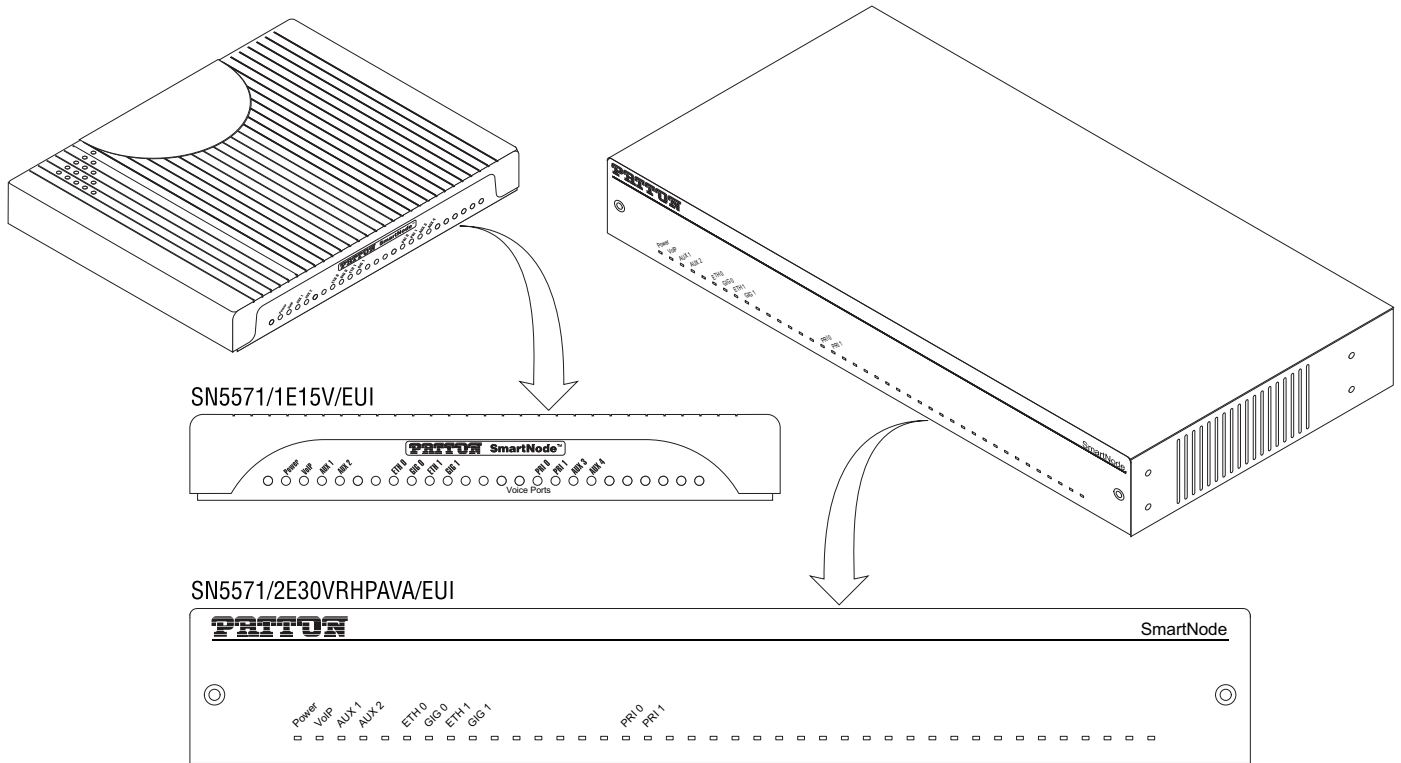


Figure 3. SmartNode SN5570 front panel LEDs

Table 3. LED Definitions

LED	Description
	Note If an error occurs, all LEDs will flash solid for MORE than 5 seconds before the device reboots
Power	When lit, indicates power is applied. Blinks fast during bootloader phase and blinks slow during boot process of Trinity Software. Becomes solid when the system is up and running.
VoIP	<ul style="list-style-type: none"> On indicates the gateway is registered to a SIP server, or, a SIP device has registered to the SN5570. Off indicates the unit is not configured or registered, or has no active direct routed VoIP connection.
PRI 0–PRI 1	<ul style="list-style-type: none"> On when L1 and L2 are active. Flashes when there are ongoing calls. Off when no line or PBX is connected or the port is shutdown.

Table 3. LED Definitions (Continued)

LED	Description
ETH 0–ETH1	<ul style="list-style-type: none">• On when the Ethernet connection on the corresponding port has a link indication.• Flashes when data is received or transmitted at the corresponding Ethernet port.
GIG 0–GIG 1	<ul style="list-style-type: none">• On when the Ethernet is connected to a 1000Mb network.• Off when the Ethernet is connected to a 10Mb or 100Mb network or not connected
AUX 1	On when connected to Patton Cloud
AUX 2–AUX 4	Auxiliary LEDs for future use.

Chapter 2 **Applications Overview**

Chapter contents

Introduction	22
Application—Edge Intelligence of Enterprise Communication	22
How it works:	23
Application—Multi-service ISDN, Secure VoIP and Data Routing Solution	23

Introduction

Patton's SmartNode eSBCs deliver the features you need for advanced multiservice voice and data network applications. They combine high quality voice-over-IP with powerful *quality* of service routing functions to build professional, secure and reliable VoIP and data networks. This chapter describes typical applications for which this SmartNode is uniquely suited.

Note Detailed configuration information for SmartNode applications can be found online at:
<http://www.patton.com/session-border-controller/>.

Application—Edge Intelligence of Enterprise Communication

Enterprises are excited about voice over IP and convergence for the following reasons:

- Bypassing the PSTN. Using Internet telephony service providers (ITSPs) instead of incumbent carriers dramatically reduces telephony costs
- IP PBXs, with their full suite of features and ease of integration into existing IT environments are very appealing
- Convergence lowers technology ownership costs and enables enterprises to deploy new integrated applications

However, there are several concerns about migrating the whole telephony infrastructure to VoIP:

- Loss of voice quality
- Unknown reliability
- Lack of experience/expertise in voice over IP
- VoIP Security concerns

Patton's SmartNode series of eSBCs address these concerns enabling enterprises to safely migrate to VoIP. SmartNodes enable system administrators to gradually introduce VoIP, using it as the edge communication device for all worlds, connecting PSTN, legacy PBX, ITSPs and an IP PBX.

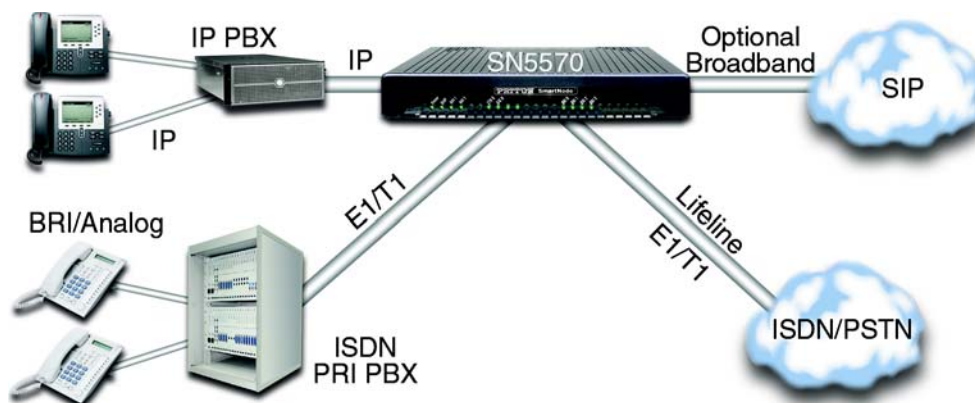


Figure 4. Edge intelligence of enterprise communication application

How it works:

1. Connect the SmartNode to the PSTN and legacy PBX, and configure the call router to pass all calls from the PBX to the PSTN and vice versa. This first step will not affect any uses in the enterprise
2. Choose your ITSPs, and configure as many on the SmartNode as you need. Use the intelligent call router in the SmartNode to decide which call is forwarded to which ITSP, and which calls should go to the PSTN. This may be based upon least-cost routing criteria, or for example, on calling party number. The latter is ideal if you want to test calls to an ITSP before enabling it for all users within the enterprise. As far as supported by the ITSP, the SIP signaling but also the Media can be sent and received encrypted using SIP TLS and SRTP.
3. Voice over IP can be switched off instantly on one single box (the SmartNode) to revert the system back to as it was before.
4. Build up an IP PBX system that uses the SmartNode as PSTN gateway. For all calls from this IP PBX, you can direct them to the PSTN or to ITSPs. Numbering plan adaptations are handled through regular expression matching by the SmartNode. No need to change anything on the PBXs.
5. Once the IP PBX is ready, you can choose on incoming calls from the PSTN, for each extension whether this extension is to be directed to the IP PBX or on the legacy PBX.

Application—Multi-service ISDN, Secure VoIP and Data Routing Solution

The SmartNode 5570 Series can be used to make and receive calls to and from the public ISDN network and internet telephony services on any ISDN PRI PBX (see figure 5). Using individually configurable routing tables, an outbound call can be directed to the local PSTN connection or to an Internet telephony service provider (ISTP). Inbound calls from the Internet and the PSTN can ring the same phone.

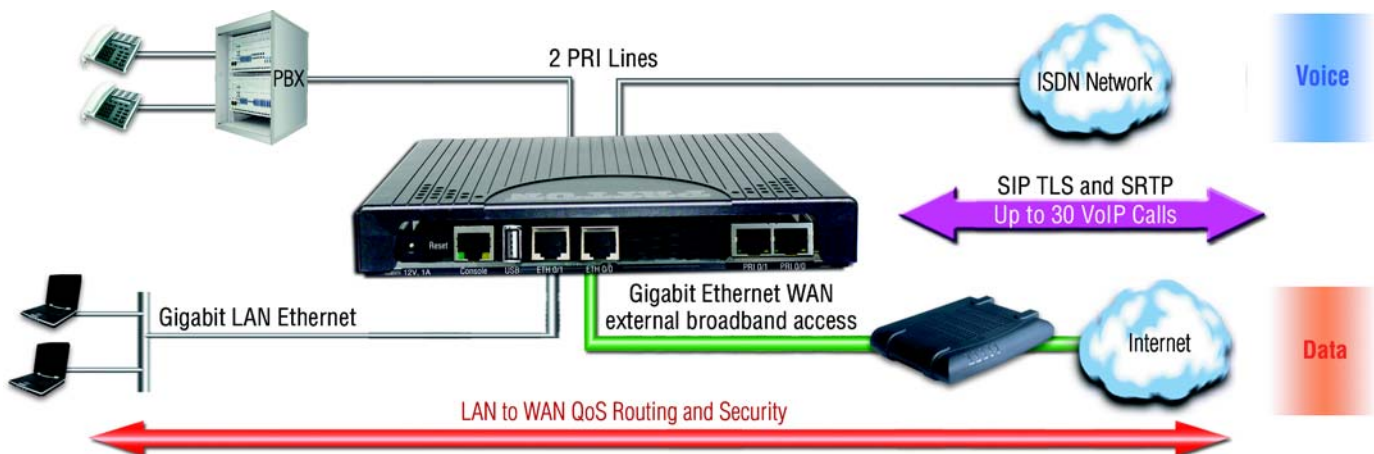


Figure 5. Multi-service ISDN, Secure VoIP and Data Routing Solution

Broadband network connectivity integrates with any fixed IP, DHCP or PPPoE service. An integrated 10/100/1000 Ethernet LAN port, with advanced routing features such as NAT, Stateful-Firewall/ACL, DynDNS, packet-based routing, etc, fulfills the requirements of demanding network users.

Quality of Service (QoS) features complete the offering with advanced voice prioritization and traffic management. Patton's patent-pending DownStreamQoS™ ensures voice without interruptions even over best-effort Internet connections.

Chapter 3 SmartNode Installation

Chapter contents

- Planning the Installation.....26
 - Site log26
 - Network information26
 - Network Diagram26
 - IP related information26
 - Software tools27
 - Power source27
 - Location and mounting requirements27
- Installing the Patton SmartNode eSBC27
 - Placing the SmartNode27
 - Installing cables28
 - Connecting ISDN PBX and NT to the SmartNode’s ISDN PRI ports28
 - Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables28
 - Installation cable requirements for the DSL WAN cable (SN5570/2G, /4G, /AVA, /AVB Models)29
 - Installation cable requirements for the SFP for Fiber WAN module (SN5570/F)29
 - Connecting the Power Supply29

Planning the Installation

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

- **Create a network diagram** (see section “[Network information](#)” on page 26)
- **Gather IP related information** (see section “[IP related information](#)” on page 26 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 “[Power source](#)” on page 27).

When you finish preparing for SmartNode installation, go to section “[Installing the Patton SmartNode eSBC](#)” on page 27 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 4.

Table 4. 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 Trinity software

Network information

Network connection considerations that you should take into account for planning are described for several types of network interfaces 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 5570 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 and/or URL of SIP servers or Internet telephony services (if used)

- Login and password for PPPoE Access
- Login and Password for SIP 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 or Putty to configure the software on your SmartNode eSBC.

Also you may use your WEB browser to configure the unit. The Web wizard in this case reduces time to get your unit up and running. See more details on the [Knowledgebase](#).

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. 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.

Location and mounting requirements

The SmartNode eSBC is intended to be placed on a desktop or similar sturdy, flat surface that offers easy access to 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 Patton SmartNode eSBC

SmartNode eSBC installation consists of the following:

- **Placing the device at the desired installation location** (see section “[Placing the SmartNode](#)” on page 27)
- **Installing the interface and power cables** (see section “[Installing cables](#)” on page 28)

When you finish installing the SmartNode, go to Chapter 4, “[Initial Configuration](#)” on page 31.

Placing the SmartNode

Place the SmartNode on a desktop or similar sturdy, flat surface that offers easy access to the cables. The Smart-Node should be installed in a dry environment with sufficient space to allow air circulation for cooling. In order to prevent overheating and damaging the unit, proper ventilation is required when stacking the device.



To prevent overheating and damaging the unit, proper ventilation is required when placing the device; leave at least 2 inches (5 cm) to the left, right, front, and rear of the SmartNode device.

The device should be installed in a dry environment with sufficient space to allow air circulation for cooling. Do not stack multiple SmartNode devices directly on top of one another, and do not place items on top of the device. If you will be installing equipment above the SmartNode device, leave at least 2 inches (5 cm) of clearance between the devices.

Installing cables



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



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

Connect the cables in the following order:

1. Connect the ISDN PBX and NT to the PRI ports (see section “[Connecting ISDN PBX and NT to the SmartNode’s ISDN PRI ports](#)”)
2. Connect the 10/100/1000Base-T Ethernet LAN and WAN (see section “[Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables](#)”)
3. Connect the power mains cable (see section “[Connecting the Power Supply](#)” on page 29)

Connecting ISDN PBX and NT to the SmartNode’s ISDN PRI ports

The SmartNode comes with one or two ISDN PRI (E1/T1) ports located on the rear panel (see figure 2 on page 16). Both ports (0/0 and 0/1) can be connected to the PSTN (ISDN NT) or to a PBX (ISDN TE). In either case, one PRI cross over cable must be used due to the different pin-out used on port 0/1. However, the application is meant to have the ISDN PBX connected to PRI port 0/1 and the ISDN PSTN to port 0/0. This way a straight trough cable can be used for both connections.



For the ISDN connection to a carrier Network, it shall be connected to a Network Termination Device and not connected directly to an outside POTS line.

Note On Lifeline Relay models (/R option) the PSTN line should be connected to PRI 0/0 and a terminal to PRI 0/1 to benefit from the lifeline function. (See the full list of models on www.patton.com).

For details on the PRI port pinout and ISDN cables, refer to [Appendix C, “Cabling”](#) on page 48 and [Appendix D, “Port pin-outs”](#) on page 53.

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

The SmartNode 5570 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.

1. Connect to the subscriber port of the broadband access modem (DSL, cable, WLL) to ETH 0/0.
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 48 and [Appendix D, “Port pin-outs”](#) on page 53.

Installation cable requirements for the DSL WAN cable (SN5570/2G, /4G, /AVA, /AVB Models)

The SmartNode Model SN5570 comes with an optional G.SHDSL(EFM-ATM) or VDSL-ADSL WAN interface. Use a straight-through RJ-45 cable to connect the DSL port.

For details on the G.SHDSL port pinout, refer to section “G.SHDSL EFM & ATM port (/2G and /4G models)” on page 55.

For details on the VDSL and ADSL port pinout, refer to section “VDSL-ADSL Port (/A and /AVA & /AVB models only)” on page 55.

Installation cable requirements for the SFP for Fiber WAN module (SN5570/F)

For SmartNode models that come with an option for an SFP for Fiber WAN module, see details about the tested and compatible SFP modules on <http://www.patton.com/products/sfpmodules.asp>.

Connecting the Power Supply

Do the following to connect the main power to the Model 5570:

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

1. Insert the female end of the AC power supply cable to the mains port (see [figure 2](#) on page 17).



There are no user-serviceable parts in the power supply section of the model SN5570. Contact Patton Electronics Technical Support at support@patton.com for more information

2. Verify that the AC power cord included with your device is compatible with local standards. If it is not, refer to “[Contacting Patton for Assistance](#)” on page 36 to find out how to replace it with a compatible power cord.
3. Connect the male end of the power cord to an appropriate power outlet.

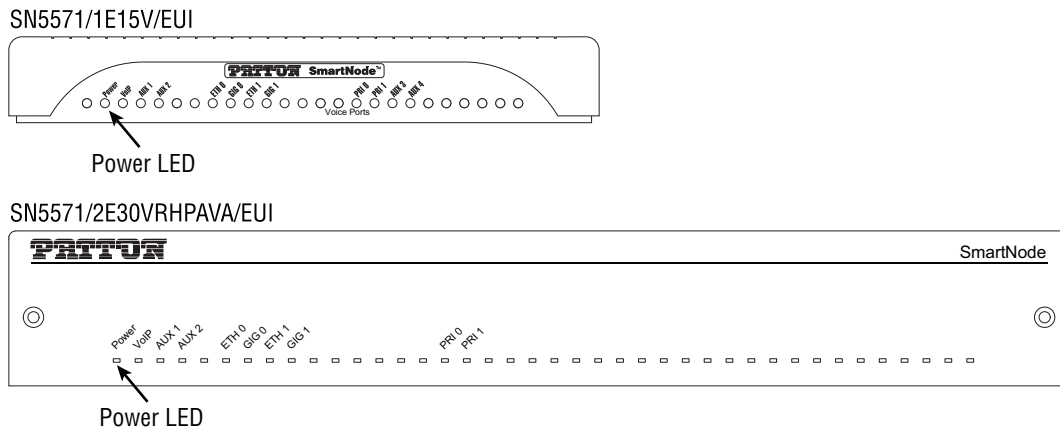


Figure 6. Power LED

4. Verify that the green *Power* LED is lit (see [figure 6](#)). Blinks fast during bootloader phase and blinks slow during boot process of Trinity Software. Becomes solid when the system is up and running.

Congratulations, you have finished installing the SmartNode Enterprise Session Border Controller! Now go to Chapter 4, “[Initial Configuration](#)” on page 31.

Chapter 4 Initial Configuration

Chapter contents

- Introduction 32
- Connecting the SmartNode to Your Laptop PC..... 32
- Configure the Desired IP Address..... 33
 - Factory-default IP Settings 33
 - Login 33
 - Changing the WAN IP address 33
- Connecting the SmartNode to the Network..... 34
- Loading the Configuration (optional)..... 35
- Additional Information 35

Introduction

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

Note If you haven't already installed the SmartNode, refer to Chapter 3, "SmartNode Installation" on page 25.

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

Connecting the SmartNode to Your Laptop PC

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



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



For the ISDN connection to a carrier network, it shall be connected to a network termination device and not connected directly to an outside POTS line.

The SmartNode 5570 Series is equipped with Auto-MDX Ethernet ports, so you can use straight-through cables for host or hub/switch connections (see figure 7).

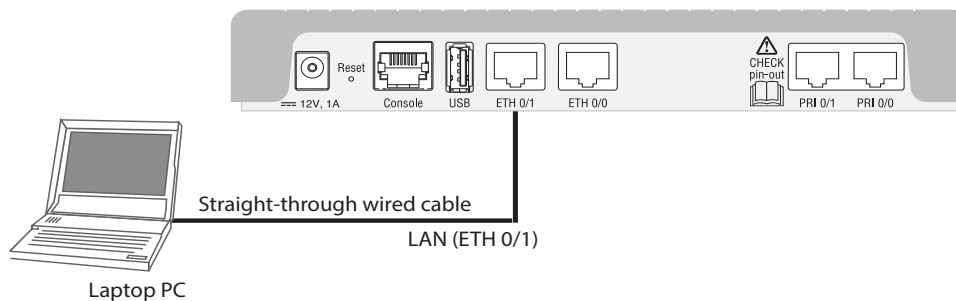


Figure 7. Connecting the SmartNode to your Laptop PC

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

```
ping 192.168.1.1
```


Configure the Desired IP Address

Factory-default IP Settings

The factory default configuration for the Ethernet interface IP addresses and network masks are listed in Table 5. Both Ethernet interfaces are activated upon power-up. LAN interface *ETH 0/1 (LAN)* provides a default DHCP server, the WAN interface uses DHCP client to automatically assign the IP address and network mask.

Table 5. Factory Default IP Address and Network Mask Configuration

	IP Address	Network Mask
WAN Interface Ethernet 0 (ETH 0/0)	DHCP	DHCP
LAN Interface Ethernet 1 (ETH 0/1)	192.168.1.1	255.255.255.0
DHCP Address Range	192.168.1.10–192.168.1.99	255.255.255.0

If these addresses match with those of your network, go to section “[Connecting the SmartNode to the Network](#)” on page 34. Otherwise, refer to the following sections to change the addresses and network masks.

Login

To access the SmartNode, start the Telnet application. Type either the host name **smartnode.local**

or the default IP address into the address field of the Telnet application:

192.168.1.1

Accessing your SmartNode via a Telnet session displays the login screen. Type the factory default login: *admin* and leave the password empty. Press the Enter key after the password prompt.

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

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

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

Changing the WAN IP address

Select the context IP mode to configure an IP interface.

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

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

```

192.168.1.1(ctx-ip)[Router]#interface WAN
192.168.1.1(if-ip)[WAN]#no ipaddress DHCP
192.168.1.1(if-ip)[WAN]#ipaddress WAN 172.16.1.99/24
2002-10-28T00:09:40 : LOGINFO      : Link down on interface WAN.
2002-10-29T00:09:40 : LOGINFO      : Link up on interface WAN.
172.16.1.99(if-ip)[WAN]#

```

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

Note The modified configuration is applied immediately. It is not necessary to reboot the device when changing any configuration parameter.

```

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

```

The SmartNode can now be connected to your network.

Connecting the SmartNode to the Network

In general, the SmartNode will connect to the network via the *WAN (ETH 0/0)* port. This enables the SmartNode to offer routing services to the PC hosts on *LAN (ETH 0/1)* port. The SmartNode 5570 Series is equipped with Auto-MDX Ethernet ports, so you can use straight through or crossover cables for host or hub/switch connections. (see [figure 8](#)).



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



For the ISDN connection to a carrier network, it shall be connected to a network termination device and not connected directly to an outside POTS line.

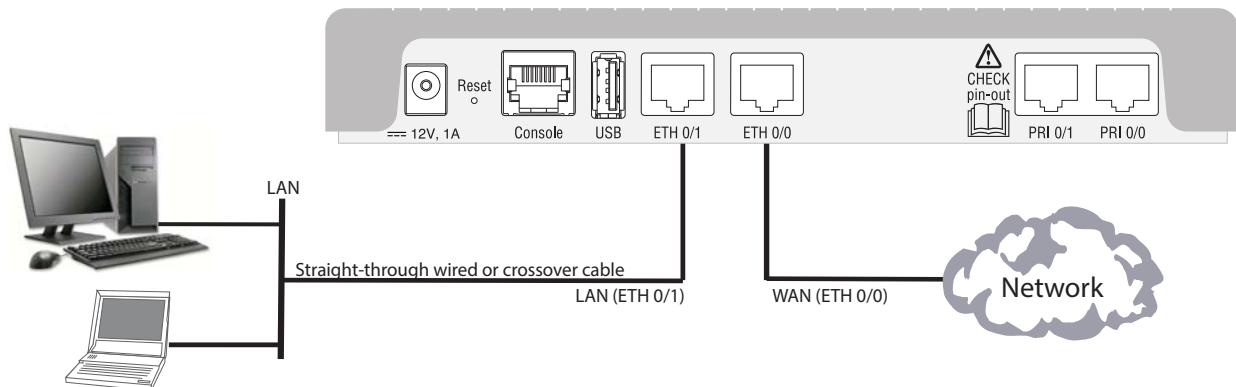


Figure 8. Connecting the SmartNode to the network

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

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

Note If the WAN address is *not* set to DHCP, to ping a device outside your local LAN you must first configure the default gateway. (For information on configuring the default gateway, refer to section “Set IP addresses” in the Trinity Release 3.5.x– Command Line Reference Guide.)

Note Connecting both ethernet ports to the same switch will only work if the switch has separate ARP tables for each connection.

Loading the Configuration (optional)

The Patton Community provides several Web Wizards to help with setting up your SmartNode configuration.

<http://www.patton.com/wizard>

Patton also provides a collection of configuration templates on the support page at:

<http://www.patton.com/support/kb.asp> —one of which may be similar enough to your application that you can use it to speed up configuring the SmartNode. Simply download the configuration note that matches your application to your PC. Adapt the configuration as described in the configuration note to your network (remember to modify the IP address) and copy the modified configuration to a TFTP server. The SmartNode can now load its configuration from this server.

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

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

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

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

```
172.16.1.99(if-ip)[WAN]#reload
Press 'yes' to restart, 'no' to cancel :yes
The system is going down NOW
```

Additional Information

For detailed information about configuring and operating guidance, set up procedures, and troubleshooting, refer to the Trinity Release 3.5.x– Command Line Reference Guide available online at www.patton.com/manuals.

Chapter 5 **Contacting Patton for Assistance**

Chapter contents

- Introduction37
- Contact information37
 - Contacting Patton Technical Services for Free Support37
- Warranty Service and Returned Merchandise Authorizations (RMAs)37
 - Warranty coverage37
 - Out-of-warranty service38
 - Returns for credit38
 - Return for credit policy38
 - RMA numbers38
 - Shipping instructions38

Introduction

This chapter contains the following information:

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

Contact information

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

Contacting Patton Technical Services for Free Support

REGION	North America	Western Europe	Central & Eastern Europe	Middle East North Africa
Location	Maryland, USA	Bern, Switzerland	Budapest, Hungary	Beirut, Lebanon
Time Zone	EST/EDT UTC/GMT - 4/5 hours	CET/CEDT UTC/GMT + 1/2 hours	CET/CEDT UTC/GMT + 1/2 hours	EET/EEDT UTC/GMT + 2/3 hours
Business Hours	Monday-Friday 8:00am to 5:00pm	Monday-Friday 09:00 to 12:00 13:30 to 17:30	Monday-Friday 8:30 to 17:00	Monday-Friday 8:00am to 5pm
Email	support@patton.com	support@patton.com	support@patton.com	support@patton.com
Phone	+ 1 301 975 1007	+41 31 985 25 55	+36 439 3835	+96 1 359 1277
Fax	+1 301 869 9293	+41 31 985 2526		

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

- Compliance40
 - EMC40
 - Safety40
- Radio and TV Interference (FCC Part 15)40
- EC Declaration of Conformity40
- Authorized European Representative40
- ISDN Compliance41

Compliance

EMC

- FCC Part 15, Class A
- EN55032, Class A
- EN55024

Safety

- UL 62368-1/CSA C22.2 N0. 62368-1
- IEC/62368-1
- AS/NZS 62368-1

Radio and TV Interference (FCC Part 15)

This equipment 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. This equipment has been tested and found to comply with the limits for a Class A computing device in accordance with the 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 equipment causes interference to radio or television reception, which can be determined by disconnecting the cables, 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).

EC Declaration of Conformity

We certify that the apparatus identified above conforms to the requirements of Council Directive 2014/30/EU on the approximation of the laws of the member states relating to electromagnetic compatibility; Council Directive 2014/35/EU on the approximation of the laws of the member states relating to electrical equipment designed for use within certain voltage limits; Council Directive 2011/65/EU as modified by Council Directive 2015/863/EU on the approximation of the laws of the member states relating to RoHS and REACH compliance; and Council Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products.

Authorized European Representative

Martin Green
European Compliance Services Limited
Milestone house
Longcot Road
Shrivenham
SN6 8AL, UK

ISDN Compliance

The device is approved for connection to the public ISDN telecommunication network.



For the ISDN connection to a carrier network, it shall be connected to a network termination device and not connected directly to an outside POTS line.

Appendix B Specifications

Chapter contents

DSP.....	43
Voice Connectivity.....	43
Data Connectivity.....	43
Voice Processing (signalling dependent).....	43
Fax and modem support.....	44
WAN Interface (if applicable).....	44
Voice Signalling.....	45
Voice Routing—Session Router.....	46
IP Services.....	46
Management.....	47
System.....	47
Physical.....	47
Plastic Enclosure.....	47
Metal Enclosure.....	47

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

DSP

Two 16 channel DSP

Voice Connectivity

1 or 2 ISDN PRI ports, 4-wire

RJ45 ports NT/TE configurable per port (layer 1 pin-out does not change)

Life-line bypass relay between PRI 0/0 and PRI 0/1 ports (Depends on model; /R option)

Data Connectivity

Two 10/100/1000Base-TX Ethernet ports

All ports full duplex, autosensing, auto-MDX

Voice Processing (signalling dependent)

15 to 30 full-duplex channels with Voice CODECS:

- G.711 A-Law/-Law (64 kbps)
- G.722 (64 kbps)
- G.726 (ADPCM 16,24,32,40 kbps)
- G.723.1 (5.3 or 6.3 kbps)
- G.729ab (8kbps)
- Transparent ISDN data

G.168 echo cancellation (128ms)

15 to 30 simultaneous low-bandwidth voice or T.38 fax calls

DTMF detection and generation

Carrier tone detection and generation

Silence suppression and comfort noise

Adaptive and configurable dejitter buffer

Configurable tones (dial, ringing, busy, etc.)

Configurable transmit packet length

RTP/RTCP (RFC 1889)

SRTP (RFC 3711)

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

WAN Interface (if applicable)

Note For information on configuring the WAN interface, see Chapter 4, “[Initial Configuration](#)” on page 29.

Table 6. WAN Interface Specifications

Factor	Specs
VDSL-ADSL (/AVA and /AVB models)	<ul style="list-style-type: none"> • ANSI T1.413 Issue 2 • G.992.1 (G.dmt) • G.992.2 (G.lite) • G.992.3 (ADSL2, G.dmt.bit) • G.992.4 (ADSL2, G.lite.bis) • G.992.5 (ADSL2+) • G.993.1 (VDSL) • G.993.2 (VDSL2) • G.994.1 (G.hs) • G.Vectoring • Annex A, M and L • Annex B and J • VDSL Profile up to 30a supported
G.SHDSL-EFM (/2G and /4G models)	<ul style="list-style-type: none"> • Support ITU-T G991.2/G.994.1 standards • Support ITU-T G.998.1 (G.bond) • TC-PAM line modulation 16,32,64 & 128 • CO or CPE Mode • IEEE 802.3 2Base-TL (aka 802.3ah) compliant • Rate negotiating/manually rate adaptation configuration • 2–8 wire mode auto detect • Data rate selections: Up to Nx239 (5.7 Mbps) per pair • Support bonding based on EFM • Line interface: up to 4 pairs on a single RJ45 connector

Table 6. WAN Interface Specifications

Factor	Specs
G.SHDSL-ATM (/2G and /4G models)	<ul style="list-style-type: none"> • Classical IPoA (RFC 1577/2225) • PPPoE Client (over ATM) (RFC 2516) • IPoA (RFC 2684/1483) • ATM AAL5 encapsulation • Max. 8 PVCs • User selectable VC MUX and LLC MUX (default) • Configurable auto-connection • ATM QoS: UBR (default), CBR, and VBR-rt, VBR-nrt, UBR: per VC queuing • Auto-configuration: TR-037 & ILMI 4.0
Interworking/Interoperability	<ul style="list-style-type: none"> • G.SHDSL Interoperability: <ul style="list-style-type: none"> - Alcatel - NEC - Lucent Anymedia - Lucent Stinger • BRAS Interoperability: <ul style="list-style-type: none"> - Cisco - Redback - Alcatel-Lucent EVLT-K - Calix E5-120 - Ericsson Telecom AB EDN612nm - Adtran, Inc. IU VDSL48J3:ME - Adtran, Inc. Adtran TA1248V - Alcatel-Lucent ABLT-D
Fiber (/F models)	<ul style="list-style-type: none"> • 100Mbps and 1000Mbps Fiber SFP. • (For a list of tested SFP modules, refer to http://www.patton.com/products/sfpmodules.asp)

Voice Signalling

SIPv2

SIPv2 over IPv6

SIPv2 over TLS

SIP call transfer, redirect

Overlap or en-bloc dialing

DTMF in-band, out-of-band

Configurable progress tones

Voice Routing—Session Router

Local switching (hairpinning)

Least cost routing

Interface huntgroups

Call-Distribution groups

Number blocking

Call Routing Criteria:

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

Regular expression number manipulation functions:

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

IP Services

IPv4 & IPv6 router (Dual Stack)

Routing functionalities:

- Programmable static routes and policy-routing
- BGP
- GRE
- RIP
- VRRP

OpenVPN, L2TP, IPSec (License at additional charge)

ICMP redirect (RFC 792); Packet fragmentation

DiffServe/ToS set or queue per header bits

Packet Policing discards excess traffic

DHCP client and server (IPv4 and IPv6—Dual Stack)

DNS client and relay-server, DynDNS

Management

Patton Cloud Management

Web-based GUI; Trinity WEB Wizard

Industry standard CLI with remote Telnet and SSH access, fully documented

HTTP web management and firmware loading

TFTP configuration & firmware loading

HTTPS configuration & firmware provisioning

SNMP v3 agent (MIB II and private MIB)

Built-in diagnostic tools (trace, debug)

Secure Auto-provisioning

TR-069 config file and software image provisioning

System

Dual Core CPU Broadcom BCM53012 operating at 1GHz

Memory:

- 256 Mbytes DRAM
- 32 Mbytes Flash

Physical

Plastic Enclosure

Dimensions: 8.2 x 1.3H x 6.5D inch (20.8W X 3.4H x 16.5D cm)

Weight: <15.9 oz. (<450 g)

Power consumption: <10W

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

Operating humidity: up to 90%, non condensing

Metal Enclosure

Dimensions: 12.11W x 1.77H x 6.09D inch (30.75W X 4.49H x 15.46D cm)

Weight: 25.6 oz (725 g)

Power consumption: <10W

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

Operating humidity: up to 90%, non condensing

Appendix C **Cabling**

Chapter contents

Introduction.....	49
Serial Console.....	49
Ethernet	50
ISDN PRI (E1/T1)	51

Introduction

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

Serial Console

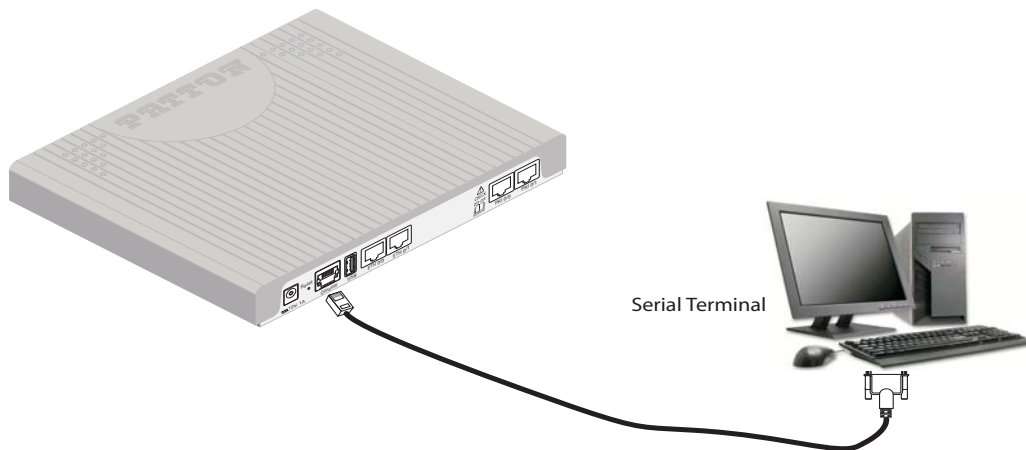
The SmartNode can be connected to a serial terminal over its serial console port, as depicted in figure 9.



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



For the ISDN connection to a carrier network, it shall be connected to a network termination device and not connected directly to an outside POTS line.



Note A Patton Model 16F-561 RJ45 to DB-9 adapter is included with each SmartNode Series device

Figure 9. Connecting a serial terminal

Console Connection settings:

- 19200 Bps
- 8bits, no parity
- 1stop bit
- flow control off

Note See section “Console port” on page 54 for console port pin-outs.

Ethernet

Ethernet devices (10/100/1000 Base-T) are connected to the SmartNode over a cable with RJ-45 plugs. All Ethernet ports on the SN5570 are Auto-MDX. Use any straight or crossover cable to a host, hubs, switches, PCs or other devices.



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



For the ISDN connection to a carrier network, it shall be connected to a network termination device and not connected directly to an outside POTS line.

Note Connecting both Ethernet ports to the same switch will only work if the switch has separate ARP table for each connection.

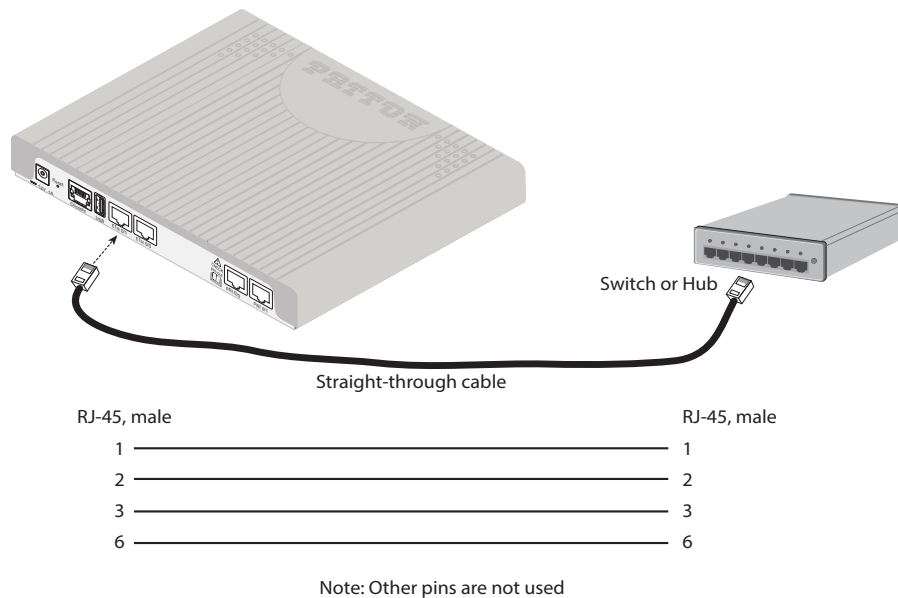


Figure 10. Typical Ethernet straight-through cable diagram for 10/100Base-T

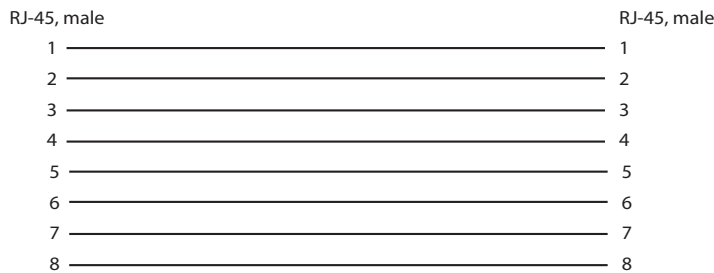


Figure 11. Typical Ethernet straight-through cable diagram for 1000Base-T

ISDN PRI (E1/T1)

The E1/T1 PRI port 0/1 is usually connected to a PBX or switch—local exchange (LE). Type and pin outs of these devices vary depending on the manufacturer. In most cases, a straight-through RJ-45 to RJ-45 can be used to connect the PRI port 0/1 with a PBX.

The E1/T1 PRI port 0/0 is usually connected to a PSTN NT. In most cases, a straight-through RJ-45 to RJ-45 can be used to connect.

Note Port 0/1 uses a different pin-out than port 0/0. This avoids the usage of a PRI cross-over cable when connecting the PBX to port 0/1 and the PSTN NT to port 0/0.

In case both ports have to be connected to a PBX, one port requires a PRI cross-over cable. The same applies when connecting both ports to the PSTN.

The pin-out of a cross-over cable is illustrated in [figure 13](#) on page 52.



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



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

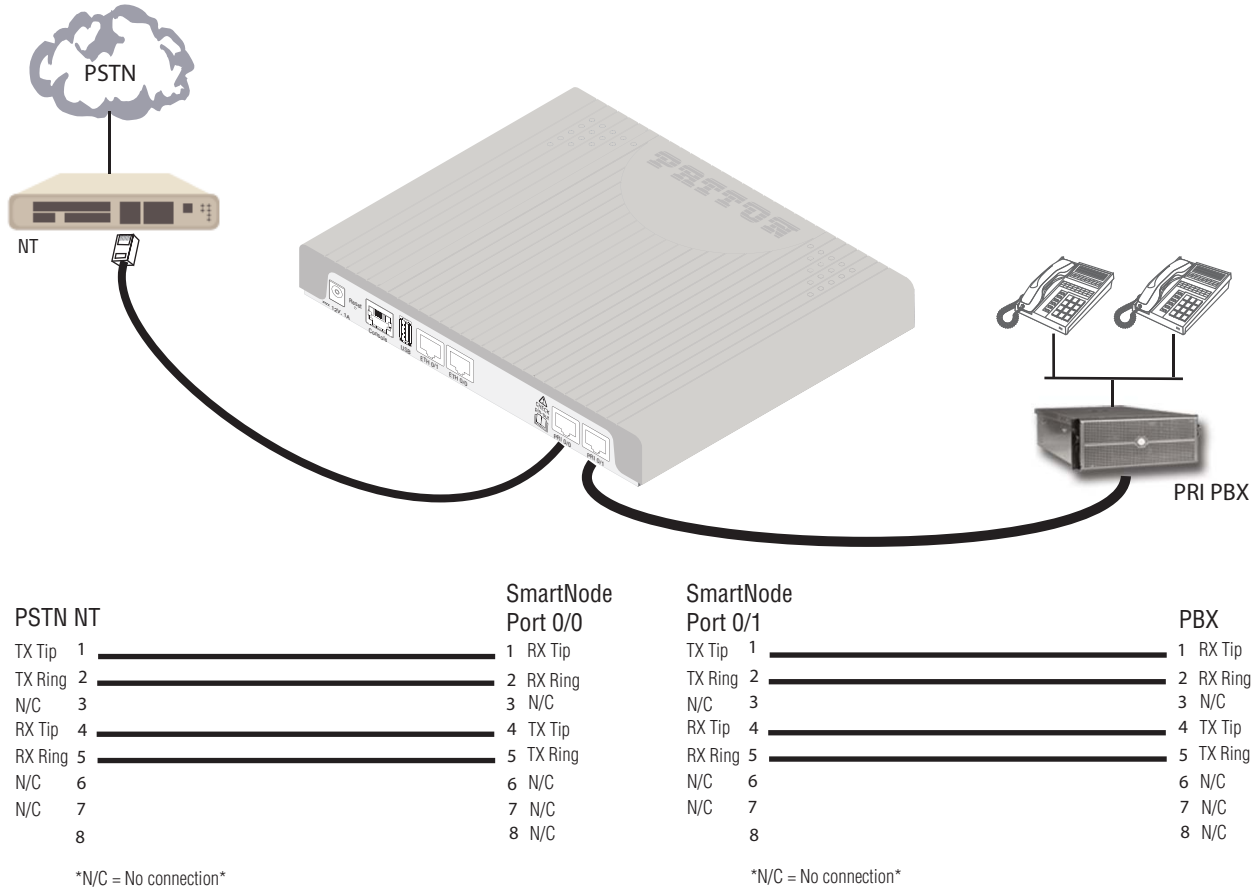


Figure 12. PRI E1/T1 Cabling

In case both ports will be connected to a PBX or to the PSTN, one port requires a PRI cross-over cable.

- Both ports connected to PSTN: Port 0/1 requires a PRI cross-over cable
- Both ports connected to PBX: Port 0/0 requires a PRI cross-over cable

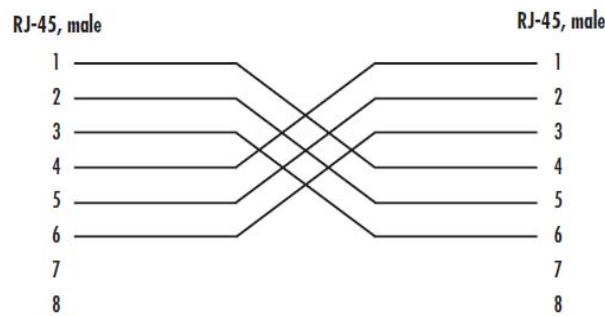


Figure 13. PRI E1/T1 cross-over cable

Appendix D **Port pin-outs**

Chapter contents

Introduction.....	54
Console port.....	54
Ethernet	54
VDSL-ADSL Port (/A and /AVA & /AVB models only).....	55
G.SHDSL EFM & ATM port (/2G and /4G models).....	55
Fiber Ports (/F models only).....	56
ISDN PRI (E1/T1) Port Pin-outs.....	56

Introduction

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

Console port

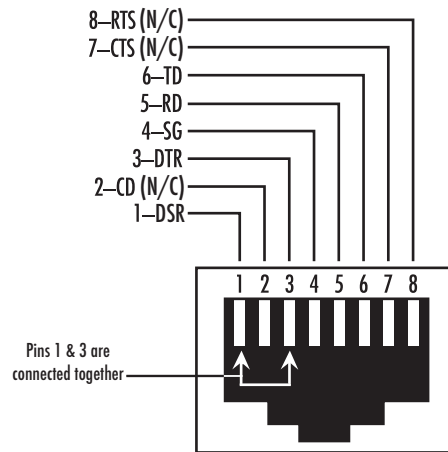


Figure 14. EIA-561 (RJ-45 8-pin) port

Note N/C means no internal electrical connection.

Console Connection Settings:

- 19200bps
- 8 bits, no parity
- 1 stop bit
- flow controls off

Ethernet

Table 7. 10/100 Base-T RJ-45 socket

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

Note Pins not listed are not used.

Table 8. 1000Base-T RJ-45 Socket

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

VDSL-ADSL Port (/A and /AVA & /AVB models only)

Table 9. VDSL-ADSL Port: RJ-45 connector

Pin	Signal
4	Tip
5	Ring

Note Pins not listed are not used

G.SHDSL EFM & ATM port (/2G and /4G models)

Table 10. EFM Port

Pin	Signal	Pair
1	Tip	1
2	Ring	1
3	Tip	2
4	Tip	0
5	Ring	0
6	Ring	2
7	Tip	3
8	Ring	3



CAUTION

RJ11 connectors **ARE NOT** to be inserted in to RJ45 sockets. An RJ11 connector can cause permanent damage to RJ45 socket pins and cause data connections to fail. An RJ11 to RJ45 adapter should be used if necessary.

Fiber Ports (/F models only)

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

ISDN PRI (E1/T1) Port Pin-outs

Table 11. Port 0/0

Pin	Signal
1	RX_TIP
2	RX_RING
3	NC
4	TX_TIP
5	TX_RING
6	NC
7	NC
8	NC

Table 12. Port 0/1

Pin	Signal
1	TX_TIP
2	TX_RING
3	NC
4	RX_TIP
5	RX_RING
6	NC
7	NC
8	NC

Note Pins not listed are not used

Note All pins between the port PRI 0/0 and the port PRI 0/1 are connected during power failure. Fallback relay operation (depending on Model. Only for Models with /R in Product code)

Appendix E **SmartNode 5570 Factory Configuration**

Chapter contents

Introduction.....	58
-------------------	----

Introduction

The factory configuration settings for SmartNode 5570 series can be obtained with the following command through the CLI;

```
login: admin
password: <Enter>
192.168.1.1>show config:shipping-config
```

Please see Chapter 4, "[Initial Configuration](#)" on page 31 for more details about IP address settings for initial configuration.

Appendix F **Reset Button Functions**

Chapter contents

Introduction.....	60
Resetting the SmartNode device when it is operating and the Power LED is lit.....	61
Resetting the SmartNode device when it is initially powered off.....	61
Very exceptional case - minimal config recovery	62

Introduction

The *Reset* button (see [figure 15](#)) is used to do the following:

- Reboot the SmartNode device (see section “[Resetting the SmartNode device when it is operating and the Power LED is lit](#)”)
- Erase the *startup-config* settings, which is followed by a SmartNode device reboot as indicated by the slow blinking of all LEDs (see section “[Resetting the SmartNode device when it is operating and the Power LED is lit](#)”)
- Factory reset, which is followed by a device reboot as indicated by the fast blinking of all LEDs (see section “[Resetting the SmartNode device when it is operating and the Power LED is lit](#)”)
- Troubleshoot the SmartNode device if it is not booting properly (see section “[Resetting the SmartNode device when it is initially powered off](#)” on page 61)

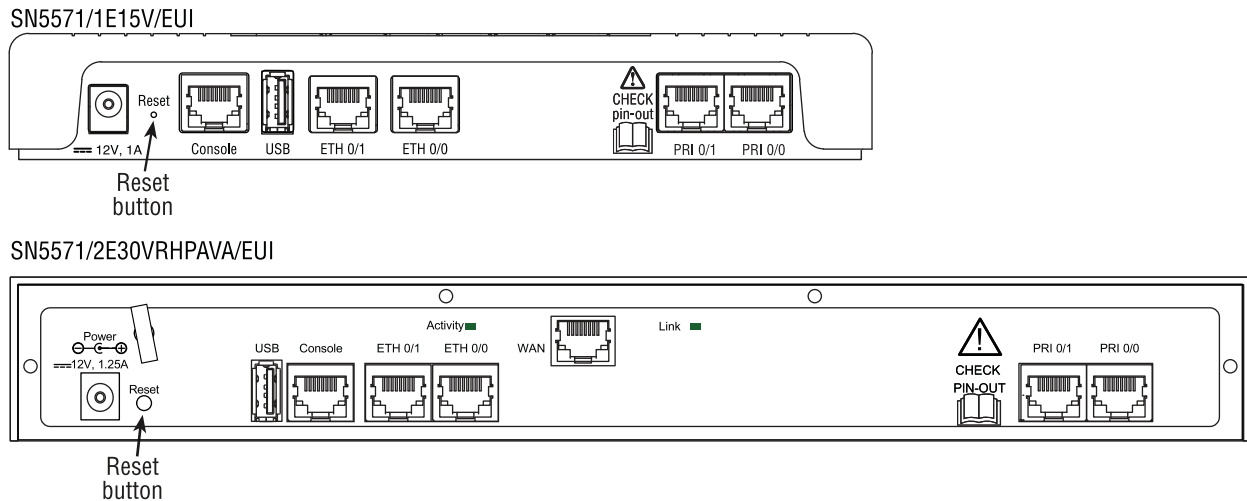


Figure 15. SN5570 *Reset* button

Resetting the SmartNode device when it is operating and the *Power LED* is lit

The *Reset* button has the following behaviors depending on how many seconds (see [figure 16](#)) the button is pressed (see [table 13](#) for the results from pressing the button).



Figure 16. Reset button periods (in seconds) for performing actions

Table 13. Results from pressing the Reset button

Period	Action
A (less than 1 second)	Reboot device
B (1 to 4 seconds)	No action
C (5 to 14 seconds)	<ul style="list-style-type: none"> • Erase <i>startup-config</i> • Reboot (indicated by the slow blinking of all LEDs)
D (15 to 20 seconds)	<ul style="list-style-type: none"> • Factory reset which erases entire flash memory except for <i>shipping-config</i>, shipping wizards, default root CAs and software licenses • Reboot (indicated by fast blinking of all LEDs)

Resetting the SmartNode device when it is initially powered off



This procedure should **only** be performed if the SmartNode device is not booting properly. It should be used by trained SmartNode technicians and Patton Support personnel only.

If the SmartNode device is not booting properly, the *Reset* button may remedy the problem by switching to the backup image.

The following procedure must be performed starting with the SmartNode device in a powered off state:

1. While pressing and holding the *Reset* button, apply power to the SmartNode device. The *Power LED* flashes quickly for 2 seconds, during which time the *Reset* button must remain pressed.
2. The *Power LED* will begin a series of blink pattern starting with 1-blink, pause (see [table 14](#)).

Table 14. Using the *Reset* button to switch to a backup image

LED Blink Pattern	Action
1-blink, pause	Boot normally
2-blinks, pause	Switch to backup image, then Boot normally

3. Repeatedly pressing and releasing the *Reset* button will cycle through the blink patterns.
4. When you get to the 2-blink pattern that will switch to backup image, release the *Reset* button. 10 seconds later, the device will switch to the backup image, then boot normally.

If the SmartNode device is still not working properly, see section “[Very exceptional case - minimal config recovery](#)”.

Very exceptional case - minimal config recovery

If, after performing the procedure in section “[Resetting the SmartNode device when it is initially powered off](#)” on page 61, the SmartNode device is still not operational, the following may remedy the problem by erasing the entire contents of flash memory (no exceptions). However it is recommended that in such a case the device be sent to Patton for analysis and repair. See section “[Warranty Service and Returned Merchandise Authorizations \(RMAs\)](#)” on page 37 for details.



The following procedure is NOT standard and is NOT to be used to perform a factory reset. It should ONLY be used as a last resort for a minimal recovery of the device when it is in an undefined state, and if the instructions in section “[Resetting the SmartNode device when it is initially powered off](#)” on page 61 did not provide a remedy.



Performing the following procedure will result in loss of all data, including the shipping-config, software licenses, Wizards, backup-configs, etc. The device will have to be manually set up afterward.

Do the following:

1. While pressing and holding the *Reset* button, apply power to the SmartNode device. The *Power* LED flashes quickly for 2 seconds, during which time the *Reset* button must remain pressed.
2. The *Power* LED will begin a series of blink pattern starting with 1-blink, pause.

Table 15. Using the *Reset* button to switch to erase flash memory

LED Blink Pattern	Action
3-blinks, pause	Erase entire contents of flash memory (no exceptions), then boot. Note Erasing flash memory also deletes previously purchased and loaded software license keys.

3. Repeatedly pressing and releasing the *Reset* button will cycle through the blink patterns.
4. When you get to the 3-blink pattern that will erase the entire flash memory (see [table 15](#)), release the *Reset* button. 10 seconds later, flash memory will be erased, then the device will boot.

Appendix G **End User License Agreement**

Chapter contents

- End User License Agreement64
 - 1. Definitions64
 - 2. Title64
 - 3. Term64
 - 4. Grant of License64
 - 5. Warranty65
 - 6. Termination65
 - 7. Notices65
 - 8. Other Licenses65
 - 9. Unenforceable Provisions66
 - 10. Governing Law66
 - 11. Waiver66

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 the End User.

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.

Patton does not convey any intellectual property title or rights in the Licensed Products to Licensee. All Licensed Products furnished by Patton, and all copies thereof, and compilations, programmatic extension, and all Patches, Updates, Upgrades and Platform Releases, are and shall remain the property of Patton or Patton’s licensors, as applicable. Further, the Licensed Products provided under this Agreement are not custom software but are standard commercial software. Except for the license use rights otherwise expressly provided in this Agreement, no right, title or interest in Patton Licensed Products is granted hereunder. Licensee shall not use any proprietary information of Patton to create any computer software program or user documentation, which is substantially similar to the Licensed Products.

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 65.

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 64.
- 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. Notices

Patton devices may log, collect and report data related to installed software, licenses, feature utilization, product performance, device management, service quality and other parameters which is used for quality control, product improvement, license management, service level management and technical support. Collected data may be reported to Patton or a service provider delivering its services connected to the device.

Patton may use this information for other business purposes, such as to alerting you to updated products or services, securing access to software updates, and assisting in order processing.

Any and all information collected by Patton or its assigns will be kept strictly confidential and will not be sold, rented, loaned, or otherwise disclosed to any third party except as required by law.

8. 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>).
- RedBoot (Red Hat Embedded Debug and Bootstrap) embedded system debug/bootstrap environment from Red Hat distributed to you pursuant to the eCos license terms (ecos.sourceware.org/license-overview.html) and GNU General Public License (GPL) terms (www.gnu.org/copyleft/gpl.html). Source code is available upon request.

9. Unenforceable Provisions

If any part of these terms and conditions are found to be invalid or unenforceable under applicable law, such part will be ineffective to the extent of such invalid or unenforceable part only, without in any way affecting the remaining parts of these terms and conditions.

10. Governing Law

The rights and obligations of the parties pursuant to these terms and conditions are governed by, and shall be construed in accordance with, the laws of the State of Maryland, USA.

User may be subject to other local, provincial or state and national laws. User hereby irrevocably submits to the exclusive jurisdiction of the courts of the State of Maryland, USA for any dispute arising under or relating to this agreement and waives user's right to institute legal proceedings in any other jurisdiction. Patton shall be entitled to institute legal proceedings in connection with any matter arising under this agreement in any jurisdiction where User resides, does business, or has assets.

11. Waiver

No waiver of any of the provisions of these terms and conditions will be deemed to constitute a waiver of any other provision nor shall such a waiver constitute a continuing waiver unless otherwise expressly provided in writing duly executed by the party to be bound thereby. Any other terms and conditions of sale, to the extent not inconsistent herein, regarding a Patton device, program, license or service remain in full force and effect.