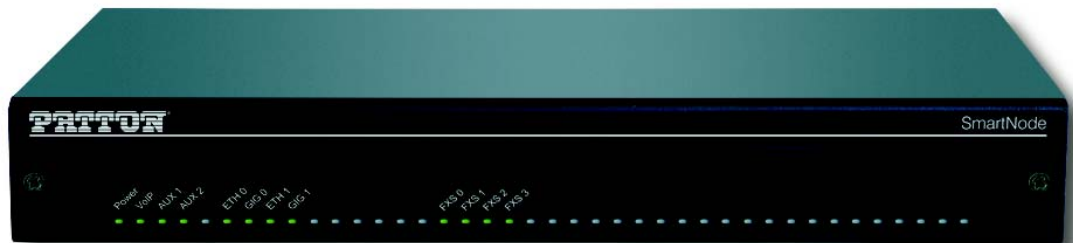


SmartNode 5540 and 4140 Series Enterprise Session Border Controller, Integrated Access Device, and VoIP Gateway

User Manual



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: 07MDSN5540-SN4140-UM Rev. G
Revised: April 12, 2022

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 terms *SmartWare* and *SmartNode* are trademarks of Patton Electronics Company. All other trademarks presented in this document are the property of their respective owners.

Copyright © 2016–2020, 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 router 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 Quick Start 14
- 2 General information 17
- 3 Applications overview 27
- 4 SmartNode Installation 31
- 5 Initial Configuration 39
- 6 Contacting Patton for Assistance 47
- A Compliance Information 50
- B Specifications 52
- C Cabling 59
- D Port pin-outs 63
- E SmartNode Device Factory Configuration 67
- F Reset Button Functions 69
- G End User License Agreement 75

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	9
Safety when working with electricity	10
Deutsch	11
General observations	12
Typographical conventions used in this document	12
1 Quick Start	14
Default IP Settings	15
Default Login.....	15
Analog Port Pinout.....	15
2 General information	17
SmartNode devices overview	18
SmartNode 5540 Series eSBC/IAD	19
Port descriptions	20
Front panel LED definitions	21
SmartNode SN4140 Series VoIP Gateway	22
Port descriptions	24
Front panel LED definitions	25
3 Applications overview	27
Introduction.....	28
Application for SmartNode 5540 eSBC.....	28
Application for SmartNode 4140 VoIP Gateway.....	29
4 SmartNode Installation	31
Planning the Installation.....	32
Site log	32
Network information	32
Network Diagram	32
IP related information	32
Software tools	33
Power source	33
Installing the SmartNode device.....	33
Placing the SmartNode device	33
Connecting cables	34

	Installation cable requirements for the WAN interface (SN5540 /2G, /4G, /AVA, /AVB /F Models)	34
	Installing a grounding wire on the SmartNode device’s ground lug	35
	Installing an interface cable on the SmartNode device’s FXS and FXO interface ports	36
	Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables	37
	Installation cable requirements for the DSL & Fiber WAN cable (SN5540/2G, /4G, /AVA, /AVB, /F Models) 37	
	Connecting the power supply	37
5	Initial Configuration	39
	Introduction	40
	Connecting the SN5540 & SN4140/2ETH to your laptop PC.....	40
	Configure the desired IP address	40
	Factory-default IP Settings	40
	Login	41
	Changing the WAN IP address	41
	Connecting the SmartNode device to the network	42
	Connecting the SN4140 to a laptop PC.....	43
	Configure the Desired IP Address	44
	Factory-default IP Settings	44
	Login	44
	Changing the WAN IP address	45
	Loading the Configuration (optional).....	45
	Additional Information	46
6	Contacting Patton for Assistance	47
	Introduction	48
	Contact information.....	48
	Contacting Patton Technical Services for Free Support	48
	Warranty Service and Returned Merchandise Authorizations (RMAs).....	48
	Warranty coverage	48
	Out-of-warranty service	49
	Returns for credit	49
	Return for credit policy	49
	RMA numbers	49
	Shipping instructions	49
A	Compliance Information	50
	Compliance.....	51
	EMC	51
	Safety	51
	Radio and TV Interference (FCC Part 15)	51
	EC Declaration of Conformity	51
	Authorized European Representative	51
B	Specifications	52
	DSP.....	53
	Voice Connectivity.....	53

Data Connectivity	53
Voice Processing (signaling dependent)	53
Fax and modem support	54
Voice Signaling	54
Voice Routing—session router	54
IP Services	55
WAN Interface (if applicable)	56
Management	57
System	57
Physical	57
C Cabling	59
Introduction	60
Ethernet	60
Analog FXS	61
Analog FXO	62
D Port pin-outs	63
Introduction	64
Ethernet	64
FXS port	64
FXO port	65
VDSL-ADSL Port (/A and /AVA & /AVB models only)	65
G.SHDSL EFM & ATM port (/2G and /4G models)	65
Fiber Ports (/F models only)	66
E SmartNode Device Factory Configuration	67
Introduction	68
F Reset Button Functions	69
Introduction	70
Resetting the SmartNode device when it is operating and the Power LED is lit	72
Very exceptional case—minimal config recovery	73
G End User License Agreement	75
End User License Agreement	76
1. Definitions	76
2. Title	76
3. Term	76
4. Grant of License	76
5. Warranty	77
6. Termination	77
7. Notices	77
8. Other Licenses	77
9. Unenforceable Provisions	78
10. Governing Law	78
11. Waiver	78

List of Figures

1	RJ-11 pinout diagram	16
2	SmartNode 5540 and 4140	18
3	Examples of SN5540 Series rear panels	19
4	SmartNode SN5540 Series front panels	21
5	Examples of SN4140 Series rear panels	23
6	SmartNode 4140 Series front panels	25
7	SN5540 application	29
8	SN4140 application	30
9	Rear view showing location of Ethernet, FXS, FXO and WAN connectors (SmartNode 5541 shown)	35
10	Analog FXS connection	36
11	Analog FXO connection	36
12	Power LED	38
13	Connecting the SmartNode device to your laptop PC	40
14	Connecting the SmartNode to the network	42
15	Connecting the SmartNode to a laptop PC	43
16	Connecting SmartNode device and PC to a LAN with DHCP server.	44
17	Typical Ethernet straight-through cable diagram for 10/100Base-T	60
18	Typical Ethernet straight-through cable diagram for 1000Base-T	60
19	Connecting an FXS device	61
20	Connecting to an FXO line jack	62
21	RJ-11 pinout diagram	65
22	RJ11 and RJ45 pin comparison	66
23	SN4140 Reset button	70
24	SN5540 Reset button	71
25	Reset button periods (in seconds) for performing actions	72

List of Tables

1	General conventions	12
2	Rear panel ports	20
3	SmartNode 5540 LED Definitions	22
4	Rear panel ports	24
5	SmartNode 4140 LED Definitions	25
6	Sample site log entries	32
7	RJ-11 socket	36
8	Factory Default IP Address and Network Mask Configuration	41
9	Factory Default IP Address and Network Mask Configuration	44
10	WAN Interface Specifications	56
11	10/100 Base-T RJ-45 socket	64
12	1000Base-T RJ-45 Socket	64
13	RJ-11 socket	64
14	VDSL-ADSL Port: RJ-45 connector	65
15	EFM Port	65
16	Results from pressing the Reset button	73
17	Using the Reset button to switch to a backup image	74

About this guide

This guide describes the SmartNode 5540 and 4140 Series hardware, installation and basic configuration. For detailed software configuration information refer to the [Trinity Command Line Reference 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](#), starting on page 14, contains what you need to quickly start using the SmartNode device.
- [Chapter 2](#), starting on page 17, provides information about router features and capabilities
- [Chapter 3](#), starting on page 27, contains an overview describing router operation and applications
- [Chapter 4](#), starting on page 31, provides SmartNode device installation procedures
- [Chapter 5](#), starting on page 39, leads you through the steps to set up a new SmartNode device and download a configuration
- [Chapter 6](#), starting on page 47, contains information on contacting Patton technical support for assistance
- [Appendix A](#), starting on page 50, provides compliance info for the SmartNode devices
- [Appendix B](#), starting on page 52, contains specifications for the routers
- [Appendix C](#), starting on page 59, provides cable recommendations
- [Appendix D](#), starting on page 63, describes the router's ports and pin-outs
- [Appendix E](#), starting on page 67, describes how to obtain factory configuration settings for the SmartNode device
- [Appendix F](#), starting on page 69, describes the *Reset* button functions
- [Appendix G](#), starting on page 75, provides the End User License Agreement

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

Precautions

Notes and cautions, which have the following meanings, are used throughout this guide to help you become aware of potential SmartNode device 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



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



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.



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

- 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

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.
Italicized Helvetica type	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.

Table 1. General conventions (Continued)

Convention	Meaning
<i>node</i>	The leading IP address or nodename of a SmartNode is substituted with <i>node</i> in bold-face 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 Quick Start

Chapter contents

- Default IP Settings 14
- Default Login 14
- Analog Port Pinout..... 14

Default IP Settings

SN5540 and SN4140/2ETH Models:

- ETH 0/0: DHCP Client
- ETH 0/1: DHCP Server:
 - 192.168.200.10 mask 255.255.255.0
 - or (smartnode.local)

SN4140 Models (with 1 Ethernet port only):

- ETH 0/0:
 - 192.168.200.20 | 255.255.255.0
 - DHCP Client

Default Login

Username: *admin*

Leave the password empty

Press the *Enter* key after the password prompt.



You are responsible for creating a new administrator account to maintain system security. Patton Electronics accepts no responsibility for losses or damage caused by loss or misuse of passwords. Refer to Chapter 4 “Accessing the CLI,” section “Selecting a secure password” in the [Trinity Command Line Reference Guide](#) for more details.

Analog Port Pinout

FXS & FXO ports use an RJ-11 connector with 6 positions. The middle 2 positions (3 and 4) are used as shown in [figure 1](#) on page 16.

Note Pins not listed are not used.

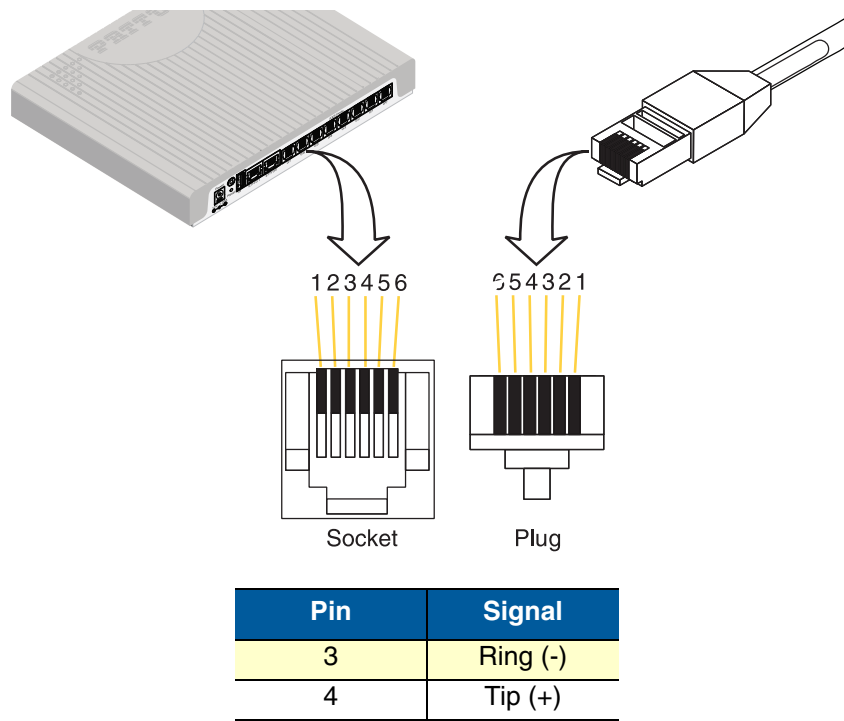


Figure 1. RJ-11 pinout diagram

Chapter 2 **General information**

Chapter contents

- SmartNode devices overview14
- SmartNode 5540 Series eSBC/IAD15
 - Port descriptions16
 - Front panel LED definitions17
- SmartNode SN4140 Series VoIP Gateway18
 - Port descriptions20
 - Front panel LED definitions21

SmartNode devices overview

SmartNode SN5540 Enterprise Session Border Controllers (eSBCs) and Integrated Access Devices (IADs), and SN4140 VoIP Gateways (see [figure 2](#)) combine IP routing, VoIP security, DSL access and quality of service (QoS) for up to 8 voice and FAX calls over any IP. Leverage low-cost IP services with packet-voice for complete branch office voice and data connectivity or for legacy equipment integration into All-IP environments.



Figure 2. SmartNode 5540 and 4140

The SmartNode SN5540 eSBC and IAD, and SN4140 VoIP Gateway are equipped with 2, 4 or 8 analog interfaces (FXS/FXO), and provide the following major functions:

- Analog telephony to voice over IP (SIP) conversion for 2, 4 or 8 analog ports FXS/FXO
- Fax T.38 and G711 bypass support
- Modem bypass support
- Optional PacketSmart
- One Ethernet port
- Stateful Firewall
- QoS

The 2-Ethernet-port gateways support:

- Two Ethernet ports (IP Routing requires license to enable)
- USB port

In addition, the eSBC supports:

- IP routing including GRE, BGP, VPN1
- 4 SIP to SIP calls (license upgradeable up to a total of 200)
- Optionally, the product supports (at additional cost): SIP-TLS/SRTP; SIP Registrar
- Secure Zero Touch Provisioning

While the IAD models support on top of the eSBC

- WAN access termination (VDSL2, ADSL2/2+, SHDSL, Fiber SFP)

Section “[SmartNode 5540 Series eSBC/IAD](#)” on page 19 provides more information on the device. Section “[SmartNode SN4140 Series VoIP Gateway](#)” on page 22 describes the SmartNode 4140 Series.

SmartNode 5540 Series eSBC/IAD

The SmartNode 5540 eSBC/IAD Series are compact Enterprise Session Border Controllers that support 2 up to 8 voice calls (FXS/FXO–VoIP and versa) depending on the model (see figure 3) and up to 200 SIP-to-SIP calls (non-transcoded). By default there are 4 SIP to SIP calls enabled. Additional calls can be enabled by loading SNSW-1B licenses (additional charge). The IAD versions also have WAN uplink termination included, such as Fiber-SFP, ADSL/VDSL or G.SHDSL (EFM/ATM).

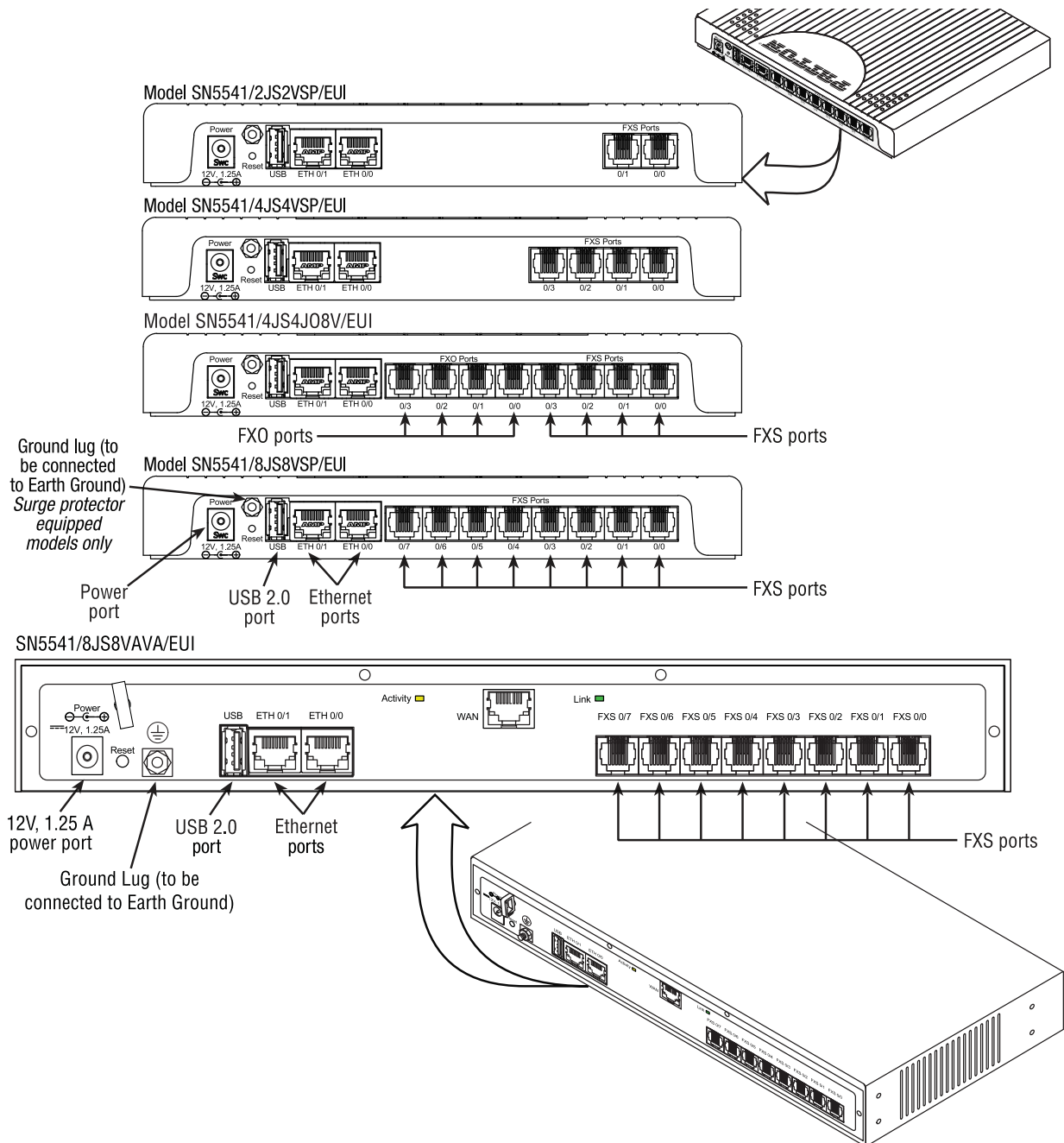


Figure 3. Examples of SN5540 Series rear panels

On the products the following model code conventions apply:

- *JS* stands for FXS ports
- *JO* stands for FXO ports
- *V* stands for number of voice channels
- *SP* stands for surge protection (K.21 compliant)¹
- *EUI* stands for external universal input power supply
- *AVA* stands for VDSL / ADSL (Annex A,L,M)
- *AVB* stands for VDSL/ADSL (Annex B,J)
- *F* stands for SFP slot being used for Fiber link termination
- *2G* stands for 2-pair G.SHDSL.bis
- *4G* stands for 4-pair G.SHDSL.bis

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

Port descriptions

The SmartNode 5540 Series rear panel ports are described in [table 2](#).

Table 2. Rear panel ports

Port	Description
Ethernet ETH 0/0 & ETH 0/1	RJ-45 connectors that connect the SmartNode device to an Ethernet device (e.g., a cable or DSL modem, LAN hub or switch).
Analog voice ports, FXS 0/0–FXS 0/7	FXS RJ-11 (6 position, 4 wire) connectors that connect the device with an analog terminal (a telephone, for example). FXS on-hook voltage is 48V for each FXS port.
Analog voice ports, FXO 0/0–FXO 0/7	FXO RJ-11 (6 position, 4 wire) connectors. These ports connect to FXS devices such as the PSTN.
Power	The SmartNode device requires 12 VDC, 1.25 A power for operation. Every SmartNode device comes with an external power supply converting from AC to DC power (100–240 VAC, 50/60 Hz).
USB 2.0	USB 2.0 host port used to connect a USB 3G/4G cellular modem. A list of supported USB models can be found here Certified USB Modems
WAN interface SFP, VDSL- ADSL, G.SHDSL (EFM-ATM)	The VDSL-ADSL, G.SHDSL, RJ-45 Ethernet and SFP slot status LEDs are located on either side of the port. ACT (when lit or blinking) shows activity, and LINK (when lit) shows that the port is connected. 1000 is indicating when a Gigabit Ethernet link is established Note: On VDSL-ADSL models (/AVA and /AVB) only, the ACT LED has no function.
Reset	The reset button has several functions, as described in appendix F, “ Reset Button Functions ” on page 69.

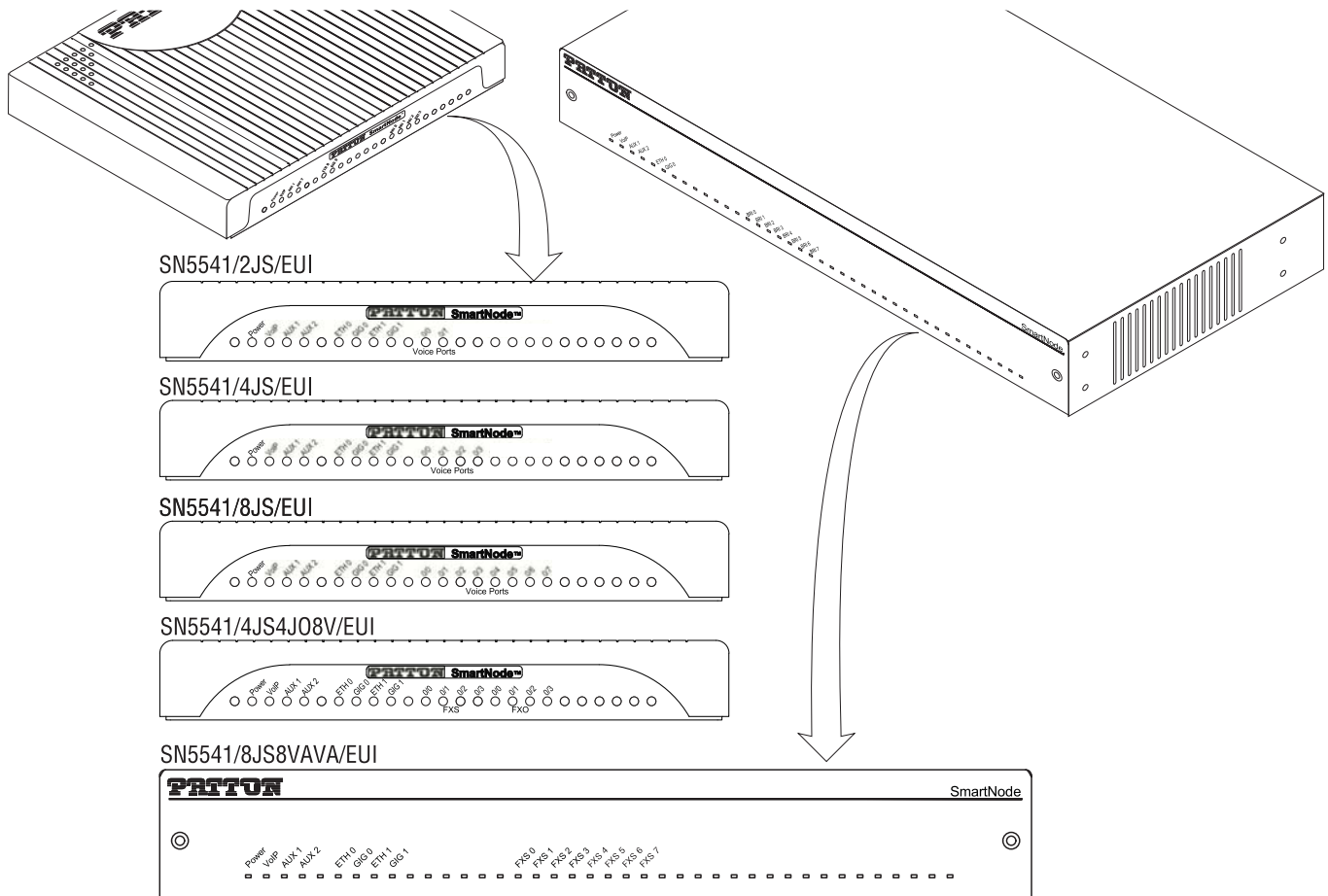


Figure 4. SmartNode SN5540 Series front panels

Front panel LED definitions

Figure 4 shows SmartNode SN5540 LEDs; the LED definitions are listed in [table 3](#) on page 22.

Note If an error occurs, all LEDs will flash for *more* than 5 seconds before the device reboots.

Table 3. SmartNode 5540 LED Definitions

LED	Description
Power	When lit, indicates power is applied. Blinks fast during bootloader phase and blinks slow during the boot process . Becomes solid when the system is up and running.
VoIP	<ul style="list-style-type: none"> • When lit, indicates the SmartNode device is registered to a SIP server, or a SIP device has registered to the SmartNode device. • Off indicates the unit is not configured or registered, or has no active directly routed VoIP connection.
AUX 1	On when connected to Patton Cloud
AUX 2	Auxiliary LED for future use.
Voice Ports FXS 0–FXS 7	<ul style="list-style-type: none"> • When lit, indicates FXS port is enabled. Flashes when there are ongoing or ringing calls. • Off when no line or phone is connected or the port is shut down.
Voice Ports FXO 0–FXO 7	<ul style="list-style-type: none"> • In 'Idle' state LED is off • In 'Dialing' or 'Ringing' state blink-frequency is 2 per second, • In 'Connected' state blink-frequency is 1 per second
ETH 0 & ETH 1	<ul style="list-style-type: none"> • When lit, indicates 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"> • When lit, indicates Ethernet is connected to a 1000Mb network. • Off when Ethernet is connected to a 10Mb or 100Mb network or not connected.

SmartNode SN4140 Series VoIP Gateway

The SmartNode SN4140 Series are compact VoIP Gateways that support 2 to 8 VoIP calls (see [figure 5](#)). Depending on the model, they have 1 or 2 Ethernet ports.

The 2 Ethernet port SN4140 models (SN4141/2ETH...) do not support IP routing. See the product accessories for software license options to enable it.

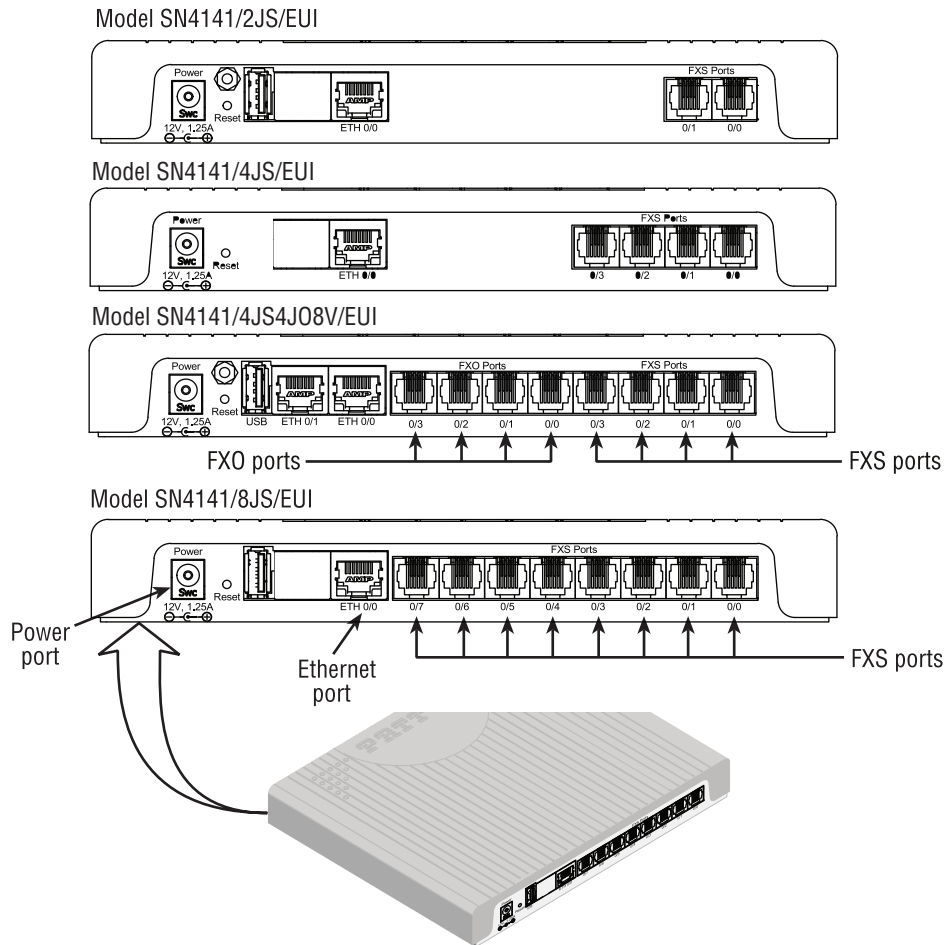


Figure 5. Examples of SN4140 Series rear panels

On the products the following model code conventions apply:

- *JS* stands for FXS ports
- *JO* stands for FXO ports
- *EUI* stands for external universal input power supply
- *2ETH* stands 2 Ethernet ports on gateway models

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

Port descriptions

The SmartNode 4140 Series rear panel ports are described in [table 4](#).

Table 4. Rear panel ports

Port	Description
Ethernet ETH 0/0 & ETH 0/1	RJ-45 connectors that connect the SmartNode device to an Ethernet device (e.g., a cable or DSL modem, LAN hub or switch). Note: IP Routing is disabled on SN4140/2ETH models. See Software license options to enable it.
Analog voice ports, FXS 0/0–FXS 0/7	FXS RJ-11 (6 position, 4 wire) connectors that connect the SmartNode device with an analog terminal (a telephone, for example) FXO port. EuroPOTS support (ETSI EG201 188). FXS on-hook voltage is 48V for each FXS port.
Analog voice ports, FXO 0/0–FXO 0/7	FXO analog voice ports on RJ-11 (6 position, 4 wire) connectors. These ports connect to FXS devices such as the PSTN.
Power	The SmartNode device requires 12 VDC, 1.25 A power for operation. Every SmartNode device comes with an external power supply converting from AC to DC power (100–240 VAC, 50/60 Hz).
Reset	The reset button has several functions, as described in appendix F, “ Reset Button Functions ” on page 69.

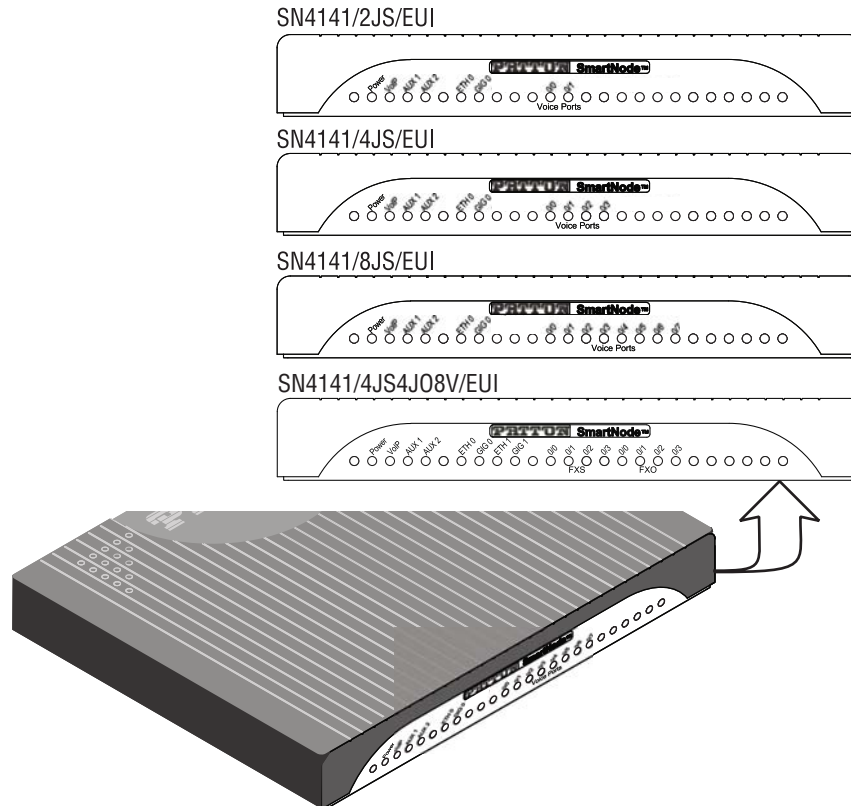


Figure 6. SmartNode 4140 Series front panels

Front panel LED definitions

Figure 6 shows SmartNode 4140 LEDs; the LED definitions are listed in [table 5](#) on page 25.

Note If an error occurs, all LEDs will flash for *more* than 5 seconds before the device reboots.

Table 5. SmartNode 4140 LED Definitions

LED	Description
Power	When lit, indicates power is applied. Blinks fast during bootloader phase and blinks slow during the boot process. Becomes solid when the system is up and running.
VoIP	<ul style="list-style-type: none"> When lit, indicates the SmartNode device is registered to a SIP server, or a SIP device has registered to the SmartNode device. Off indicates the unit is not configured or registered, or has no active directly routed VoIP connection.
AUX 1	On when connected to Patton Cloud
AUX 2	Auxiliary LED for future use.

Table 5. SmartNode 4140 LED Definitions (Continued)

LED	Description
Voice Ports FXS 0–FXS 7	<ul style="list-style-type: none"> • When lit, indicates FXS port is enabled. Flashes when there are ongoing or ringing calls. • Off when no line or phone is connected or the port is shutdown.
Voice Ports FXO 0–FXO 7	<ul style="list-style-type: none"> • In 'Idle' state LED is off • In 'Dialing' or 'Ringing' state blink-frequency is 2 per second, • In 'Connected' state blink-frequency is 1 per second
Ethernet ETH 0–ETH 1	<ul style="list-style-type: none"> • When lit, indicates the Ethernet connection has a link indication. • Flashes when data is received or transmitted at the Ethernet port. <p>Note IP Routing is disabled on SN4140/2ETH models. See Software license options to enable it.</p>
GIG 0 - GIG 1	<ul style="list-style-type: none"> • When lit, indicates Ethernet is connected to a 1000Mb network. • Off when Ethernet is connected to a 10Mb or 100Mb network or not connected.

Chapter 3 Applications overview

Chapter contents

- Introduction.....24
- Application for SmartNode 5540 eSBC.....24
- Application for SmartNode 4140 VoIP Gateway.....25

Introduction

Patton's SmartNode eSBCs/IADs and VoIP Gateways deliver the features you need for advanced multi-service voice and data network applications. They combine high quality voice-over-IP with powerful quality of service routing, assessment and monitoring 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:

- www.patton.com/session-border-controller/
- <https://www.patton.com/voip-iad/>
- www.patton.com/voip-gateway/

Application for SmartNode 5540 eSBC

The SmartNode 5540 eSBC/IAD, equipped with 2 Ethernet ports, acts as an Enterprise Session Border Controller securing the LAN from the WAN and it connects up to 8 Analog devices / lines integrating them in to an All-IP environment (see [figure 7](#) on page 29). In addition it can also terminate the WAN links for Fiber-SFP, ADSL, VDSL or G.SHDSL.

The major functions of the SN5540 eSBC/IAD are:

- Network topology hiding
- Fraud prevention
- Service demarcation
- QoS (quality of service with downstream and upstream QoS)
- Number normalization and mapping
- Fallback and survivability call routing
- Fax, modem, PoS integration and VoIP conversion
- Solves interoperability issues between softswitches and IP PBXs
- 4G-LTE USB cellular modem WAN uplink¹
- IADs: Fiber-SFP, ADSL, VDSL and G.SHDSL

1. Licensed feature at additional charge

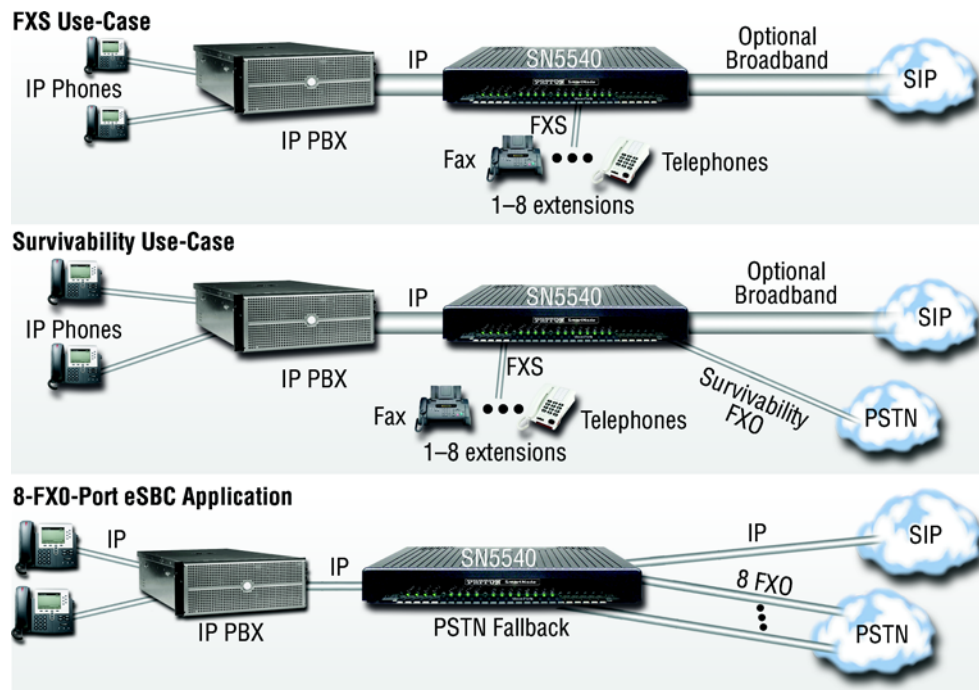


Figure 7. SN5540 application

Application for SmartNode 4140 VoIP Gateway

The SmartNode 4140 VoIP Gateway, equipped with 1 Ethernet port, acts as a VoIP Gateway connecting POTS equipment which cannot easily be replaced by an IP-ready device (such as alarm systems, fax machines, modems, PoS terminals, etc.) into an All-IP environment. In addition SN4140 models with FXO interfaces serve use-cases where survivability is desired (see figure 8).

Additionally, /2ETH models have 2 Ethernet ports, which enable them to be upgraded to enterprise session border controllers (eSBCs) after purchasing a software license.

The major functions of the SmartNode 4140 VoIP Gateway are:

- Network quality assessment and monitoring (optional PacketSmart¹)
- QoS (packet tagging)
- Number normalization and mapping
- Fallback and survivability call routing to alternate SIP provider/IP-PBX
- Fax, modem, PoS integration and VoIP conversion
- Legacy telephone to VoIP conversion
- PSTN line integration for IP based on premise telephony setups

1. Licensed feature at additional charge. See the following link for Certified USB modems: https://www.paton.com/products/trinity_usb_modems.asp

Note Additional functions can be unlocked by loading software licenses (such as an eSBC license bundle—see the product page under Ordering for more details).

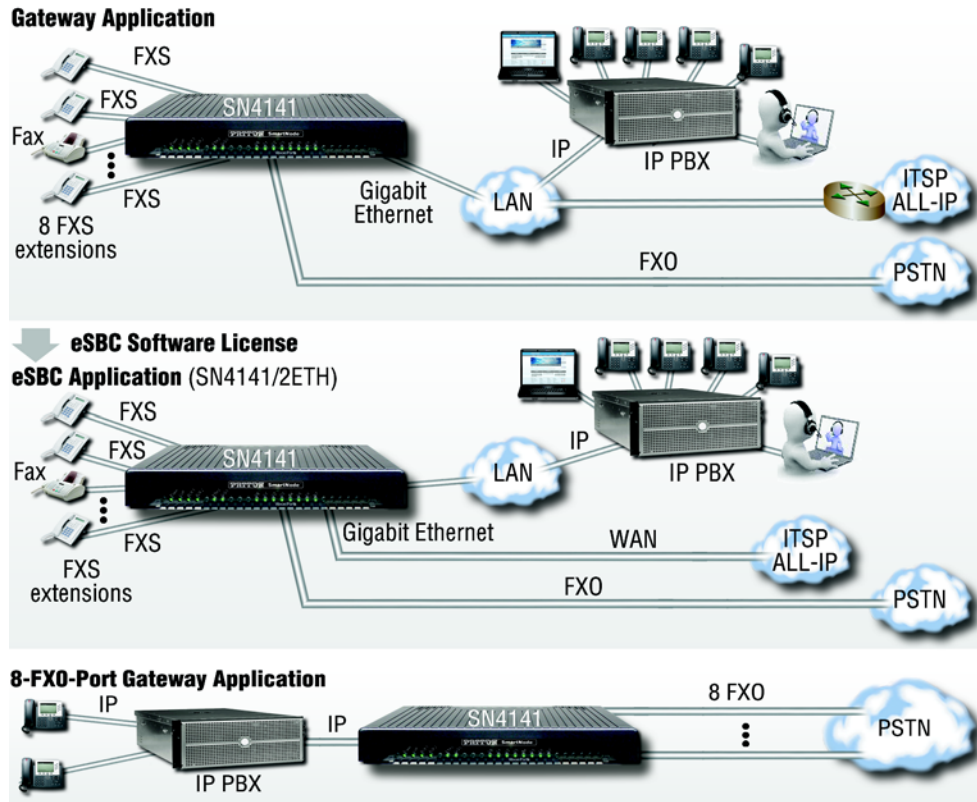


Figure 8. SN4140 application

Chapter 4 SmartNode Installation

Chapter contents

- Planning the Installation.....28
 - Site log28
 - Network information28
 - Network Diagram28
 - IP related information28
 - Software tools29
 - Power source29
- Installing the SmartNode device.....29
 - Placing the SmartNode device29
 - Connecting cables30
 - Installation cable requirements for the WAN interface (SN5540 /2G, /4G, /AVA, /AVB /F Models)30
 - Installing a grounding wire on the SmartNode device’s ground lug31
 - Installing an interface cable on the SmartNode device’s FXS and FXO interface ports32
 - Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables33
 - Installation cable requirements for the DSL & Fiber WAN cable (SN5540/2G, /4G, /AVA, /AVB, /F Models)33
 - Connecting the power supply33

Planning the Installation

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

- **Create a network diagram** (see section “Network information” on page 32)
- **Gather IP related information** (see section “IP related information” on page 32 for more information)
- **Install the hardware and software needed to configure the SmartNode device.** (See section “Software tools” on page 33)
- **Verify power source reliability** (see section “Power source” on page 33).

When you finish preparing for SmartNode device installation, go to section “Installing the SmartNode device” on page 33 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 6](#).

Table 6. 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 device 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

The simplest way of configuring the SmartNode is through [Patton Cloud](#).

Alternatively you may use the Web interface in combination with a Web wizard to get your unit up and running. For more details, see the [Wizard Portal](#).

The Command Line Interface is also supported for configuration, and can be accessed through Telnet /SSH. Also see the [Knowledgebase](#) for config snippets when configuring your device through CLI.

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.

Installing the SmartNode device

SmartNode device installation consists of the following:

- Placing the device at the desired installation location (see section “[Placing the SmartNode device](#)” on page 33)
- Installing the grounding wire (if your SmartNode device came equipped with a surge protector), and installing interface and power cables (see section “[Connecting cables](#)” on page 34)

When you finish installing the SmartNode device, go to Chapter 5, “[Initial Configuration](#)” on page 39.

Placing the SmartNode device

Place the SmartNode device on a desktop or similar sturdy, flat surface. 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.

To prevent overheating and damaging the unit, proper ventilation is required when placing the device. The device should be installed in a dry environment with sufficient space to allow air circulation for cooling.



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.

Connecting 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. If your SmartNode device is equipped with a surge protector go to section “[Installing a grounding wire on the SmartNode device’s ground lug](#)”) to install the ground wire. Otherwise, go to step 2.

Note SmartNode devices that include surge protection have **/SP** in their model code. All SmartNode **/SP** models provide a secondary protection against over-voltage and over-current conditions (surges) including lightning strikes and power cross.

For phone lines that go across buildings (TNV-3), a SmartNode **/SP** device (which includes K.21-compliant surge protection) is required.

For SmartNode models without surge protection, only TNV-2 circuits are allowed to be connected inside buildings.

2. Installing the RJ-11 voice port (FXS) / (FXO) cable or cables (see section “[Installing an interface cable on the SmartNode device’s FXS and FXO interface ports](#)” on page 36)
3. Connect the 10/100/1000Base-T Ethernet LAN and WAN (see section “[Connecting the 10/100/1000Base-T Ethernet LAN and WAN cables](#)” on page 37)

Installation cable requirements for the WAN interface (SN5540 /2G, /4G, /AVA, /AVB /F Models)

The SmartNode SN5540 series comes with an optional Fiber-SFP, G.SHDSL(EFM-ATM) or VDSL-ADSL WAN interface. For DSL lines use a straight-through RJ-45 cable to connect the WAN port.

For details on the G.SHDSL port pinout, refer to section “[G.SHDSL EFM & ATM port \(/2G and /4G models\)](#)” on page 65.

For details on the VDSL and ADSL port pinout, refer to section “[FXO port](#)” on page 65.

For details about the tested and compatible SFP modules see <http://www.patton.com/products/sfpmodules.asp>.

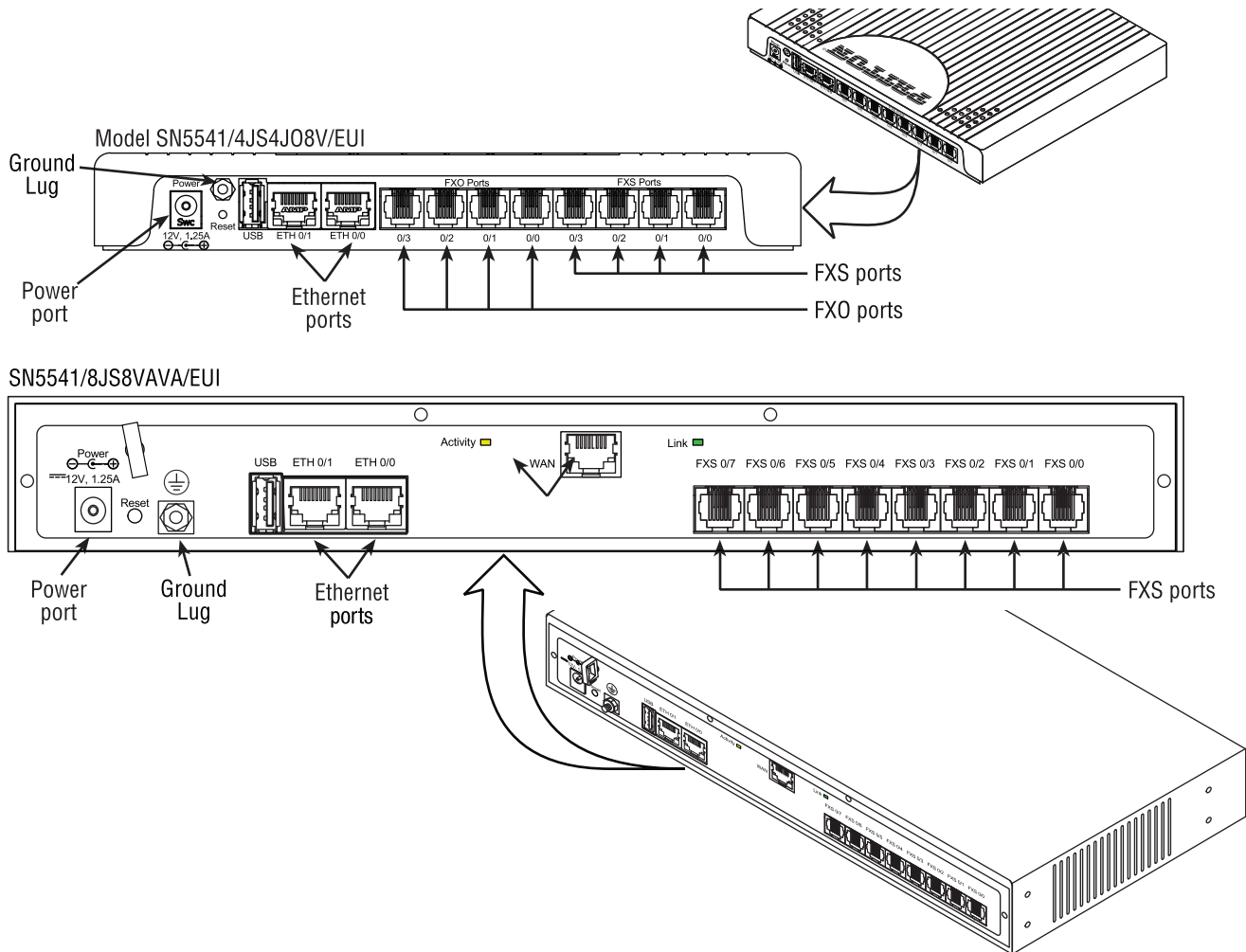


Figure 9. Rear view showing location of Ethernet, FXS, FXO and WAN connectors (SmartNode 5541 shown))

Installing a grounding wire on the SmartNode device's ground lug

1. Route the grounding wire from a building ground connection to the SmartNode device.



According to UL60950/IEC62368, a connection to earth ground—using the ground lug at the rear of the units (see figure 9)—is required to protect against power cross.

2. Connect the grounding wire to the ground lug of the SmartNode device (see figure 9).
3. Verify that the resistance of the ground path is less than 0.5 ohms.

Installing an interface cable on the SmartNode device's FXS and FXO interface ports

The SmartNode comes with at least two FXS analog ports (see figure 9 on page 35) located on the back of the device. Some Models have FXO ports as well, with equal number of ports as for FXS. The FXS interfaces are connected to analog devices via cables (see figure 10) terminated with RJ-11 connectors (see section “Analog FXS” on page 61), while the same type of cable and pinout is being used to connect a POTS line to the FXO ports of the SmartNode (see figure 11).

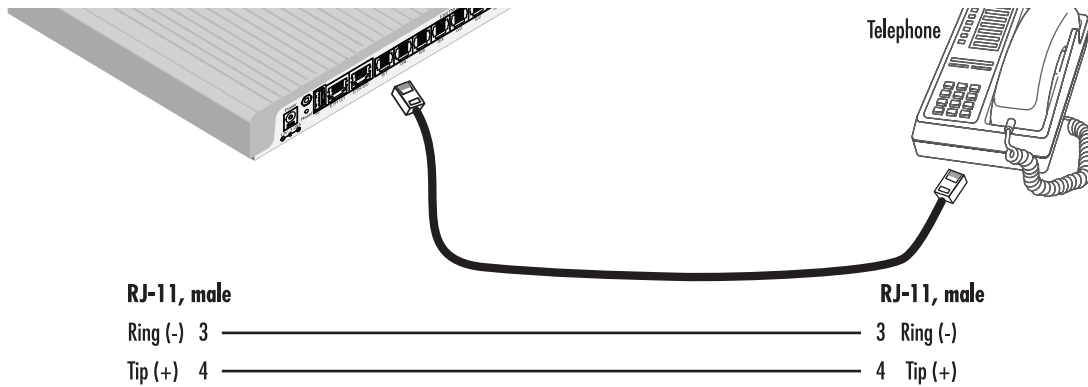


Figure 10. Analog FXS connection

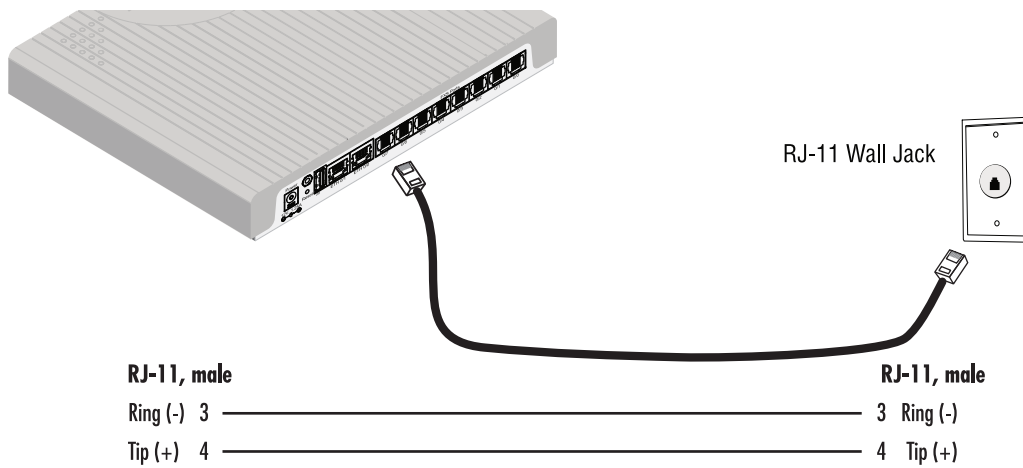


Figure 11. Analog FXO connection

Table 7. RJ-11 socket

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

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

The SmartNode device 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.
3. If your SmartNode device is equipped with an xDSL WAN interface, refer to section [Connecting the xDSL WAN interface cables](#)

For details on the Ethernet port pinout and cables, refer to [Appendix C, “Cabling”](#) on page 59 and [Appendix D, “Port pin-outs”](#) on page 63.

Refer to [Appendix D, “Port pin-outs”](#) on page 63 for port pinouts of the DSL interfaces

Installation cable requirements for the DSL & Fiber WAN cable (SN5540/2G, /4G, /AVA, /AVB, /F Models)

The SmartNode Model SN5540 comes with an optional Fiber-SFP, G.SHDSL(EFM-ATM) or VDSL-ADSL WAN interface. Use a straight-through RJ-45 cable to connect the DSL port or a fiber optic cable to connect to the SFP port

For details on the G.SHDSL port pinout, refer to section [“G.SHDSL EFM & ATM port \(/2G and /4G models\)”](#) on page 65.

For details on the VDSL and ADSL port pinout, refer to section [“VDSL-ADSL Port \(/A and /AVA & /AVB models only\)”](#) on page 65.

For details on the Fiber connection, refer to section [“Fiber Ports \(/F models only\)”](#) on page 66.

Connecting the power supply

Do the following to connect the main power to the SmartNode device:

1. Verify that the AC power supply included with your device is compatible with local standards. If it is not, refer to Chapter 6, [“Contacting Patton for Assistance”](#) on page 47 to find out how to replace it with a compatible power supply.

Note The SmartNode does not have a power switch; it powers on when the device is plugged in.

2. The power connection is made via the barrel jack on the rear panel of the SmartNode. No configuration is necessary for the power supply.

Connect the female end (barrel plug) to the barrel jack on the rear of the SmartNode (see [figure 3](#) on page 19 for an SN5540 or [figure 5](#) on page 23 for an SN4140) and the power supply male connectors to an appropriate power outlet.

3. Verify that the green *Power* LED is lit (see [figure 12](#) on page 38). It blinks fast during bootloader phase and blinks slow during boot process of Trinity Software. It becomes solid when the system is up and running.

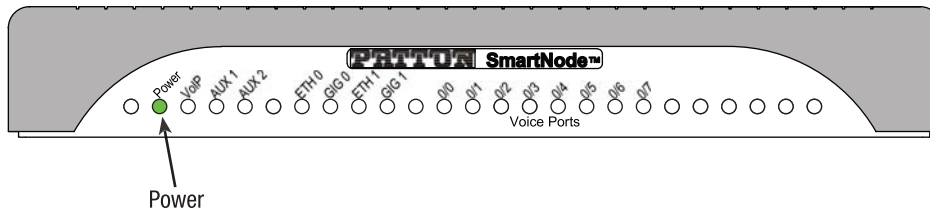


Figure 12. Power LED

Congratulations, you have finished installing the SmartNode device! Now go to Chapter 5, “[Initial Configuration](#)” on page 39.

Chapter 5 Initial Configuration

Chapter contents

Introduction	36
Connecting the SN5540 & SN4140/2ETH to your laptop PC.....	36
Configure the desired IP address	36
Factory-default IP Settings	36
Login	37
Changing the WAN IP address	37
Connecting the SmartNode device to the network	38
Connecting the SN4140 to a laptop PC.....	38
Configure the Desired IP Address	40
Factory-default IP Settings	40
Login	40
Changing the WAN IP address	40
Loading the Configuration (optional).....	41
Additional Information	41

Introduction

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

Note If you haven't already installed the SmartNode device, refer to Chapter 4, "SmartNode Installation" on page 31.

If you are installing an SN5540 or SN4140/2ETH, see section "Connecting the SN5540 & SN4140/2ETH to your laptop PC". Otherwise, to install an SN4140, see section "Connecting the SN4140 to a laptop PC" on page 43.

Connecting the SN5540 & SN4140/2ETH to your laptop PC

First, the SmartNode device 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 device is ready.

Note The SmartNode device is equipped with Auto-MDX Ethernet ports, so you can use straight-through cables for host or hub/switch connections (see figure 13).

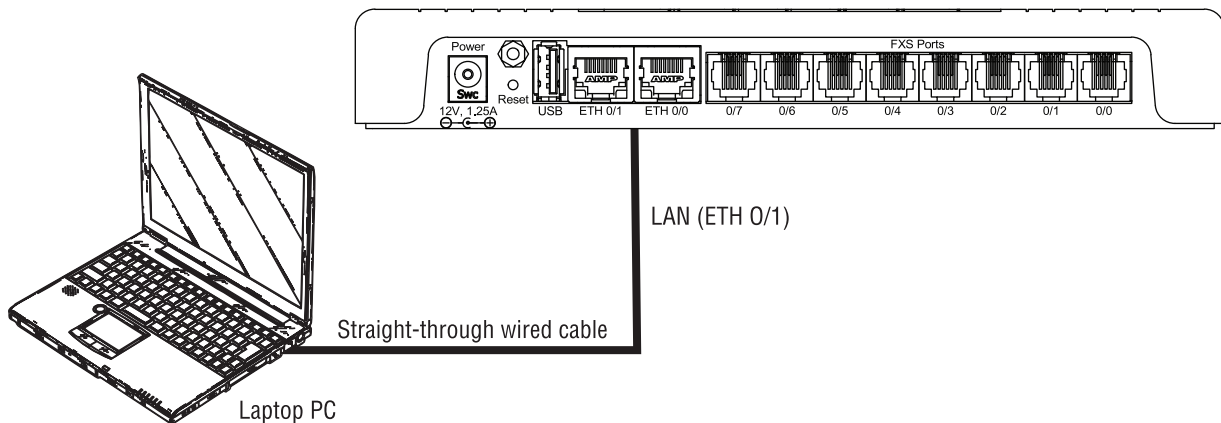


Figure 13. Connecting the SmartNode device to your laptop PC

The SmartNode device comes with a built-in DHCP server to simplify configuration. Therefore, to automatically configure the PC for IP connectivity to the SmartNode device, 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 192.168.200.10
```

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 8. 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 8. 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)	192.168.200.10	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 device to the network](#)” on page 42. 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:

192.168.200.10

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>
192.168.200.10>
```

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.

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



You are responsible for creating a new administrator account to maintain system security. Patton Electronics accepts no responsibility for losses or damage caused by loss or misuse of passwords. Refer to Chapter 4 “Accessing the CLI”, section “Selecting a secure password” in the [Trinity Command Line Reference Guide](#) for more details.

Changing the WAN IP address

Select the context IP mode to configure an IP interface.

```
192.168.200.10 (cfg) #context ip ROUTER
192.168.200.10 (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).

```

192.168.200.10(ctx-ip)[Router]#interface WAN
192.168.200.10(if-ip)[WAN]#no ipaddress DHCP
192.168.200.10(if-ip)[WAN]#ipaddress WAN 172.16.1.99/24
2002-10-28T00:09:40 : LOGININFO : Link down on interface WAN.
2002-10-29T00:09:40 : LOGININFO: 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 device 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 device is equipped with Auto-MDX Ethernet ports, so you can use straight through or crossover cables for host or hub/switch connections. (see [figure 14](#)).

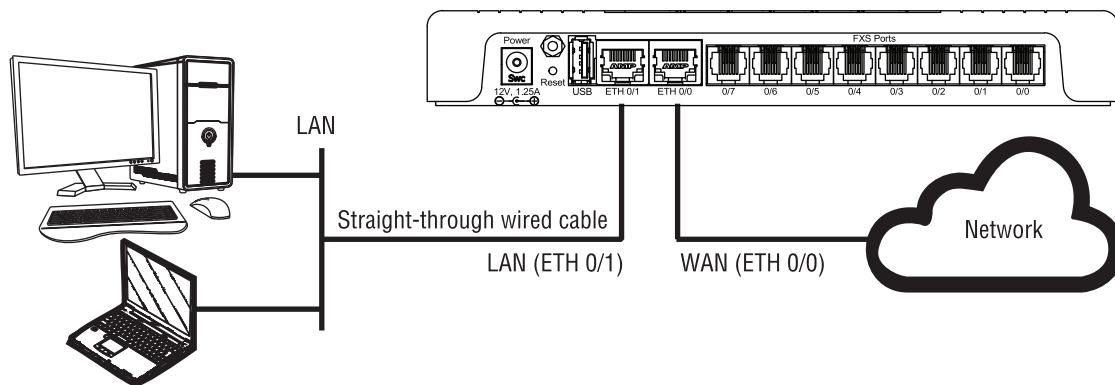


Figure 14. Connecting the SmartNode to the network

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 Software Configuration Guide.)

Note IP Routing is disabled on SN4140 models. See Software license options to enable it.

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

Go to section “[Loading the Configuration \(optional\)](#)” on page 45.

Connecting the SN4140 to a laptop PC

First, the SmartNode device 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 device is ready.

Note The SmartNode device has a fixed IP and a DHCP client setup to simplify configuration. The Ethernet port is equipped with Auto-MDX so you can use a straight-through cable for host or hub/switch connection.

There are two options for configuring the SmartNode device:

1. The SmartNode device is connected to a laptop PC (see [figure 15](#)) that is configured with a fixed IP in the same range as the SmartNode device’s IP address (for instance: PC’s IP address; 192.168.200.20; mask: 255.255.255.0).

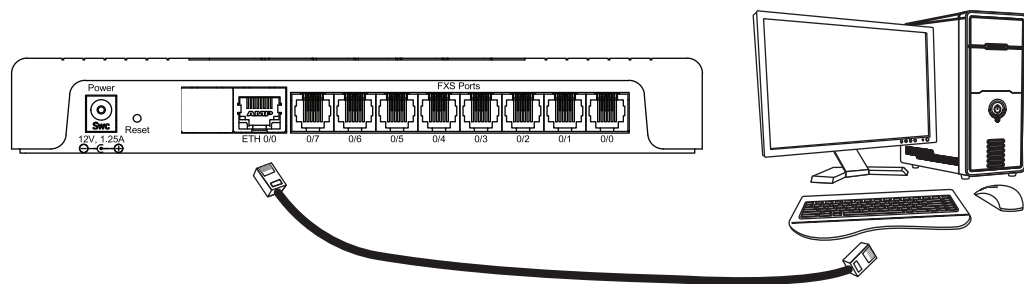


Figure 15. Connecting the SmartNode to a laptop PC

2. The SmartNode device is connected to a local area network (LAN) that has a DHCP server running which assigns an IP address to the SmartNode device (see [figure 16](#)). Using the [SN Discovery tool](#), the SmartNode device’s IP can be determined.

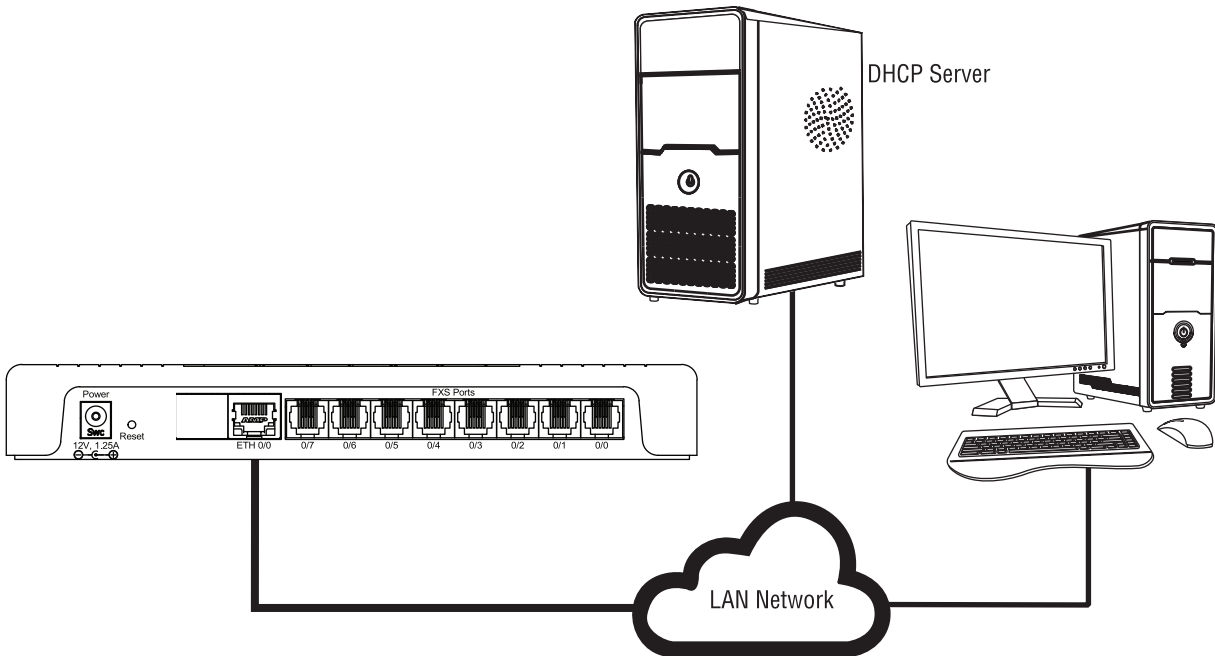


Figure 16. Connecting SmartNode device and PC to a LAN with DHCP server.

You can check the connection to the SmartNode by executing the ping command from the PC command window as follows:

```
ping 192.168.200.20
```

Configure the Desired IP Address

Factory-default IP Settings

The factory default configuration for the Ethernet interface is listed in [table 8](#). The interface bound to *ETH 0/0* (*WAN*) has a DHCP client running and a fixed IP address.

Table 9. Factory Default IP Address and Network Mask Configuration

WAN Interface Ethernet 0 (ETH 0/0)	IP Address	Network Mask
Fixed IP	192.168.200.10	255.255.255.0
DHCP client	DHCP	DHCP

If these addresses match with those of your network, go to section “[Loading the Configuration \(optional\)](#)” on page 45. 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 default IP address into the address field of the Telnet application:

192.168.200.20

Or use the *SN Discovery Tool* to find out the IP address previously assigned by the DHCP server.

Accessing your SmartNode device 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>
192.168.200.20>
```

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.

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

Changing the WAN IP address

Select the context IP mode to configure an IP interface.

```
192.168.200.20 (cfg) #context ip ROUTER
192.168.200.20 (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).

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

Copy this modified configuration to you 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 device can now be connected to your network.

Loading the Configuration (optional)

The [WebWizard Community](#) provides a collection of Wizards that help to reduce the setup time of a Patton device.

Simply download the appropriate Wizard to your device, execute it locally, and you are ready to do phone calls after the SmartNode has rebooted.

Optionally, you may execute the Wizard that matches your application online, and import the generated .cfg config into the SmartNode device.

In addition to that the [Knowledgebase](#) provides configuration file templates that may fit your application.

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 *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 device 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 Command Line Reference Guide* available online at www.patton.com/manuals.

Chapter 6 **Contacting Patton for Assistance**

Chapter contents

- Introduction 43
- Contact information 43
 - Contacting Patton Technical Services for Free Support 43
- Warranty Service and Returned Merchandise Authorizations (RMAs) 43
 - Warranty coverage 43
 - Out-of-warranty service 44
 - Returns for credit 44
 - Return for credit policy 44
 - RMA numbers 44
 - Shipping instructions 44

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
Location	Maryland, USA	Bern, Switzerland	Budapest, Hungary
Time Zone	EST/EDT UTC/GMT - 4/5 hours	CET/CEDT UTC/GMT + 1/2 hours	CET/CEDT UTC/GMT + 1/2 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
Email	support@patton.com	support@patton.com	support@patton.com
Phone	+ 1 301 975 1007	+41 31 985 25 55	+36 439 3835
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

- Compliance46
 - EMC46
 - Safety46
- Radio and TV Interference (FCC Part 15)46
- EC Declaration of Conformity46
- Authorized European Representative46

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

Appendix B **Specifications**

Chapter contents

DSP.....	48
Voice Connectivity.....	48
Data Connectivity.....	48
Voice Processing (signaling dependent).....	48
Fax and modem support.....	49
Voice Signaling.....	49
Voice Routing—session router.....	49
IP Services.....	50
WAN Interface (if applicable).....	51
Management.....	52
System.....	52
Physical.....	53

Note Refer to the [software feature matrix](#) for the most up-to-date specifications.

DSP

One 8-channel DSP. All 2V and 4V models are restricted by software to not allow more than 4 calls. Upgradeable by license to max. 8 calls (at additional cost).

Voice Connectivity

2, 4 or 8 FXS ports, RJ-11/12

or

2, 4 or 8 FXO ports, RJ-11/12

or a combination of both with a total of 8 ports

2-wire Loopstart

EuroPOTS (ETSI EG201188)

Programmable AC impedance, feeding, ring and onhook voltage

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

Long Reach FXS—10 km @ 3REN load per FXS port

MWI—high voltage, line reversal and FSK method

Localization—All tones programmable (dial, ringing, busy)

Peak Ring voltage: 87.7Vpk

Ring voltage: 62Vrms

Current Feed ILA: 26mA

Talk Battery Voltage: -20V

On-Hook voltage VOC: 51V

Secondary Surge Protection*

Data Connectivity

Two 10/100/1000Base-TX Ethernet ports (SN5540; SN4140/2ETH)

One 10/100/1000Base-TX Ethernet port (SN4140)

All ports full duplex, auto-sensing, auto-MDX

Voice Processing (signaling dependent)

Full-duplex channels with voice CODECS:

- G.722
- G.711m/A-law
- G.723.1 (6.4 kbps)

- G.729, 729a, 729ab (8 kbps)
- G.726 (16, 24, 32, 40 Kbps)
- AMR-NB (4.75, 5.15, 5.9, 6.7, 7.4, 7.95, 10.2, 12.2 kbps)
- Fax relay T.38, bypass G.711
- iLBC at 13.33 kbps (SIP–SIP only)
- SILK (SIP–SIP only)

G.168-2004 echo cancellation (128 ms)

Up to 8 simultaneous low-bandwidth voice or T.38 fax calls

Up to 8 HD calls with SRTP

Silence suppression and comfort noise

Adaptive and configurable dejitter buffer

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

Configurable RTP 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 (incl. Super G3 Fax)

Voice Signaling

SIPv2

SIPv2 over IPv6

SIPv2 over TLS - (licensed feature on SN4140)

SIP call transfer, redirect

Overlap or en-bloc dialing

DTMF in-band, out-of-band

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
- 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 are optional on SN4140:

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

WAN Interface (if applicable)

Note For information on configuring the WAN interface, see Chapter 5, “Initial Configuration” on page 39.

Table 10. 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
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

Table 10. WAN Interface Specifications

Factor	Specs
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, please refer to http://www.patton.com/products/sfpmodules.asp)

Management

Patton Cloud Orchestrated

Customizable WebWizard, Web-based GUI HTTP/HTTPS access, CLI Telnet/SSH

Secure Auto-Provisioning (Zero Touch) with built in root CA

Separate config domain (LAN side config and WAN side config)

TR-069 (CWMP-ACS), TFTP, HTTP, HTTPS configuration & firmware up- and download

Radius, TACACS+

SNMPv3 agent—MIB II and private MIB

Built-in diagnostic tools

System

Dual Core CPU Broadcom BCM53012 operating at 1GHz

Memory:

- 256 Mbytes DRAM
- 128 Mbytes Flash

Physical

Dimensions:

- Plastic enclosure: 7.3W x 1.6H x 6.1D in. (18.5W x 4.1H x 15.5D cm)

- Metal enclosure: 12.1W x 1.5H x 6.1D in. (30.7W x 3.8H x 15.5D cm)

Weight:

- Plastic enclosure: <15.9 oz. (<450g)
- Metal enclosure: 25.6 oz (725.7 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	55
Ethernet	55
Analog FXS	56
Analog FXO	57

Introduction

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

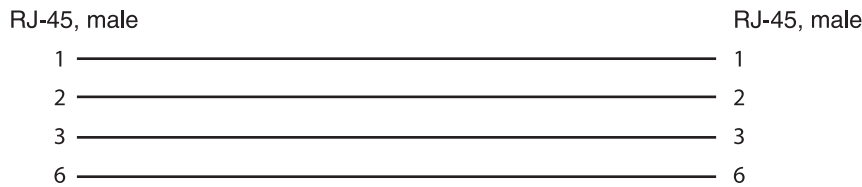
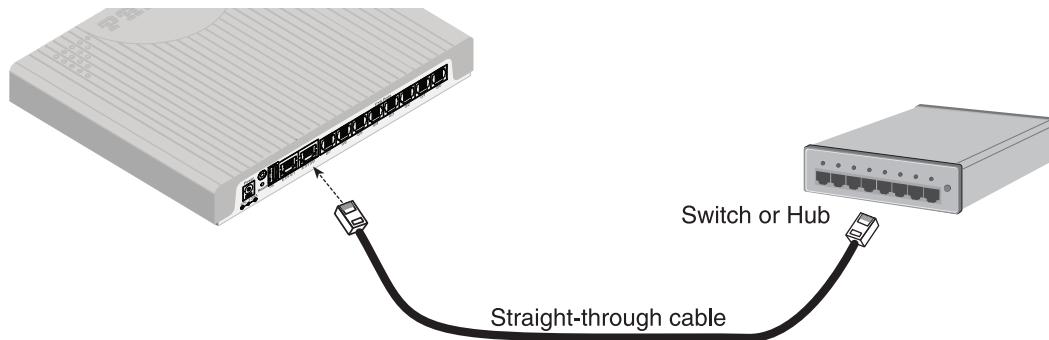
Ethernet

Ethernet devices (10/100/1000 Base-T) are connected to the SmartNode over a cable with RJ-45 plugs. All Ethernet ports on the SmartNode device 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.

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



Note: Other pins are not used

Figure 17. Typical Ethernet straight-through cable diagram for 10/100Base-T

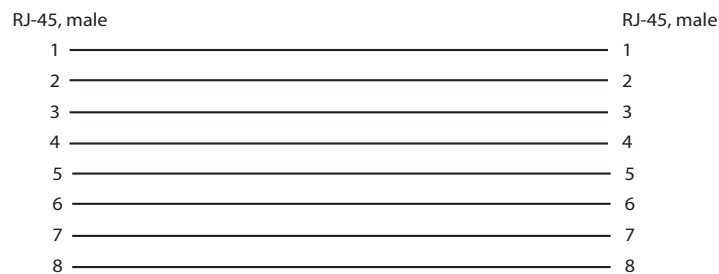


Figure 18. Typical Ethernet straight-through cable diagram for 1000Base-T

Analog FXS



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.

Applicable to SmartNode devices equipped with FXS ports. The FXS ports are connected to analog terminals (phones, fax machines, answering machines, etc.) via cables terminated with RJ-11 connectors (see section “FXS port” on page 64 for details on port pinouts).

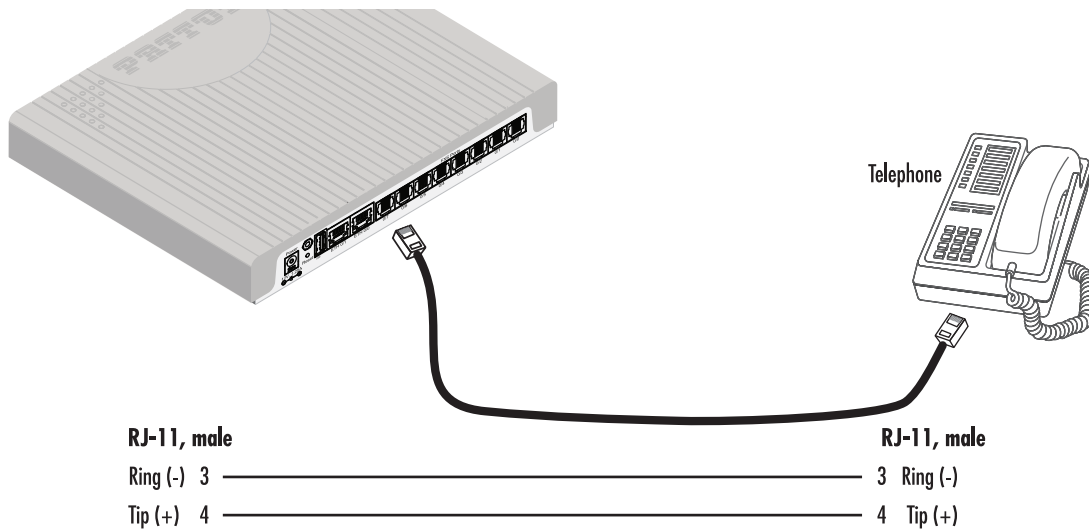


Figure 19. Connecting an FXS device

Analog FXO



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.

Applicable to SmartNodes equipped with FXO ports. The FXO ports are connected to analog phone lines via cables terminated with RJ-11 connectors (see section “FXO port” on page 65 for details on port pinouts).

Note The phone line socket (connector type and pinout) available from the public network vary from country to country. Refer to technical information available from your local operator for additional cabling information.

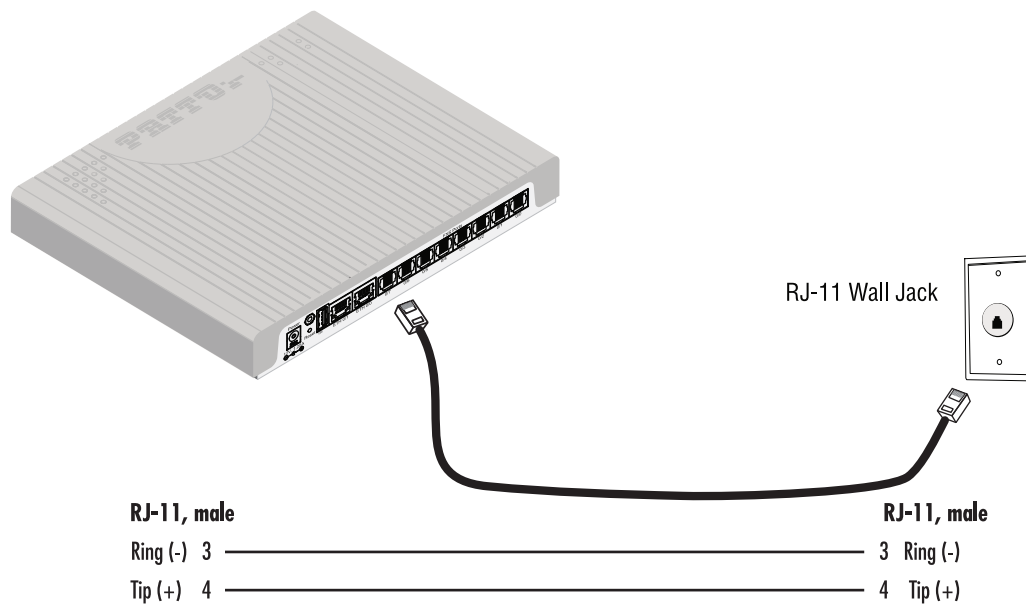


Figure 20. Connecting to an FXO line jack

Appendix D **Port pin-outs**

Chapter contents

Introduction.....	59
Ethernet	59
FXS port.....	59
FXO port	60
VDSL-ADSL Port (/A and /AVA & /AVB models only)	60
G.SHDSL EFM & ATM port (/2G and /4G models).....	60
Fiber Ports (/F models only).....	61

Introduction

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

Ethernet

Table 11. 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 12. 1000Base-T RJ-45 Socket

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

FXS port

The FXS ports use an RJ-11 connector with 6 positions. The middle two positions 3 and 4 are used according to [table 13](#) and [figure 21](#) on page 65.

Table 13. RJ-11 socket

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

Note Pins not listed are not used.

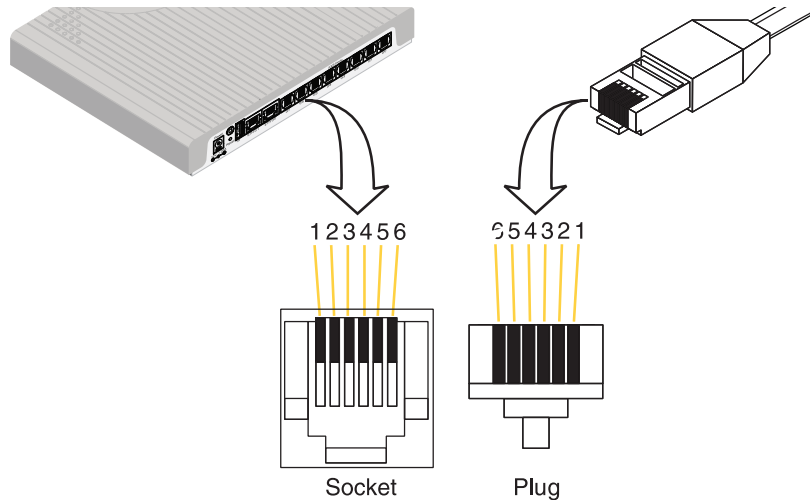


Figure 21. RJ-11 pinout diagram

FXO port

The FXO ports use an RJ-11 connector with 6 positions. The middle two positions 3 and 4 are used according to table 13 on page 64.

Note Pins not listed are not used.

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

Table 14. 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 15. EFM Port

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

Table 15. EFM Port (Continued)

Pin	Signal	Pair
7	Tip	3
8	Ring	3



CAUTION

DO NOT insert an RJ11 connector into an RJ45 socket. An RJ11 connector, which has 4 or 6 pins (see [figure 22](#) on page 66) can permanently damage the 8 pins in an RJ45 socket, causing data connections to fail. This can especially be an issue with WAN interfaces (SDSL, ADSL, etc). If it is necessary to connect an RJ11 connector with an RJ45 port, an RJ11-to-RJ45 adapter must be used.



RJ11 (4 or 6 pins)



RJ45 (8 pins)

Figure 22. RJ11 and RJ45 pin comparison

Fiber Ports (/F models only)

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

Appendix E **SmartNode Device Factory Configuration**

Chapter contents

Introduction.....	63
-------------------	----

Introduction

Factory configuration settings for the SmartNode device can be obtained with the following command through the CLI;

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

See Chapter 5, "[Initial Configuration](#)" on page 39 for more details about IP address settings for initial configuration.

Appendix F **Reset Button Functions**

Chapter contents

Introduction.....	65
Resetting the SmartNode device when it is operating and the Power LED is lit.....	66
Resetting the SmartNode device when it is initially powered off.....	67
Very exceptional case—minimal config recovery	67

Introduction

The *Reset* button (see [figure 23](#) on page 70 for the SN4140 *Reset* button location, and [figure 24](#) on page 71 for the SN5540 *Reset* button location) 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” on page 72)
- 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” on page 72)
- 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” on page 72)

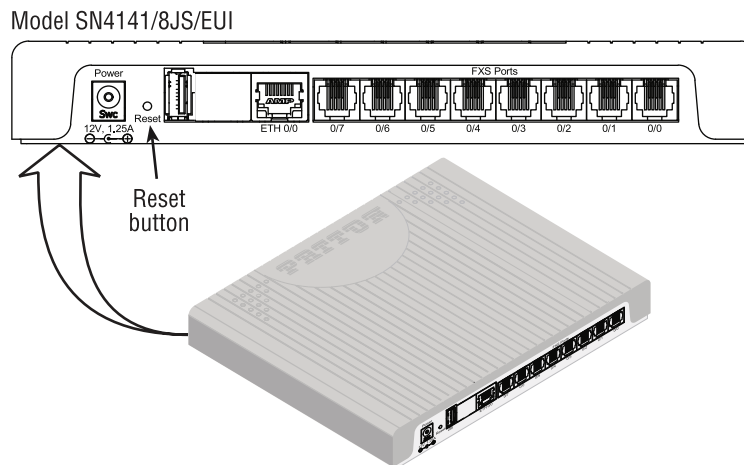


Figure 23. SN4140 *Reset* button

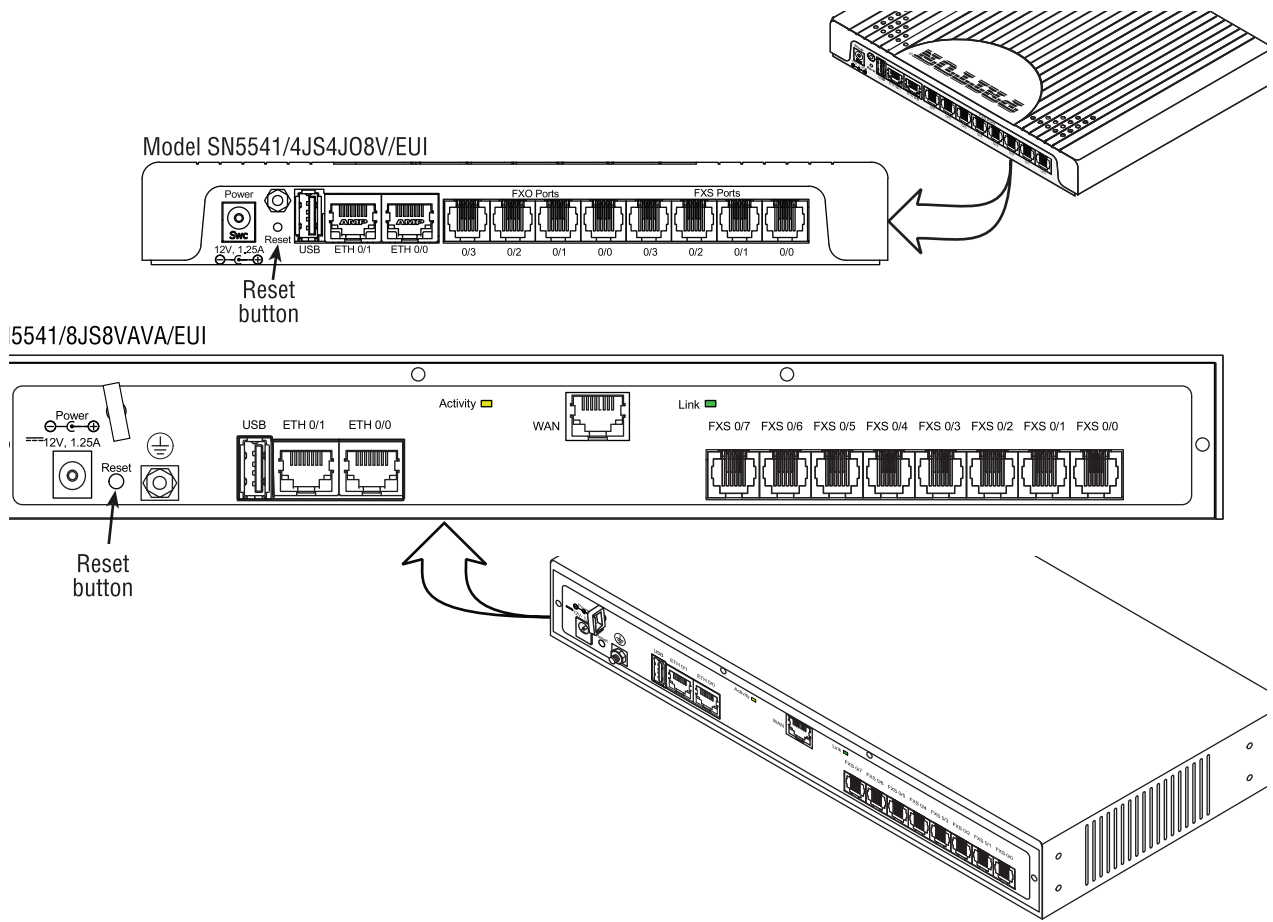


Figure 24. SN5540 Reset button

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 25](#)) the button is pressed (see [table 16](#) on page 73 for the results from pressing the button).

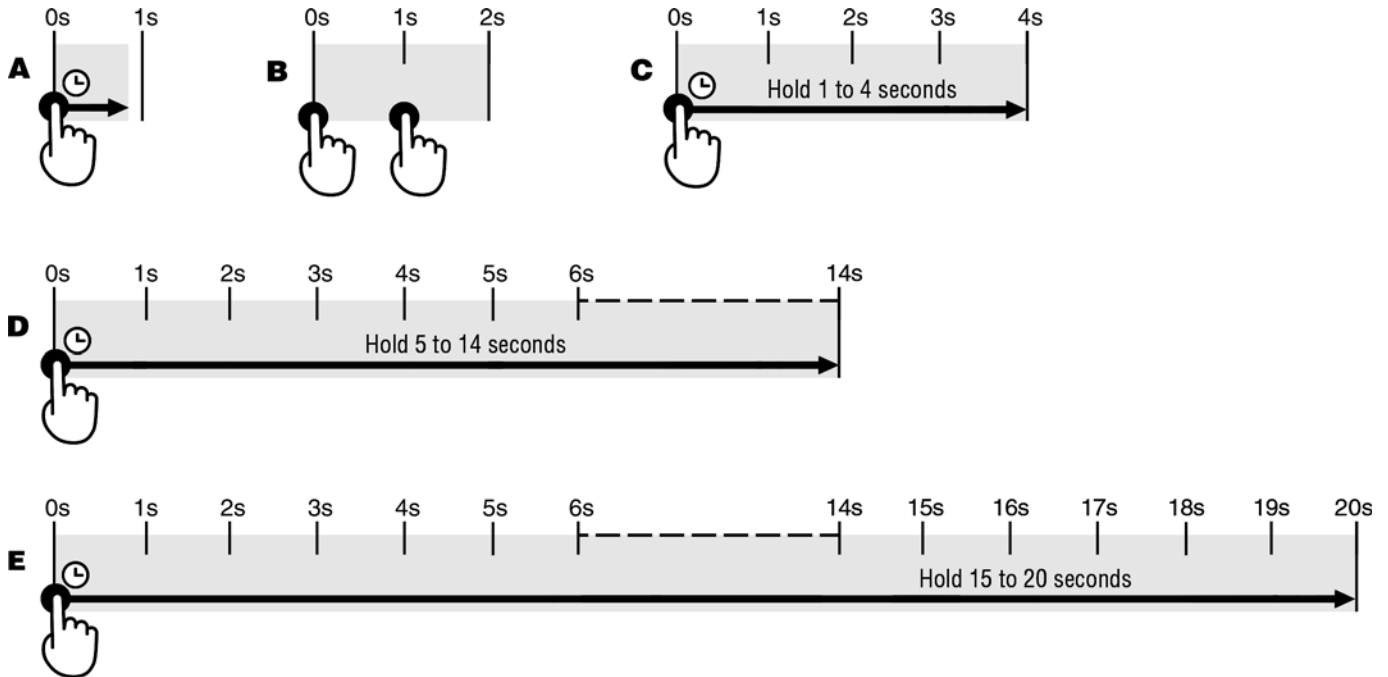


Figure 25. Reset button periods (in seconds) for performing actions

Table 16. Results from pressing the Reset button

Period	Action
A (less than 1 second)	Reboot device
B (press twice with 1-second gap between presses)	Patton Cloud On-boarding procedure. Do the following: <ol style="list-style-type: none"> 1. Log into Patton Cloud at https://patton.io. 2. Click on <i>Devices</i>. 3. Click on <i>Register Device(s)</i> to register the SmartNode device.
C (1 to 4 seconds)	No action
D (5 to 14 seconds)	<ul style="list-style-type: none"> • Erase <i>startup-config</i> • Reboot (indicated by the slow blinking of all LEDs)
E (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)

Very exceptional case—minimal config recovery

If, after performing the procedure in section “Resetting the SmartNode device when it is operating and the Power LED is lit” on page 72, 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 48 for details.



IMPORTANT

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 operating and the Power LED is lit” on page 72 did not provide a remedy.



CAUTION

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.

- The *Power* LED will begin a series of blink pattern starting with 1-blink, pause (see [table 17](#)).

Table 17. 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-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.

- Repeatedly pressing and releasing the *Reset* button will cycle through the blink patterns.
- When you get to the 3-blink pattern that will erase the entire flash memory, release the *Reset* button. 10 seconds later, flash memory will be erased, then the device will boot.
- Once booted up, the device will run using the “minimal-config”:

```
#-----#
#                                             #
# Minimal configuration file                 #
#                                             #
#-----#

cli version 4.00

telnet-server
  shutdown

ssh-server
  no shutdown

web-server http
  shutdown

web-server https
  shutdown

context ip ROUTER

  interface LAN
    ipaddress LAN 192.168.200.20/24
    ipaddress DHCP dhcp

port ethernet 0 0
  bind interface ROUTER LAN
  no shutdown
```

Appendix G **End User License Agreement**

Chapter contents

- End User License Agreement71
 - 1. Definitions71
 - 2. Title71
 - 3. Term71
 - 4. Grant of License71
 - 5. Warranty72
 - 6. Termination72
 - 7. Notices72
 - 8. Other Licenses72
 - 9. Unenforceable Provisions73
 - 10. Governing Law73
 - 11. Waiver73

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 77.

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 76.
- 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.