PATTON Electronics Co.

SL4020
SmartLink Analog VoIP SoHo Router

Getting Started Guide

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Patton Electronics warrants all SmartLink 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.

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About this guide

This guide describes using the SmartLink 4020 router.

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 20 provides information about router features and capabilities
- Chapter 2 on page 22 provides hardware installation procedures
- Chapter 3 on page 25 provides quick-start procedures for configuring the SmartLink router
- Chapter 3 on page 26 describes the Home section settings
- Chapter 4 on page 29 describes the WAN section settings
- Chapter 5 on page 41 describes the LAN section settings
- Chapter 6 on page 48 describes the Telephony section settings
- Chapter 7 on page 64 describes the System section settings
- Chapter 8 on page 79 describes how to download and display the SmartLink 4020 router user guide
- Chapter 9 on page 81 describes how to log out of the router management system
- Chapter 10 on page 83 contains information on contacting Patton technical support for assistance
- Appendix A on page 86 contains compliance information for the router
- Appendix B on page 88 contains specifications for the router
- Appendix C on page 91 describes dialing plans and contains sample plans

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

Precautions

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

Note A note presents additional information or interesting sidelights.

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

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

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

The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.

Safety when working with electricity

The SmartLink contains no user serviceable parts. The equipment shall be returned to Patton Electronics for repairs, or repaired by qualified service personnel.

Mains Voltage: Do not open the case when the power cord is attached. For systems without a power switch, line voltages are present within the power supply when the power cords are connected. The mains outlet that is utilized to power the SmartLink shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker.

The SmartLink is not shipped with power cables. 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.

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

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

Before opening the chassis, disconnect the telephone network cables to avoid contact with telephone line voltages. When detaching the cables, detach the end away from the SmartLink first.

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

General observations

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

Typographical conventions used in this document

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

General conventions

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

Table 1. General conventions

Convention	Meaning
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the **Go to Previous View** button in the Adobe® Acrobat® Reader toolbar to return to your starting point.
Garamond bold type	Indicates the names of command buttons that execute an action.

Table 1. General conventions

Convention	Meaning
< >	Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on.

Chapter 1 General information

Chapter contents

SmartLink 4020 overview

The SmartLink VoIP SoHo Router (see figure 1) provides transparent connectivity for analog phones and faxes to the world of Internet voice. Connecting to any analog phone, fax or PBX, the SmartLink product is an effective and flexible solution for small offices and telecommuters to access Internet-based telephone services and corporate intranet systems across established LAN and Internet connections like xDSL and cable modems.

Figure 1. SmartLink 4020

The SmartLink Model 4021 provides two RJ-45 Ethernet ports and one FXS (RJ-11) analog phone port. The SmartLink Model 4022 provides two RJ-45 Ethernet ports and two FXS (RJ-11) analog phone ports. Front panel LEDs quickly show at-a-glance the status of the system, LAN, WAN, and phone ports.

A full suite of IP features (DHCP, NAT/PAT, NTP and VPN) are available to LAN devices attached downstream. VLAN tagging and prioritization enables voice traffic to be handled before data traffic. Support for PPPoE and IPSEC tunneling simplifies extending corporate intranet services to remote teleworkers.

The web interface offers two levels of configuration access for the network operator and end user. The friendly web interface and product labeling (Phone, LAN, WAN etc.) to help ensure a trouble-free installation for the end user. Configuration and firmware can be downloaded from a TFTP server or HTTP server.

Chapter 2 SmartLink installation

Chapter contents

Installing the router

Do the following:

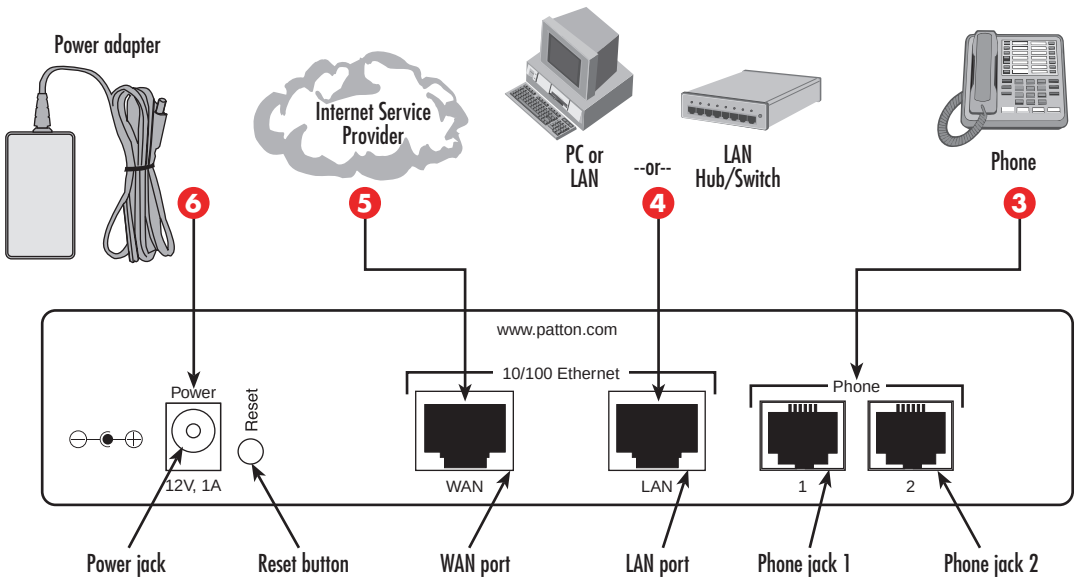

Figure 2. SmartLink 4020 installation diagram

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

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

2. Set your LAN Local Area Connection Properties for Internet Protocol (TCP/IP) to *Obtain an IP address automatically* and to *Obtain DNS server address automatically.*

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

3. Plug in the telephone or telephones (see figure 2).

4. Plug in the PC or LAN, or a LAN hub/switch.

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

5. Connect to the Internet service provider.

CAUTION

The external router power supply automatically adjusts to accept an input voltage from 100 to 240 VAC (50/60 Hz).

Verify that the proper voltage is present before plugging the power cord into the receptacle. Failure to do so could result in equipment damage.

6. Verify that the AC power cord included with your router is compatible with local standards. If it is not, refer to "Contacting Patton for assistance" on page 83 to find out how to replace it with a compatible power cord. Plug the power adapter into the *12V DC, 1.0A* port on the SmartLink 4020. Connect the other end of the power cord to an appropriate AC power outlet.

7. Wait 30 seconds after powering the SmartLink 4020 on, then verify that the green *Power* LED is lit (see figure 3). At this point, you should be able to use your browser to surf the Internet.

Note **Follow the directions of your voice service provider to set up voice services.**

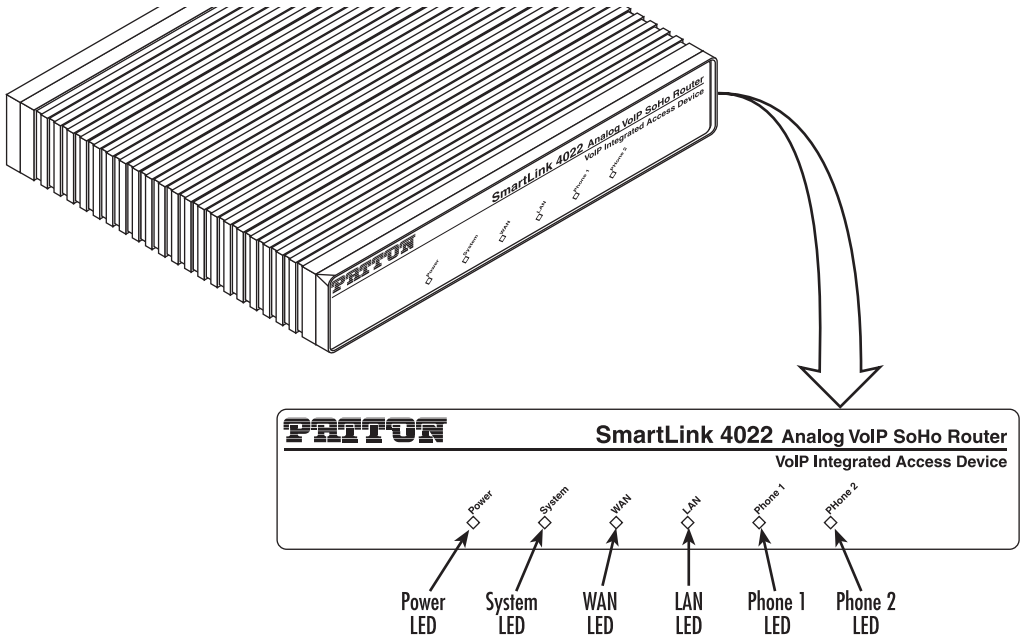

Figure 3. Router front panel LEDs

Connecting the SmartLink to the network

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

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

Respectively from the host: *ping 172.16.1.99*

Chapter 3 Home

Chapter contents

System information

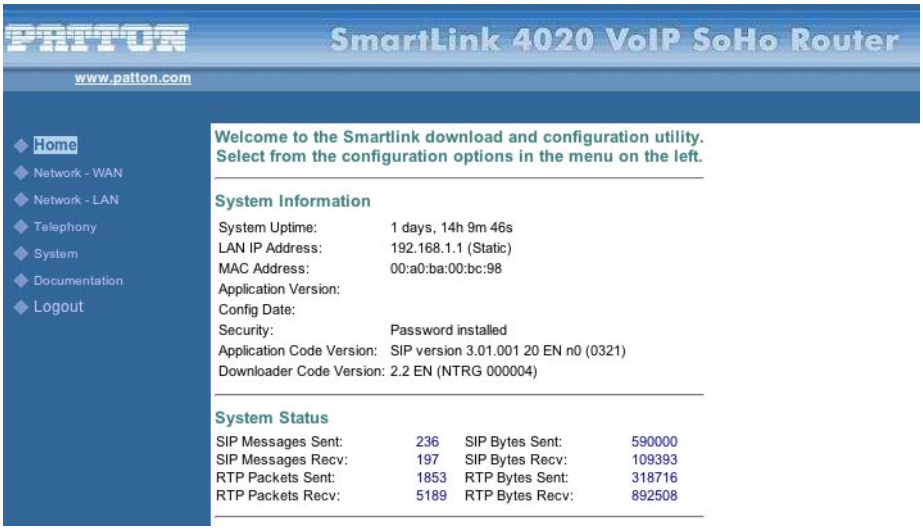

Figure 4. SmartLink VoIP download and configuration Home page

System Uptime

Shows how long the SmartLink has been operating since the last time it was reset.

LAN IP Address

The IP address of your LAN.

MAC address

The media access control (MAC) address of the LAN Ethernet interface in the SmartLink.

Application Version

The SmartLink firmware version number.

Config Date

The date of the configuration file that was downloaded from an auto-upgrade server.

Security

Indicates that the SmartLink utility has been secured with a password. To configure a password, see section "Set Security Password" on page 67.

Application Code Version

Shows the application code version being used.

Download Code Version

Shows the download code version being used.

System Status

SIP Messages Sent
Total number of VoIP SIP messages sent (including retransmissions)

SIP Messages Received
Total number of VoIP SIP messages received (including retransmissions)

SIP Bytes Sent
Total number of bytes of VoIP SIP messages sent (including retransmissions)

SIP Bytes Received
Total number of bytes of VoIP SIP messages received (including retransmissions)

RTP Packets Sent
Total number of VoIP RTP packets sent (including redundant packets)

RTP Packets Received
Total number of VoIP RTP packets received (including redundant packets)

RTP Bytes Sent
Total number of VoIP RTP bytes sent

RTP Bytes Received
Total number of VoIP RTP bytes received

Chapter 4 Network—WAN

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Status

Interface Status

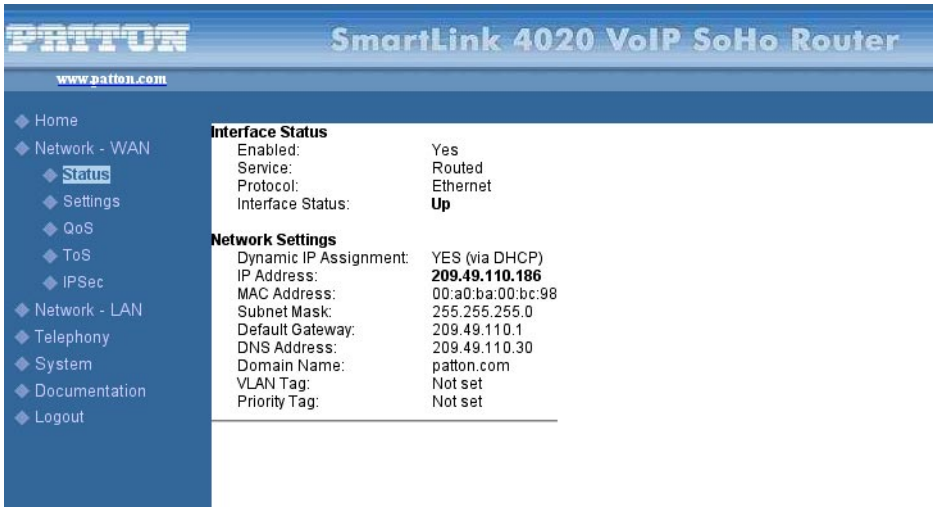

Figure 5. Internet Status window

Enabled
Yes indicates the WAN interface is enabled and ready to be used.

Service
Either *Routed* or *Bridged*, displays the level of your WAN interface's connection.

Protocol
Indicates that the Ethernet protocol is being used to transfer data.

Interface Status
Either *Up* or *Down*.

Network Settings
These are the details of your WAN network settings.

Dynamic IP Assignment
Displays *Yes (via DHCP)* if you are using a dynamic IP address or *No* if a dynamic IP address is not being used.

IP address
The IP address of the SmartLink on the WAN.

MAC address
The MAC address of the WAN Ethernet interface in the SmartLink.

Subnet Mask
The subnet mask is 32-bit number that filters a destination IP address to determine to which subnet it belongs. For example, a subnet mask of *255.255.0.0* for a network ID of *192.5.0.0* tells the switch to accept traffic destined for IP addresses that begin with *192.5*—all other packets are ignored.

Default Gateway
The IP address of the gateway. The gateway IP address can be retrieved automatically in DHCP mode or be set up manually with a fixed IP address.

Domain name
The network domain of the SmartLink.

DNS address
Refers to the address of your domain name server, if applicable.

VLAN
VLAN tag value encoded in the WAN Ethernet header in all outgoing packets

Priority Tag
Priority tag value encoded in the WAN Ethernet header in outgoing packets.

Settings

The *Settings* window contains the following sections:

- Internet Configuration (see figure 6 on page 33)
- WAN PPPoE Configuration (see figure 7 on page 34)
- MAC Spoofing Configuration (see figure 8 on page 35)
- MTU (see figure 9 on page 35)
- Internet VLAN Configuration (see figure 8 on page 35)

Note After configuring the sections, click the **Save Internet Settings** button (see figure 5 on page 31) to save the new configuration.

Internet Configuration

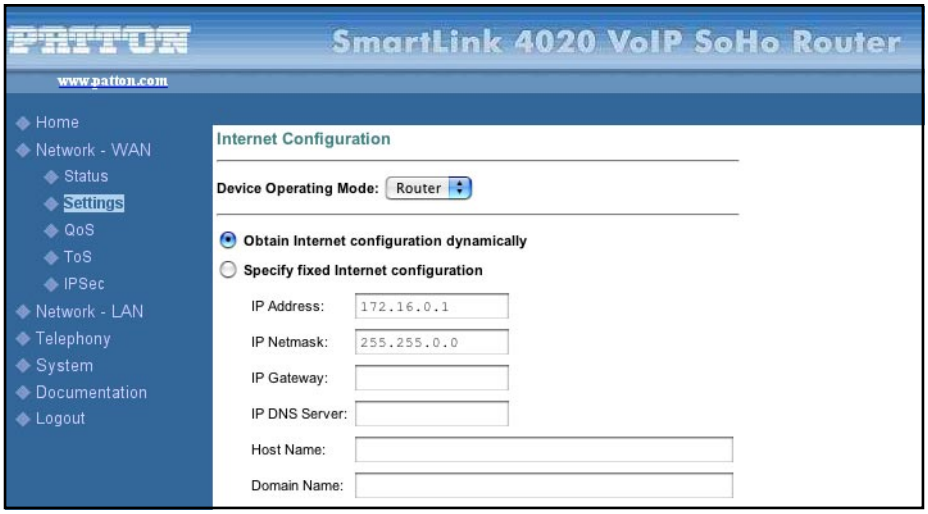

Figure 6. Internet Configuration section of the Settings window

Device Operating Mode

Choose *Router* or *Bridged* depending on your operation.

Obtain WAN configuration dynamically

Select this option if appropriate. If you choose *Obtain WAN configuration dynamically*, the information is detected automatically through DHCP.

Specify fixed WAN configuration

Select this option if you will not be using DHCP. If you choose *Specify fixed WAN configuration*, you will have to enter the following information:

- IP address.
- IP of the netmask.
- IP of the gateway.
- IP of the DNS Server, if applicable.
- Host name (the name will identify the computer on the Internet, such as *www.patton.com*.
- Domain name (the name that will identify one or more IP addresses). For example, the *patton.com* domain is used by Patton Electronics Company. That domain can include multiple hostnames (such as **www**.patton.com, **ftp**.patton.com, and so on) that point to individual computers on the Patton network. In short, for the hostname URL *http://www.patton.com*, the domain name is *patton.com*.

WAN PPPoE Configuration

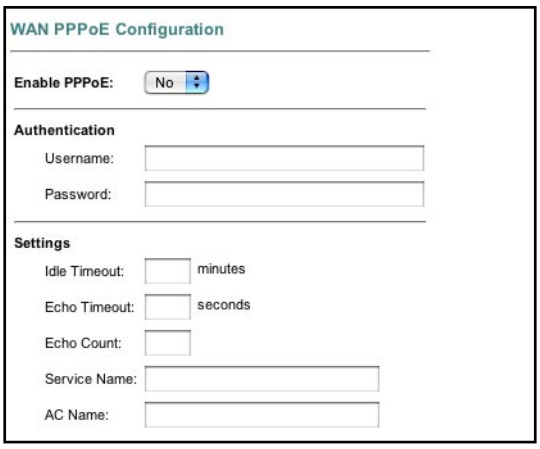

Figure 7. WAN PPPoE Configuration section of the Settings window

Enable PPPoE

Select *Yes* to enable PPPoE or *No* to disable PPPoE.

Authentication

Enter the username and password provided by your ISP.

Settings

Idle Timeout. Idle timeout before PPP connection is closed due to inactivity

Echo Timeout. The duration between PPP echo requests sending to server.

Echo Count. The number of unanswered PPP echo requests before PPP connection is closed.

Service Name. PPPoE Service name

AC Name. PPPoE AC name

MAC Spoofing Configuration

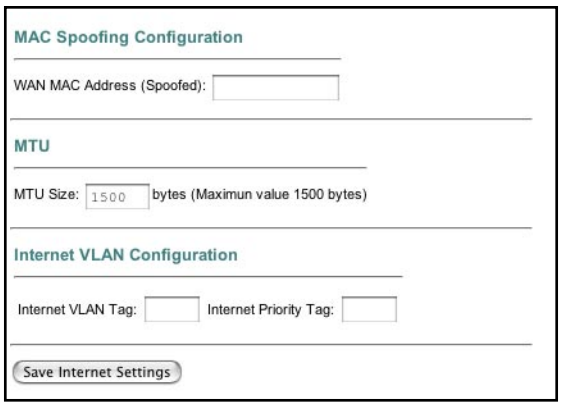

Figure 8. MAC Spoofing Configuration section of the Settings window

WAN MAC Address (Spoofed)
Only available when the unit is under the router mode. The spoofed MAC address to be used by the device's WAN interfaces, the Ethernet address of the outgoing packets from the WAN interface would be replaced with this address. If blank, the WAN interfaces will use the value of MAC

MTU Size

Figure 9. MTU section of the Settings window

MTU (Maximum Transfer Unit) Size
The size limit (bytes) of the packet for all outgoing packets.

Internet VLAN Configuration

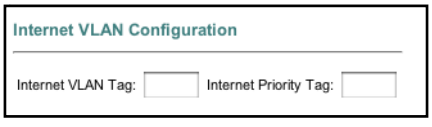

Figure 10. Internet VLAN Configuration section of the Settings window

Internet VLAN Tag
VLAN tag for all outgoing packets on WAN interface. The value should be between 0 and 4094.

Internet Priority Tag
Priority tag for all outgoing packets on WAN interface. The value should be between 0 and 7.

Saving your work

When you are finished configuring the VLAN settings, click the **Save Internet Settings** button (see figure 8 on page 35) to save all changes.

QoS (Quality of Service)

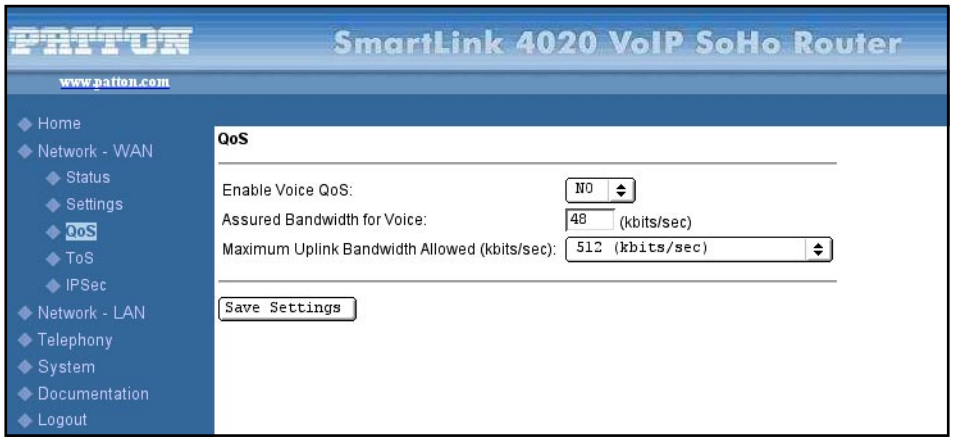

Figure 11. QoS window

Enable Voice QoS

Enable or disable the voice quality of service function.

Assured Bandwidth for Voice

Bandwidth allocated for voice.

Maximum Uplink Bandwidth Allowed

Specify a maximum uplink bandwidth.

Saving your work

When you are finished configuring settings, click the **Save Settings** button to save the changes.

ToS/DiffServ

This sub-page is used to configure the Type-of-Service/Diffserv byte values which are to be used in the IP header of all transmitted SIP signaling packets and RTP packets. The ToS/DiffServ byte values are entered as two-digit hexadecimal values. If no special ToS/DiffServ value is to be used for a particular traffic type, enter **00** or leave the setting empty.

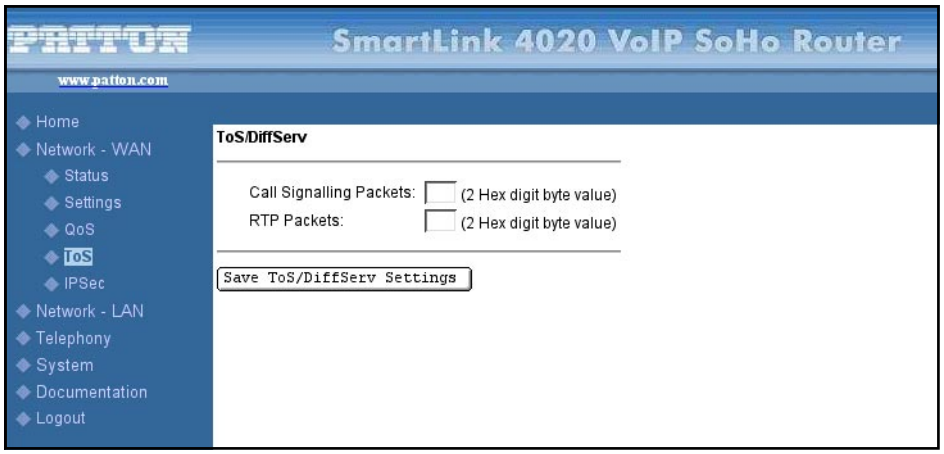

Figure 12. TOS/DiffServ window

Saving your work

When you are finished configuring ToS/DiffServ settings, click the **Save ToS/DiffServ Settings** button to save the changes.

IPSec Configuration

This page allows configuration of the device's IPSec (IP security) settings.

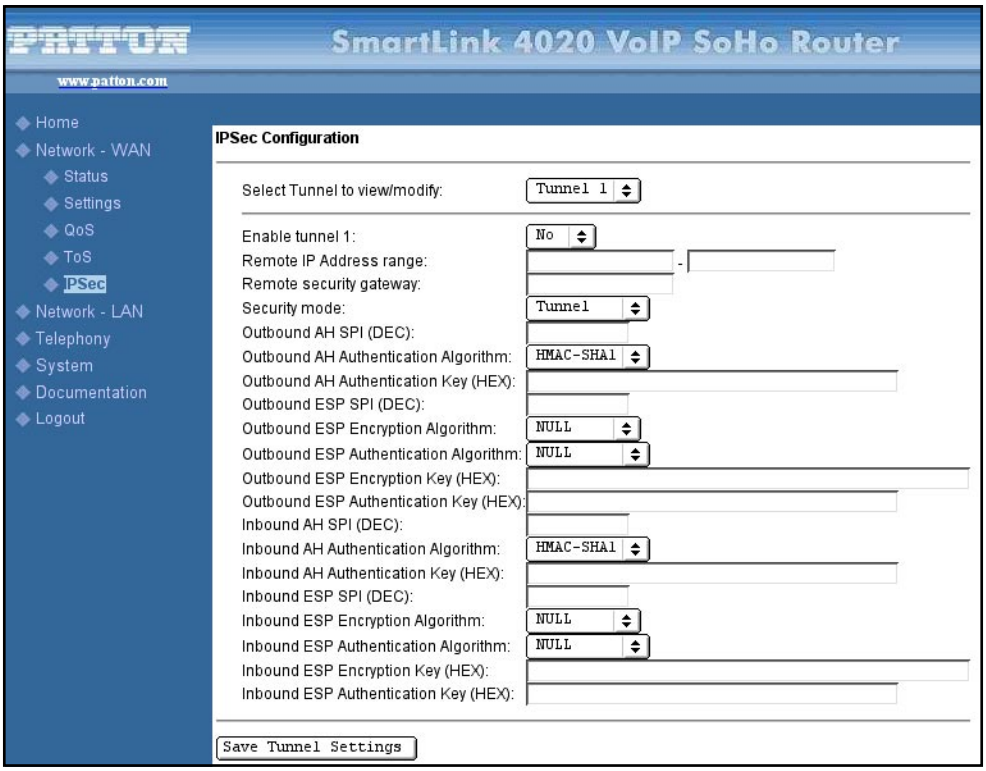

Figure 13. IPSec Configuration window

Select Tunnel to view/modify

Select the desired tunnel from the pop-up menu. The following sections and examples assume *Tunnel 1* was selected.

Enable tunnel 1

Enable/disable tunnel 1 IP sec

Remote IP Address range

Start and end of remote IP address range.

Remote security gateway

Remote security gateway IP address

Security Mode

IPSec mode (tunneling/transport)

Outbound AH SPI (DEC)

Outbound AH security parameter index number.

Outbound AH Authentication Algorithm
HMAC-MD5 or HMAC-SHA1

Outbound AH Authentication Key (HEX)
Hex number up to 40 nibbles

Outbound ESP SPI (DEC)
Outbound ESP security parameter index number

Outbound ESP Encryption Algorithm
3DES-CBC or DES-CBC

Outbound ESP Authentication Algorithm
HMAC-MD5 or HMAC-SHA1

Outbound ESP Encryption Key (HEX)
Hex number up to 48 nibbles

Outbound ESP Authentication Key (HEX)
Hex number up to 40 nibbles

Inbound AH SPI (DEC)
Inbound AH security parameter index number

Inbound AH Authentication Algorithm
HMAC-MD5 or HMAC-SHA1

Inbound AH Authentication Key (HEX)
Hex number up to 40 nibbles

Inbound ESP SPI (DEC)
Inbound ESP security parameter index number

Inbound ESP Encryption Algorithm
3DES-CBC or DES-CBC

Inbound ESP Authentication Algorithm
HMAC-MD5 or HMAC-SHA1

Inbound ESP Encryption Key (HEX)
Hex number up to 48 nibbles

Inbound ESP Authentication Key (HEX)

Hex number up to 40 nibbles

Saving your work

When you are finished configuring tunnel settings, click the **Save Tunnel Settings** button to save the changes.

Chapter 5 Network—LAN

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Settings

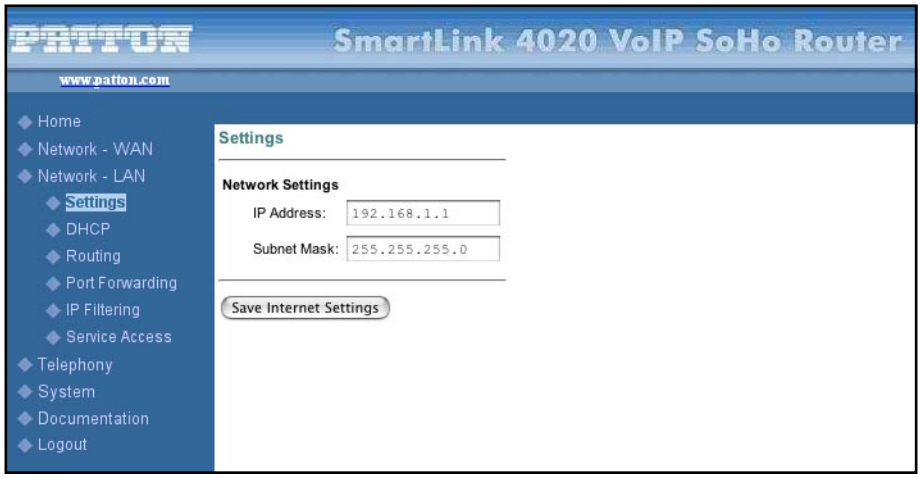

Figure 14. Network Settings window

Network Settings

Enter the IP address and subnet mask of your LAN network.

Saving your work

When you are finished, click the **Save Settings** button to save the changes.

DHCP

These configuration parameters are for the internal DHCP server that will provide IP network information to LAN attached devices.

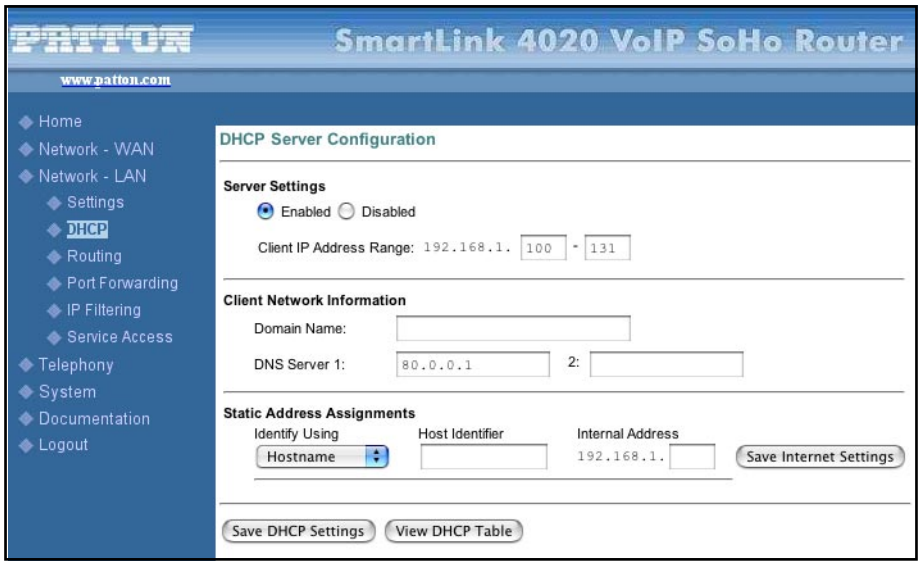

Figure 15. DHCP Server Configuration window

Server Settings
Select *Yes* to enable or *No* disable DHCP.

Client IP Address Range
Minimum and Maximum limit on the DHCP IP address pool

Client Network Information
Domain Name
LAN domain name provided to DHCP clients during the DHCP OFFER process.

DNS Server
This statically assigned DNS server IP address will be provided to clients during the DHCP OFFER process.

Static Address Assignment
Up to eight static DHCP address assignments can be configured. To add a static IP assignment, enter the LAN device's host name (must be unique in the private network) and/or MAC address. Specify the Internal address to be assigned and press the **Add** button.

Viewing the DCHP Client Table
Click the **View DHCP Table** button to display the *DHCP Client Table* (see figure 16).

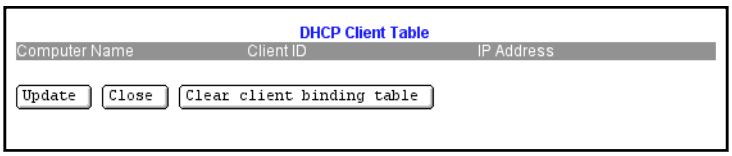

Figure 16. DHCP Client Table window

Saving your work
When you are finished configuring DHCP server settings, click the **Save DHCP Settings** button (see figure 15 on page 42) to save the changes.

Routing

These configuration parameters are for the internal router.

Figure 17. Router Configuration window

Dynamic Routing

Whether or not dynamic routing on the interfaces is enabled/disabled.

Static Routing

Under *Static Routing*, you can specify the routing paths of your internal network.

Viewing the Routing Table

Click the **View Routing Table** button to display the *Routing Table* (see figure 18).

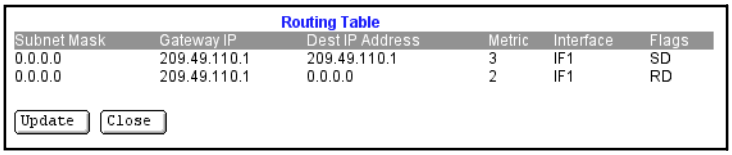

Figure 18. Routing Table window

Saving your work

When you are finished configuring Router settings, click the **Save Router Settings** button (see figure 17 on page 44) to save the changes.

Port Forwarding

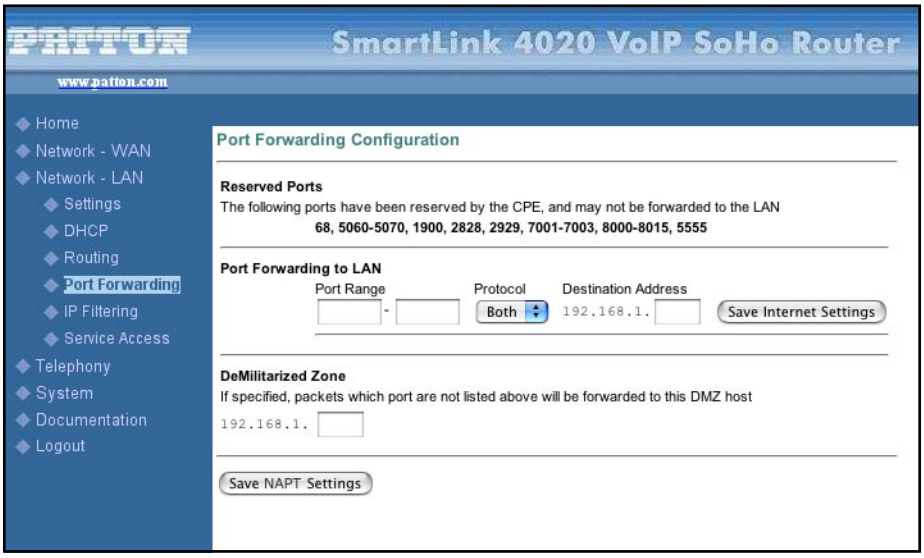

Figure 19. Port Forwarding Configuration window

Reserved Ports

Specifies reserved ports that cannot be forwarded to the LAN.

Port Forwarding to LAN

In this section, you enter the specifications, which you will be forwarding to the LAN, including port range, protocol (*Both*, *TCP* or *UDP*), and destination IP address.

De-Militarized Zone

Packets which are not listed above will be forwarded to the DMZ host you specify.

Saving your work

When you are finished configuring Port Forwarding settings, click the **Save NAPT Settings** button to save the changes.

IP Filtering

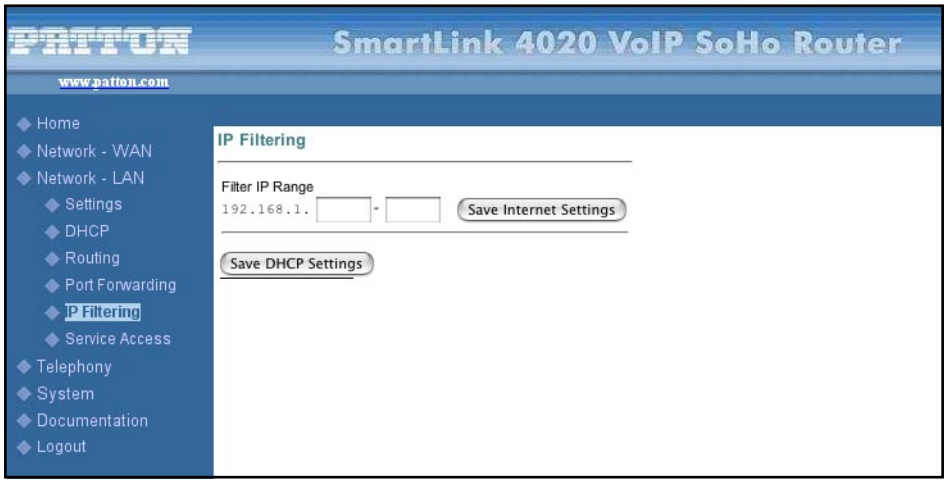

Figure 20. IP Filtering window

Filter IP Range

A computer having an IP address that falls within the specified IP address range will not be allowed to access the Internet.

Saving your work

When you are finished configuring settings, click the **Save Settings** button to save the changes.

Service Access

Figure 21. Service Access window

HTTP

Enable/disable WAN access by HTTP.

Ping Reply
Enable/disable PING echo.

Saving your work
When you are finished configuring settings, click the **Save Service Access Settings** button to save the changes.

Chapter 6 Telephony

Chapter contents

VoIP Status

Figure 22. VoIP Status window

VoIP Server Registration Status

Current Server
Shows the current VoIP server.

Domain
The VoIP domain name is the domain name that is hosting the VoIP server..

Base RTP Port
Displays the base RTP port number for the RTP-RTCP port pair.

Phone Line Status

The *Phone Line Status* table shows the current operational status of phones 1 and 2. It displays the VoIP registration status, the configured VoIP usernames, whether they are subscribed to voicemail or have messages waiting, and the caller ID setting.

SIP

The *SIP* window contains the following sections:

- SIP Configuration (see figure 23 on page 52)
- SIP Extensions (see figure 24 on page 53)
- RTP Telephone Event Configuration (see figure 25 on page 53)
- VoIP VLAN Configuration (see figure 26 on page 54)
- SIP Parameters (see figure 27 on page 54)
- NAT Traversal (see figure 28 on page 55)

Note After configuring the sections, click the **Save SIP Settings** button (see figure 28 on page 55) to save the new configuration.

SIP Configuration

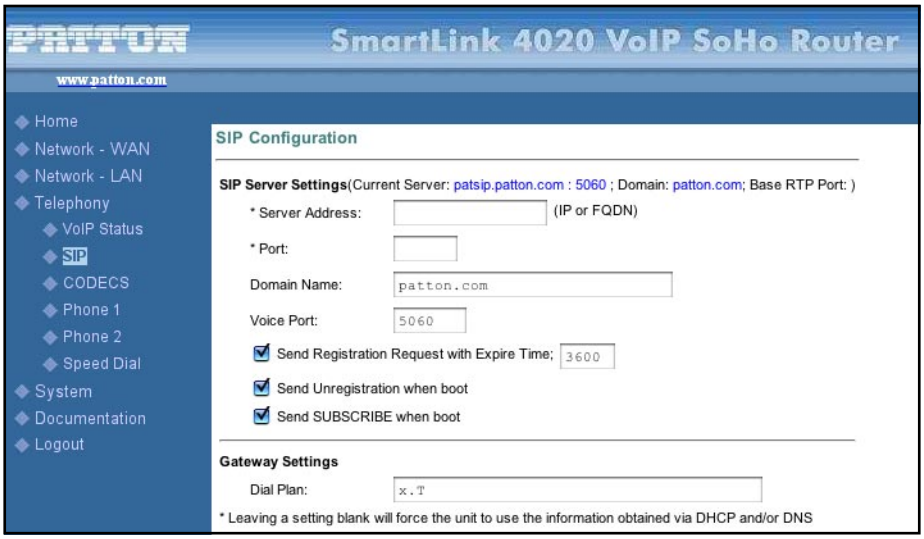

Figure 23. SIP Configuration section of the SIP window

SIP Server Settings

The SmartLink 4020 will automatically attempt to locate the VoIP server by using the domain name specified in the WAN interface or the server will be discovered via DHCP on the WAN interface. When found, the discovered server will be listed as the *Current Server*.

Enter the following information:

- Server address—The IP address or domain name hosting the VoIP SIP server
- Port—The UDP port of the VoIP SIP server. The default is *5060*.
- Domain name—The VoIP domain name (realm) is used for validation of each phone's username
- Expiration time unit (if you choose to send registration request with an expiration time)
- Unregistration—If checked, the SmartLink will send a SIP unregistered at system reload before sending a SIP registration request.

Gateway Settings

Dial Plan. Refer to appendix C, Dial plans on page 91

SIP Extensions

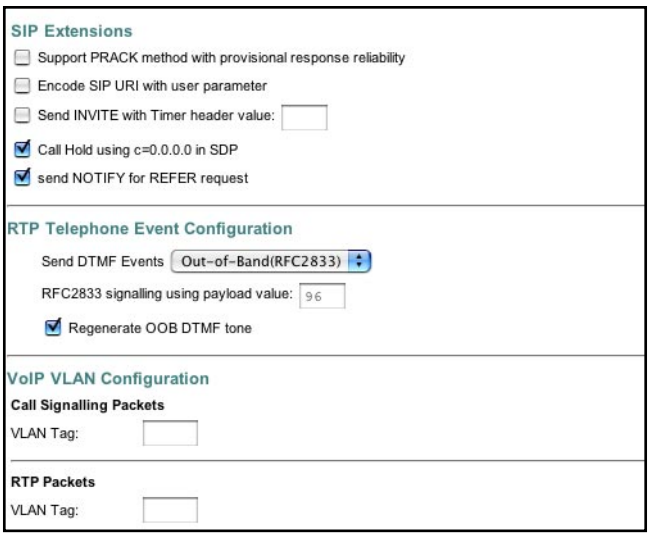

Figure 24. SIP Extensions section of the SIP window

Support PRACK method
Select to enable SIP PRACK support.

Encode SIP URI with user parameter
Select to encode user=phone parameter in SIP URI.

Send INVITE with Timer header
Select to encode Timer header in all INVITE requests for ringing timeout.

Call Hold using C=0.0.0.0
Using the call hold method described in RFC 2543. If unchecked, the call hold would follow the RFC 3263 method.

Send NOTIFY
Send out NOTIFY request to transferer for unattended and attended call transfer.

RTP Telephone Event Configuration

This sub-page allows configuration of the out-of-band signaling options for SIP. Select whether OOB telephone event signaling is to be done using the SIP INFO message, or to be done via RFC2833 RTP signaling. For additional information please refer RFC2833.

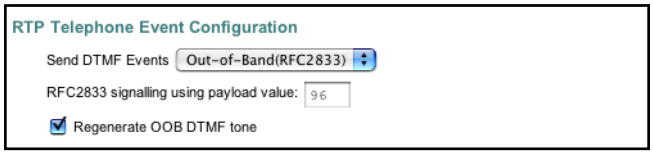

Figure 25. RTP Telephone Event Configuration section of the SIP window

VoIP VLAN Configuration

This sub-page allows configuration of specific VLAN tags that are to be applied to all SIP signalling and RTP packets used for VoIP calls. These VLAN settings will override any general VLAN settings applied to the interface.

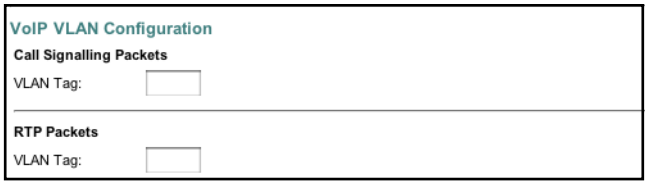

Figure 26. VoIP VLAN Configuration section of the SIP window

SIP Parameters

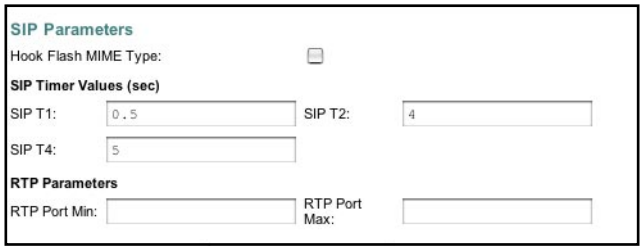

Figure 27. SIP Parameters section of the SIP window

Hook Flash MIME Type

This is the MIME Type to be used in a SIP INFO message used to signal hook flash event.

SIP Timer Values (sec)

SIP T1. RFC 3261 T1 value (RTT estimate). Range: 0–64 seconds.

SIP T2. RFC 3261 T2 value (maximum retransmit interval for non-INVITE requests and INVITE responses). Range: 0–64 seconds.

SIP T4. RFC 3261 T4 value (maximum duration a message will remain in the network). Range: 0–64 seconds.

RTP Parameters

RTP Port Min and *RTP Port Max* define a range that contains at least four even-numbered ports (100–106, for example).

NAT Traversal

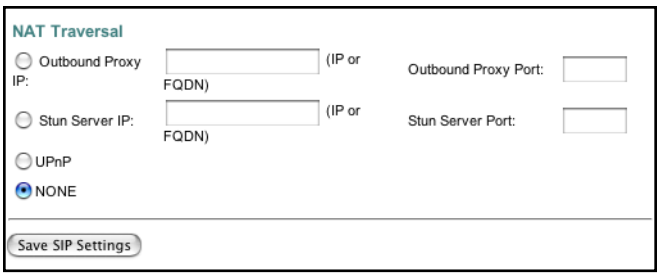

Figure 28. NAT Traversal section of the SIP window

Outbound Proxy IP
Type the outbound proxy IP address provided by your service provider.

Outbound Proxy Port
Type the outbound proxy IP port number provided by your service provider.

Stun Server IP
Type the stun server IP IP address provided by your service provider.

Stun Server Port
Type the stun server port number provided by your service provider.

UPnP
Univeral plug-and-play method. This method works with NAT routers that support UPnP gateway.

NONE
Select this if you will not be using NAT traversal methods.

Saving your work

When you are finished configuring SIP settings, click the **Save SIP Settings** button (see figure 28) to save the changes.

Audio/CODEC Configuration

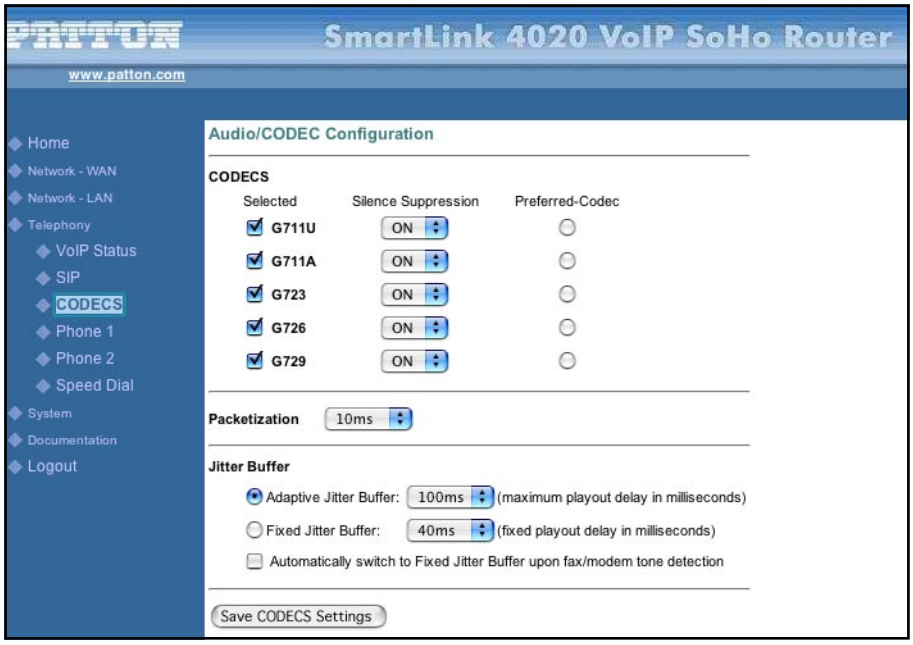

Figure 29. Audio/CODEC Configuration window

CODECS

- *Selected* column: Check the codecs that are acceptable to use
- *Silence Suppression* column: Configure as appropriate
- *Preferred-Codec* column: Select the codec to be used as the first choice when encoding voice

Packetization

Configure the packet sending increments.

Jitter Buffer

Configure the timing of the voice buffering:

- Selection between adaptive or fixed jitter buffer. Default = ADAPTIVE .
- Set the adaptive jitter buffer maximum playout delay. Default = 100ms or Fixed jitter buffer playout delay. Default = 40ms
- Whether or not to automatically switch from an adaptive jitter buffer to a fixed jitter buffer upon fax/modem tone detection

Saving your work

When you are finished configuring CODEC settings, click the **Save CODECS Configuration** button to save the changes.

Phone 1 & Phone 2

The *Phone 1* and *Phone 2* windows contains the following sections:

- User Information (see figure 30)
- Supplementary Service Settings (see figure 31 on page 58)
- Dial Out Type (see figure 32 on page 60)
- Call Forward Settings (see figure 26 on page 54)
- Selective Call Forward Settings (see figure 27 on page 54)
- Incoming Call Block (see figure 28 on page 55)
- Distinctive Ring Settings (see figure 28 on page 55)
- HTTP Digest Setting (see figure 28 on page 55)

Note After configuring the sections, click the **Save** button (see figure 37 on page 62) to save the new configuration.

User Information

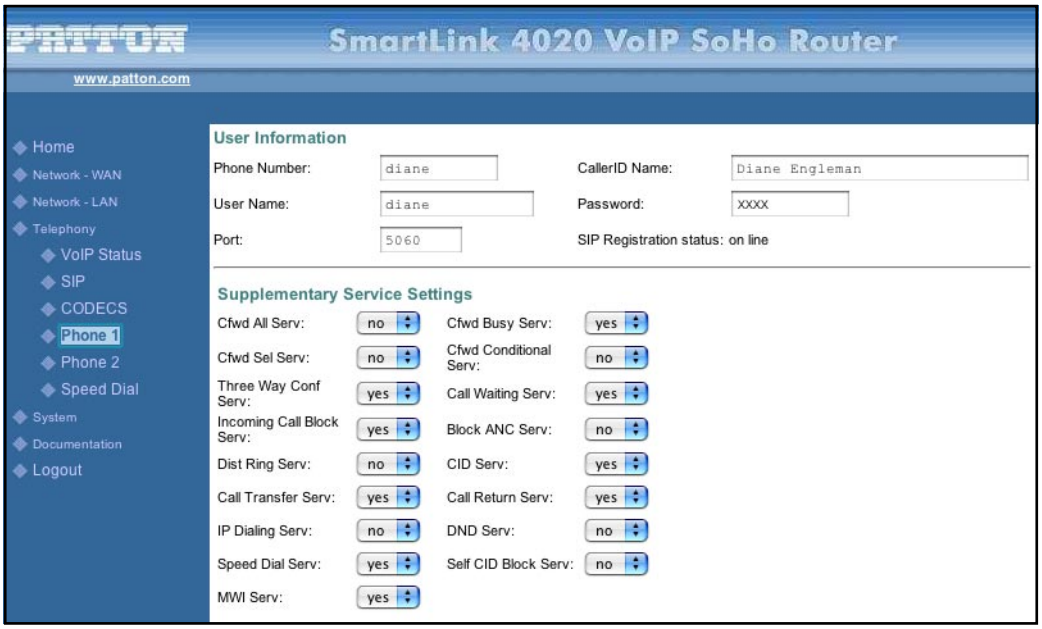

Figure 30. User Information section of Phone 1 or Phone 2 window

Phone Number

Type the telephone number or the user part of the SIP registration.

User Name

Type the user name that will be used for validation of the VoIP SIP registration or call invitation.

Port
Specify the signaling port.

CallerID Name
Input the caller ID name.

Password
Input the password.

Supplementary Service Settings

These settings enable or disable each of following calling features. Most features can also be enabled or disabled by using the telephone handset (see section "Supplementary Service Keys" on page 72 for details).

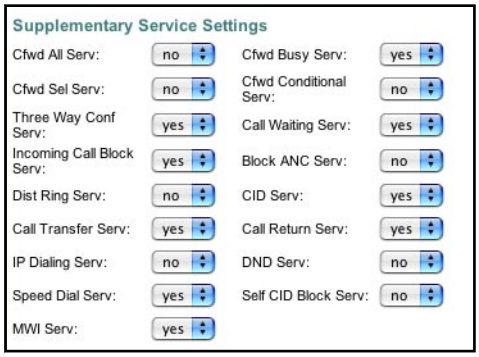

Figure 31. Supplementary Service Settings section of Phone 1 or Phone 2 window

Cfwd All Serv
Enable call forward all service—All received calls will be forwarded to the destination specified under the call forwarding settings.

Cfwd No Ans Serv
Enable call forward no answer service—All received calls that are not answered will be forwarded to the destination specified under the call forwarding settings.

Three Way Conf Serv
Enable three way conference service—This service enables you to add a third party to an existing two-way conversation, and hold a three-party conference call.

Incoming Call Block Serv
Enable incoming call block service—Allows for selected inbound caller IDs to be blocked.

Dist Ring Serv
Enable distinctive ringing service—This service allows additional telephone numbers to be added to an existing telephone line and when a caller dials one of these "distinctive ringing" numbers, the telephone will ring in a unique pattern to indicate which number is being dialed.

Call Transfer Serv
Enable call transfer service—This service allows you to transfer calls to another number.

IP Dialing Serv
Enable IP dialing service—This service allows user addresses formatted as aliases or e-mail addresses to be used to make calls.

MWI Serv
Enable MWI service—The message-waiting indicator (MWI) is a common feature of telephone networks and uses an audible indication (such as a special dial tone) to indicate that a voice mail message is waiting.

Speed Dial Serv
Enable speed dial service.

Cfwd Busy Serv
Enable call forward on busy service.

Cfwd Sel Serv
Enable call forward selective service.

Call Waiting Serv
Enable call waiting service.

Block ANC Serv
Enable block anonymous calls service—When enabled, blocks calls from anonymous callers.

CID Serv
Enable caller ID service.

Call Return Serv
Enable call return service—When enabled, allows you to return a call to the last incoming call, whether answered or not.

DND Serv
Enable do not disturb service.

Self CID Block Serv
Enable blocking self caller ID shown in the outgoing message.

Dial Out Type

Figure 32. Dial Out Type section of Phone 1 or Phone 2 window

Dial Out Type
This syntax allows for the implementation of Hot-Line and Warm-Line services. To achieve this, one sequence in the plan must start with a pause, with a 0 delay for a Hot Line, and a non-zero delay for a Warm Line.

Hot Line Number
Input the number for Hot Line function—This number will be called immediately when the telephone goes off-hook.

Warm Line Number
Input the number for Warm Line function—The warm line function provides a 6-second period after the telephone goes off-hook for the user to dial a number different than that specified for the warm line. If the 6 seconds have expired with no other number being dialed, the warm line number will be dialed.

Call Forward Settings

Figure 33. Call Forward Settings section of Phone 1 or Phone 2 window

Cfwd All Dest
Input the destination for all call forwarding.

Cfwd Busy Dest
Input the destination for all busy call forwarding.

Selective Call Forward Settings

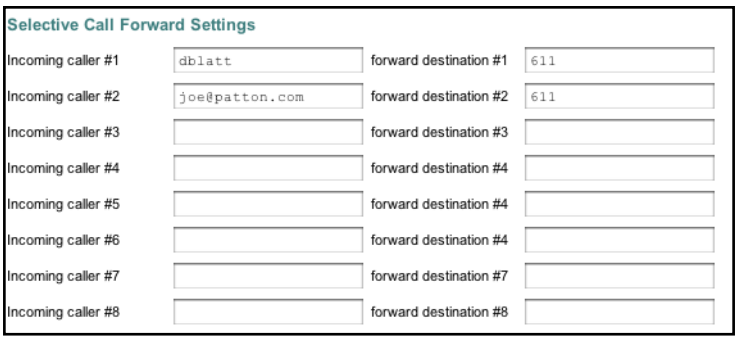

Figure 34. Selective Call Forward Settings section of Phone 1 or Phone 2 window

Incoming caller #1–8
Up to 8 incoming calls can be selected for call forwarding.

Forward destination #1–8
Up to 8 destinations to which incoming calls can be forwarded.

Incoming Call Block

Figure 35. Incoming Call Block section of Phone 1 or Phone 2 window

Block Caller ID
Specify a Caller ID for call block.

Distinctive Ring Settings

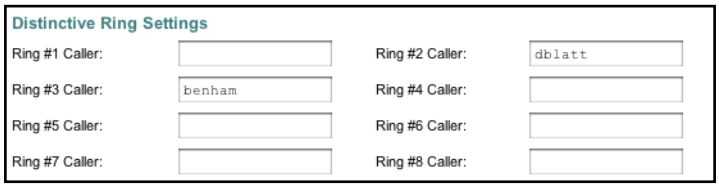

Figure 36. Distinctive Ring Settings section of Phone 1 or Phone 2 window

Ring #1–8 Caller
Up to 8 callers can be assigned a specific ring tone.

HTTP Digest Setting

SIP INVITE must contain a valid Authorization header that is based on an Auth ID and a password using MD5 digest algorithm. The Auth ID must be specified in the username parameter in the Authorization header.

Figure 37. HTTP Digest Setting section of Phone 1 or Phone 2 window

Saving your work

When you are finished configuring settings, click the **Save** button (see figure 37) to save the changes.

Speed Dial

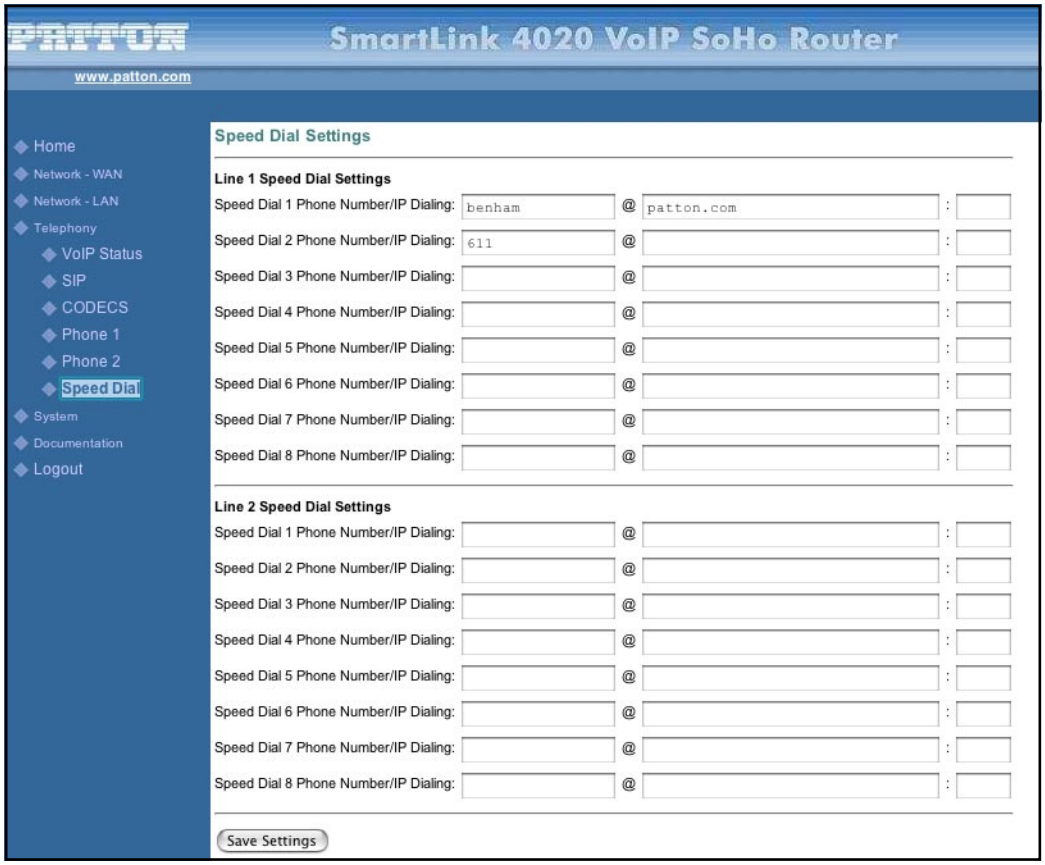

Figure 38. Speed Dial window

Line 1 Speed Dial Settings

Speed Dial Serv

Enable Speed Dial Service.

Speed Dial 1–8 Phone Number/IP Dialing

Target 1–8 phone number (or URL) assigned to speed dial.

Line 2 Speed Dial Settings

Speed Dial Serv
Enable Speed Dial Service.

Speed Dial 1–8 Phone Number/IP Dialing
Target 1–8 phone number (or URL) assigned to speed dial.

Saving your work

When you are finished configuring settings, click the **Save Settings** button (see figure 38) to save the changes.

Chapter 7 System

Chapter contents

Set Security Password

Figure 39. Set Security Password window

Web Page Protect
Enable or disable web access protection.

New Root Password
Type the password for administrator.

New User Password
Type the password for User.

Confirm new password
Re-enter the password for confirmation.

Saving your work
When you are finished configuring security settings, click the **Save Settings** button to save the changes.

Configuration

Figure 40. Configuration window

Logging

Enable Syslog

Enable or disable system logging.

Syslog Server

Specify the syslog server IP address. This feature specifies the server for logging IAD system information and critical events.

Enable Debug

Enable or disable System Debug.

Debug Server

The debug server IP address and port. This feature specifies the server for logging IAD debug information. The level of detailed output depends on the debug level parameter setting.

Debug Connect Port

The port number of the debug server to be used for receiving debug messages from the IAD.

Saving your work

When you are finished configuring settings, click the **Save** button to save the changes.

Manual Upgrade

For both **HTTP** and **TFTP** methods, the device will reboot itself into the downloader mode if the main application is executing, and proceed with the ROM file download and permanent write of the application to the device's flash memory. After the download is completed, the download status page will be displayed.

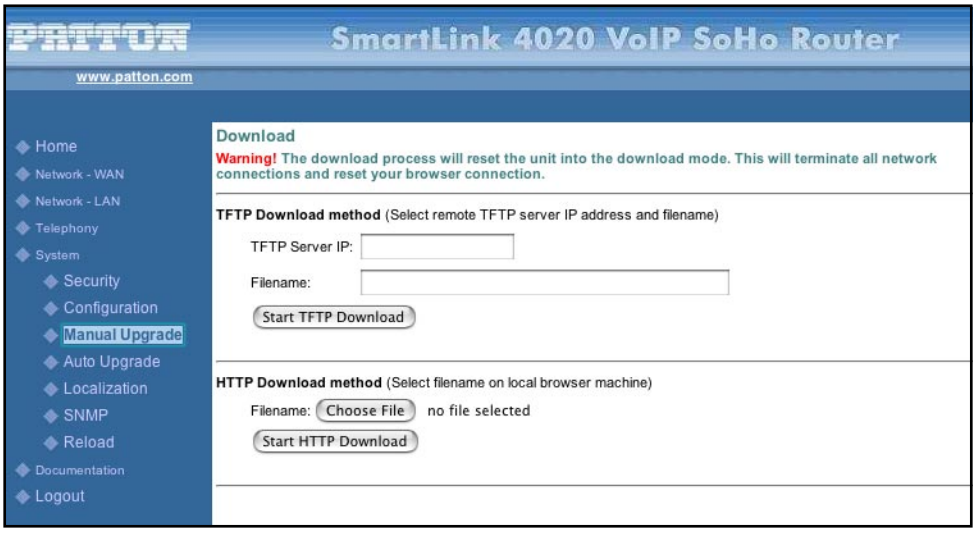

Figure 41. Manual Upgrade window

Auto Upgrade

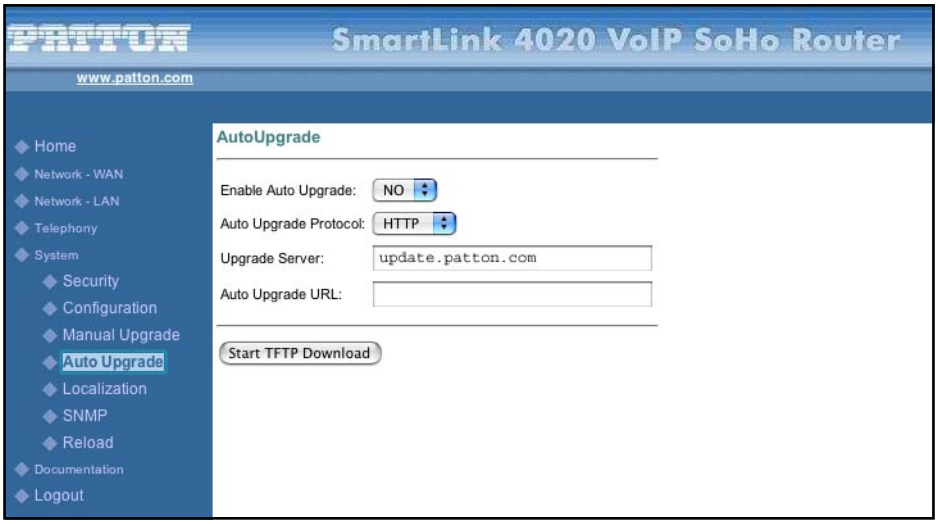

Figure 42. AutoUpgrade window

Enable Auto Upgrade

Enable or disable auto upgrade—If enabled, the SmartLink 4020 will automatically check the upgrade server for new system firmware and software upon reload or power cycle.

Auto Upgrade Protocol
Select the protocol for auto upgrade

Upgrade Server
Specify the auto upgrade server IP address

Auto Upgrade URL
Specify the auto upgrade server by URL. This field is dependent on the auto upgrade service package installation. The default value is iadmgr.

Localization

The *Localization* window contains the following sections:

- Call Progress Tones (see figure 43)
- Distictive Ring Setting (see figure 44 on page 71)
- Supplementary Service Keys (see figure 45 on page 72)
- Control Timer Values (see figure 46 on page 74)
- Ring Setting (see figure 47 on page 75)
- Miscellaneous (see figure 48 on page 75)
- FXS Port Polarity (see figure 49 on page 76)

Note After configuring the sections, click the **Save** button (see figure 49 on page 76) to save the new configuration.

Call Progress Tones
Choose the correct country for a proper impedance match, as well as the NTP Server, and Time Zone. Select *Adjust clock for daylight savings* if applicable.

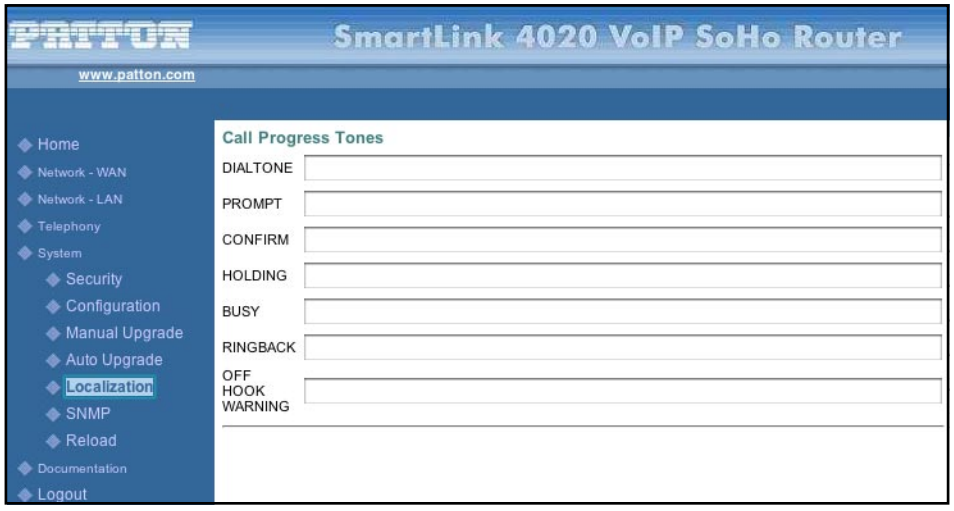

Figure 43. Call Progress Tones section of Localization window

Dial Tone
Played when prompting the user to enter a phone number.

Prompt Tone
Played when prompting the user to enter a call forward phone number.

Confirm Tone
This should be a brief tone to notify the user that the last input value has been accepted.

Holding Tone
Indicate to the local user that the far end has placed the call on hold.

Busy Tone
Played when a 486 RSC is received for an outbound call.

Ring Back Tone
Played for an outbound call when the far end is ringing.

Off Hook Warning
Played when the subscriber does not place the handset on the cradle properly.

Distinctive Ring Setting 1–8

Specify up to 8 sets of distinctive ring cadence (refer the Appendix 2).

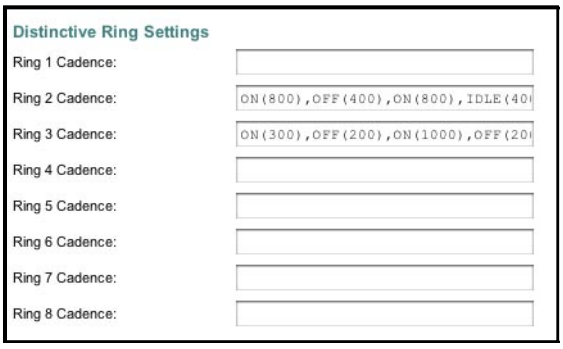

Figure 44. Distinctive Ring Setting section of Localization window

Supplementary Service Keys

Note Following function key must be start by '*','#' character, or f(flash hook) and follow a 1 or 2 numeric digit(s).

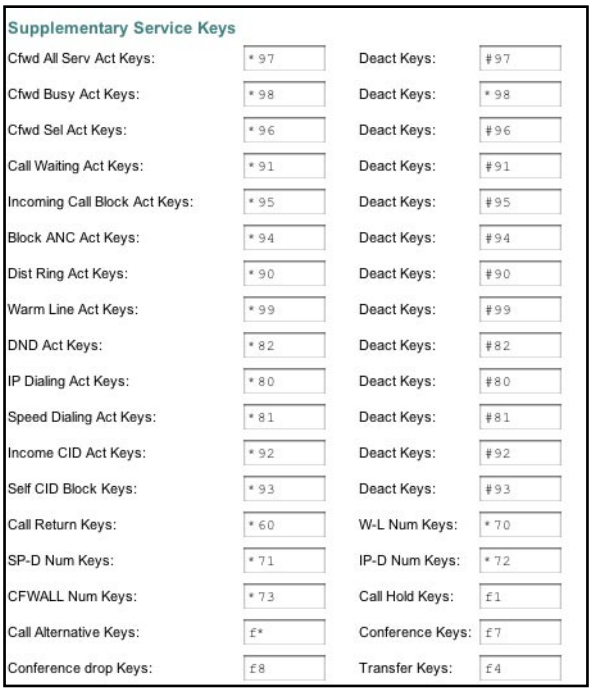

Figure 45. Supplementary Service Keys section of Localization Window

Cfwd All Serv Act Keys
Forward all calls to the target specified after the activation key.

Cfwd Busy Act Keys
Forward busy calls to the target specified after the activation key.

Cfwd Sel Act Keys
Specified after the activation key.

Call Waiting Act Keys
Call wait specified after the activation key.

Incoming Call Block Act Keys
Incoming call specified after the activation key.

Block ANC Act Keys
Block Anonymous Calls specified after the activation key.

Dist Ring Act Keys
Dist Ring specified after the activation key.

Warm Line Act Keys
Warm Line specified after the activation key.

DND Act Keys
DND Act specified after the activation key.

IP Dialing Act Keys
IP Dialing specified after the activation key.

Speed Dialing Act Keys
Speed Dialing specified after the activation key.

Income CID Act Keys
Activate incoming caller ID display.

Self CID Block Keys
Blocking self CID shown in the outgoing message after the activation key.

Deact Keys
The key for deactivate all above settings.

Call Return Keys
Start Call Return Function key.

W–L Num Keys
Start to config Warm Line number function key (i.e., *xx+ warm line number).

SP–D Num Keys
Start to config Speeding Dialing function key.

IP–D Num Keys
Start to config IP Dialing function key.

CFWALL Num Keys
Start to config Call forward all number function key.

Call Hold Keys
Call hold function key.

Call Alternative Keys
Call alternatice function key.

Conference Keys
Conference function key.

Conference Drop Keys
Drop conference call function key.

Transfer Keys
Call Transfer function key.

Control Timer Values

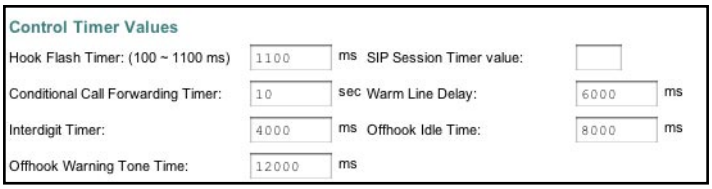

Figure 46. Control Timer Values section of Localization window

Hook Flash Timer
Maximum on-hook time before off-hook to qualify as hookflash. More than this the on-hook event is treated as on-hook.

Minimum on-hook time before off-hook to qualify as hookflash.Less than this the on-hook event is ignored.

SIP Session Timer value
SIP Session Timer.

Conditional Call Forwarding Timer
Specified a time period as a call forward condition.

Warm Line Delay
Specify a time period as a delay time for warm line dialing.

Interdigit Timer
Specify a time period between entering digits when dialing.

Offhook Idle Time
Specify a time period for offhook dialing.

Offhook Warning tone time
Specify a time period as a delay time to play a warning tone.

Ring Setting

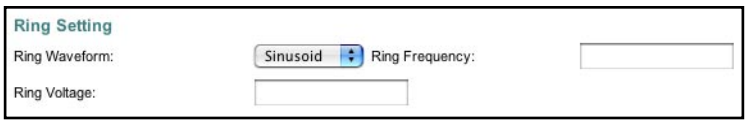

Figure 47. Ring Setting section of Localization window

Ring Waveform
Specify the ring tone waveform.

Ring Frequency
Specify the ring tone frequency.

Ring Voltage
Specify the ring tone voltage.

Miscellaneous

Choose the correct country for a proper impedance match, as well as the NTP Server, and Time Zone. Select *Adjust clock for daylight savings* if applicable.

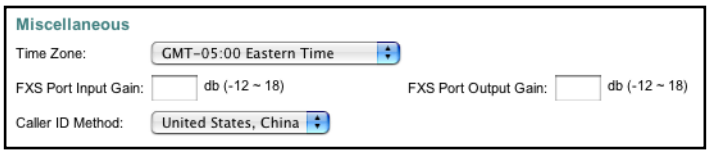

Figure 48. Miscellaneous section of Localization window

Time Zone
Specify your time zone.

NTP Server
Specify the NTP server if available

FXS port Input Gain
Adjust the input gain level for FXS port.

FXS port Output Gain
Adjust the output gain level for FXS port.

Caller ID Method
Specify the Caller ID format.

FXS Port Polarity Configuration

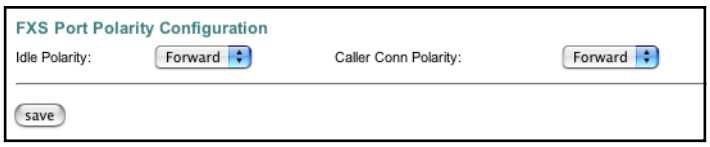

Figure 49. FXS Port Polarity section of Localization window

Idle Polarity
Polarity before call connected.

Caller Conn Polarity
Polarity after outbound call connected.

Saving your work

When you are finished configuring settings, click the **Save** button (see figure 49) to save the changes.

SNMP Configuration

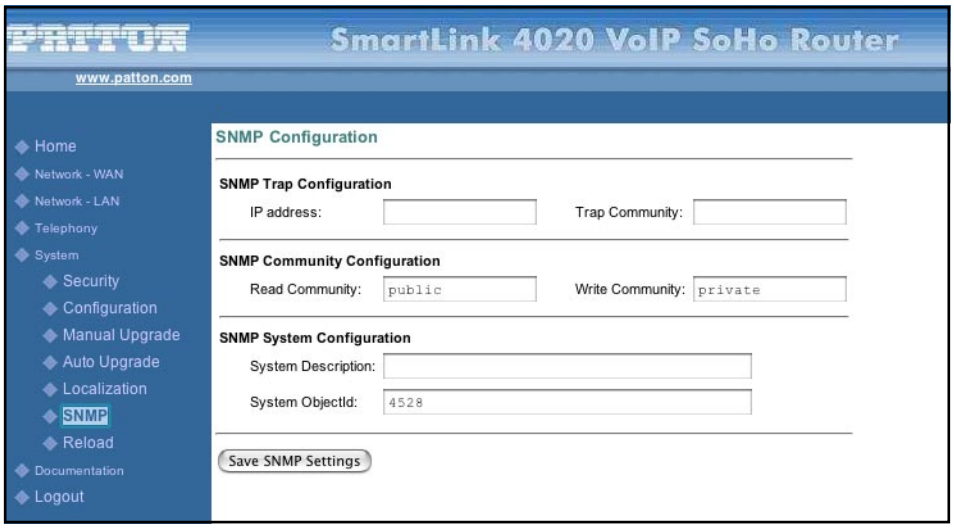

Figure 50. SNMP Configuration window

SNMP Trap Configuration

IP address
Trap host IP address.

Trap Community
The community name used by the SNMP manager to verify traps. The default value is *public*.

SNMP Community Configuration

Read Community
The community name used by the SNMP manager when reading SNMP data items from a client MIB. The default value is *public*.

Write Community
The community name used by the SNMP manager when setting SNMP data items in a client's MIB. The default value is *public*.

SNMP System Configuration

System Description
Description of the unit (e.g. "John's phone")

System Object Id
A vendor's enterprise ID

Saving your work

When you are finished configuring settings, click the **Save SNMP Settings** button to save the changes.

Reload

Figure 51. Reset window

CAUTION

Resetting the system will terminate all network connections and reset your browser connection.

Chose the *Reset and execute Main Application* option, for execution of the main application which you have configure, once you reset the system.

Chose the *Reset and execute Downloader Application* option, to being downloading, once you reset the system.

Chapter 8 Documentation

Chapter contents

Introduction

Clicking the **Documentation** link (see figure 52) connects to the Patton website to display the most current version of the *SmartLink 4020 Getting Started Guide* in portable document format (PDF).

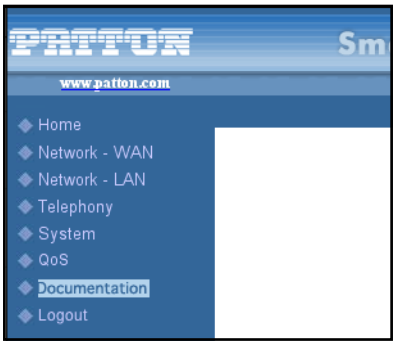

Figure 52. Documentation link

Chapter 9 Logout

Chapter contents

Introduction

Clicking the **Logout** button (see figure 53) exits you from the SmartLink management utility and returns you to the password verification page (see figure 54).

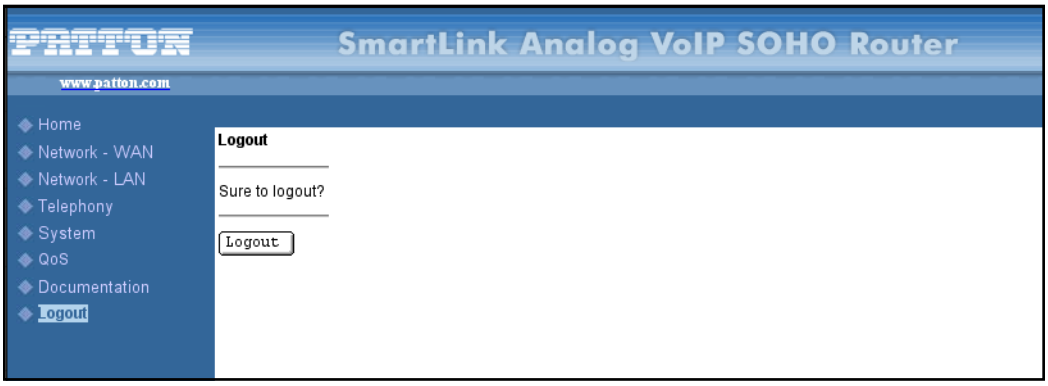

Figure 53. Logout window

Figure 54. Password verification page

Chapter 10 Contacting Patton for assistance

Chapter contents

Introduction

This chapter contains the following information:

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

Contact information

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

Patton support headquarters in the USA

- Online support: available at **www.patton.com**
- E-mail support: e-mail sent to **support@patton.com** will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from **8:00 am** to **5:00 pm EST** (**1300** to **2200 UTC/GMT**)—by calling **+1 (301) 975-1007**
- Fax: **+1 (253) 663-5693**

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

- Online support: available at **www.patton-inalp.com**
- E-mail support: e-mail sent to **support@patton-inalp.com** will be answered within 1 business day
- Telephone support: standard telephone support is available five days a week—from **8:00 am** to **5:00 pm CET** (**0900** to **1800 UTC/GMT**)—by calling **+41 (0)31 985 25 55**
- Fax: **+41 (0)31 985 25 26**

Warranty Service and Returned Merchandise Authorizations (RMAs)

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

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

Warranty coverage

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

Out-of-warranty service

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

Returns for credit

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

Return for credit policy

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

RMA numbers

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

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

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

Shipping instructions

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

Patton Electronics Company
RMA#: xxxx
7622 Rickenbacker Dr.
Gaithersburg, MD 20879-4773 USA

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

Appendix A **Compliance information**

Chapter contents

Compliance

EMC Compliance:

FCC Part 15, Class B

EN55022, Class B

EN55024

Safety Compliance

EN60950-1

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause radio interference in which case the user will be required to correct the interference at his or her own expense.

Radio and TV Interference

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

CE-Mark Warning

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

CE notice (Declaration of Conformity)

We certify that the apparatus identified in this document conforms to the requirements of Council Directive 1999/5/EC on the approximation of the laws of the member states relating to Radio and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

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

Appendix B **Specifications**

Chapter contents

Voice Connectivity

2-wire Loopstart, RJ-11/12

Short haul loop 1.1 km @3REN

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

Connectivity

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

Voice Processing (signalling dependent)

SIP

MGCP

- Packet Cable NCS 1.0
- IETF MGCP 1.0

Voice codes

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

G.168 echo cancellation

4 parallel voice connections

DTMF detection and generation

Carrier tone detection and generation

Silence suppression and comfort noise

Configurable dejitter buffer

DTFM in-band & out-of-band

Configurable transmit packet length

RTP/RTCP (RFC 1889)

Fax and Modem Support

G.711 transparent FAX

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

Voice Services/Features

Call forwarding

Call transfer

Call hold

Call waiting

3-way calling

IP Services

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

IP filtering

NAPT

NTP

DHCP client & server

PPPoE

IPSEC VPN

Programmable static routes

ICMP redirect (RFC 792); Packet fragmentation

DiffServe/ToS set or queue per header bits

VLAN support 802.1p/q

AES/DES/3DES Encryption

Management

Browser configuration interface

TFTP configuration & firmware loading

SNMP v2 agent (MIB II and private MIB)

Operating Environment

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

Operating humidity: 5–80% (non condensing)

System

Power: 100–240 VAC (50/60 Hz)

Appendix C **Dial plans**

Chapter contents

Introduction

The H.323 and SIP code will allow provisioning (via web browser) of the dial plan. A dial plan gives the unit a map to determine when a complete number has been entered and should be passed to the gatekeeper for resolution into an IP address. Dial plans are expressed using the same syntax as used by MGCP NCS specification.

The formal syntax of the dial plan is described by the following notation:

```
Digit ::= "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"
Timer ::= "T" | "t"
Letter ::= Digit | Timer | "#" | "*" | "A" | "a" | "B" | "b" | "C" | "c"| "D" | "d"
Range ::= "X" | "x" -- matches any digit
| "[" Letters "]" -- matches any of the specified letters
Letters::= Subrange | Subrange Letters
Subrange::= Letter -- matches the specified letter
| Digit "-" Digit -- matches any digit between first and last
Position::= Letter | Range
StringElement::= Position -- matches any occurrence of the position
| Position "." -- matches an arbitrary number of occurrences
including 0
String ::= StringElement | StringElement String
StringList::= String | String "|" StringList
DialPlan::= String | "(" StringList ")"
```

A dial plan, according to this syntax, is defined either by a (case insensitive) string or by a list of strings. Regardless of the above syntax a timer is only allowed if it appears in the last position in a string (12T3 is not valid). Each string is an alternate numbering scheme. The unit will process the dial plan by comparing the current dial string against the dial plan, if the result is underqualified (partial matches at least one entry) then it will do nothing further. If the result matches or is over-qualified (no further digits could possibly produce a match) then send the string to the gatekeeper and clear the dial string. The Timer T is activated when it is all that is required to produce a match. The period of timer T is 4 seconds. For example a dial plan of (xxxT|xxxxx) will match immediately if 5 digits are entered, it will also match after a 4 second pause when 3 digits are entered.

Sample Dial Plans

Simple Dial Plan

Allows dialing of 7-digit numbers (e.g. 5551234) or an operator on 0. Dial plan is (0T|xxxxxxx)

Non-dialed Line Dial Plan

As soon as handset is lifted the unit contacts the gatekeeper (used for systems where DTMF detection is done in-call). Dial plan is (x.) i.e. match against 0 (or more) digits. Note: the dot '.'

Complex Dial Plan

- Local operator on 0, long distance operator on 00
- 4-digit local extension number starting with 3, 4, or 5
- 7-digit local numbers are prefixed by an 8

- 2-digit star services (e.g. 69)
- 10-digit long distance prefixed by 91
- International numbers starting with 9011+variable number of digits.

Dial plan for this is:

```
(0T|00T|[3-5]xxx|8xxxxxxx|*xx|91xxxxxxxxxx|9011x.T)
```

Appendix D **Calling Features**

Chapter contents

Introduction

The SL4020 family supports advanced calling features that can be turned on and off from phones attached to the SL4020 (see table 2).

Note Your telephony service provider must enable your service for these calling features to work.

Note F in table 2 refers to the *hook flash* event.

Table 2. Calling features

Feature	Keypad	Feature	Keypad
Call Hold	**F1**	Call Retrieve	**F***
Conference	**F7**	Conference **Drop**	**F8**
Call Transfer	**F4**		
Do not Disturb **ON**	***82**	Do not Disturb **OFF**	**#82**
Distinctive **ON**	***90**	Distinctive **OFF**	**#90**
Call Waiting **ON**	***91**	Call Waiting **OFF**	**#91**
Incoming Caller ID Display **ON**	***92**	Incoming Caller ID Display **OFF**	**#92**
Self Caller ID Block Service **ON**	***93**	Self Caller ID Block Service **OFF**	**#93**
Anonymous Call Reject **ON**	***94**	Anonymous Call Reject **OFF**	**#94**
Incoming Call Block **ON**	***95**	Incoming Call Block **OFF**	**#95**
Call Forward Selective **ON**	***96**	Call Forward Selective **OFF**	**#96**
Call Forward All **ON**	***97**	Call Forward All **OFF**	**#97**
Call Forward Busy **ON**	***98**	Call Forward Busy **OFF**	**#98**
Warm Line **ON**	***99**	Warm Line **OFF**	**#99**
IP Dialing **ON**	***80**	IP Dialing **OFF**	**#80**
Speed Dialing **ON**	***81**	Speed Dialing **OFF**	**#81**
Call Return	***60**		
Config Warm Line Number (**70yyyyy* where *yyyyy* = number to call)	***70**		
Config Speed Dialing Number (**71xyyyyy* where *x* = speed dial key and *yyyyy* = number to call)	***71**		
Config IP Dialing (**72xxx*xxx*xxx*xxx*yyyy* where *xxx* = IP address and *yyyy* = optional port number)	***72**		
Set Call Forward Number (Wait for 3 short confirmation tones before hanging up)	***73**		
Access Voicemail	***86**		

Appendix E **Ring Cadence Configuration**

Chapter contents

Introduction

The following is a sample ring cadence patter configuration:

```
Timeval ::= time in milliseconds
Repeatval ::= # of cycles to repeat
Tonename ::= "RING_0" | "RING_1" | "RING_2" | "RING_3" | "RING_4"
| "RING_5" | "RING_6" | "RING_7" | "RING_8" | "RING_9"
Idle ::= "IDLE"
Active ::= "ON" | "OFF"
Inactive ::= Idle "(" Timeval ")"
Active ::= Active "(" Timeval ")"
Sequence ::= Active | Active "," Sequence
Repetition ::= "[" Sequence "]" Repeatval
Repeat ::= "R"
Cycle ::= Sequence | Repetition
Fullsequence ::= Cycle | Cycle "," Fullsequence
Cadence ::= Fullsequence | Fullsequence "," Repeat | Fullsequence
"," Inactive "," Repeat
Ring ::= Cadence
```

For the ring cadence pattern above, the configuration would be:

```
RING_0 ON(200),OFF(300),ON(100),OFF(400),ON(200),OFF(4000),R
```

Note The Bellcore standard ring cadence patterns are shown in table 3.

Table 3. Bellcore standard ring cadence patterns

Name	Value
RING_0	ON(2000), IDLE(4000), R
RING_1	ON(800), OFF(400), ON(800), IDLE(4000), R
RING_2	ON(400),OFF(200)]2,ON(800),IDLE(4000),R
RING_3	ON(300), OFF(200), ON(1000), OFF(200), ON(300), IDLE(4000), R
RING_4	ON(500)
RING_5	