

SmartLink 4020

SmartLink Analog VoIP SoHo Router

Getting Started Guide



Important

This is a Class B device and is intended for use in a light industrial or residential environment. It is not intended nor approved for use in an industrial environment.

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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 describes the Home section settings
- [Chapter 4](#) on page 28 describes the WAN section settings
- [Chapter 5](#) on page 38 describes the LAN section settings
- [Chapter 6](#) on page 44 describes the Telephony section settings
- [Chapter 7](#) on page 61 describes the System section settings
- [Chapter 8](#) on page 80 describes how to download and display the SmartLink 4020 router user guide
- [Chapter 9](#) on page 82 describes how to log out of the router management system
- [Chapter 10](#) on page 85 contains information on contacting Patton technical support for assistance
- [Appendix A](#) on page 88 contains compliance information for the router
- [Appendix B](#) on page 90 contains specifications for the router
- [Appendix C](#) on page 93 describes dialing plans and contains sample plans
- [Appendix D](#) on page 96 describes the calling features that can be accessed from phones attached to the SmartLink 4020

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.



IMPORTANT

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



CAUTION

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



CAUTION

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.



WARNING

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



WARNING

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



- This device contains no user serviceable parts. The equipment shall be returned to Patton Electronics for repairs, or repaired by qualified service personnel.
- The external power adapter shall be a listed Limited Power Source rated for an output of 12VDC, 1A . 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. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker.
- Hazardous network voltages are present in WAN ports regardless of whether power to the unit is ON or OFF. To avoid electric shock, use caution when near WAN ports. When detaching the cables, detach the end away from the device first.
- Do not work on the system or connect or disconnect cables during periods of lightning activity.



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.

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

Chapter 1 **General information**

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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, and NTP) are available to LAN devices attached downstream. VLAN tagging and prioritization enables voice traffic to be handled before data traffic. Support for PPPoE 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**

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Installing the router

Do the following:

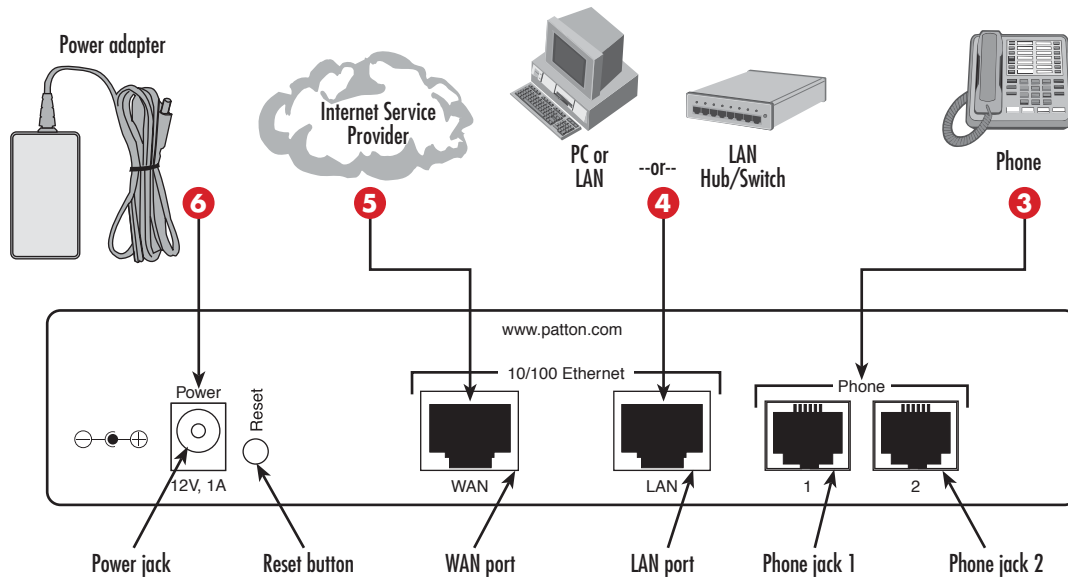


Figure 2. SmartLink 4020 installation diagram

- 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.



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 85 to find out how to replace it with a compatible power cord. Plug the power adapter into the *12VDC, 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.

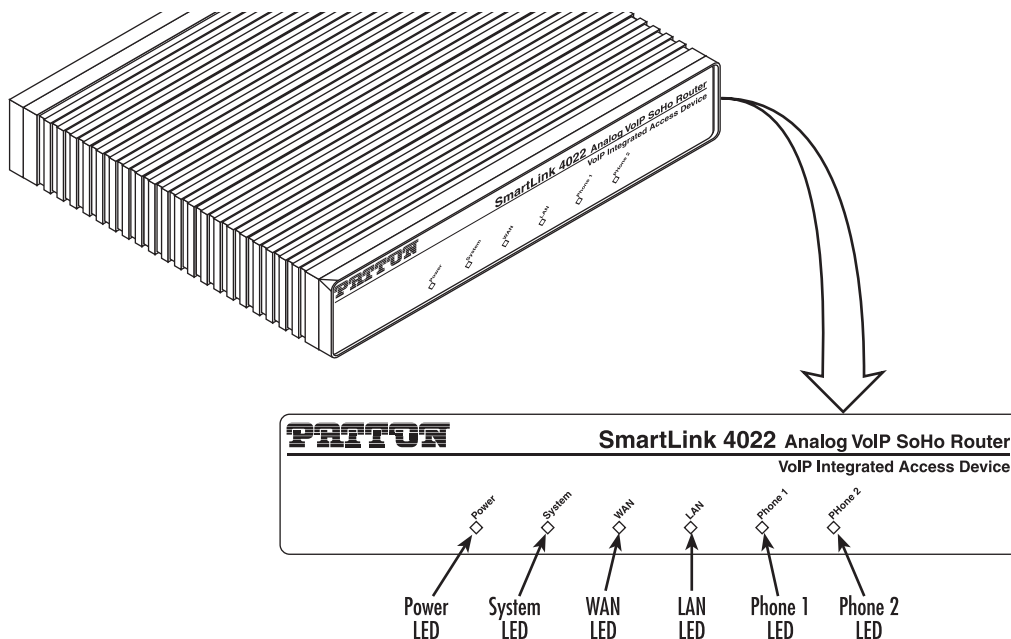


Figure 3. Router front panel LEDs

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System information

Patton SmartLink 4020 VoIP SoHo Router
www.patton.com

Welcome to the Smartlink download and configuration utility.
Select from the configuration options in the menu on the left.

System Information

System Uptime: 1 days, 0h 8m 5s
 WAN IP Address: 172.16.1.99
 LAN IP Address: 192.168.1.1 (Static)
 MAC Address: 00:A0:BA:00:da:c0
 Application Version:
 Config Date:
 Security: Password installed
 Application Code Version: SIP version 3.01.001 20 EN n0 (0920)
 Downloader Code Version: 2.2 EN (NTRG 000004)

System Status

SIP Messages Sent:	76	SIP Bytes Sent:	190000
SIP Messages Recv:	57	SIP Bytes Recv:	31379
RTP Packets Sent:	0	RTP Bytes Sent:	0
RTP Packets Recv:	0	RTP Bytes Recv:	0

Figure 4. SmartLink VoIP download and configuration Home page

System Uptime

Shows how long the SmartLink 4020 has been operating since the last time it was reloaded (either by powering the unit off and then on again, or by selecting *System > Reload*).

WAN IP Address

The IP address of the SmartLink 4020 on the WAN interface.

LAN IP Address

The IP address of the SmartLink 4020. If *(Static)* is shown next to the address, it means the IP address was assigned to the SmartLink 4020 under the WAN Settings. *(Dynamic)* indicates the IP address was learned via DHCP.

MAC address

The media access control (MAC) address of the 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 web interface utility has been secured with a password. To configure a password, see section “Set Security Password” on page 64.

Application Code Version

Shows the application code version being used.

Downloader Code Version

Shows the downloader code version being used.

System Status

Shows VoIP statistics for the period of time since the SmartLink 4020 was last reloaded (either by powering the unit off and then on again, or by selecting *System > Reload*).

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.

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Status

Shows the status of key WAN network settings as configured under *WAN settings*

Interface Status

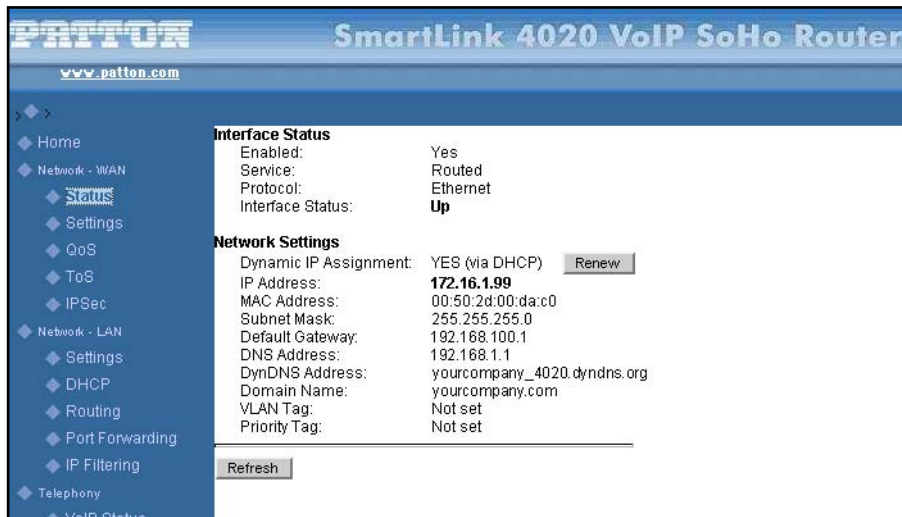


Figure 5. Internet Status window

Enabled

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

Service

Either *Routed* or *Bridged*, displays whether the SmartLink's WAN interface connection is operating in a routed or bridged mode.

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 interface.

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 name of the SmartLink.

DNS address

Refers to the address of your domain name server that was defined under WAN settings or that was learned dynamically through DHCP.

DynDNS address

The IP address of the dynamic DNS server that will be notified when the SmartLink 4020's dynamic IP address changes.

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 32)
- WAN PPPoE Configuration (see [figure 7](#) on page 33)
- MAC Spoofing Configuration (see [figure 9](#) on page 34)
- MTU (see [figure 10](#) on page 35)
- Internet VLAN Configuration (see [figure 9](#) on page 34)

Note After configuring the sections, click the **Save Internet Settings** button (see [figure 5](#) on page 30) to save the new configuration.

Internet Configuration

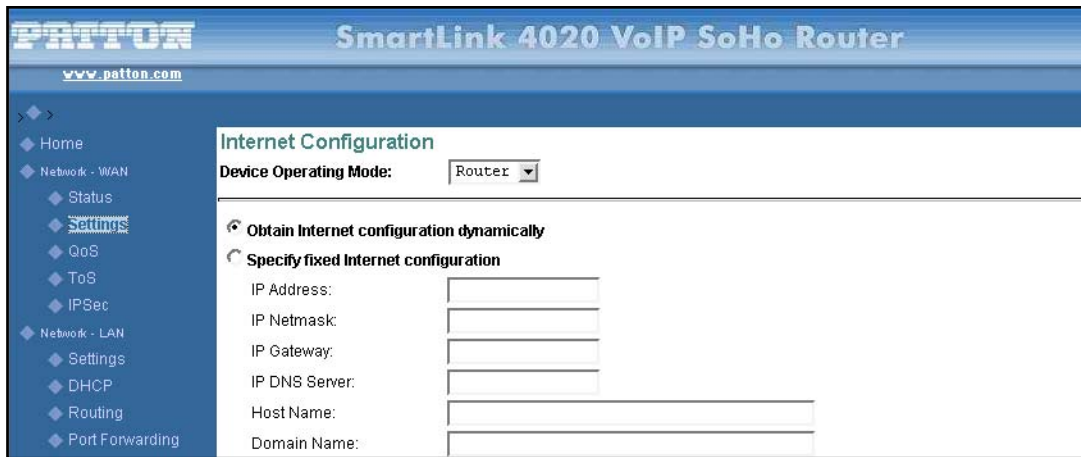


Figure 6. Internet Configuration section of the Settings window

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 *SL4020.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 *SL4020.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

The screenshot shows the 'WAN PPPoE Configuration' window. At the top, there is a title bar. Below it, the 'Enable PPPoE' option is set to 'No' with a dropdown arrow. The 'Authentication' section contains two text input fields: 'Username' and 'Password'. The 'Settings' section contains five text input fields: 'Idle Timeout' (with 'minutes' to its right), 'Echo Timeout' (with 'seconds' to its right), 'Echo Count', 'Service Name', and 'AC Name'.

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 sending PPP echo requests to server.

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

Service Name. PPPoE Service name

AC Name. PPPoE access concentrator (AC) name

Dynamic DNS

The SL4020 supports Dynamic DNS for use in environments where the IP address of WAN IP interface is not assigned statically (i.e. permanently) but instead is assigned dynamically using protocols like DHCP.

With a statically assigned IP addresses, DNS is used to establish a fixed relationship between an IP address a DNS name (example: 209.22.110.3 = joe@patton.com). The DNS name allows the IP device, like a phone attached to an SL4020, to be found by the DNS name (joe@patton.com) anywhere on the Internet.

Prior to Dynamic DNS, dynamically assigned IP address changes could not be automatically reflected in DNS. As a result, VoIP devices like the SL4020 could not always be located on the Internet by DNS name. This is especially true for cable modem and ADSL services that use DHCP to assign addresses to customers.

With Dynamic DNS, the SmartLink 4020 will inform the dynamic DNS server of its IP address when it receives a new or dynamically assigned IP address from the network. This allows the SL4020 to always be

found using a fixed DNS name when the IP address changes. With Dynamic DNS cable modem and ADSL users can be found on the Internet using a DNS name.

The DNS server used for registration is operated by Dynamic Network Services, Inc., Dynamic DNS (DynDNS). You can find detailed information about the company and the services it offers on the webpage www.dyndns.org. The company offers different levels of service. The basic services are offered free of charge, while the more advanced services are fee-based.

Dynamic DNS Service	
Choose Server:	Null
Hostname:	<input type="text"/>
Username:	<input type="text"/>
Password:	<input type="password"/>

Figure 8. Dynamic DNS Service window

Configuring Dynamic DNS

1. Select *System > Configuration*.
2. **Choose Server:** To enable DynamicDNS, select the name of the DYNDNS service from the drop-down menu (see [figure 8](#)).
3. **Host Name:** The host name is the name of the SL4020 as registered on the DYNDNS service.
4. **Username:** The user name is the user name as registered on the Dynamic DNS service.
5. **Password:** The password is the password as registered on the Dynamic DNS service.

MAC Spoofing Configuration

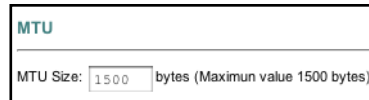
MAC Spoofing Configuration	
WAN MAC Address (Spoofed):	<input type="text"/>
MTU	
MTU Size:	1500 bytes (Maximum value 1500 bytes)
WAN VLAN Configuration	
WAN VLAN Tag:	<input type="text"/>
WAN Priority Tag:	<input type="text"/>
Save Internet Settings	

Figure 9. MAC Spoofing Configuration section of the Settings window

WAN MAC Address (Spoofed)

Only available when the unit is using 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 hardware value of MAC

MTU Size



MTU

MTU Size: bytes (Maximum value 1500 bytes)

Figure 10. MTU section of the Settings window

MTU (Maximum Transfer Unit) Size

The size limit (bytes) of the packet for all outgoing packets.

WAN VLAN Configuration

The SmartLink 4020 can mark outgoing Ethernet frames on the WAN interface with VLAN and priority tags. Other devices on the LAN can use the tags to control how frames from the SmartLink 4020 are processed. All data leaving the SmartLink 4020 will be marked with the specific value unless overridden on the telephony VLAN configuration settings.



WAN VLAN Configuration

WAN VLAN Tag: WAN Priority Tag:

Figure 11. WAN VLAN Configuration section of the Settings window

WAN VLAN Tag (IEEE 802.1q)

IEEE 802.1q Ethernet VLAN tag for all outgoing packets on WAN Ethernet interface. The value should be between 0 and 4094.

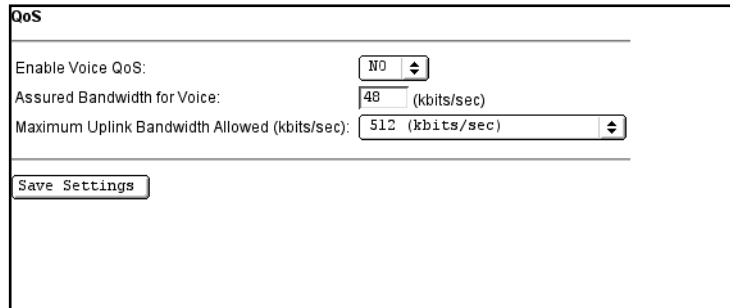
WAN Priority Tag (IEEE 802.1p)

IEEE 802.1p Ethernet Priority tag for all outgoing packets on WAN Ethernet 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 9](#) on page 34) to save all changes.

QoS (Quality of Service)



QoS

Enable Voice QoS: NO

Assured Bandwidth for Voice: 48 (kbits/sec)

Maximum Uplink Bandwidth Allowed (kbits/sec): 512 (kbits/sec)

Save Settings

Figure 12. QoS window

Enable Voice QoS

Enable or disable the voice quality of service function. When QoS is enabled, the SmartLink 4020 will prioritize and rate-limit the introduction of voice and data traffic onto the WAN interface.

Assured Bandwidth for Voice

This parameter defines the guaranteed bandwidth for voice traffic on the WAN interface (in kbits/sec).

Maximum Uplink Bandwidth Allowed

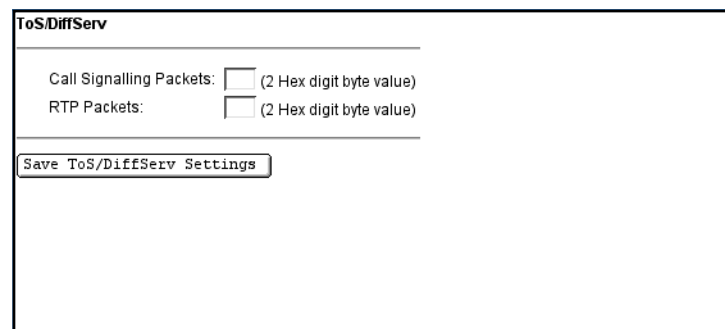
The maximum uplink bandwidth that can be allocated to voice traffic.

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.



ToS/DiffServ

Call Signalling Packets: (2 Hex digit byte value)

RTP Packets: (2 Hex digit byte value)

Save ToS/DiffServ Settings

Figure 13. 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.

Chapter 5 **Network – LAN**

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Settings

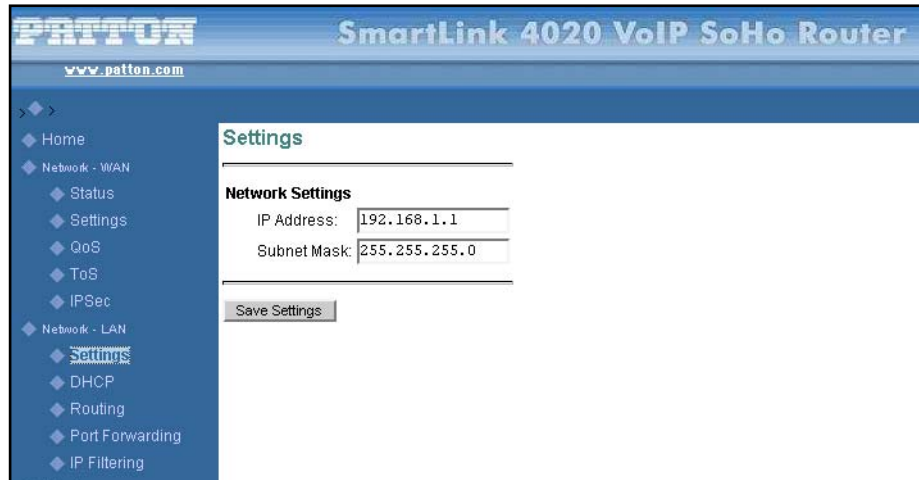


Figure 14. Network Settings window

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 SmartLink 4020's internal DHCP server that will provide IP network information to LAN attached devices.

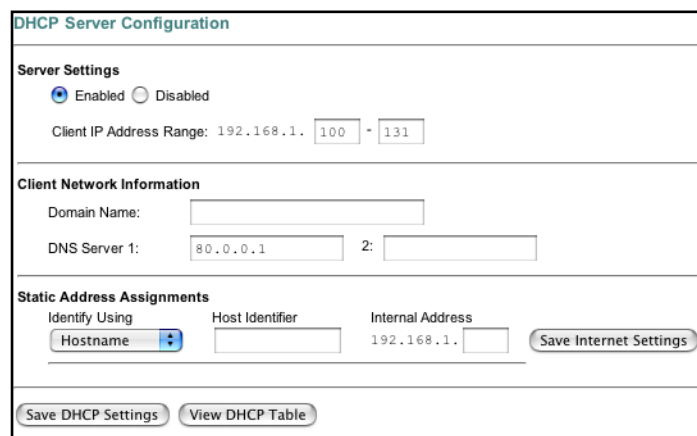


Figure 15. DHCP Server Configuration window

Server Settings

Select *Yes* to enable or *No* to disable DHCP. When enabled, the SmartLink 4020 will act as a DHCP server to devices connected to the SmartLink 4020 LAN port.

Client IP Address Range

Minimum and maximum limits on the range of IP addresses that will be allocated by DHCP to LAN attached devices. The IP addresses included in the block should not be statically assigned to non-DHCP devices on the LAN. The network portion of the *Client IP Address Range* is determined by the IP address and subnet mask specified under *Network—LAN* settings.

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 as host identifier the LAN device's host name (must be unique in the private network) and/or MAC address. Specify the IP address to be assigned and press the **Add** button.

Viewing the DHCP Client Table

Click the **View DHCP Table** button to display the *DHCP Client Table* (see [figure 16](#)).

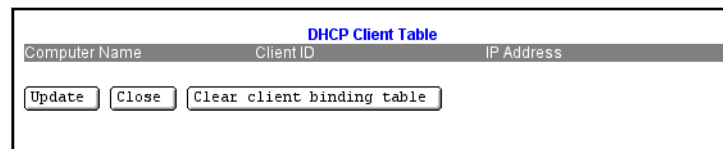


Figure 16. DHCP Client Table window

The **Update** button refreshes the displayed DHCP client table.

The **Close** button closes the open window and returns to the main menu.

The **Clear client binding table** button clears all dynamically assigned IP addresses on the SmartLink 4020 DHCP server.

Saving your work

When you are finished configuring DHCP server settings, click the **Save DHCP Settings** button (see [figure 15](#) on page 39) to save the changes.

Routing

These configuration parameters are for the internal router.

Note These parameters only apply when the *Device Operating Mode* is set to *Router* (see section “[Device Operating Mode](#)” on page 32).

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](#)).

Routing Table						
Subnet Mask	Gateway IP	Dest IP Address	Metric	Interface	Flags	
0.0.0.0	209.49.110.1	209.49.110.1	3	IF1	SD	
0.0.0.0	209.49.110.1	0.0.0.0	2	IF1	RD	

Update Close

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 41) 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 WAN interface. Typically this is used to block access to the Internet

Saving your work

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

Chapter 6 **Telephony**

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Call Return	57
Do Not Disturb	57
Self Caller ID Block	57
Outgoing Call Block	57
Dial Out Type	57
Dial Out Type	57
Hot Line Number	57
Warm Line Number	58
Call Forward Settings	58
Cfwd All Dest	58
Cfwd Busy Dest	58
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VoIP Status



Figure 21. VoIP Status window

VoIP Server Registration Status

Current Server

Shows the current VoIP server that has been pre-defined or has been discovered using DNS service records (DNS-SRV).

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, if the usernames are subscribed to voicemail and have messages waiting, and the caller ID setting. The messages waiting will indicate the number of new messages, old messages, new urgent messages and old urgent messages.

Registration Status

Shows the currently operational status of the phones 1 and phones 2. The following registration status values may be displayed:

- **Online**—The phone line is online, registered with the SIP server and ready to send and receive phone calls using the SIP server.
- **Registering**—The SmartLink 4020 is in the process of registering with the VoIP server.

- **No Registration**—The SmartLink 4020 is not attempting to register with the SIP server because “Send Registration Request” is not checked on SIP sever setting screen.
- **Error: Not Authorized**—A SIP final status message status of 401 or 407 has been received from the SIP server.
- **Error: Forbidden**—SIP final status message status of 401 or 407 has been received from the SIP server.
- **Error 408: Request timeout**— A SIP final status message status of 408 has been received from the SIP server.
- **Response: xxx**—A SIP final status message status of xxx has been received from the SIP server.

User Name

The authentication username that was specified under section “[Phone 1 & Phone 2](#)” on page 54. This user name will be used to register with the VoIP server.

Caller ID Setting

The Caller ID name setting that was specified under section “[Phone 1 & Phone 2](#)” on page 54. This is the display name that others will see as your caller id when you make a call.

Subscribed for Voicemail

Shows if the SIP Subscribe message was successful for this phone line. If “Yes”, then the subscription process was successful. The number of voicemail messages in the queue will not be provided if the subscription for voice mail fails.

Messages waiting

After successful subscription to the SIP server, the SIP server/Internet Telephony service provider should send the number of voicemail messages that are queued up for the user using the SIP Notify message. The messages waiting shows the number of normal priority new messages, normal priority old (listened to) messages, number of urgent priority new voicemail messages and the number of old (listened to) urgent priority voicemail messages as reported to the SmartLink 4020 by the VoIP SIP server.

SIP

The *SIP* window contains the following sections:

- SIP Configuration (see [figure 22](#) on page 49)
- SIP Extensions (see [figure 24](#) on page 50)
- RTP Telephone Event Configuration (see [figure 25](#) on page 50)
- VoIP VLAN Configuration (see [figure 26](#) on page 51)
- SIP Parameters (see [figure 27](#) on page 51)
- NAT Traversal (see [figure 28](#) on page 52)

Note After configuring the sections, click the **Save SIP Settings** button (see [figure 28](#) on page 52) to save the new configuration.

SIP Configuration

SIP Configuration

SIP Server Settings (Current Server: `patsip.patton.com` : 5060 ; Domain: `patton.com`; Base RTP Port:)

* SIP Registration Server Address: [] (IP or FQDN)

SIP Port: []

SIP Domain: `yourdomain.com`

Voice Port: []

* Leaving a setting blank will force the unit to use the information obtained via DHCP and/or DNS

Send Registration Request with Expire Time: `3600`

Send Unregistration at boot

Send SUBSCRIBE.

SUBSCRIBE Server IP or FQDN(defaults to registration server): []

Figure 22. 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
- Send Registration Request with Expire Time—If selected, determines the amount of time (in seconds) that the SIP registration will be valid for.
- Unregistration—If checked, the SmartLink will send a SIP unregister at system reload before sending a SIP registration request.
- Send SUBSCRIBE—If checked, the SmartLink will send a SIP *subscribe* to the server specified. This box must be checked for the voicemail message counted and message waiting notification to work.
- SUBSCRIBE Server IP or FQDN—The IP address or fully qualified domain name of the subscription service. If not specified, the SIP subscribes to the SIP server.

Gateway Settings

Dial Plan: []

Figure 23. Gateway Settings section of the SIP window

Gateway Settings

Dial Plan. Refer to appendix C, “Dial plans” on page 93

SIP Extensions

Figure 24. SIP Extensions section of the SIP window

Support PRACK method

Select to enable SIP provisional acknowledgement (PRACK) support as defined in RFC 3262.

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

When checked, calls will be held using the call hold method described in RFC 2543. If unchecked, the call hold would follow the RFC 3263 method.

Send NOTIFY

Send out SIP 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.

VoIP VLAN Configuration

Call Signalling Packets
VLAN Tag:

RTP Packets
VLAN Tag:

Figure 26. VoIP VLAN Configuration section of the SIP window

SIP Parameters

SIP Parameters

Hook Flash MIME Type:

SIP Timer Values (msec)

SIP T1: SIP T2:

SIP T4:

RTP Parameters

RTP Port Min: RTP Port Max:

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 (milliseconds)

SIP T1. RFC 3261 T1 value (RTT estimate). Range: 0–64000 milliseconds (default is 5000 msec or 5 seconds).

SIP T2. RFC 3261 T2 value (maximum retransmit interval for non-INVITE requests and INVITE responses). Range: 0–64000 milliseconds (default is 4000 msec or 4 seconds).

SIP T4. RFC 3261 T4 value (maximum duration a message will remain in the network). Range: 0–64 seconds (default is 5000 msec or 5 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

The screenshot shows a configuration window titled "NAT Traversal". It contains four radio button options: "Outbound Proxy IP:" with an input field and "(IP or FQDN)" label, "Outbound Proxy Port:" with an input field, "Stun Server IP:" with an input field and "(IP or FQDN)" label, and "Stun Server Port:" with an input field. Below these are three radio button options: "UPnP", "NONE" (which is selected), and a "Save SIP Settings" button at the bottom.

Figure 28. NAT Traversal section of the SIP window

Outbound Proxy IP

Type the fully qualified domain name for the outbound proxy server, or type the 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

Enter the fully qualified domain name for the stun server, or type the IP address provided by your service provider.

Stun Server Port

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

UPnP

Universal 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

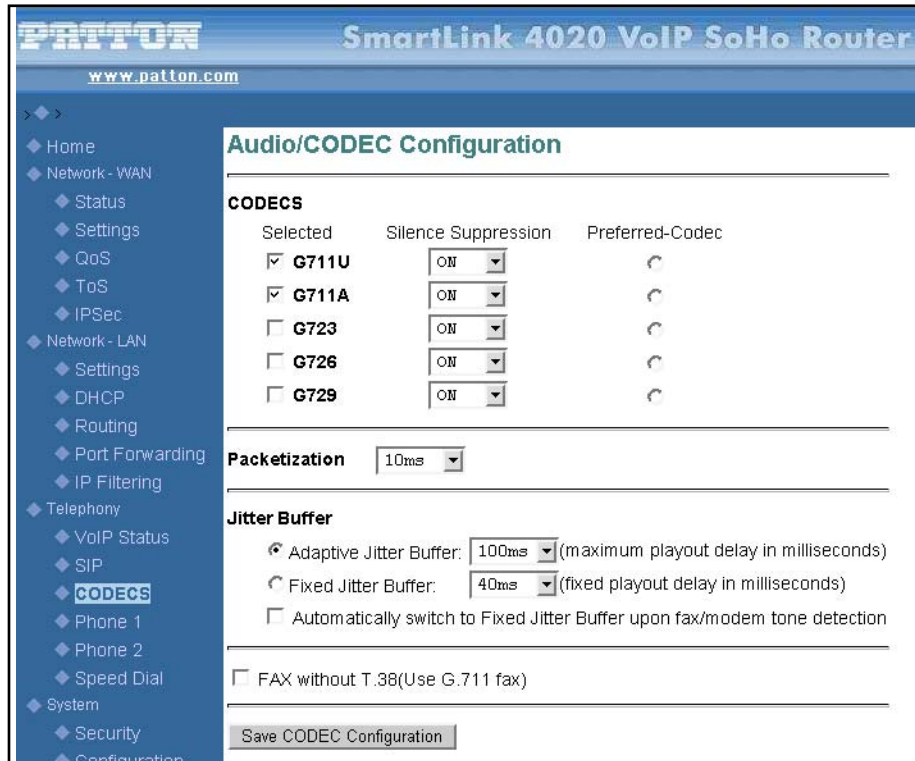


Figure 29. Audio/CODEC Configuration window

CODECS

- *Selected* column: Check the codecs that are acceptable to use
- *Silence Suppression* column: Specifies whether silence suppression should be turned on in the SmartLink 4020.
- *Preferred-Codec* column: Select the codec to be used as the first choice when encoding voice

Packetization

Configure the packet sending increment.

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

FAX without T.38 (Use G.711 fax)

When checked, T.38 is disabled and the SL4020 will not attempt T.38 session negotiation for fax transmissions initiated by the originator of the fax. The fax transmissions will be transported using G.711 fax pass-through. The selection of T.38 or G.711 fax pass-through for fax transmissions originated from the SL4020 will be determined by the receiving fax device. T.38 is enabled by default.

To disable T.38, go to *Telephony > CODECS* and select *FAX without T.38 (Use G.711 fax)* (see [figure 29](#) on page 53).

Saving your work

When you are finished configuring CODEC settings, click the **Save CODEC Configuration** button (see [figure 29](#) on page 53) 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 56)
- Dial Out Type (see [figure 32](#) on page 57)
- Call Forward Settings (see [figure 26](#) on page 51)
- Selective Call Forward Settings (see [figure 27](#) on page 51)
- Incoming Call Block (see [figure 28](#) on page 52)
- Distinctive Ring Settings (see [figure 28](#) on page 52)
- HTTP Digest Setting (see [figure 28](#) on page 52)

Note After configuring the sections, click the **Save** button (see [figure 37](#) on page 59) to save the new configuration.

User Information

User Information			
Phone Number	<input type="text" value="jerry"/>	CallerID Name	<input type="text" value="mike"/>
User Name	<input type="text" value="jerry"/>	Password	<input type="text" value="****"/>
Port	<input type="text" value="5060"/>	SIP Registration status	Registered
Supplementary Services Activation			
Service	Enable?	Service	Enable?
Call Forward All	<input type="button" value="No"/>	Call Forward on Busy	<input type="button" value="No"/>
Selective Call Forward	<input type="button" value="No"/>	Conditional Call Forward	<input type="button" value="No"/>
Three Way Conferencing	<input type="button" value="Yes"/>	Call Waiting	<input type="button" value="Yes"/>
Incoming Call Block	<input type="button" value="Yes"/>	Anonymous Call Reject	<input type="button" value="No"/>
Distinctive Ring	<input type="button" value="No"/>	Caller ID	<input type="button" value="Yes"/>
Call Transfer	<input type="button" value="Yes"/>	Call Return	<input type="button" value="Yes"/>
Dialing by IP Address	<input type="button" value="No"/>	Do Not Disturb	<input type="button" value="No"/>
Speed Dial	<input type="button" value="No"/>	Self Caller ID Block	<input type="button" value="No"/>
Message Waiting Indicator	<input type="button" value="Yes"/>	Outgoing Call Block	<input type="button" value="Yes"/>

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

Phone Number

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

User Name

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

Port

Specify the signaling port.

CallerID Name

Enter the caller ID name.

Password

Enter the password.

Supplementary Service Activation

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 70 for details).

Supplementary Services Activation			
Service	Enable?	Service	Enable?
Call Forward All	No	Call Forward on Busy	No
Selective Call Forward	No	Conditional Call Forward	No
Three Way Conferencing	Yes	Call Waiting	Yes
Incoming Call Block	Yes	Anonymous Call Reject	No
Distinctive Ring	No	Caller ID	Yes
Call Transfer	Yes	Call Return	Yes
Dialing by IP Address	No	Do Not Disturb	No
Speed Dial	No	Self Caller ID Block	No
Message Waiting Indicator	Yes	Outgoing Call Block	Yes

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

Call Forward All

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

Selective Call Forward

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 Conferencing

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

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

Distinctive Ring

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

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

Dialing by IP Address

Enable IP dialing service—This service allows user IP addresses to be used to make calls.

Speed Dial

Enable speed dial service.

Message Waiting Indicator

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.

Call Forward on Busy

Enable call forward on busy service.

Conditional Call Forward

Enable call forward selective service.

Call Waiting

Enable call waiting service.

Anonymous Call Reject

Enable block anonymous calls service—When enabled, calls from anonymous callers will be blocked.

Caller ID

Enable caller ID service.

Call Return

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

Do Not Disturb

Enable do not disturb service.

Self Caller ID Block

Enable blocking self caller ID shown in the outgoing message.

Outgoing Call Block

Enable blocking of outgoing calls based on the digit pattern specified under outgoing call block.

Dial Out Type



The screenshot shows a configuration window titled "Dial Out Type". It contains three fields: "Dial Out Type:" with a dropdown menu currently showing "NORMAL", "Hot Line Number:" with an empty text input field, and "Warm Line Number:" with a text input field containing the number "227".

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

Dial Out Type

Enable Hot-Line and Warm-Line services. To achieve this, one sequence in the dial 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 delay period after the telephone goes off-hook for the user to dial a number different than that specified for the warm line. If the delay period has expired with no number being dialed, the warm line number will be dialed. The delay period is set under *System > Localization*.

Call Forward Settings

Call Forward Settings			
Cfwd All/Conditional Dest:	<input type="text" value="611"/>	Cfwd Busy Dest:	<input type="text" value="211"/>
Cfwd Conditional Time:	<input type="text" value="5"/> sec		

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

Selective Call Forward Settings			
Incoming caller #1	<input type="text" value="lukan"/>	forward destination #1	<input type="text" value="482"/>
Incoming caller #2	<input type="text" value="joe@yourcompany.com"/>	forward destination #2	<input type="text" value="413"/>
Incoming caller #3	<input type="text"/>	forward destination #3	<input type="text"/>
Incoming caller #4	<input type="text"/>	forward destination #4	<input type="text"/>
Incoming caller #5	<input type="text"/>	forward destination #4	<input type="text"/>
Incoming caller #6	<input type="text"/>	forward destination #4	<input type="text"/>
Incoming caller #7	<input type="text"/>	forward destination #7	<input type="text"/>
Incoming caller #8	<input type="text"/>	forward destination #8	<input type="text"/>

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



Incoming Call Block
Block Caller ID:

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

Block Caller ID

Specify a Caller ID for call block.

Outgoing Call Block

Outgoing call block allows for the blocking of an outbound call based on the digit pattern dialed. For example: outbound call blocking may be used to prevent an end user from dialing long distance or toll calls. Outbound call blocking uses the same digit matching process as the dial plan described in appendix C, “Dial plans” on page 93.



Outgoing Call Block
Digit Pattern:

Figure 36. Incoming Call Block section of Phone 1 or Phone 2 window

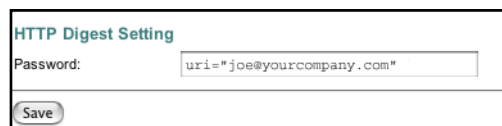
Digit Pattern

The *Digit Pattern* box is where you can specify the outgoing call block pattern.

Example: Specifying an outgoing call block pattern of *002|009|0204* will block all outbound calls to numbers 002, 009, or 0204.

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.



HTTP Digest Setting
Password:

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

The screenshot shows the 'Speed Dial Settings' window for a Patton SmartLink 4020 VoIP SoHo Router. The interface includes a left sidebar with navigation options: Home, Network - WAN, Network - LAN, Telephony (with sub-items: VoIP Status, SIP, CODECS, Phone 1, Phone 2, and Speed Dial), System, Documentation, and Logout. The main content area is titled 'Speed Dial Settings' and is divided into two sections: 'Line 1 Speed Dial Settings' and 'Line 2 Speed Dial Settings'. Each section contains eight rows of input fields for 'Speed Dial 1' through 'Speed Dial 8', each with a 'Phone Number/IP Dialing' field, an '@' symbol, and a colon. In the Line 1 section, the first field contains 'bill' and the second contains 'yourcompany.com'. A 'Save Settings' button is located at the bottom of the window.

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**

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Set Security Password

The screenshot shows the web interface for the SmartLink 4020 VoIP SoHo Router. The title bar reads 'SmartLink 4020 VoIP SoHo Router' and 'www.patton.com'. The left navigation menu is expanded to 'System' > 'Security'. The main content area is titled 'Set Security Password' and contains the following fields:

- Web Page Protect: YES (dropdown menu)
- New Root Password: [text input field]
- Confirm new password: [text input field]
- New User Password: [text input field]
- Confirm new password: [text input field]

A 'Done' button is located at the bottom of the configuration area.

Figure 39. Set Security Password window

Two levels of system configuration are available: user level and system level. Access to each level is password controlled.

Web Page Protect

Enable or disable web access protection. When set to *YES*, a password will be required to access the SmartLink 4020 web configuration interface.

New Root Password

Type the administrator's password.

New User Password

Type the user's password.

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. During normal operations, Syslog should be turned off. A sample Syslog record of a complete call is shown below.

SYSLOG

```

11-09-2005  11:28:17      Local0.Info           209.49.110.185  Nov 09
08:28:34 syslog: [1234] On-Hook [7190]
11-09-2005  11:28:06      Local0.Info           209.49.110.185  Nov 09
08:28:23 syslog: [1234] Call-Out [7190]
11-09-2005  11:27:50      Local0.Info           209.49.110.185  Nov 09
08:28:07 syslog: [1234] Call-Out [190]
11-09-2005  11:16:32      Local0.Info           209.49.110.185  Nov 09
08:16:49 syslog: [1234] On-Hook [555]
11-09-2005  11:16:16      Local0.Info           209.49.110.185  Nov 09
08:16:33 syslog: [1234] Call-Out [7190]
11-09-2005  11:15:38      Mail.Emerg            209.49.110.185  Jan 01
00:00:00 syslog: DownloadConfig:No, DownloadImage:No
11-09-2005  11:15:36      Local0.Info           209.49.110.185  Jan 01
00:00:00 syslog: Check Autoupgrade

```

Syslog Server

Specify the syslog server IP address or DNS name. This feature specifies the server for logging SmartLink 4020 system information and critical events.

Enable Debug

Enable or disable System Debug.

Debug Server

The debug server IP address and port. This specifies the server for logging SmartLink 4020 debug information. Debug information can be sent to a syslog server. A sample record of debug output is shown below:

SYSLOG

```

07-07-2005 14:49:09 Local7.Debug 10.10.22.13 **EndPoint State: StateConnect ==> StateOnHook
  in src/common/endpoint.c: 333
07-07-2005 14:49:09 Local0.Info 10.10.22.13 Jul 07 11:49:09 syslog: [usersjphone] On-Hook
  [100]
07-07-2005 14:49:03 Local7.Debug 10.10.22.13 !!!! Handset 349b4 received event 52 in file src/
  common/fxs/ConnectFxs.c line 466
07-07-2005 14:48:59 Local7.Debug 10.10.22.13 The EnvetAddress is f and length is 1.
07-07-2005 14:48:59 Local7.Debug 10.10.22.13 **EndPoint State: StateWaiting ==> StateConnect
  in src/common/fxs/WaitingFxs.c: 116
07-07-2005 14:48:59 Local7.Debug 10.10.22.13 call 468bc ==>CallChangeState():: from
  CALL_ALERT to CALL_CONNECT in file src/common/fxs/WaitingFxs.c line 114
07-07-2005 14:48:59 Local7.Debug 10.10.22.13 APP rcv rsp 200 of req 32769
07-07-2005 14:48:59 Local7.Debug 10.10.22.13 call 468bc ==>CallChangeState():: from
  CALL_OUTGOING to CALL_ALERT in file src/common/fxs/WaitingFxs.c line 58
07-07-2005 14:48:59 Local7.Debug 10.10.22.13 APP rcv rsp 180 of req 32769
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 !!!! Handset 349b4 received event 26 in file src/
  common/fxs/WaitingFxs.c line 212
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 APP rcv rsp 100 of req 32769
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 **EndPoint State: StateOffHook ==> StateWaiting
  in src/common/fxs/OffHookFxs.c: 418
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 Dial numbers is 100
07-07-2005 14:48:58 Local0.Info 10.10.22.13 Jul 07 11:48:58 syslog: [usersjphone] Call-Out
  [100]
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 call 0 ==>CallChangeState():: from CALL_IDLE to
  CALL_OUTGOING in file src/common/call.c line 80
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 Codec[2]=8
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 Codec[1]=18
07-07-2005 14:48:58 Local7.Debug 10.10.22.13 Codec[0]=0
07-07-2005 14:48:54 Local7.Debug 10.10.22.13 The EnvetAddress is 100 and length is 3.
07-07-2005 14:48:53 Local7.Debug 10.10.22.13 The EnvetAddress is 10 and length is 2.
07-07-2005 14:48:53 Local7.Debug 10.10.22.13 The EnvetAddress is 1 and length is 1.
07-07-2005 14:48:51 Local7.Debug 10.10.22.13 **EndPoint State: StateOnHook ==> StateOffHook
  in src/common/fxs/OnHookFxs.c: 55

```

Debug Connect Port

The port number of the debug server to be used for receiving debug messages from the SmartLink 4020. Use port 412 to send debug output to a syslog server.

Saving your work

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

Service Access

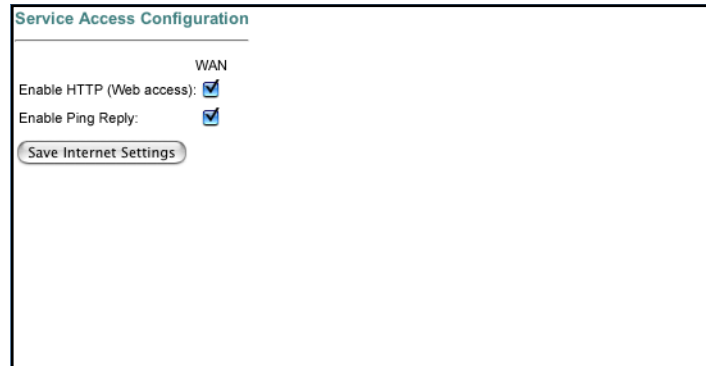


Figure 41. Service Access window

Enable HTTP

When checked access to the web configuration interface (HTTP) of the SmartLink 4020 through the WAN interface port is enabled.

Note If the *Enable HTTP* option is not checked, your WAN service provider will no longer be able to access the SmartLink 4020 to make configuration changes.

Enable Ping Reply

When checked, the SmartLink 4020 will reply to ping requests received on the WAN port. If the option is not checked, the SmartLink 4020 will not respond to ping requests received on the WAN port.

Saving your work

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

Localization

The *Localization* window contains the following sections:

- Call Progress Tones (see [figure 42](#) on page 68)
- Distinctive Ring Setting (see [figure 43](#) on page 69)
- Supplementary Service Keys (see [figure 44](#) on page 71)
- Control Timer Values (see [figure 46](#) on page 74)
- FXS Port (see [figure 47](#) on page 75)
- Ring Setting (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

The dialtone, confirmation, busy, ringback and offhook warning call progress tones that are played to the handset can be set manually or the tones will be set automatically to the country specified under *Call ID method* if the checkbox, *Call Progress Tones synchronization* has been selected.

To set the call progress tones manually specify:

```
[frequency 1]@[Energy 1]+[frequency 2]@[Energy 2]#ON([ms]),OFF([ms]),R
```

Where:

- *Frequency 1* and *frequency 2* are the frequency of the tone to be played.
- *Energy 1* and *energy 2* are the energy level of the tone to be played in dBm.
- *ON(ms)* is the duration that the tone will be played in milliseconds.
- *OFF(ms)* is the duration of the pause between cycles of playing the tone.
- *R* indicates the tone should be repeated using the ON and OFF durations specified

To specify a 350-Hz and 480-Hz tone that will be played at 15 dB for one second and then pause for 0.5 seconds, you would specify:

```
350@-15+480@-15#ON(1000),OFF(500),R
```

The following example would repeat playing of a tone of 280 Hz at -8 dBm for 0.3 seconds with a pause of 0.1 second and a tone of 550 Hz for 0.8 seconds with a pause of 0.15 seconds.

```
280@-8+550@-20#ON(300),OFF(100),ON(800),OFF(150),R
```

Localization	
Call Progress Tones	
DIALTONE	330@-13+440@-13#ON(1000),R
CONFIRM	350@-13+440@-13#[ON(100),OFF(100)]3,OFF(1000),R
BUSY	440@-13#ON(500),OFF(500),R
RINGBACK	440@-13#ON(1500),OFF(3500),R
OFF HOOK WARNING	1400@-3+2060@-3+2450@-3+2600@-3#ON(100),OFF(100),R

Figure 42. 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

The SmartLink 4020 Distinctive Ring Settings window (see [figure 43](#)) enables you to specify up to 8 sets of distinctive ring cadences.

Distinctive Ring Settings	
Ring 1 Cadence:	<input type="text"/>
Ring 2 Cadence:	<input type="text" value="ON(800),OFF(400),ON(800),IDLE(400)"/>
Ring 3 Cadence:	<input type="text" value="ON(300),OFF(200),ON(1000),OFF(200)"/>
Ring 4 Cadence:	<input type="text"/>
Ring 5 Cadence:	<input type="text"/>
Ring 6 Cadence:	<input type="text"/>
Ring 7 Cadence:	<input type="text"/>
Ring 8 Cadence:	<input type="text"/>

Figure 43. Distinctive Ring Setting section of Localization window

The following is a sample ring cadence pattern 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

```

Note The Bellcore standard ring cadence patterns are shown in [table 2](#).

Table 2. 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	

Supplementary Service Keys

Supplementary Service Keys are key sequences that can enable and disable certain calling features from an analog phone handset attached to the SmartLink 4020.

Note The supplementary service keys must begin with a ‘*’,#’ character, or f (flash hook) and follow a 1 or 2 numeric digit(s).

Supplementary Service Keys		
	Enable Sequence	Disable Sequence
Call forward All	*97	#97
Call forward on Busy	*98	#98
Call forward selective	*96	#96
Call Waiting	*91	#91
Incoming Call Block	*95	#95
Block Anonymous Calls	*94	#94
Distinct Ring	*90	#90
Warm Line	*99	#99
Do Not Disturb	*82	#82
IP Dialing	*80	#80
Speed Dialing	*81	#81
Incoming Caller ID	*92	#92
Self Caller ID Block	*93	#93

Figure 44. Supplementary Service Keys section of Localization Window

Call forward All

Enables or disables the unconditional call forwarding feature.

Call forward on Busy

Enables or disables the call forwarding on busy feature.

Call forward selective

Enables or disables the call forwarding on busy feature.

Call Waiting

Enables or disables the call waiting feature.

Incoming Call Block

Enables or disables the blocking of incoming calls based on the phone number of the caller feature.

Block Anonymous Calls

Enables or disables the blocking of incoming calls that are using the anonymous caller ID feature.

Distinctive Ring

Enables or disables the distinctive ring tones based on the phone number of the calling party feature.

Warm Line

Enables or disables the warm line calling feature.

Do Not Disturb

Enables or disables the do not disturb feature.

IP Dialing

Enables or disables dialing by IP address.

Speed Dialing

Enables or disables the speed dialing feature.

Income Caller ID

Enables or disables the display of incoming caller ID feature.

Self Caller ID Block

Enables or disables the blocking of transmission of caller ID feature for outgoing calls.

Calling Prefix Keys

Calling Prefix Keys and other configuration parameters define the behavior of the calling feature.

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

Calling Prefix Keys			
Call Return	*60	Warm Line	*70
Speed Dial	*71	IP Dialing	*72
Call Forward All Destination	*73	Call Forward Busy Destination	*74
Hotline	*75	Call Hold	F1
Call Alternative	F*	Call Conference	F7
Call Conference drop	F8	Call Transfer	F4
VoiceMail dial	*86		
[Note] (f)=Flash hook			

Figure 45. Calling Prefix Keys section of Localization Window

Call Return

Automatically places a call to the number of the last call received.

Warm Line

Configures the number to call automatically after a delay period once the telephone goes off hook. To configure the warm line number enter the calling prefix key (*70 is the factory default), the number to dial and then on hook the phone. You will hear a second dial tone after entering the calling prefix key. Before using warm-line calling it must be enabled using the activate sequence defined in the supplementary service table.

Example:

*7013019751000 and on-hook the phone. When the handset is lifted, 301951000 will be called if another number is not entered within the delay period specified under *System > Localization*.

Speed Dial

Configures speed dialing keys. To configure speed dialing numbers enter the calling prefix key (*71 is the factory default), the speed dial key, the number to dial and then on hook the phone. You will hear a second dial tone after entering the calling prefix key. Speed dial calling must be enabled using the activate sequence defined in the supplementary service table.

Example:

*7123019751000 and on-hook the phone. When 2 is pressed on the telephone key pad, 3019751000 will be called.

Call Forward All

Configures the number to unconditionally forward all calls to. To configure call forward all enter the calling prefix key (*73 is the factory default), the number to dial and then on hook the phone. You will hear a second dial tone after entering the calling prefix key. Before using, *Call Forward All* must be enabled using the activate sequence defined in the supplementary service table.

Example:

*733019751000 and on-hook the phone. All calls received will forward to 3019751000.

IP Dialing

Allows direct calling using an IP address. To use calling by IP address enter the calling prefix key (*72 is the factory default), the * key, the IP address using the * key to between octets of the IP address, the * key and the port number. You will hear a second dial tone after entering the calling prefix key. Before using direct IP address dialing must be enabled using the activate sequence defined in the supplementary service table.

Example:

To place a call to IP address 192.168.1.20:5061 enter *73*192*168*1*20*5060.

Call Hold

Configures the key sequence to place a call on call on hold – The factory default is flash hook 1.

Call Waiting (call alternative)

Configures the key sequence to switch between calls. The factory default is flash hook *.

Call Conference

Configures the key sequence to conference two calls together. The factory default is flash hook 7.

Call Conference Drop

Configures the key sequence to drop the last call that was added to the conference the conference. The factory default is flash hook 8.

Call Transfer

Configures the key sequence for call transfer. The factory default is flash hook 4.

Voicemail access

Configures the key sequence for call for voicemail access. The factory default is flash hook *86. If the voicemail key sequence is entered on the phone a call will automatically be placed to the configured service provider using the configured authentication information.

Call Forward Busy Destination

Configures the number to forward calls to when busy. To configure call forward busy enter the calling prefix key (*74 is the factory default), the number to dial and then on hook the phone. You will hear a second dial

tone after entering the calling prefix key. Before using, call forward busy must be enabled using the activate sequence defined in the supplementary service table.

Example:

*743019751000 and on-hook the phone. All calls received will forward to 3019751000 when the phone is busy.

Hotline

Configures the number to call when the telephone goes off hook. To configure the hotline number enter the calling prefix key (*75 is the factory default), the number to dial and then on hook the phone. You will hear a second dial tone after entering the calling prefix key. Before using hotline calling it must be enabled using the activate sequence defined in the supplementary service table.

Example:

*753019751000 and on-hook the phone. When the handset is lifted, 3019751000 will immediately be called.

Control Timer Values

Control Timer Values			
Hook Flash Timer: (100 ~ 1100 ms)	<input type="text" value="1100"/>	ms	SIP Session Timer value: <input type="text"/>
Conditional Call Forwarding Timer:	<input type="text" value="10"/>	sec	Warm Line Delay: <input type="text" value="6000"/> ms
Interdigit Timer:	<input type="text" value="4000"/>	ms	Offhook Idle Time: <input type="text" value="8000"/> ms
Offhook Warning Tone Time:	<input type="text" value="12000"/>	ms	

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 value and the on-hook event is treated as on-hook (hanging up the call).

Minimum on-hook time before off-hook to qualify as hookflash. At less than this value, the on-hook event is ignored.

SIP Session Timer value

The amount of time the SmartLink 4020 will wait during an active call to send repeated re-invites on active calls to allow the SIP server to determine the status of a call.

Conditional Call Forwarding Timer

Specified a time period as a call forward condition. After the number of seconds specified, the conditional call forwarding process will be performed.

Warm Line Delay

Specify a time period as a delay time for warm line dialing. If warm line is enabled, then the SmartLink 4020 will wait this amount of time after the handset is off-hook before dialing the warm line phone number.

Interdigit Timer

The number of seconds the SmartLink 4020 will wait for the caller to input a subsequent digit of the dialed number. If the timer value is exceeded before the dial plan is matched (see section “Gateway Settings” on page 49), the busy tone will be played to the caller.

Offhook Idle Time

If the handset is off-hook with no dialing activity for longer than the time specified, then the busy tone will be played. The default is 6000 ms (6 seconds).

Offhook Warning tone time

If the handset is off-hook with no dialing activity for longer than the time specified, then the off-hook warning tone will be played. The default is 12000 ms (12 seconds). This value should be greater than the off-hook idle time (see section “Offhook Idle Time”).

FXS Port

Choose the correct country for a proper impedance match.

The screenshot shows the 'FXS Port' configuration section. It includes the following elements:

- FXS Port Input Gain:** A text input field followed by 'db (-12 ~ 18)'.
- FXS Port Output Gain:** A text input field followed by 'db (-12 ~ 18)'.
- Caller ID Method:** A dropdown menu currently displaying 'France'.
- "Call Progress Tones" Synchronization:** A checked checkbox.

Figure 47. FXS Port Polarity Configuration section of Localization window

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

Specifies the country-specific Caller ID format.

“Call Progress Tones” Synchronization

When “Call Progress Tones” Synchronization is selected, the Caller ID presentation method value is used to automatically set the county-specific call progress tones.

Ring Setting

The screenshot shows the 'Ring Setting' configuration section. It includes the following elements:

- Ring Waveform:** A dropdown menu currently displaying 'Sinusoid'.
- Ring Voltage:** A text input field.
- Ring Frequency:** A text input field.

Figure 48. 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.

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.

Auto Upgrade

The Smartlink 4020 family includes a configuration and firmware download manager server that allows for the updating of large numbers of SmartLink 4020s from a central location. By factory default, all SmartLink 4020 units are set with auto-update on and to access the Patton auto-update server. Many of Patton's carrier customers have chosen to setup their own auto-update server to provide service specific information for their end users. Patton recommends that end users do not change the auto-update server or set "Enable auto-upgrade" to "NO" without consulting with their service provider.

Figure 51. AutoUpgrade window

Routine Upgrade every xxx day(s)

If selected, the Smartlink 4020 will check for updates at system reload time and on a periodic basis based on the number of days selected.

Enable Auto Upgrade

Enable or disable auto upgrade—If enabled, the SmartLink 4020 will automatically check the upgrade server on a periodic basis 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`.

Saving your work

When you are finished configuring settings, click the **Save AutoUpgrade** 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. During download of new firmware images, the LEDs on the SmartLink 4020 will flash sequentially. Typically, HTTP downloads take about 5–10 minutes. After the download is completed, the download status page will be displayed.

The screenshot shows a web interface titled "Download". At the top, there is a red warning message: "Warning! The download process will reset the unit into the download mode. This will terminate all network connections and reset your browser connection." Below the warning, there are two sections for selecting a download method. The first section is "TFTP Download method (Select remote TFTP server IP address and filename)", which includes input fields for "TFTP Server IP:" and "Filename:", and a "Start TFTP Download" button. The second section is "HTTP Download method (Select filename on local browser machine)", which includes a "Filename:" input field with a "Browse..." button next to it, and a "Start HTTP Download" button.

Figure 52. Manual Upgrade window

Reload

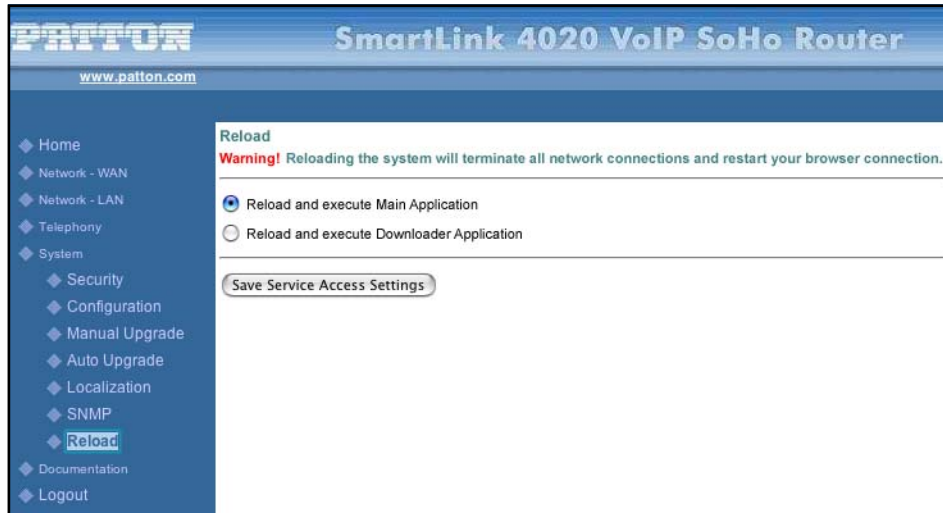


Figure 53. Reload window



Reloading the system will terminate all network connections and restart your browser connection.

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

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

Chapter 8 **Documentation**

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Introduction

Clicking the **Documentation** link (see [figure 54](#)) connects to the Patton website to display the most current version of the *SmartLink 4020 Getting Started Guide* in portable document format (PDF).



Figure 54. Documentation link

Chapter 9 Logout

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Introduction

Clicking *Logout* (see [figure 55](#)) displays *Logout—Sure to Logout?*.

If you want to exit from the SmartLink management utility, click the **Logout** button (see [figure 55](#)).



Figure 55. Logout window

You will be returned to the password verification page (see [figure 56](#)).



Figure 56. Password verification page

Chapter 10 **Contacting Patton for assistance**

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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**

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Compliance

EMC Compliance:

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

Safety Compliance

- UL 60950-1/CSA C22.2 N0. 60950-1
- IEC/EN60950-1
- AS/NZS 60950-1

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 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**

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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
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**

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 - Complex Dial Plan94

Introduction

The MGCP 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 SIP server or gatekeeper for resolution into a destination 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 under qualified (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**

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Introduction

The SmartLink 4020 family supports advanced calling features that can be turned on and off from phones attached to the SmartLink 4020 (see [table 3](#)).

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

Note F in [table 3](#) refers to the *hook flash* event.

Table 3. 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		