

User Guide

V²IU 6400-S Converged Network Appliance

April 2005

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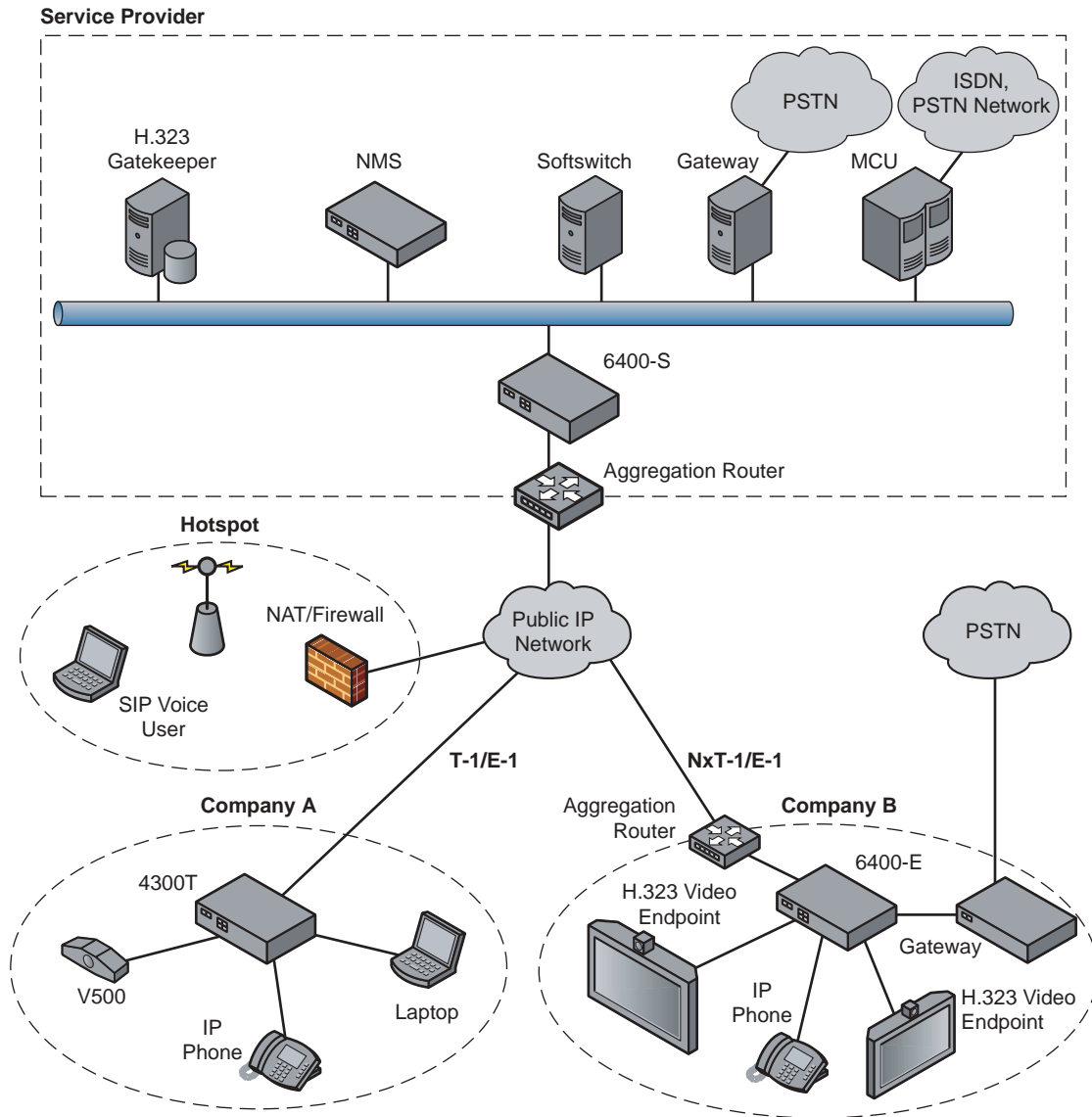
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Introduction

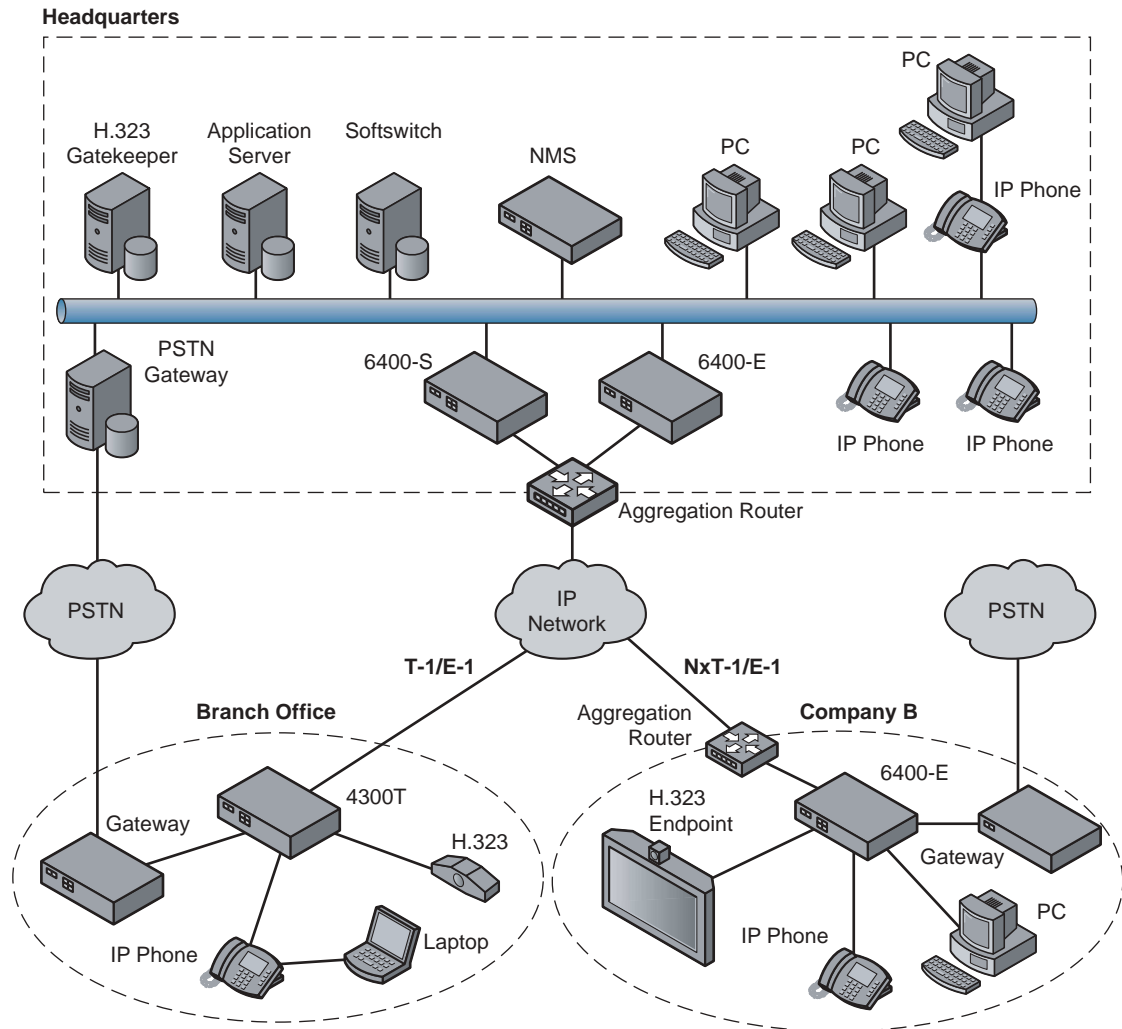
Introducing the V²IU 6400-S Converged Network Appliance

Installed at the edge of the operations center, 6400-S Series converged network appliances secure critical voice, video and data infrastructure components such as VoIP softswitches, video Gatekeepers, gateways and media servers.

The 6400-S Series converged network appliances can be deployed in service provider or enterprise environments as depicted below.



EM015A



The 6400-S is designed to protect managed VoIP service providers and enterprise customers from network-based attacks. It combines topology hiding, dynamic session admission control and stateful packet inspection to secure critical voice, video and data infrastructure components. This chapter introduces the:

- Functional features
- Hardware features
- Management features

Features

- Resolves firewall traversal problems at the Network Operations Center for VoIP by providing a VoIP application layer gateway (ALG) or voice and video aware firewall that supports SIP, MGCP and H.323
- Resolves firewall traversal problems at customer offices for VoIP by providing NAT-Traversal capability for SIP.
- Supports up to 10,000 concurrent VoIP calls or up to 85 Mbps of H.323 video traffic
- Protects the enterprise LAN using a stateful packet inspection (SPI) firewall for both voice and data traffic
- Performs static IP routing
- Provides integrated test tools to facilitate problem isolation
- Performs TFTP relay for IP phone images
- Uses a simple web based GUI for configuration and management
- Supports logging to external syslog servers and interfaces to network management systems using SNMP

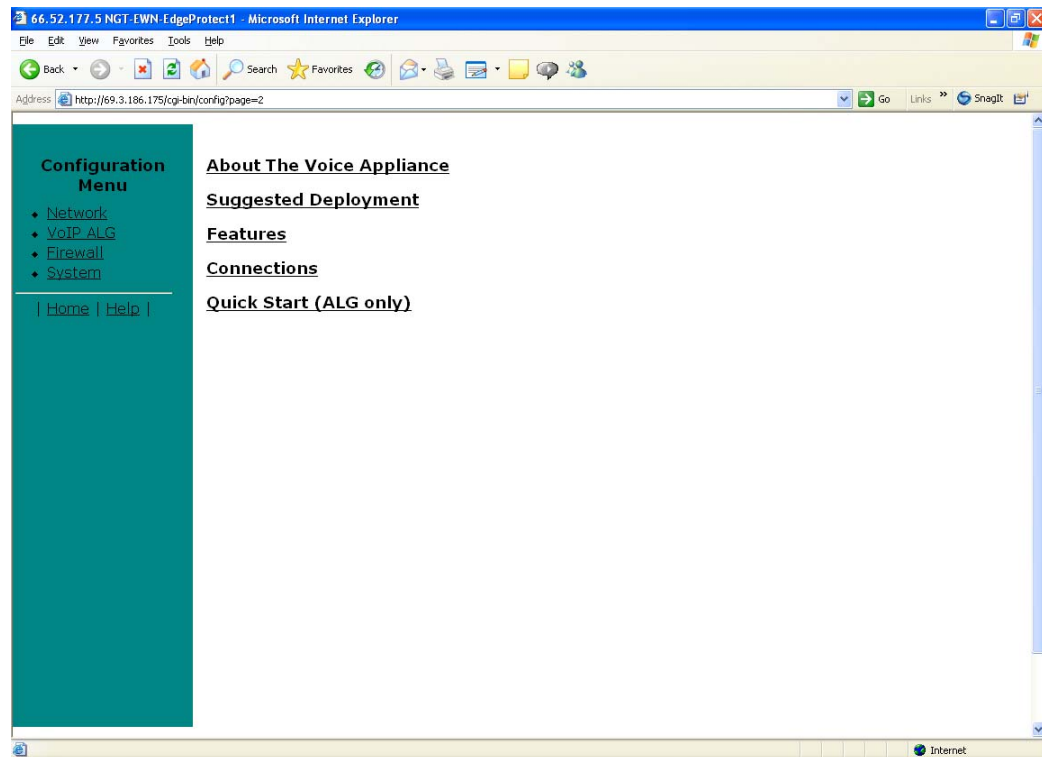
Physical Connections and Specifications

Port	Description
Subscriber (ETH0) Ethernet Port 1	This port is a 10/100/1000 auto sensing port. It is connected through an Ethernet switch to IP phones, IADs or PCs installed on the public network.
Provider (ETH1) Ethernet Port 2	This port is a 10/100/1000 auto sensing port. It is connected to the private network.
Out of Band Management Port 3	This port can be configured to allow out of band management sessions. It is typically connected to a private management network.
Console Port (COM 1)	This port is used to establish a local console session with the EdgeProtect using a VT100 terminal or emulation program. The baud rate is 9600. It is used for debug or local diagnostic purposes only.

Port	Description
Dimensions	Compact 2U design - 3.45"(H) x 17.11"(W) x 20"(D)
Weight	45 lbs (20411 grams)
Power	Dual, redundant 500W AC supplies Dual, redundant 470W DC supplies
Warranty	1 Year

Management Features

The 6400-S is configured and managed through the Configuration Menu, a web-based Graphical User Interface.



Access the Configuration Menu by entering a URL in a web browser such as Internet Explorer, Netscape, or Firefox.

Using the Configuration Menu, you can set a wide range of network services, including:

- Provider and subscriber settings and related network settings.

- Remote system logging.
- VoIP and subnet routing.
- Firewall
- Administration, maintenance and upgrading.

The following chapters give you detailed processing steps you need to set up the 6400-S.

Installing the 6400-S

Physical Installation¹

Anchor the equipment rack that will contain the 6400.

The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more systems are extended in front of the rack on slides. You must also consider the weight of any other device installed in the rack. A crush hazard exists should the rack tilt forward which could cause serious injury.

If AC power supplies are installed

Mains AC power disconnect

The AC power cord(s) is considered the mains disconnect for the 6400-S and must be readily accessible when installed. If the individual server power cord(s) will not be readily accessible for disconnection then you are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire rack, not just to the 6400-S(s). To remove all power, two AC cords must be removed.

Grounding the rack installation

To avoid the potential for an electrical shock hazard, you must include a third wire safety ground conductor with the rack installation. If the 6400-S power cord is plugged into an AC outlet that is part of the rack, then you must provide proper grounding for the rack itself. If the 6400-S power cord is plugged into a wall AC outlet, the safety ground conductor in the power cord provides proper grounding only for the 6400-S. You must provide additional, proper grounding for the rack and other devices installed in it.

¹ Intel® Telco/Industrial Grade Server TIGPR2U Product Guide

Overcurrent protection

The 6400-S is designed for an AC line voltage source with up to 20 amperes of overcurrent protection per cord feed. If the power system for the equipment rack is installed on a branch circuit with more than 20 amperes of protection, you must provide supplemental protection for the 6400-S. The overall current rating of a 6400-S configured with two power supplies is less than 4 amperes.

If DC power supplies are installed:

Connection with a DC source should only be performed by trained service personnel. The 6400-S with DC input is to be installed in a Restricted Access Location in accordance with articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70. The DC source must be electrically isolated by double or reinforced insulation from any hazardous AC source. The DC source must be capable of providing up to 650 Watts of continuous power per feed pair.

Main DC power disconnect:

You are responsible for installing a properly rated DC power disconnect for the 6400-S system. This main disconnect must be readily accessible, and it must be labeled as controlling power to the 6400-S. The circuit breaker of a centralized DC power system may be used as a disconnect device when easily accessible and should be rated no more than 10 amps.

Grounding the 6400-S

To avoid the potential for an electrical shock hazard, you must reliably connect an earth grounding conductor to the 6400-S. The earth grounding conductor must be a minimum 14AWG connected to the earth ground stud(s) on the rear of the 6400-S. The safety ground conductor should be connected to the chassis stud with a Listed closed two-hole crimp terminal with a maximum width of 0.25 inch. The nuts on the chassis earth ground studs should be installed with a 10 in/lbs torque. The safety ground conductor provides proper grounding only for the 6400-S. You must provide additional, proper grounding for the rack and other devices installed in it.

Overcurrent protection

Overcurrent protection circuit breakers must be provided as part of each host equipment rack and must be incorporated in the field wiring between the DC source and the 6400-S. The branch circuit protection shall be rated minimum 75Vdc, 10 A maximum per feed pair. If the DC power system for the equipment rack is installed with more than 10 amperes of protection, you must provide supplemental protection for the 6400-S. The overall current rating of a 6400-S configured with two power supplies is 8 amperes.

Do not attempt to modify or use an AC power cordset that is not the exact type required. You must use a power cordset that meets the following criteria:

- **Rating:** For U.S./Canada cords must be UL Listed/CSA Certified type SJT, 18-3 AWG. For outside U.S./Canada cords must be flexible harmonized (<HAR>) or VDE certified cord with 3 x 0.75 mm conductors rated 250 VAC.
- **Connector, wall outlet end:** Cords must be terminated in grounding-type male plug designed for use in your region. The connector must have certification marks showing certification by an agency acceptable in your region and for U.S. must be Listed and rated 125% of overall current rating of the 6400-S.
- **Connector, 6400-S end:** The connectors that plug into the AC receptacle on the 6400-S must be an approved IEC 320, sheet C19, type female connector.
- **Cord length and flexibility:** Cords must be less than 4.5 meters (14.76 feet) long. **CAUTION Temperature:** The temperature in which the 6400-S operates when installed in an equipment rack, must not go below 5 °C (41 °F) or rise above 40 °C (104 °F). Extreme fluctuations in temperature can cause a variety of problems in your 6400-S.
- **Ventilation:** The equipment rack must provide sufficient airflow to the front of the 6400-S to maintain proper cooling. The rack must also include ventilation sufficient to exhaust a maximum of 1023 BTU's per hour for the 6400-S. The rack selected and the ventilation provided must be suitable to the environment in which the 6400-S will be used.

Power Supplies¹

The power supply cage shown is accessed from the rear of the chassis. The power supply cage supports up to two hot-swap power supplies (either AC input or DC input) in a (1+1) redundant configuration. Only the DC input version is NEBS certified. The combined output power to the 6400-S system is 470 Watts per DC supply and 500 Watts per AC supply.

DC Power Supply Interface Requirements

The DC power source may produce hazardous voltage levels exceeding -60 VDC and high energy levels above 240VA that may cause electric shock or burns. All DC input connections should be made only by a qualified service person to prevent injury. All wiring terminals connected to the DC input terminal block must be fully insulated with no exposed bare metal.

The power supply will operate within all specified limits over the input voltage range outlined as follows:

¹ Intel® Telco/Industrial Grade Server TIGPR2U Product Guide

Voltage

- Minimum tolerance = -38VDC
- Nominal rating = -48 to -60VDC
- Maximum tolerance = -75VDS
- Maximum input current = 17.0 Amps

The power supply will power-off if the DC input is less than -34 VDC.

DC Power Supply LED Indicators

Power Supply condition	Power Supply LED
No DC power to all PSUs	Off
No DC power to this PSU only	Amber
DC present/Only Standby Outputs On	Blink Green
Power supply DC outputs ON and OK	Green
Current limit	Amber
Power supply failure	Amber

AC Power Supply Interface Requirements

The AC power supply operates within the following limits:

- AC line voltage = Auto-ranging for either 100-127 VAC or 200-240 VAC
- AC line frequency = 50/60 Hz
- AC input current = 4 Amp at 100-127 VAC, 2 Amp at 200-240 VAC

AC Power Supply LED Indicators

Power Supply condition	Power Supply LED
No AC power to all PSUs	Off
No AC power to this PSU only	Amber
DC present/Only Standby Outputs On	Blink Green
Power supply DC outputs ON and OK	Green
Power supply in Alert Condition	Blink Amber
Power supply failure	Amber

Configuring the V²IU 6400-S

Configure the 6400-S using a web browser such as Internet Explorer or Netscape Navigator. The 6400-S is shipped with a pre-configured IP address for its Subscriber (Port 1) interface.

This chapter gives you the information you need to get started. It covers:

- [Connecting to the 6400-S](#)
- [Logging in and out of the 6400-S](#)
- [Navigating through the configuration pages](#)
- [Getting help](#)

Connecting to the 6400-S

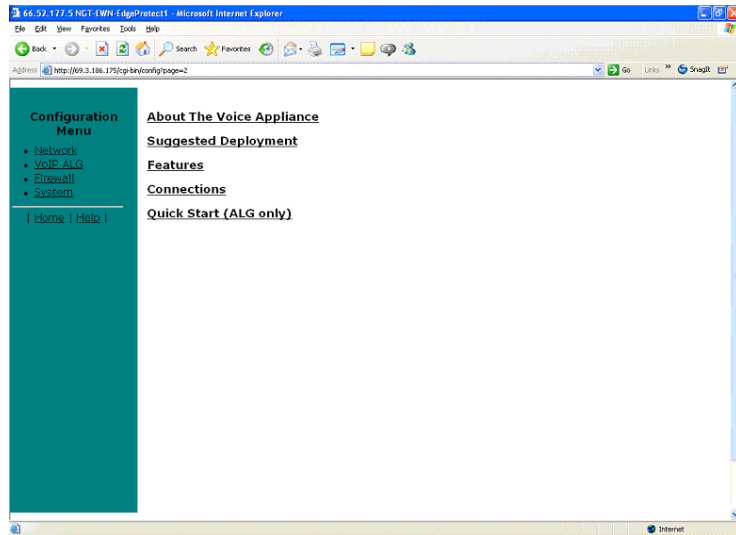
You need to connect to the 6400-S before you can configure it to work with your network. Connect using the supplied preset IP address and subnet mask. You are also supplied with a default user ID and password.

To connect to the 6400-S:

1. Connect a PC using an IP address of 192.168.1.2 and subnet mask of 255.255.255.0 to Port 1 of the 6400-S.
2. Launch a web browser on the PC and enter the URL string: 192.168.1.1.

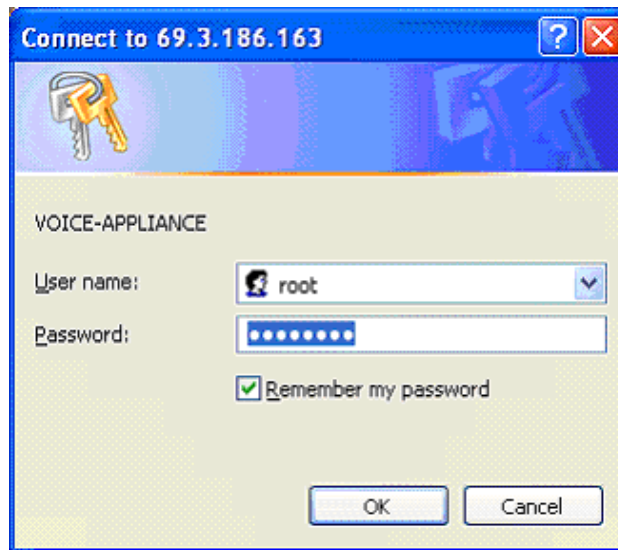
3. Press Return.

The Main Configuration Menu appears.



4. To log in, select Network from the navigation bar.

5. In the Connect to pop-up enter the following default information:



- For username: root
- For password: default

Caution

To maintain your network security, be sure to change the default username and password as described under [Changing the administration password](#) on page 7-1.

6. Continue to configure the system using the information provided in subsequent chapters of this guide.

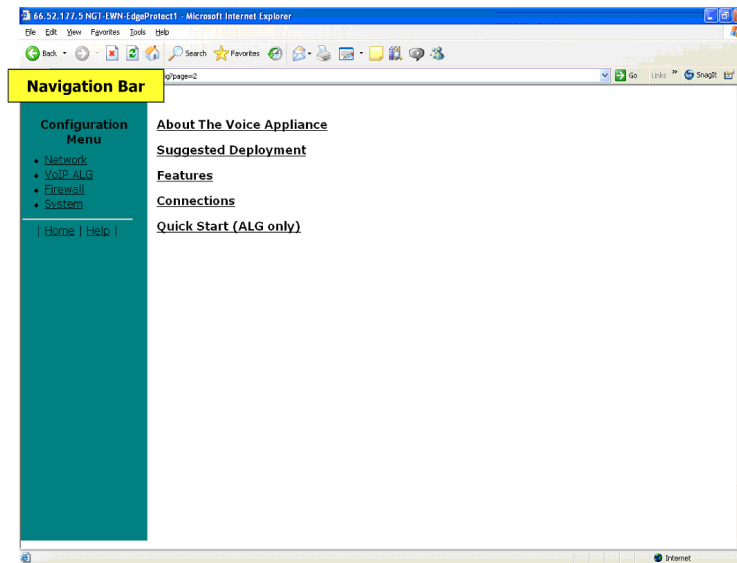
Logging in and out of the 6400-S

You are prompted to log in every time you point a new browser session to the Configuration URL.

To log out, simply close your browser.

Navigating through the configuration pages

Navigate through the configuration pages from the navigation bar.



The choices are:

Menu	Description
Network	Through the <i>Network</i> page, you can configure a wide range of multimedia network services. These services can be enabled or disabled depending on the functionality required for a network configuration. The device's network settings include configuring the Subscriber and Provider interfaces, DNS and Default Gateway.
VoIP ALG	Using the <i>VoIP ALG</i> page, you can configure the connectivity and management for Subscriber and Provider voice and video over IP devices.
Firewall	Through the <i>Firewall</i> page, you can configure the 6400-S to act as a firewall for voice, video and data traffic.
System	Through the <i>System</i> menu you have access to a variety of configuration operations and status information.

Getting help

You can get help from several sources in the Configuration Menu.

- By pressing Help in the navigation bar.
- Following the link in Info at the top of the various Configuration pages.
- From the links on the Configuration Menu home page.

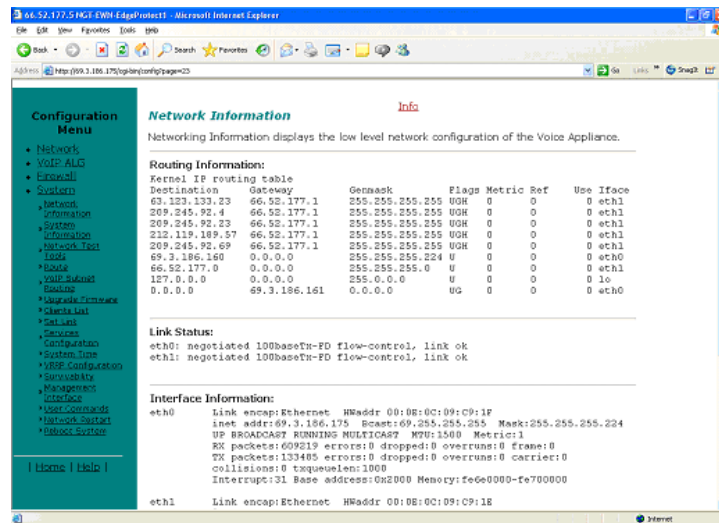
Getting information about the network

You can view a variety of information about the network from Network Information in the System menu. Networking Information displays the low-level IP network and interface configuration of the 6400-S.

To view network information:

1. In the navigation bar, select System.

2. In the System menu, select Network Information.



3. Scroll through the Network Information page to view:

- Routing information
- Link status
- Interface information

Routing Information

The system routing table contains the static routes for the hosts and networks that are on the Provider side of the 6400-S. When the provider and subscriber settings have been fully configured, there must be at least four routing lines displaying:

- The private subnet associated with the Provider interface.
- The immediate subnet associated with the Subscriber interface.
- The loopback interface.
- The network's default gateway, this must be the next-hop-router on the Subscriber side of the 6400-S.

The order of the lines may vary depending on the subnet masks.

Additional lines may be displayed depending on the contents of the Route and VoIP Subnet Routing pages. Each of the entries on these pages will cause an additional entry in the routing table.

Link Status

Link Status displays the status of the Ethernet connections. Ethernet auto negotiation is often unreliable, especially between different vendors or old and new networking equipment. Failure of auto negotiation is generally not a cause for concern. However, if the negotiated rates change intermittently, or the link is down or there is no link, the link rate may need to be set manually on the Set Link Rate page. Intermittent data and voice outages may be caused by auto negotiation "flutter". Setting the link rate manually is recommended and ensures that the device at the far end of the connection will not renegotiate rates during VoIP operation.

Interface Information

The specific status and configuration information for the system interfaces is displayed in the Interface Information section. The MAC address of interface eth0 is needed to retrieve the VoIP ALG License Key if the license information is lost.

The interface statistics can point to areas of congestion in the network. If the errors statistic increase during normal operation of the device, it may be an indication of excessive congestion on the network interface. If the congestion is not corrected, the quality of voice calls will be affected. The topology of the network attached to the network interface with the errors should be examined and modified to better segment and isolate network traffic. See [Link Status](#) on page 3-6.

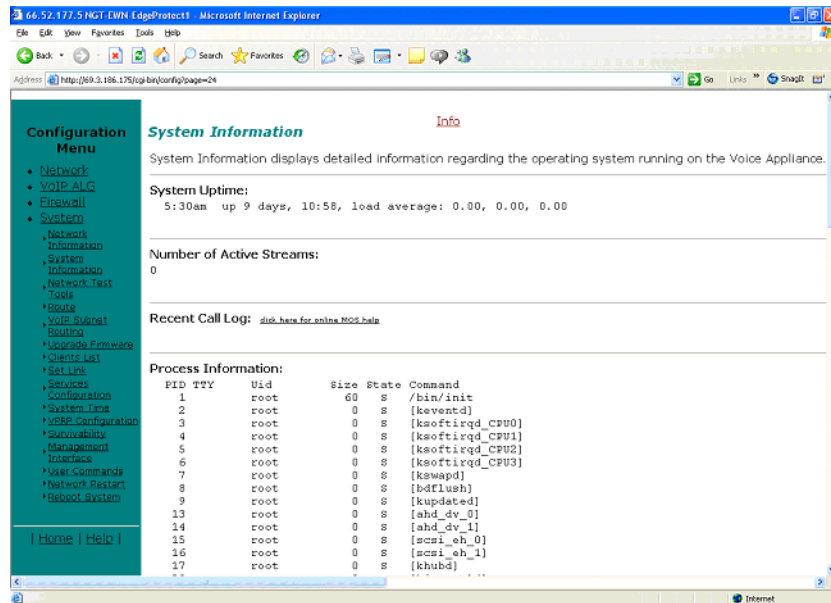
Getting information about the system

You can view a variety of information about the network from System Information in the System menu. System Information displays detailed information regarding the operating system running on the 6400-S. Customer support may ask you to examine or forward this information when troubleshooting problems with the 6400-S.

To view system information:

1. In the navigation bar, select System.

2. In the System menu, select System Information.



3. Scroll through the System Information page to view:

- System uptime
- Number of active streams
- Recent call log
- Process information
- Memory usage
- System logging messages

System uptime

System Uptime displays the current time, the amount of time elapsed since the last system reboot, and the system load averages for the past one, five, and 15 minutes. Uptime can help identify when a power outage may have interrupted service. Load averages greater than two indicate excessive system loading and could indicate over provisioning of the VoIP ALG feature.

Number of active streams

The number of active streams indicates how many calls are transiting the 6400-S (crossing from Subscriber to Provider interfaces) OR being hair-pinned by the 6400-S as part of its NAT-Traversal facility. Calls that are in progress and between two devices on one side of the 6400-S are not counted in this number.

Recent Call Log

The Recent Call Log displays quality information about calls that are in progress or have recently completed. If a call falls below the configured MOS Threshold, a system log message is created. The MOS score for a call is always displayed when the call is completed. Detailed statistics for the call are reported in the Advanced MOS syslog message.

Process Information

Process Information displays detailed process table information that may be of use to technical support.

Memory Usage

Memory Usage displays detailed memory allocation information that may be of use to technical support.

System Logging Messages

System Logging Messages displays information logged during system boot and normal operation. Logging messages may indicate unauthorized attempts to access the 6400-S, process restart messages, and excess resource utilization messages.

Configuring Network Settings

You can configure the 6400-S for:

- Subscriber interface settings.
- Provider interface settings.
- Network settings.

Optionally, you can:

- Enabling remote system logging.
- Configure a different interface for managing the 6400-S. See [Chapter 7](#) for details.
- Configure additional administrative operations, such as changing the password and setting the system date and time are available. See [Chapter 7](#) for details about these, and other operations.

Before Starting

Collect the following information:

- An IP address for the 6400-S.
- An IP address for the gateway.
- The preferred and secondary IP address for the DNS server.

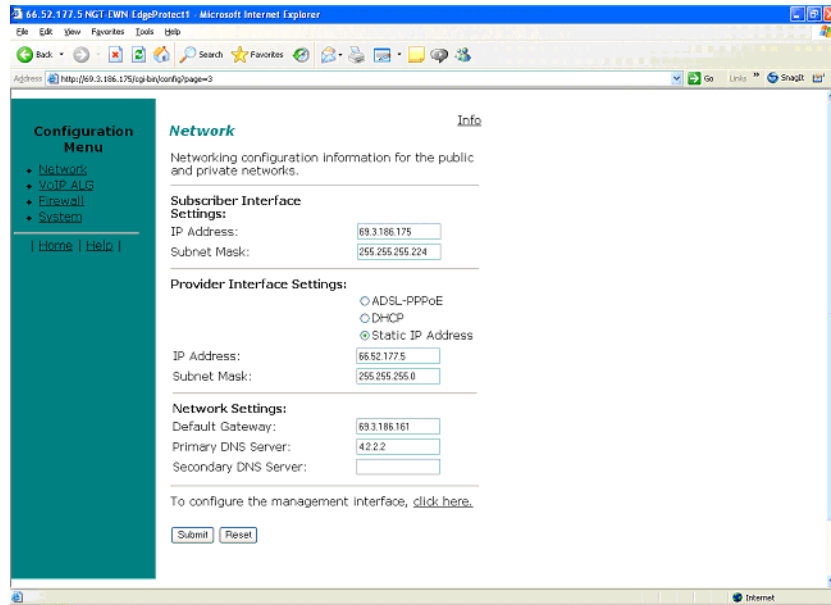
The 6400-S is shipped with the preset subscriber (Port 1) IP address of: 192.168.1.1, and the default subnet mask: 255.255.255.0 so you can access and configure the 6400-S.

Configuring subscriber interface settings

The subscriber interface defines the interface between the 6400-S and your customers' endpoints or the public network.

To configure subscriber interface settings:

1. In the navigation bar, select Network.



2. In Subscriber Interface Settings, highlight and replace the default IP Address and Subnet Mask.
3. If you are configuring network settings, see the instructions in [Configuring the Network](#) on page 4-5.
4. If you want to configure a management interface that is different than the default, complete all of the configuration tasks, then see [Configuring a management interface](#) on page 7-9.
5. Press Submit.

Note

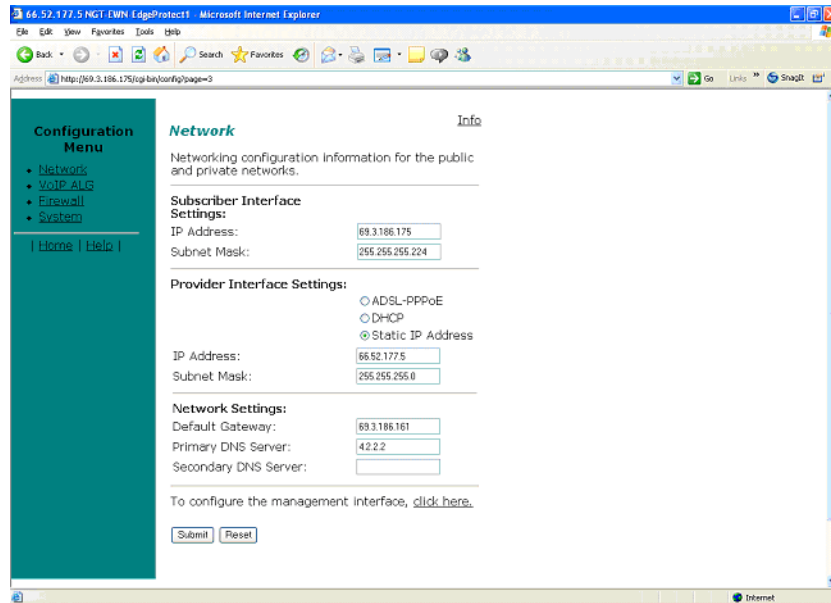
After submitting the new configurations, you need to reconnect to the 6400-S using the new IP address and subnet mask before you can continue with the configuration.

Configuring provider interface settings

The provider interface defines the interface between the 6400-S and internal voice, video and data devices. This interface is generally connected to the private network.

To configure provider interface settings:

1. In the navigation bar, select Network



2. In Provider Interface Settings, select Static IP Address (the most common configuration), or DHCP if a DHCP server assigns the 6400-S's internal address.
3. Enter an IP Address.
4. Enter a Subnet Mask.
5. If you are configuring network settings, see the instructions in "Configuring the Network " on page 20
6. If you want to configure a management interface that is different than the default, complete all of the configuration tasks, then see [Configuring a management interface](#) on page 7-9.
7. Press Submit.

Setting the Ethernet link rate

Ethernet autonegotiation is often unreliable, especially between different vendors or old and new networking equipment. Failure of autonegotiation is generally not a cause for concern. However, if the negotiated rates change intermittently or the link is reported as no link or down, the link rate may need to be set manually. An interface that "flutters" because of the autonegotiation setting, may cause intermittent voice and data outages.

Note

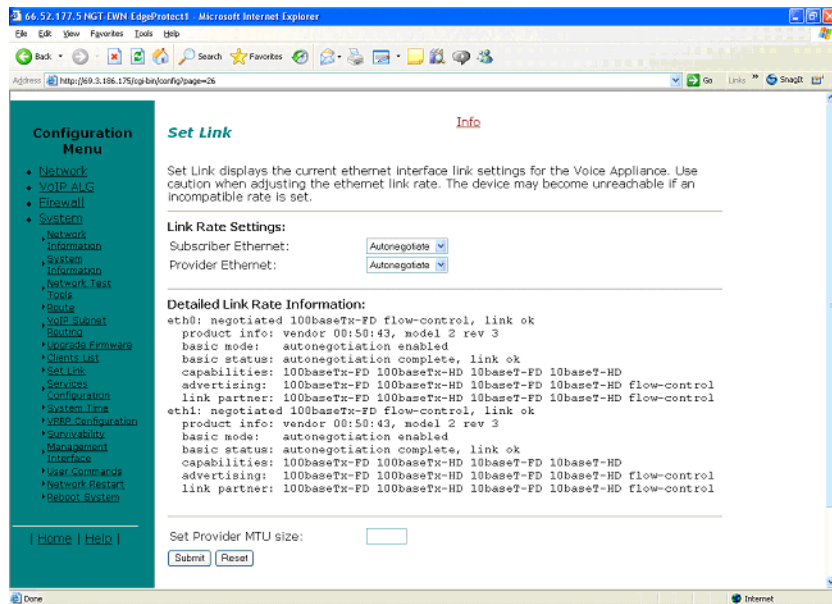
The vast majority of Ethernet networking devices including the 6400-S use "autonegotiate" as a default setting. Chances are that you will not have to set the Ethernet link rate. Please use caution if manually configuring the link rate, as a speed or duplex mismatch will result in a loss of connectivity.

If needed, configure the rate of the physical Ethernet port on the 6400-S. The default setting for the Ethernet port is autonegotiate, and it applies to both the link speed and duplex with locally attached devices.

The link rate of an interface can be assigned to a desired rate. A network administrator may want to set the rate manually if autonegotiation fails to select a rate consistently or if it selects a rate that is slower than the maximum rate supported by both interfaces.

To set the link rate:

1. In the navigation bar, select System.
2. In the System menu, select Set Link.



3. Select Subscriber Ethernet or Provider Ethernet.
4. Select the appropriate link rate for your Ethernet network (Note: If you set either 6400-S interfaces to 100FD, be sure you set the device at the other end of the line to 100FD also.):

Setting	Description
10baseT-HD	10Mbits per second using half duplex transmission
10baseT-FD	10Mbits per second using full duplex transmission
100baseT-HD	100Mbits per second using half duplex transmission
100baseT-FD	100Mbits per second using full duplex transmission
Autonegotiate	The 6400-S autonegotiates link rate and duplex with the directly attached device.

5. Press Submit.

Configuring the Network

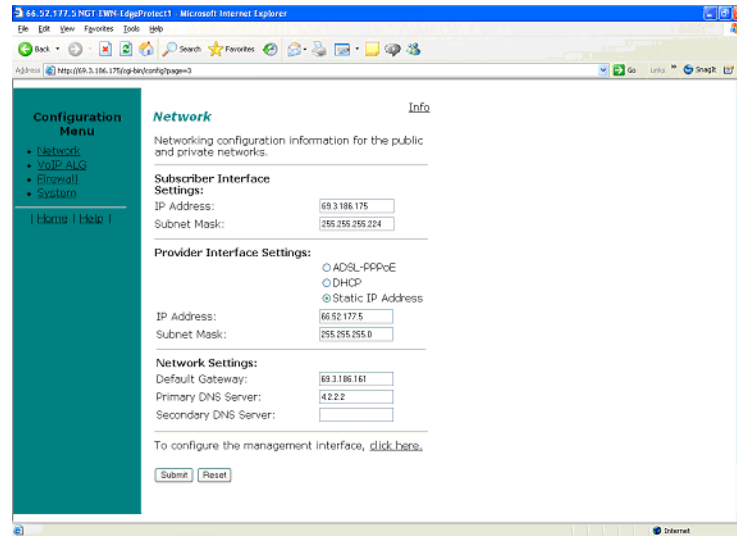
Use network settings to configure the default gateway address, and the primary and secondary DNS servers.

Packets destined for IP addresses not known to the 6400-S are forwarded to the Default Gateway for handling. For the 6400-S the Default Gateway **MUST** be the next hop router attached to Port 1 (the Subscriber interface).

The primary DNS server is used by the 6400-S to resolve domain names to IP addresses. The secondary DNS server is used in the event the primary DNS server is unreachable.

To configure network settings:

1. In the Network page, move to the Network Settings section.



2. Enter an IP address for the Default Gateway
This must be the next-hop-router connected to Port 1, the Subscriber side interface
3. Enter the Primary DNS Server.
4. Enter the Secondary DNS Server.
5. Press Submit.

Configuring VoIP

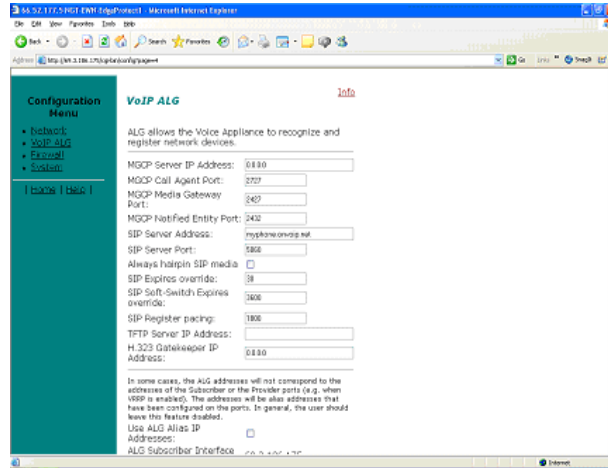
An application-layer gateway provides basic proxy features for voice and video over IP traffic. Serving as an ALG proxy, the 6400-S provides Network Address Translation (NAT) services for the protected softswitch, gatekeeper or other media devices. It maps multiple devices on the subscriber interface (public) to a single IP address on the provider interface (private). The ALG must first recognize and register a public network based device before it presents traffic from the IP telephone, video endpoint or data device through its provider port.

The 6400-S contains an MGCP, SIP, and H.323 call-control proxy ALG. VoIP phones, video endpoints and client adapters have to be configured to point to the 6400-S as the call-control server, proxy, gatekeeper or gateway (depending on protocol). The 6400-S then forward this traffic onto the actual call-control server or gatekeeper.

For corporate customers with high-end routers and firewalls, the 6400-S can be configured as a VoIP Application Layer Gateway only. This allows all of the normal data traffic to continue to be handled by the existing network devices, and only voice or traffic to be handled by the 6400-S. For this configuration, the 6400-S Subscriber Ethernet port is connected to the internet. The 6400-S Provider Ethernet port is connected to a port on the local Ethernet switch.

To configure VoIP ALG:

1. In the navigation bar, select VoIP ALG.



2. On the VoIP ALG page, enter information as follows:

Field	Description
MGCP Server IP Address	If a MGCP ALG is needed, enter the IP address for the MGCP Server as provided. This address should be reached via the Provider side Ethernet port. The MGCP server provides media gateway control protocol service to IP phones, client adapters and gateways.
MGCP Call Agent Port	The Call Agent port specifies the port number that the Call Agent (soft-switch) listens to for messages from the phones. (Default is 2727)
MGCP Media Gateway Port	The Media Gateway port specifies the port number the Media Gateway (phones) listens to for messages from the soft-switch. (Default is 2427)
MGCP Notified Entity Port	The Notified Entity port specifies the port number that the soft-switch uses for notifications from the phones, e.g. hook up, hook down, digits. (Default is 2432)

Field	Description
SIP Server Address	<p>The SIP server provides session-initialization protocol service to IP phones, client adapters and gateways.</p> <p>If a SIP ALG is needed, enter the address (either an IP or URL) for the SIP Server. This address should be reached via the Provider side Ethernet port.</p>
SIP Server Port	<p>If a SIP ALG is needed, enter a port for the SIP Server Port.</p>
Always hairpin SIP media	<p>Normally set to False. If set to True, then SIP phone-to-phone calls made on the Subscriber side of the 6400-S will always have their RTP traffic flow to and back from the EP's subscriber interface.</p>
SIP Expires override	<p>The SIP Expires override field specifies the number of seconds a registration should be valid. The 6400-S uses this value to re-write the expires value returned from the soft-switch before forwarding it to the IP phone. This value is used to force the IP phone to register at the configured interval And helps to maintain NAT bindings in network based firewalls when the 6400-S is performing NAT/firewall traversal.</p>
SIP Soft-Switch Expires override	<p>The SIP Soft-Switch expires override field specifies the number of seconds that should be used when forwarding registration messages to the soft-switch on behalf of the IP phones. This should be higher than the rate pacing value, otherwise, the soft-switch may consider the phone's registration to have expired. If this field is not set, the phone's value is forwarded unchanged.</p>

Field	Description
SIP Register pacing	If the SIP Expires override field is set to a lower value, the number of registration messages may overload the soft-switch. In order to prevent this, you can set the SIP Register pacing field to the number of seconds to wait before forwarding a register message from one phone to the soft-switch. Any register messages received before this time will be locally answered by the 6400-S. For example, you may set the expires value to 60 and the pacing value to 1800 to have the phone register to the 6400-S every minute, but only let a register message through to the soft-switch every 30 minutes.
TFTP Server IP Address	Enter the IP address for the TFTP Server.
This allows the 6400-S to forward (proxy) TFTP requests from devices on the Subscriber side to a TFTP server on the Provider side.	
H232 Gatekeeper IP Address	If an H.323 ALG is needed, enter the address (either an IP or URL) for the H.323 Gatekeeper. This address should be reached via the Provider side Ethernet port.
Use ALG Alias IP Addresses	Not used
ALG Subscriber Interface	Not Used.
Automatic MCCC Re-registration	Automatic MGCP Re-registration is used to re-register MGCP endpoints every time the network or system restarts. Enable this feature to automatically synchronize the softswitch and phones immediately after a restart. The default is Enabled.
MGCP Re-registration Rate(s)	The MGCP Re-registration Rate is used to set the number of MGCP RSIP messages to send per second to the Media Gateway Controller when re-registration is needed. If the MGCP Re-registration Rate needs to be changed, enter a value between 1 and 5. Generally, this value does not need to be modified. The default value is 5 msg/second.

Field	Description
Automatic MGCP Audit	The Automatic MGCP Audit flag specifies whether MGCP clients should be automatically audited by sending a message to each client and wait for a response.
Audit Cycle Interval	The Audit Cycle Interval specifies how often these messages should be sent out to the clients. For each cycle, all endpoints are audited so the rate of messages being sent is dependent on the number of clients currently registered.
State Time	The State Time value is used to decide when a client is supposed to be deemed stale, or unavailable.
Prevent state re-registration	The Prevent stale re-registration flag can be used to disable the automatic MGCP re-registration feature for stale clients.
Automatic Client Deletion	Automatic Client Deletion will delete clients that have been unavailable for a given period of time.
Deletion Time	Deletion Time specifies the time that a stale client will show a warning icon in the client list.
H 323 Terminal Type	The H.323 TerminalType is used to specify the type of terminal that the 6400-S should use. This value should be set to endpoint.
Maximum bandwidth (kbps)	This value is not used and should be set to 0.
Current payload bandwidth	The total bandwidth in use for H.323 video calls as requested by the H.323 video endpoints.
Estimated total bandwidth	The total bandwidth in use for video calls; generally the current payload bandwidth plus 20% for packet overhead.
H 323 Max Aliases	This value is not used and should be set to 0.

Field	Description
SIP LAN side Gateway	The SIP LAN Side Gateway is used to configure a LAN side SIP gateway to which calls that are not for a registered phone can be sent. The name of the gateway is a locally meaningful name. These two fields must both be filled in, or be empty.
Gateway Name	The name of a subscriber PSTN gateway or a single SIP proxy for multiple PSTN gateways.
Gateway Address	The IP address of a subscriber PSTN gateway or a single SIP proxy for multiple PSTN gateways.

Configuring VoIP subnet routing

In its simplest configuration, the 6400-S acts as a proxy for a soft-switch or H.323 gatekeeper on its immediate Provider subnet. Because these devices reside on the same subnet as the 6400-S, packets proxied by the ALG function do not require additional routing information.

The 6400-S can support a VoIP call-control server or H.323 gatekeeper on its Provider side but not located immediately on the Provider-side subnet by configuring VoIP Subnet Routes.

Using the VoIP Subnet Routing feature, the 6400-S can be configured to serve these remote devices. Three pieces of information are required for each subnet containing the VoIP call-control server or H.323 gatekeeper:

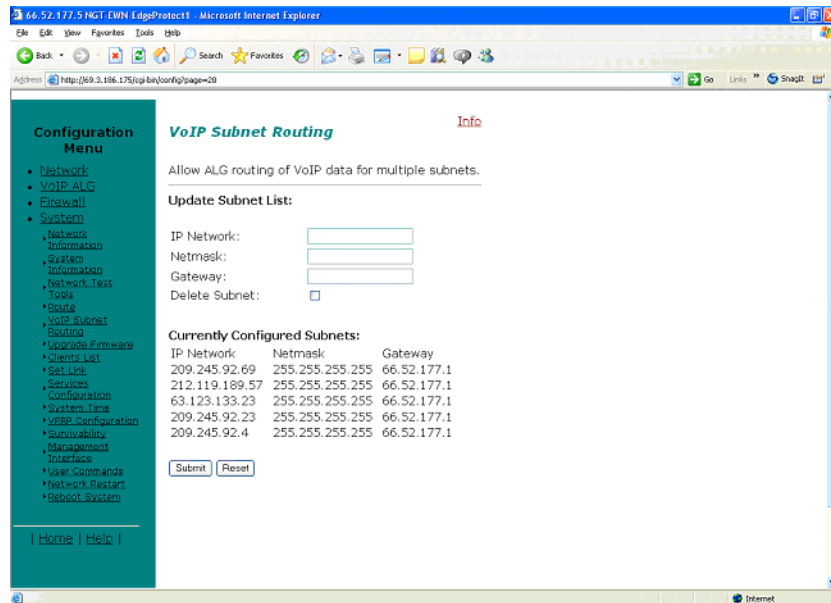
- The IP Network address.
- The Netmask.
- The Gateway.

You can configure up to 20 VoIP subnets.

To configure VoIP subnet routing:

1. In the navigation bar, select System.

2. In the System menu, select VoIP Subnet Routing.



3. Enter the network address in IP Network, such as 10.10.12.0.
This is the IP address of the remote subnet containing the voice devices.
4. Enter a subnet mask in Netmask, such as 255.255.255.0
A subnet mask of the network determines which packets are destined for the 6400-S.
5. Enter and address in Gateway, such as 10.10.10.2.
This is the IP address of the intermediate router that knows the return path to the remote subnet from the 6400-S.
6. Press Submit.
7. You can configure as many as 20 subnets. Complete steps 3 through 6 for each subnet.

Deleting a VoIP subnet route

To delete a VoIP subnet route:

1. In the navigation bar, select System.
2. In the System menu, select VoIP Subnet Route.
3. Enter an IP Network , such as 10.10.10. 0.
4. Check the Delete Subnet box.
5. Press Submit.

Configuring VoIP survivability

Survivability features enable the 6400-S to extend the availability of VoIP services. These features include:

- Support for redundant SIP softswitches
- Support for the Virtual Router Redundancy Protocol (VRRP), allowing a backup 6400-S to take control for a master 6400-S in the event of a failure.

Configuring softswitch survivability

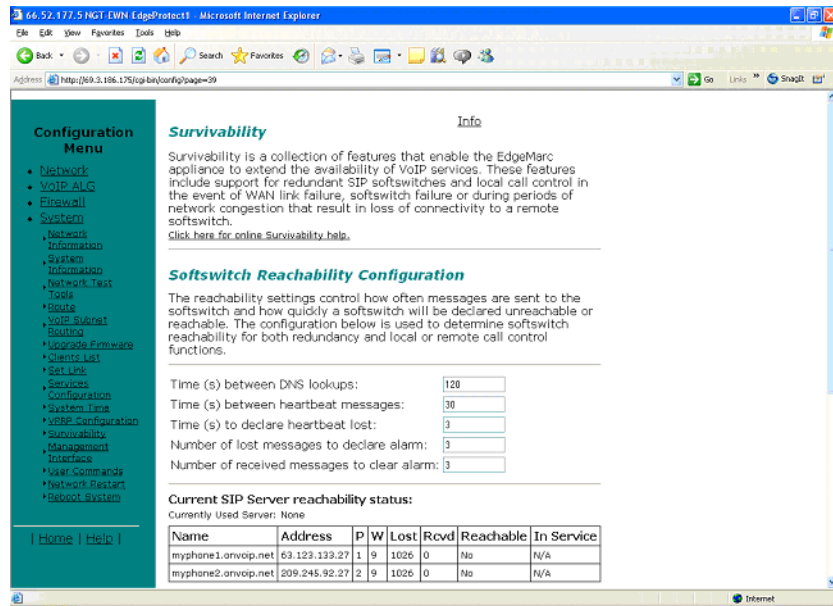
If you will be using multiple SIP softswitches then you will need to enable server redundancy and specify the time between DNS lookups in the 6400-S. Enabling redundancy allows a DNS server to provide a list of multiple call processing servers to the 6400-S in the answers to SRV lookups. Each server in the list will be monitored using periodic messages by the 6400-S and the highest priority server that is currently reachable will be used for signaling. The 6400-S uses the reachability settings described below to determine the status of remote servers and remove inoperable servers from the list.

Triggers can also be used by the 6400-S appliance to determine when to forward call requests to a secondary server in the list. A trigger is set when a configured number of resends are received by the 6400-S from a SIP user agent attempting to place a call. When initiating a call a SIP user agent will send an INVITE message to the 6400-S that will then be forwarded to the primary server. In the event that the primary server fails before a reachability alarm has been declared using the heartbeat messages the user agent will resend INVITE messages until the trigger condition is met. At this point the 6400-S forwards the call request on to the secondary server in the list.

Softswitch survivability includes:

- Softswitch reachability configuration

- Softswitch redundancy configuration



To configure softswitch survivability:

1. In the navigation bar, select System.
2. In the System menu, select Survivability.
3. To configure Softswitch Reachability, enter the following:

Field	Description
Time (s) between DNS lookups	The number of seconds between DNS lookups
Time (s) between heartbeat messages	The number of seconds between each heartbeat messages sent to the softswitch to determine connectivity.

Field	Description
Time (s) to declare heartbeat lost	The number of seconds between the heartbeats was sent until it should be declared lost if no response has been received.
Number of lost messages to declare alarm	the number of consecutively lost heartbeat messages required for the 6400-S to declare a loss of connectivity to the remote softswitch.
Number of received messages to clear alarm	the number of consecutively received heartbeat messages required for the 6400-S to declare successful connectivity to the remote softswitch.

4. To configure Sofswitch Redundancy, enter the following:

Field	Description
Enable SIP server redundancy	Enable the monitoring of multiple SIP servers, as returned by the DNS server, and use a lower priority SIP server if connectivity to the main SIP server is lost.
Trigger on resends	Trigger the SIP server fail-over when an INVITE has been resent a number of times.
Number of resends to declare alarm	The number of resends necessary before the connectivity to a SIP server is declared lost.

5. Press Submit.

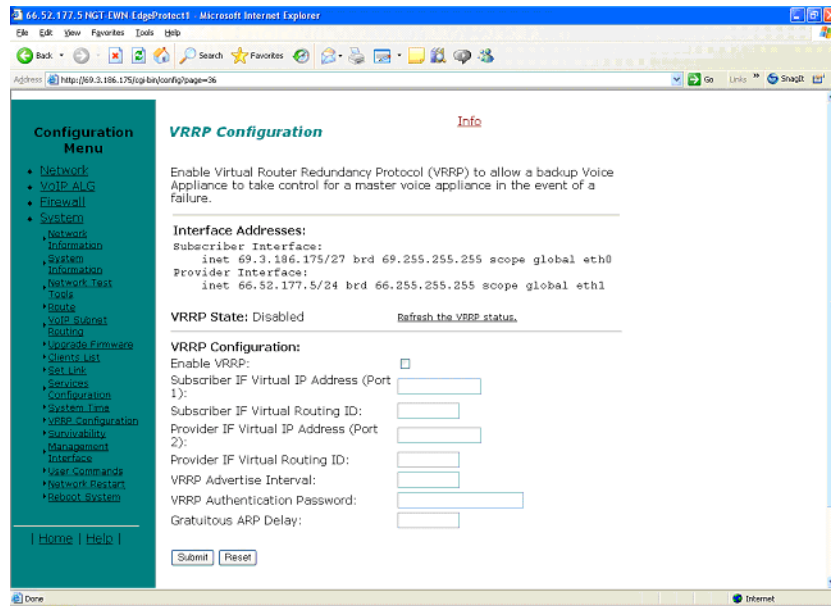
Configuring VRRP

The Virtual Router Redundancy Protocol (VRRP) is designed to eliminate the 6400-S as a single point of failure in a network configuration. Two 6400-S devices can be configured to perform as a redundant pair. One 6400-S is the Master, the other is the Backup. If the Master fails because of a network or hardware failure, the Backup takes over for the Master.

To configure VRRP:

1. In the navigation bar, select System.

2. In the System menu, select VRRP Configuration.



3. To enable VRRP, check the Enable VRRP box.
4. Enter a Subscriber IF Virtual IP Address. The common virtual IP address to be shared on the Port 1 interface.
5. Enter a Subscriber IF Virtual Routing ID. A unique number in the range 1-255 that identifies the router for the Subscriber virtual IP.
6. Enter a Provider IF Virtual IP Address. The common virtual IP address to be shared on the Port 2 interface.
7. Enter a Provider IF Virtual Routing ID. A unique number in the range 1-255 that identifies the router for the Provider virtual IP.
8. Enter the VRRP Advertise Interval. How often (in seconds) that VRRP packets should be sent.
9. Enter the VRRP Authentication Password. Password used to authenticate routers in a VRRP group.
10. Enter the Gratuitous ARP Delay. How long in seconds an 6400-S should wait after a switch over before sending Gratuitous ARPs packets.
11. Press Submit.

Configuring the Firewall

The 6400-S can act as a firewall. A firewall restricts and controls the traffic between networks, typically between a corporate network and the Internet. If an external firewall is used, the firewall features can be set to pass or block traffic depending on whether the 6400-S is placed in series or in parallel with the external firewall.

To configure the firewall, you can:

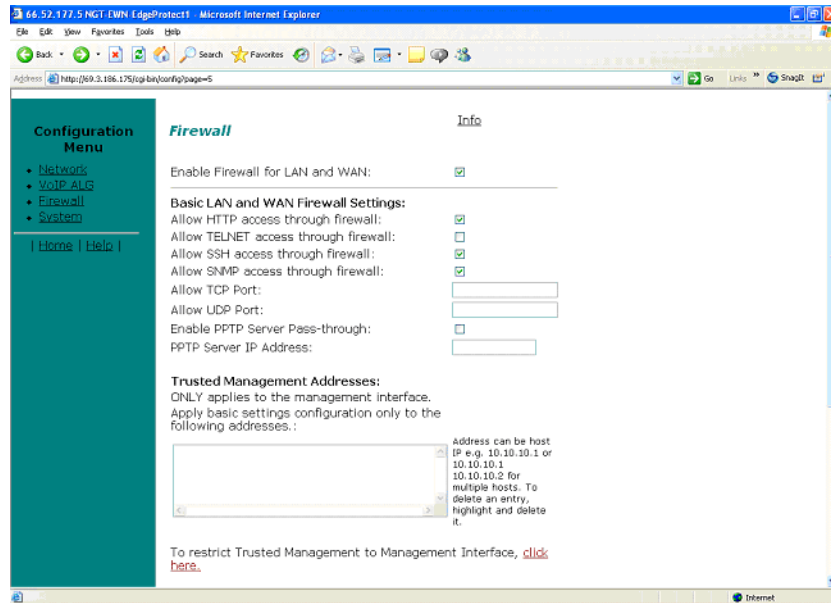
- Configure basic settings.
- Configure advanced settings
- Enable or disable the firewall.

Configuring the firewall basic settings

The basic settings are under Basic LAN (Subscriber) and WAN (Provider) Firewall Settings on the Firewall configuration page.

To configure basic settings:

1. In the navigation pane, select Firewall.



2. In the section: Basic LAN and WAN Firewall Settings, enable the management services that you want to reach the 6400-S by checking the appropriate box for:
 - Allow HTTP access through firewall
 - Allow TELNET access through firewall
 - Allow SSH access through firewall
 - Allow SNMP access through firewall
3. Configure Allow TCP Port according to the rules in "Basic settings rules" on page 31. This setting allows traffic with the specified TCP port to terminate on the 6400-S.
4. Configure Allow UDP Port according to the rules in [Basic settings rules](#) on page 6-3. This setting allows traffic with the specified UDP port to terminate on the 6400-S.
5. Skip Enable PPTP server Pass-through. This setting is not currently used.
6. Enter an IP address in PPTP Server IP Address. This setting is not currently used.
7. To restrict Trusted Management to the Management Interface, see [Configuring a management interface](#) on page 7-9.
8. Press Submit.

Basic settings rules

Follow these rules when configuring basic settings:

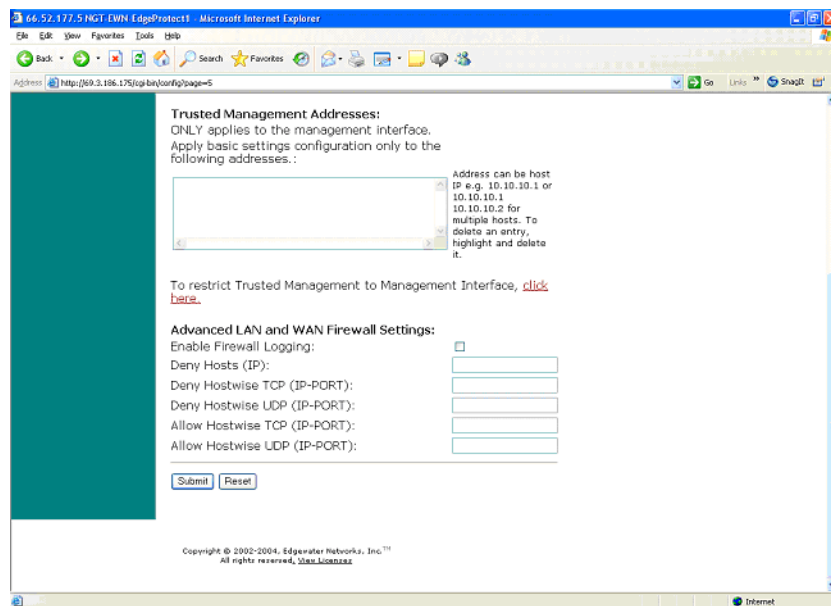
- For Allow TCP Port and Allow UDP Port, valid values are 1 through 65535.
- Separate multiple entries by spaces,
- Indicate a range of values with a colon (:). For example, 25:50 means perform the action on ports 25 through 50

Configuring advanced firewall settings

A comprehensive security policy can be created using advanced settings.

To configure advanced settings:

1. In the navigation pane, select Firewall and scroll to Advanced LAN and WAN Firewall Settings.



2. Enable to disable firewall logging. (See [Enabling or disabling the firewall](#) on page 6-4.)
3. Configure Deny Hosts (IP) according to the rules in [Advanced setting rules](#) on page 6-4. Deny Hosts (IP) denies all traffic with the source IP address matching the specified hosts

4. Configure Deny Hostwise TCP (IP-Port) according to the rules in [Advanced setting rules](#) on page 6-4. This setting denies all traffic matching the specified TCP port numbers and the specified source IP addresses
5. Configure Deny Hostwise UDP (IP-Port) according to the rules in [Advanced setting rules](#) on page 6-4. This feature denies all traffic matching the specified UDP port numbers and the specified source IP addresses
6. Configure Allow Hostwise TCP (IP-Port) according to the rules in [Advanced setting rules](#) on page 6-4. This setting allows all traffic matching the specified TCP port numbers and the specified source IP addresses
7. Configure Allow Hostwise UDP (IP-Port) according to the rules in [Advanced setting rules](#) on page 6-4. This setting allows all traffic matching the specified UDP port numbers and the specified source IP addresses
8. Press Submit.

Advanced setting rules

Follow these rules when configuring advanced settings:

- Separate multiple entries with spaces.
- Specify a port using the dash (-), as in 192.168.3.1-23 for Telnet.
- Indicate a range of ports with a colon (:). For example, 192.168.3.1-23:50 means perform the action on ports 25 through 50
- Classful IP addresses are assumed by default. For example: 192.168.3.1 uses a class "c" mask. Specify subnets using the forward slash (/), as in 192.168.3.1/24

Enabling or disabling the firewall

1. To disable the firewall, check or uncheck the Enable Firewall box.
2. Press Submit.

Administrative Options

The 6400-S supports a number of additional administrative operations. Using these options you can:

- Change the administration password
- Specify user commands
- Manage SIP, MGCP or H.323 clients
- Restart the network
- Reboot the system
- Run network test tools
- Upgrade the firmware
- Configure a management interface
- Set the MTU size
- Configure SNMP
- Set the system date and time
- Configure a static route

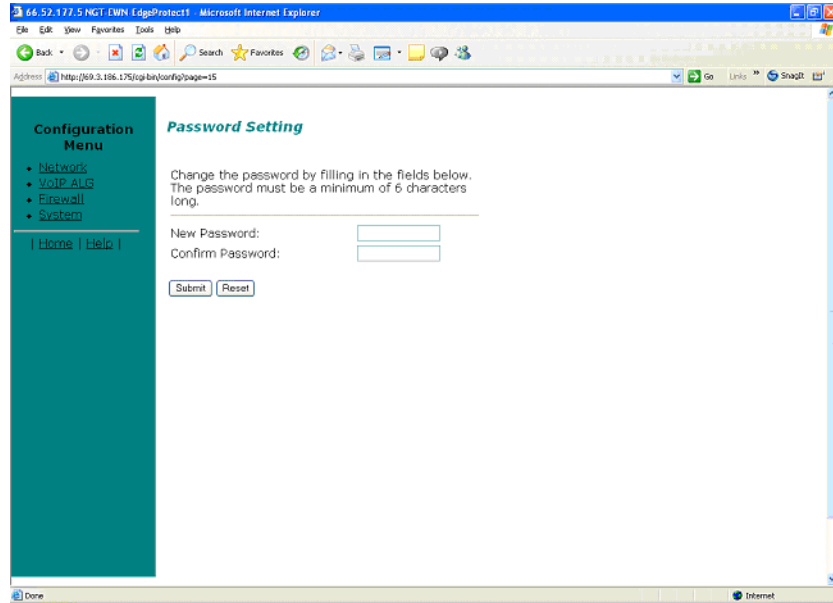
Changing the administration password

We strongly recommend that you change the default password for the root administrative account.

To change the password:

1. In the navigation bar, select System.

2. On the System page, locate Change Password, and follow this link:
The password of the device can be changed.



3. Enter the New Password. The new password must be between 6 and 20 characters in length. Any combination of alpha and numeric characters is accepted.
4. Enter the password again in the Confirm Password to ensure that there were no mistakes in the initial entry.
5. Press Submit.

Specifying user commands

User commands allow you to execute special operations that may be required for your installation, such as creating user specific firewall or routing rules.

Examples:

```
ifconfig eth0:20 192.168.20.10 netmask 255.255.255.0
```

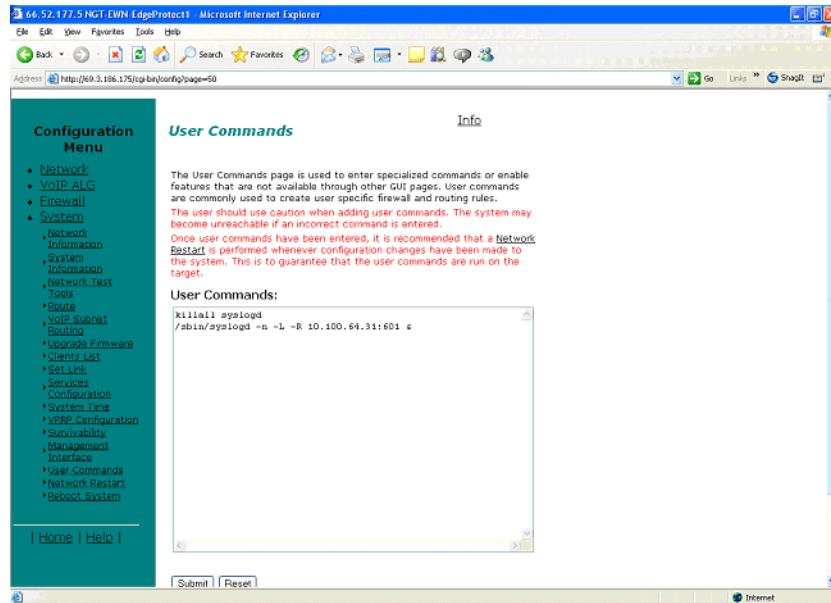
```
iptables -I POSTROUTING -t nat -s 192.168.20.10 -j ACCEPT
```

Caution

Use caution when adding user commands. The system may become unreachable if an incorrect command is entered.

To enter a user command:

1. Choose User Commands from the System menu on the navigation bar.



2. Enter a command in the User Commands: area.
3. Press Submit.
4. Restart the network to guarantee that the user commands are running. See "Restarting the network" on page 38.

Managing SIP, MGCP or H.323 clients

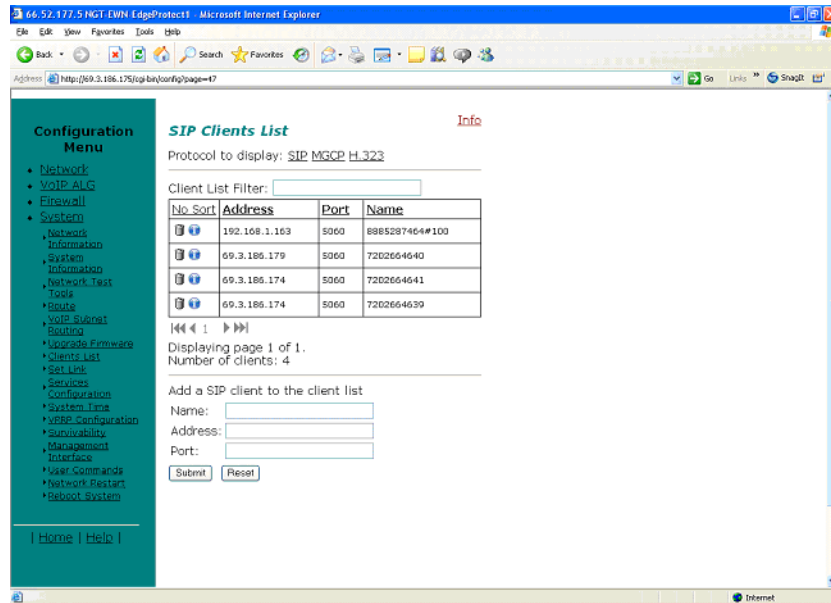
You can view and manage information about devices that have registered as clients with the 6400-S. This information is displayed on the Clients List page. You can filter, sort, query, add and delete records.

Caution

Currently, MGCP clients can be added and deleted without restarting the 6400-S but changes to SIP or H.323 clients list will automatically restart the 6400-S. Use caution! All calls that are in progress will be interrupted.

To work with the client list:

1. Choose Clients List from the System menu on the navigation bar.



2. Select a protocol from Protocol to display. The SIP client list is the default.
3. Perform an operation according to the instructions in:
 - Filtering the clients list
 - Deleting clients
 - Querying clients
 - Adding clients

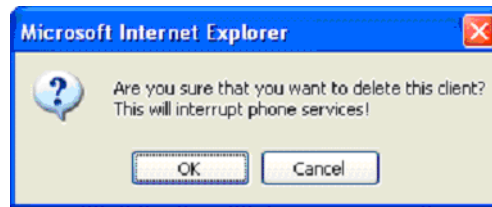
Selecting a client

You can select a single client by entering a client identifier in the Client List Filter field.

Deleting clients

1. To delete a client, click the trashcan in the No Sort column.

- Press OK to delete the client or Cancel to end the operation.



Querying clients

To query a client:

- Click the Information Icon in the No Sort column.

The screenshot shows the 'SIP Clients List' page. On the left is a 'Configuration Menu' with options like Network, VOIP, Firewall, and System. The main content area displays 'SIP Clients List' with a protocol of 'SIP MGCP H.323'. Below this is a 'Client Information' section for 'Client 8885287464' showing its address as '192.168.1.163' and registration status as 'Not Registered'. A 'Client List Filter' is present above a table of clients. The table has columns for 'No Sort', 'Address', 'Port', and 'Name'. The selected client's details are shown at the top of the page.

No Sort	Address	Port	Name
	192.168.1.163	5060	8885287464#100
	69.3.186.179	5060	7202664640
	69.3.186.174	5060	7202664641
	69.3.186.174	5060	7202664639

- Details about the selected client display at the top of the page.

Adding clients

To add a client:

- Enter the client Name.
- Enter an IP Address.
- Enter a Port.

Press Submit.

Restarting the network

Use Network Restart to stop and the restart all the networking services that are running on the system. Technical support may request that networking services be restarted during a troubleshooting session.

Restarting network services will interrupt the system for up to a minute. All voice and data sessions currently in progress will be interrupted! Proceed with caution!

To restart the network:

1. In the navigation bar, select System.
2. In the System menu, select Network Restart.
3. In the Network Restart page, press Restart.

Rebooting the system

Rebooting the system stops all networking services and reboots the 6400-S. The operating system and networking services will be loaded from scratch. Reboot is functionally equivalent to power cycling the 6400-S. Technical support may request that the system be rebooted during a troubleshooting session.

Rebooting the system will interrupt services for a few minutes. All voice and data sessions currently in progress will be interrupted! Proceed with caution!

To reboot the system:

1. In the navigation bar, select System.
2. In the System menu, select Reboot system.
3. In the Reboot system page, press Reboot.

Using Network Test Tools

A network administrator may use the test tools on this page to verify connectivity of the 6400-S and trace the path of data throughout the network. You can run a ping test or a traceroute test.

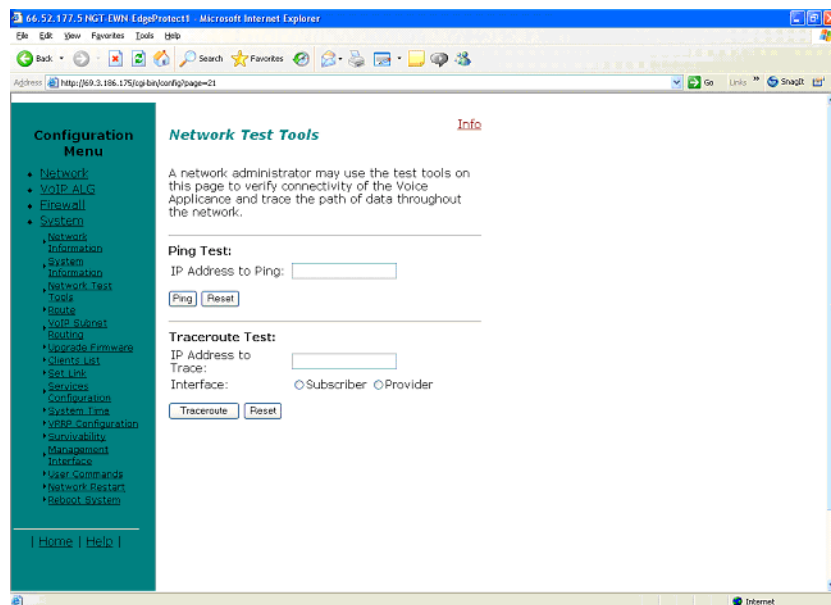
Running a ping test

The Ping Test is the most common test used to verify basic connectivity to a networking device. Successful ping test results indicate that both physical and logical path connections exist between the 6400-S and the test IP address. Successful ping tests do not guarantee that all data message are allowed between the 6400-S and the test IP address.

To run a ping test:

In the navigation bar, select System.

In the System menu, select Network Test Tools.



1. Enter an IP Address to Ping.
2. Press Ping.

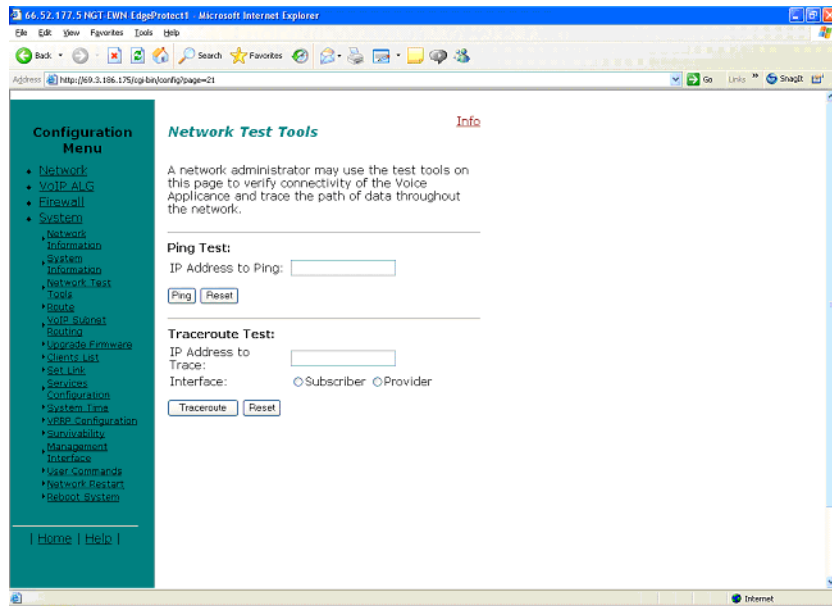
Running a traceroute test

The Traceroute Test is used to track the progress of a packet through the network. The test can be used to verify that data destined for a provider device reaches the remote IP address via the desired path. Similarly, network paths internal to a company can be traced over the subscriber network to verify the local network topology.

To run a traceroute test:

1. In the navigation bar, select System.

2. In the System menu, select Network Test Tools.



3. Enter an IP Address to Trace
4. Select an Interface.
5. Press Traceroute.

Upgrading the firmware

Occasionally, new releases of firmware will become available to add new features to the 6400-S. Upgrading the 6400-S is easy. Simply enter the IP address of the upgrade server and press Submit.

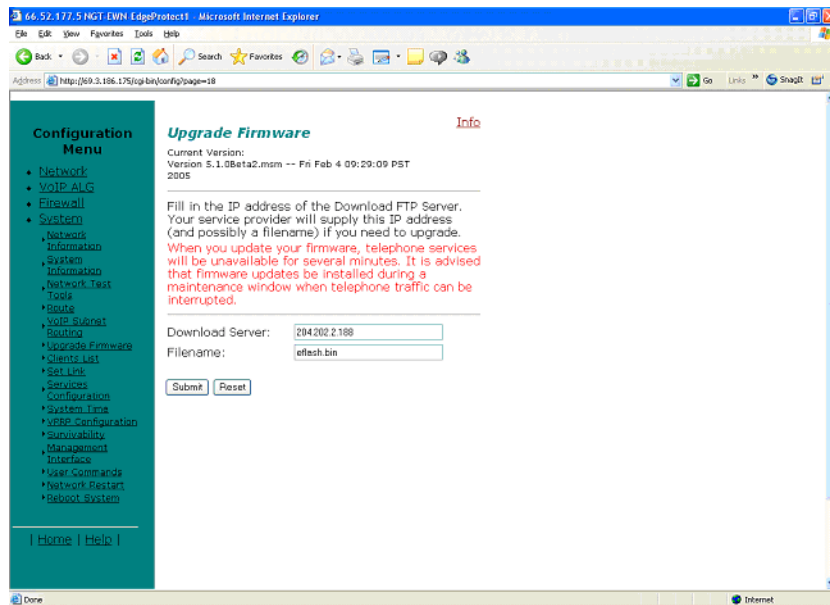
Note

During the upgrade, telephone services are interrupted. For this reason, the upgrade should take place during a maintenance window.
Warning!! During the upgrade process, the 6400-S must not be interrupted or powered off. If the upgrade is interrupted, the device may become unusable and need to be returned to the factory.

The upgrade process takes between two and five minutes, depending on how quickly the upgrade package is downloaded. Writing the software to the 6400-S takes about five minutes. Once the upgrade is started, the status of the upgrade is displayed. The progress of the upgrade process can be upgraded by pressing the refresh the upgrade status link.

To upgrade the firmware:

1. In the navigation bar, select System.
2. In the System menu, select Upgrade Firmware.



3. Enter an Download Server IP address.
4. Enter a Filename.
5. Press Submit.

Configuring a management interface

You can configure a specific management interface and restrict management of the system to this interface only. When enabled, connections to management protocols such as HTTP, SSH, SNMP, Telnet will only be allowed through this interface.

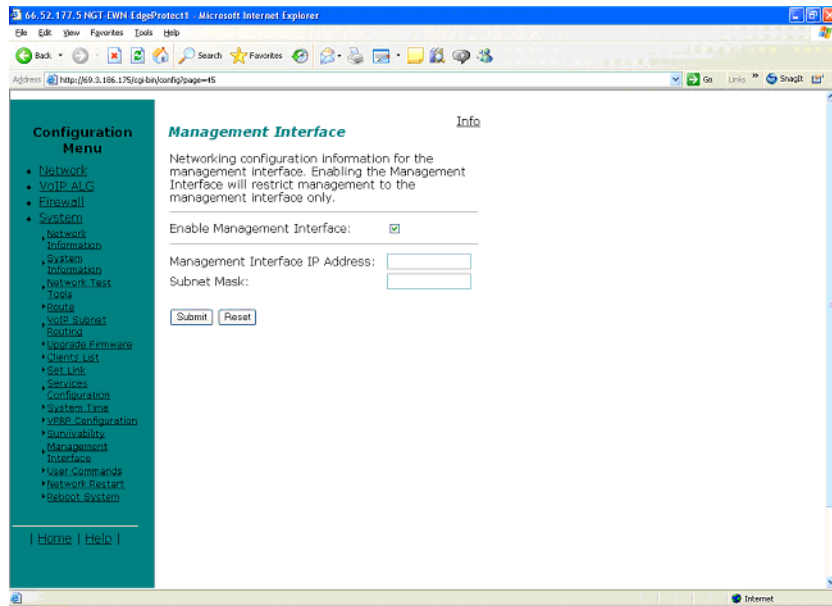
If you configure a management interface, you must also configure trusted management addresses when you configure the firewall.

Configuring the interface

To configure the Management Interface:

1. In the navigation bar, select System.

2. On the System menu, select Management Interface.



3. On the Management Interface page:
4. Check the Enable Management Interface box.
5. Enter a Management Interface IP Address.
6. Enter a Subnet Mask address.
7. Press Submit.

Reconnecting the 6400-S

1. Reconnect the 6400-S to the network by moving the connection from the Provider port (Port 2) to the Optional Out of Band Ethernet Port (Port 3).



Figure 1. Move the connection from Port 2 to Port 3

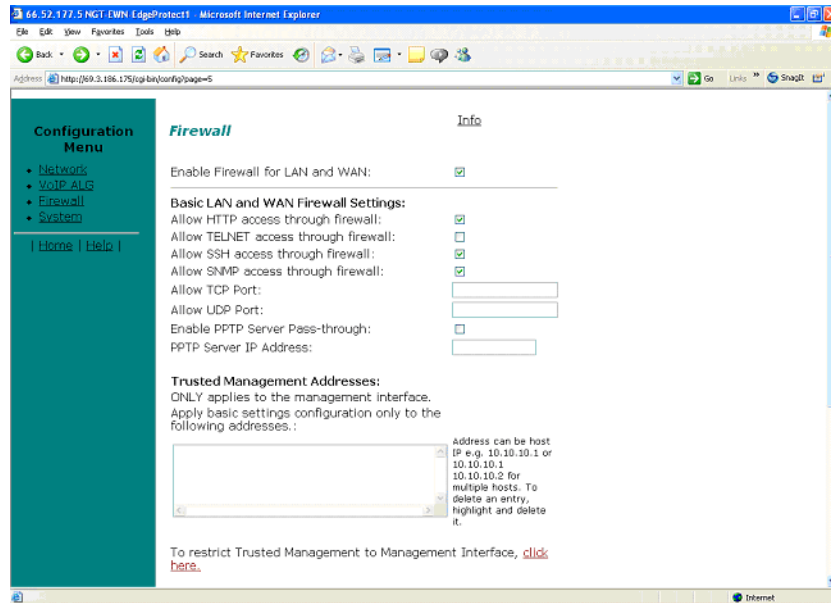
2. Restart the system.

Configuring the trusted management addresses

Trusted management addresses, define a list of trusted management host addresses or network/masks. All other addresses are blocked from accessing the device.

To configure trusted management addresses:

1. In the navigation pane, select Firewall.



2. Within the Trusted Management Addresses, enter a list of trusted management host addresses or network/masks. The basic firewall rules will be applied only to those addresses. All other addresses will be blocked from accessing the device.

If you do not include your management station, or a station to which you have access, you lose access to the 6400-S. You can only reinstate access by connecting to the serial console interface.

3. Press Submit.

Setting the Provider MTU size

The Provider MTU size may be set to reduce the latency that is introduced when large data packets are sent over a slow link. The default setting is 1500 bytes for static IP addresses. PPPoE links negotiate the value automatically although the value can be overridden using this field. If the Upstream Bandwidth is less than 256 Kbit/s, the MTU size is automatically reduced to 576 bytes.

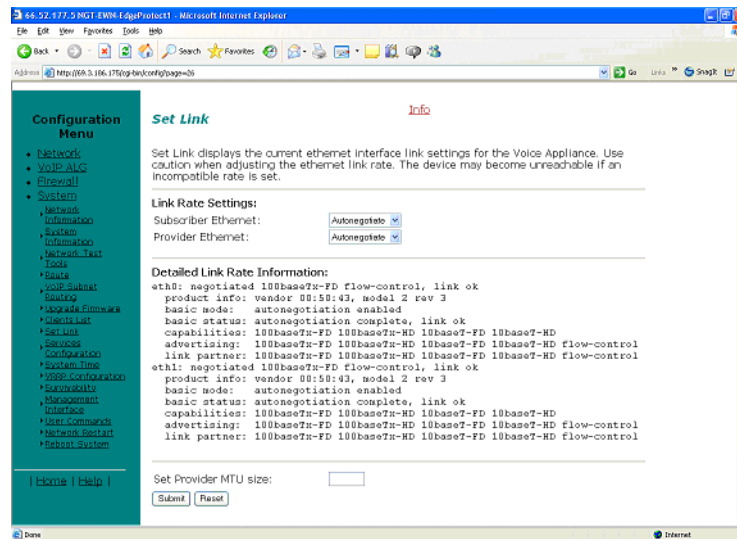
When the link rate is set manually, ensure that the device at the far end of the connection can communicate at the desired rate. Incompatible rates can cause a loss of communication with the 6400-S!

Caution

When manually configuring the MTU size we recommend that you use a setting of 800 bytes or greater. You may experience problems with certain types of VoIP traffic if the MTU size is set below 800 bytes.

To set the Provider MTU size:

1. In the navigation bar, select System.
2. In the System menu, select Set Link.



3. Enter the Provider MTU size.
4. Press Submit.

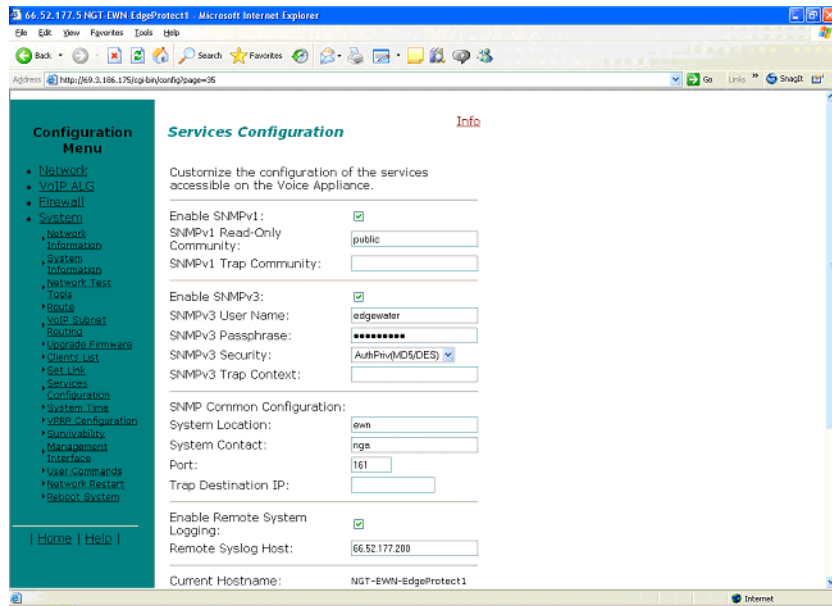
Enabling SNMP

The 6400-S can be managed remotely by an SNMP network management system such as HP Openview. The 6400-S supports SNMPv1 and MIB-II (RFC1213). All MIB-II variables are read only. The MIB variables sysContact and sysLocation are set by the web GUI.

To enable SNMP:

1. In the Navigation bar, select System.

2. In the System menu, select Services Configuration.



3. Enter information as described in the following table.

Field	Description
SNMPv1 Read-Only Community	The community string that the management station uses when accessing read-only objects from the 6400-S. The default is 'public'.
SNMPv1 Trap Community	Trap community string place in trap pdu.
SNMPv3 User Name	If SNMPv3 is enabled, this field defines the SNMPv3 user name for SNMPv3 USM based authentication and VACm access control.
SNMPv3 Passphrase	The SNMPv3 passphrase is optionally used to authenticate the user as well as encrypt the payload based on the SNMPv3 Security setting below. The minimum length of a valid passphrase is 8.

Field	Description
SNMPv3 Security	The SNMPv3 security level for user authentication and encryption of both synchronous requests as well as asynchronous traps. "None" means neither SNMPv3 authentication or encryption are used. "Auth(MD5)" means authenticating user using MD5 hash algorithm. "AuthPriv(MD5/DES)" means authentication as well as encryption using the DES encryption algorithm. The default value is None.
SNMPv3 Trap Context	The SNMPv3 trap context defaults to nothing but can be set to any string.
System Location	A comment string that can be used to indicate the location of the 6400-S. By default, no value is set.
System Contact	The administrative contact information for the 6400-S. By default, no value is set.
SNMP Port	The port that the 6400-S monitors to read and send SNMP data. The default is 161.

4. Press Submit.

Disabling SNMP

To disable SNMP, select Services Configuration from the System menu and uncheck the SNMP checkboxes.

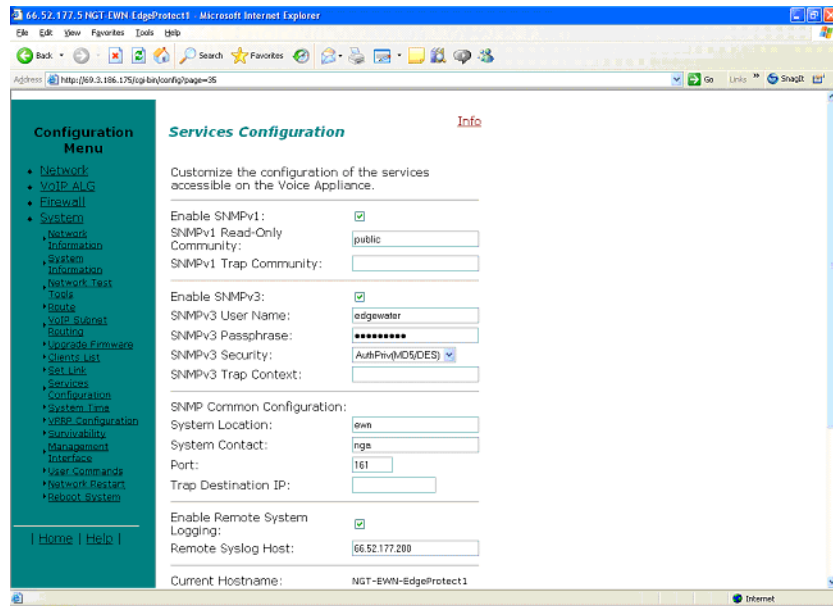
Enabling remote system logging

The 6400-S can be configured to log system messages to an external syslog server.

To enable remote system logging:

1. In the Navigation bar, select System.

2. In the System menu, select Services Configuration.



3. Scroll to Enable Remote System Logging, and check the box.
4. Enter information as described in the following table:

Field	Description
Remote Syslog Host:	The address of the system running a system log server. By default, the system sends to port 514. The system log port can be set by adding a colon and the port number to the end of the address: e.g. ADDRESS[:PORT]
Local Hostname:	Set the hostname for this system. By default, the hostname is the system type.
Enable MOS Scoring:	Enable MOS scoring for media that is passing through the 6400-S. Disabling MOS scoring will improve system performance. By default, MOS scoring is Enabled.
MOS Threshold:	Set the minimum allowable MOS for the system . MOS values below this value will cause system messages to be sent to the system log. By default, the value is 2.5

5. Press Submit.

Disabling remote system logging

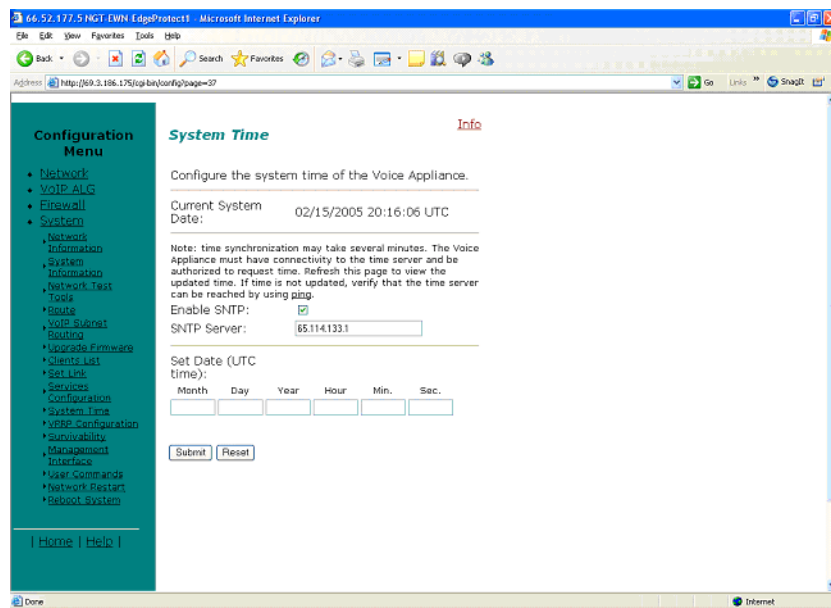
To disable remote system logging, select Services Configuration from the System menu and uncheck Enable Remote System Logging.

Setting the system date and time

The System Time page allows the user to set the 6400-S's time or configure it to synchronize with a network time source via Simple Network Time Protocol (SNTP).

To set the system date and time:

1. In the navigation bar, select System.
2. In the System menu, select System Time.



3. Enable SNTP by checking the box.
4. To synchronize with a SNTP server on the network, enable SNTP and set the address of the SNTP server. The server address can be either an IP address or the DNS name of the SNTP server.
5. To set the date and time, enter information as follows. The date on the device can be set manual using this option. The values are entered in numeric form.

Field	Description
Month	Enter a value from 1 to 12.
Day	Enter a value from 1 to 31.
Year	Enter the current year.
Hour	Enter a value from 0 (Midnight) to 23 (11 pm).
Minute	Enter a value from 0 to 59.
Second	Enter a value from 0 to 59.

6. Press Submit.

Creating a static route

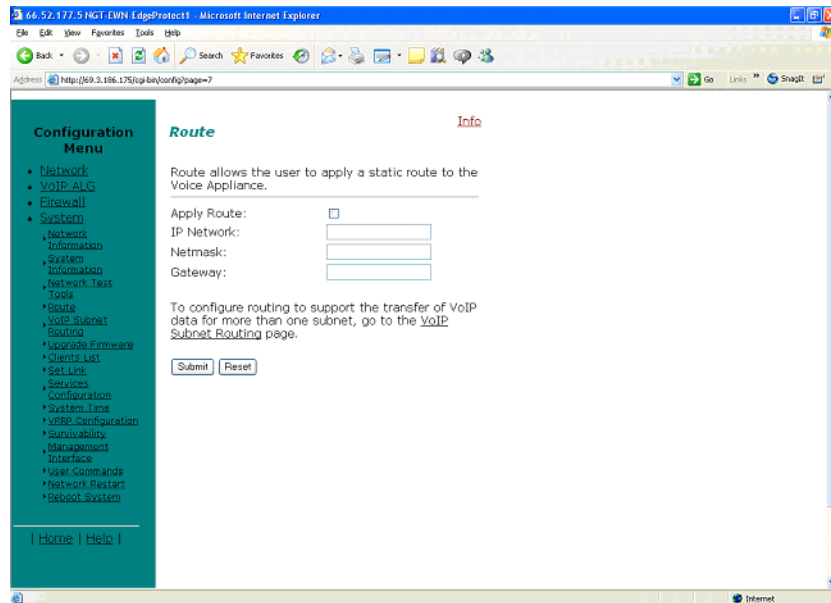
Static routes may be needed to support network applications, such as a web server, that are allowed through the firewall and directed to a specific IP address or subnet.

Use care when configuring static routes! Static routes may prevent the other networking features in the 6400-S from functioning properly.

To configure a static route:

1. In the navigation bar, select System.

2. In the System menu, select Route.



3. Check the Apply Route box.
4. Enter an IP Network address.
5. Enter a Netmask address.
6. Enter a Gateway address.
7. Press Submit.

Deleting a static route

- >> To delete a static route, uncheck the Apply Route box.

Appendix

Troubleshooting Tips

This section assists you with problems you may encounter while installing the 6400-S.

Trouble accessing the Internet

We recommend connecting a PC either directly or through a switch to the Port 1 of the 6400-S. The default IP address of the 6400-S is 192.168.1.1 so please be sure that the IP address of the PC is on the same network (eg. 192.168.1.2). Once you have connected please verify that the IP configuration information in the Network page is correct. Some other items to try:

- Ping the Port 2 interface of the 6400-S from the attached PC
- Ping the DNS server for your network. Sometimes connectivity problems occur when the domain name being used cannot be mapped to the proper IP address.
- Ping a well known address on the Internet.
- Ping the IP address of the softswitch.

No dial tone

If don't hear a dial tone when off hook:

- Check the configurations on the VoIP ALG page.
- Make sure the ALG registration code is configured.

Checking the ALG registration code

To check the ALG registration code:

1. From the navigation bar, select System.
2. From Registration Status, click License Key.
3. If you do not see a license key, contact Polycom Technical Services.

Telephone doesn't register with the softswitch

If one or more telephones are not registering with the softswitch:

- Check the configurations on the VoIP ALG page.
- Attempt to ping the softswitch.

Checking the configurations on the ALG page

To check configurations on the ALG page:

1. From the navigation bar, select VoIP ALG.
2. ...and then what? What would they be looking for and what needs to be corrected?

Pinging the softswitch

To ping the softswitch:

1. From the navigation bar, select System.
2. From the System submenu, select Network Test Tools.
3. In IP Address to Ping, enter the softswitch address.
4. Click Ping.

Regulatory Notices

Important Safeguards

Read and understand the following instructions before using the system:

- Close supervision is necessary when the system is used by or near children. Do not leave unattended while in use.
- Only use electrical extension cords with a current rating at least equal to that of the system.
- Always disconnect the system from power before cleaning and servicing and when not in use.
- Do not spray liquids directly onto the system when cleaning. Always apply the liquid first to a static free cloth.
- Do not immerse the system in any liquid or place any liquids on it.
- Do not disassemble this system. To reduce the risk of shock and to maintain the warranty on the system, a qualified technician must perform service or repair work.
- Connect this appliance to a grounded outlet.
- Only connect the system to surge protected power outlets.
- Keep ventilation openings free of any obstructions.

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END OF TERMS AND CONDITIONS

Compliance and Compatibility¹

This product is in compliance with European Union EMC Directive 89/336/EEC, using standards EN55022 (Class A) and EN55024 and Low Voltage Directive 73/23/EEC, Standard EN60950.

Safety Compliance

USA:	UL 60950 – 3rd Edition/CSA 22.2. No. 950-M93
Canada:	cUL Certified – CAN/CSA 22.2. No. 60950-00 for Canada (product bears the single UL mark for U.S. and Canada)
Europe:	Low Voltage Directive, 73/23/EECTUV/GS to EN60950 2 nd Edition with Amendments, A1 = A2 + A3 + A4
International:	TUV/CB to IEC 60950 3 rd Edition, EN60 950 2 nd Edition + Amd 1-4, EMKO-TSE (74-SEC) 207/94 plus International deviations
Australian / New Zealand:	CB Report to IEC 60950, 3 rd Edition plus International deviations

Electromagnetic Compatibility (EMC)

USA:	FCC CFR 47 Part 2 and 15, Verified Class A Limit
Canada:	IC ICES-003 Class A Limit
Europe:	<p>EMC Directive, 89/336/EEC</p> <ul style="list-style-type: none"> • EN55022, Class A Limit, Radiated & Conducted Emissions • EN55024, ITE Specific Immunity Standard • EN61000-4-2, ESD Immunity (Level 2 Contact Discharge, Level 3 Air Discharge) • EN61000-4-3, Radiated Immunity (Level 2) • EN61000-4-4, Electrical Fast Transient (Level 2) • EN61000-4-5, AC Surge • EN61000-4-6, Conducted RF • EN61000-4-8, Power Frequency Magnetic Fields • EN61000-4-11, Voltage Dips and Interrupts • EN61000-3-2, Limit for Harmonic Current Emissions • EN61000-3-3, Voltage Flicker
Japan:	VCCI Class A ITE (CISPR 22, Class A Limit) IEC 1000-3-2 Limit for Harmonic Current Emissions
Australia/New Zealand:	AS/NZS 3548, Class A
Taiwan:	BSMI Approval, Class A
Korea:	RRL Approval, Class A
China:	CCC Approval, Class A
Russia:	GOST Approved
International:	CISPR 22, Class A Limit

¹ Intel® Telco/Industrial Grade Server TIGPR2U Product Guide

FCC Electromagnetic Compatibility Notice (USA)

This equipment has been tested and found to comply with the limits for a Class A 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 operating in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. In this case, the user is required to correct the interference at his or her expense. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

FCC Declaration of Conformity

Product Type: TIGPR2U

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation
250 Berry Hill Rd., Suite 100
Columbia, SC 29210

Electromagnetic Compatibility Notices (International)

Europe (CE Declaration of Conformity)

This product has been tested in accordance to, and complies with the Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC). The product has been marked with the CE Mark to illustrate its compliance.

Japan EMC Compatibility

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation of the notice above:

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) by Information Technology Equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

ICES-003 (Canada)

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadien des Communications.

English translation of the above notice:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Canadian Department of Communications.

BSMI (Taiwan)

The BSMI Certification number and the following warning are located on the product safety label that is located visibly on the external chassis.

警告使用者:
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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