



IPitomy IP400 User Guide

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Chapter 1

Introduction



This Chapter provides an overview of the VoIP Gateway features and capabilities.

Congratulations on the purchase of your new VoIP Gateway. The VoIP Gateway bridges traditional Public Switched Telephony Network (PSTN) and IP network. It digitizes and compresses analog voice signal on Public Switched Telephone Network (PSTN), and transmits it to the Internet Protocol (IP) network. The VoIP Gateway is equipped with one RJ-45 port for connecting to IP-based network and four Plain Old Telephone Service (POTS) ports with Foreign Exchange Office (FXO) interface for connecting to PBX or Central Office (CO) lines.

VoIP Gateway Features

The VoIP Gateway incorporates many advanced features, carefully designed to provide sophisticated functions while being easy to use.

Internet Access Feature

- Fixed or Dynamic IP Address support

NAT Traversal Feature

- STUN and UPnP control point protocol for NAT traversal

VoIP Features

- Session Initiation Protocol (SIP) support
- Provides PSTN users access to IP telephony networks
- IP connectivity for traditional PBX and Key Systems
- G.711, G.726 and G.729AB voice codecs support
- Voice activity detection and comfort noise generation
- Packet lost concealment
- Dynamic Jitter Buffer
- Echo cancellation, G.168 32 ms echo tail
- DTMF tone detection and generation
- RFC2833 in-band DTMF relay
- Call progress tone detection
- Caller ID detection
- Hunt grouping of FXO ports
- Built-in dial plan
- Web Based UI for network and image control

Package Contents

The following items should be included:

- The VoIP Gateway Unit
- Power Adapter
- One RJ45 Ethernet cable.
- Quick installation guide
- CD-ROM containing the on-line manual.

Physical Details

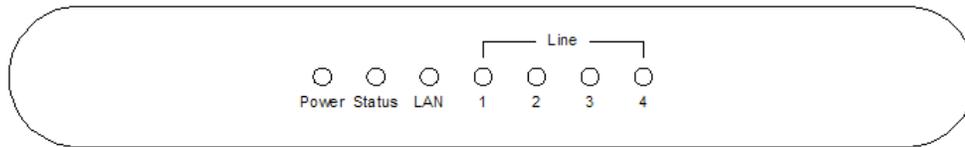


Figure 1: Front Panel

Front-mounted LEDs

Power	On - Power On. Off - No Power.
Status	On - The VoIP Gateway has successfully registered to SIP server. Flashing - The VoIP Gateway has not registered to SIP server.
LAN	On - The LAN port is active. Off - No active connection on the LAN port. Flashing - Data is being transmitted or received via the LAN port.
Line 1, 2, 3 and 4	On - The PSTN port is active. Off - The PSTN port is not in use. Flashing - The device connecting to the line is ringing.

Rear Panel

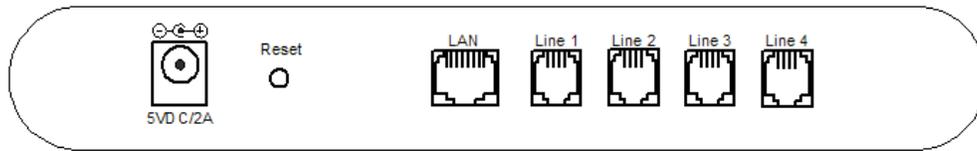


Figure 2: Rear Panel

Power	Connect the supplied power adapter here.
Reset Button	This button has two (2) functions: <ul style="list-style-type: none">• Reboot. When pressed for less than 6 seconds and released, the VoIP Gateway will reboot (restart).• Clear All Data. When press for 6 seconds longer then released. ALL data are cleared and restored to the factory default values, and the VoIP Gateway will reboot.
LAN (10/100BaseT)	Connect to a broadband router using a standard LAN cable.
Line 1~4	Connect to your PSTN phone lines or PBX extension lines here.

Chapter 2

Installation



This Chapter covers the physical installation of the VoIP Gateway.

Requirements

- TCP/IP protocol must be installed on all PCs.
- For Internet Access & VoIP, you must have access to Internet.

Procedure

1. Choose an Installation Site

Select a suitable place on the network to install the VoIP Gateway.
Ensure the VoIP Gateway is powered OFF.

2. Connect LAN Cable

Connect the LAN port of the VoIP Gateway to a router using the standard LAN cable that is shipped with the VoIP Gateway.

3. Connect Phones

Connect CO lines or PBX extension lines to the FXO ports.

4. Power Up

Connect the supplied power adapter to the VoIP Gateway and power up.
Use only the power adapter provided. Using a different one may cause hardware damage.

5. Check the LEDs

- The *Power* LED should be ON.
- The *LAN* LED should be ON.

Chapter 3

Configuration and Application



Examples

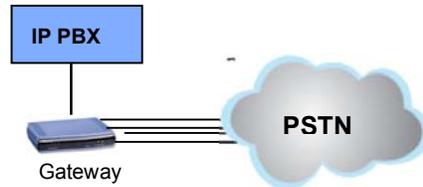
This Chapter provides some examples of VoIP Gateway configuration and application.

Configuration

The VoIP Gateway can be configured to register to a SIP server and make calls through the server. In SIP server environment, the SIP server handles the registration and serves as a proxy server for call signal. The VoIP Gateway may be configured to work in Direct Inward Dial (DID) mode or regular mode. In DID mode, calls originated from FXO ports are routed to SIP server for termination directly. In regular dialing mode, when an incoming call is detected from FXO port, the VoIP Gateway plays dial tone and waits for the final destination number to be dialed. See Line Settings Screen for further details of DID mode configuration.

Application Example 2- PSTN Trunk for IP PBX

Organization with IP PBX can use the VoIP Gateway as PSTN trunk for connecting its IP PBX to PSTN. You can configure the IP PBX as VoIP Gateway's SIP server and setup the dial plan on the IP PBX, the VoIP Gateway can be used as PSTN trunk to the IP PBX.



Chapter 4

Setup



This Chapter provides Setup details of the VoIP Gateway

Overview

This chapter describes the setup procedure for configuring the VoIP Gateway from a web browser.



After changing the settings, the new settings won't take effect until you save and reset the VoIP Gateway. Use the *Reset* button on the *Reset* screen.

Configuration Program

The VoIP Gateway contains an HTTP server. This enables you to connect and configure it by using your Web Browser. **Your web browser must support JavaScript.** The configuration program has been tested on the following browsers:

- Netscape V4.08 or later
- Internet Explorer V4 or later

Preparation

Before attempting to configure the VoIP Gateway, please ensure that:

- Your PC can establish a physical connection to network that the VoIP Gateway connects to. The PC and the VoIP Gateway must be on the same LAN segment.
- The VoIP Gateway must be installed and powered ON.
- Ensure that the VoIP Gateway's default IP Address (192.168.0.250) is not used by any host connecting to the network.

Using your Web Browser

To establish a connection from your PC to the VoIP Gateway:

1. Start your web browser.
2. In the *Address* box, enter "HTTP://" and the IP Address of the VoIP Gateway, as in this example, which uses the VoIP Gateway's default IP Address:

`http://192.168.0.250`

If you can't connect

If the VoIP Gateway does not respond, check the following:

- The VoIP Gateway is properly installed, LAN connection is OK, and it is powered ON. You can test the connection by using the "Ping" command:
 - Open the MS-DOS window or command prompt window.
 - Enter the command:

```
ping 192.168.0.250
```

If no response is received, either the connection is not working, or your PC's IP address is not compatible with the VoIP Gateway's IP Address. (See next item.)
- If your PC is using a fixed IP Address, its IP Address must be within the range 192.168.0.1 to 192.168.0.254 to be compatible with the VoIP Gateway's default IP Address of 192.168.0.250. Also, the *Network Mask* must be set to 255.255.255.0.
- Ensure that your PC and the VoIP Gateway are on the same network segment. (If you don't have a router, this must be the case.)

Logging In

After connecting to the VoIP Gateway from a web browser, you should then see a login prompt, which will ask for a *User Name* and *Password*.



Figure 3: Login Screen

Enter **admin** for the *User Name*, and leave blank for the *Password*. These are the default values. The password can and should be changed. Always enter the current user name and password, as set on the *Management* screen.

Main Menu

The main menu, on the left, contains links to the most-commonly used screen.

From the menu, check the following screens, and configure as necessary for your environment. Details of these screens and settings are described in the following sections of this chapter.

- **Setup**
 - Basic Setup,
 - SIP Service
 - Line Settings
 - Voice
- **Administration**
 - Management
 - Factory Defaults
 - Firmware Upgrade
 - Reboot
- **Status**
 - Gateway
 - VoIP
- **Event Log**
 - Set Log Level
 - Event Logs

Navigation & Data Input

- Use the menu bar on the left of the screen, and the "Back" button on your Browser, for navigation.
- Changing to another screen without clicking "Save" does NOT save any changes you may have made. You must "Save" before changing screens or your data will be ignored.



Note!

On each screen, clicking the "Help" button will display help for that screen.

Basic Setup Screen

After logging in, you will see the *Basic Setup* screen. This screen allows you to setup the network configuration.

Figure 4: Basic Setup Screen

Data - Basic Setup Screen

Network Setup	
Dynamic IP address	If selected, the VoIP Gateway will obtain its IP address and related information from a DHCP Server. Select this option only if your LAN has a DHCP Server.
Fixed IP address	If selected, you must assign the following data to the VoIP Gateway. <ul style="list-style-type: none"> IP Address - The IP Address of this device. Enter an unused IP address from the address range on your LAN. The default value is 192.168.0.250 IP Subnet Mask - The Network Mask associated with the IP Address above. Enter the value used by other devices on your LAN. The default value 255.255.255.0 Gateway IP Address - The IP Address associated with the IP Address above. The default value is 192.168.0.1
Domain Name Server (DNS) Address	
Primary DNS	Enter the IP address in the Primary DNS (Domain Name Server) field.
Secondary DNS	The Secondary DNS will be used only if the primary DNS is unavailable.
NTP	
NTP Server	Enter the IP address or host name for the desired NTP server.
Time Zone	Choose the Time Zone for your location from the drop-down list.

SIP Service Screen

This screen lets you configure the SIP servers and the related parameters.

SIP Service

SIP Server	SIP Proxy Address: <input type="text" value="192.168.1.2"/>
	SIP Proxy Port: <input type="text" value="5060"/>
	Registration Time: <input type="text" value="3600"/> (seconds)
Outbound Proxy	<input type="checkbox"/> Enable Outbound Proxy
	Outbound Proxy Address: <input type="text"/>
	Outbound Proxy Port: <input type="text" value="5082"/>
Signaling	Signaling Port: <input type="text" value="5060"/>
RTP	RTP Port: <input type="text" value="10000"/>
IP ToS/DiffServ	Call Signaling Packets: <input type="text" value="7"/> (2 Hex digit byte value)
	RTP Packets: <input type="text" value="b0"/> (2 Hex digit byte value)
Session	<input checked="" type="checkbox"/> Enable Session Timer
	Desired Refresh Time: <input type="text" value="0"/> (sec)
	Minimum Refresh Time: <input type="text" value="0"/> (sec)
NAT Traversal	<input checked="" type="radio"/> NONE
	<input type="radio"/> UPNP
	<input type="radio"/> Enable STUN Server
	Address: <input type="text" value="69.90.168.14"/>
	Port: <input type="text" value="3478"/>

Figure 5: SIP Service Screen

Data - SIP Service Screen

SIP Server	
SIP Proxy Address	Enter the address of the SIP Proxy Server.
SIP Proxy Port	Enter the port used for connections to the Server above.
Registration Time	This sets the "Idle Timeout" for the SIP Proxy Server Login. An Idle connection will be terminated after this time period. Enter the desired value.
Outbound Proxy	
Enable Outbound Proxy	Check the box if an outbound proxy is desired.
Outbound Proxy Address	The IP address or host name of the outbound proxy server.
Outbound Proxy Port	Enter the port used for connections to the outbound proxy server above.

Signaling	
Signaling Port	The UDP port that the VoIP Gateway uses for incoming call setup request.
RTP	
RTP Port	Enter the Base UDP port which the VoIP Gateway uses for RTP and RTCP. The VoIP Gateway uses a block of UDP ports for sending/receiving RTP and RTCP packets from this port number.
IP Tos/DiffServ	
Call Signaling Packets	TOS field in IP header for outgoing SIP packets.
RTP Packets	TOS field in IP header for outgoing RTP/RTCP packets
Session	
Enable Session Timer	Check this box if you want the VoIP Gateway to encode the Timer header in all INVITE requests for ringing timeout.
Desired Refresh Time	Enter the desired refresh time in seconds.
Minimum Refresh Time	Enter the minimum value of the session timer
NAT Traversal	
NONE	Check this box if no NAT Traversal is required.
UPNP	Check this box if you want to use the UPnP option for NAT traversal.
Enable STUN Server	Enable this if STUN is the preferred NAT traversal method.
Address	Specify the IP address of the STUN server
Port	Enter the port number of STUN server.

Line Settings Screen

The VoIP Gateway deals with the calls from FXO ports in two ways, Direct Inward Dial (DID) mode and non-DID mode. In DID mode, when there is an incoming call from FXO ports, the VoIP Gateway forwards the call directly to the SIP proxy server.

In non-DID mode, when an incoming call from FXO port is detected, the VoIP Gateway then presents a dial tone and waits for the caller to dial the destination number before setting up the call. The VoIP Gateway can register up to 4 phone numbers to the SIP server. By registering multiple phone numbers, you can assign each FXO port a unique phone number, so that calls from remote SIP devices are terminated to a specific FXO port according to the destination phone number the remote device encapsulates in the SIP header. Alternatively, you can group multiple FXO ports into a single hunt group and assign it a unique phone number. The VoIP Gateway will terminate calls destined to a hunt group to the first free FXO port in that hunt group.

Figure 6: Line Settings Screen

Data - Line Settings Screen

DID	
Telephone Number 1	PSTN number associated with this line.
Telephone Number 2	PSTN number associated with this line.
Telephone Number 3	PSTN number associated with this line.
Telephone Number 4	PSTN number associated with this line.
Register	
User Name	User Name that is been setup as the associated SIP Provider in the PBX.
Password	Password or Secret that has been setup as the associated SIP Provider in the PBX.

Voice Screen

This screen is for selecting and configuring the voice codec, voice parameters, and the FXO line settings.

The screenshot shows the 'Voice' configuration screen with a green sidebar on the left. The main area is divided into four sections:

- Preferred Coder:** Radio buttons for G.711U (selected), G.711A, and G.729.
- Voice Coders:** A table with columns for Packetization and VAD.

	Packetization	VAD
G.711U	20ms	ON
G.711A	20ms	ON
G.729	20ms	ON
- Calling Timers:** Input fields for 'Wait-for-Answer time' (180 sec) and 'Call Limit' (65535 sec).
- Dialing Parameters:** Input fields for 'Tone out on' (200 msec), 'Tone out off' (200 msec), 'DTMF power' (-130 (-400 ~ 30) * 0.1 dB), 'Answer after' (2 rings), 'Dial out wait' (400 msec), and 'Dial out battery threshold' (20 volts).

Figure 7: Voice Screen

Data - Voice Screen

Preferred Coders	
Preferred Coders	Select the desired codec.
Voice Coders	
Packetization	The duration that the VoIP Gateway samples voice signal and compresses it into a packet before sending to remote SIP device.
VAD	Set the Voice Activity Detection ON or OFF for the voice codec.
Calling Timers	
Wait-for-Answer time	Specify the time that the VoIP Gateway waits for the call to be answered. If the called party does not answer the call within this time period, the call is terminated automatically.
Call Limit	Specify the maximum time for a call. When the duration of a call exceeds this value, the call is terminated automatically.
Dialing Parameters	
Tone out on	Specify the tone on time in millisecond for an out dialing DTMF digit.
Tone out off	Specify the tone off time in millisecond for an out dialing DTMF digit.
DTMF power	Enter the desired value for the DTMF power.

Answer after	Number of rings the VoIP Gateway waits before answering incoming calls.
Dial out wait	Enter the desired time the VoIP Gateway waits after seizing a telephony port and before dialing out DTMF digits
Dial out battery threshold	Before seizing a FXO port for dialing out, the VoIP Gateway detects voltage level of the port to ensure that the port is connected and available. If the voltage level is below this threshold level, the port is declared unavailable.

Line Settings

Transmit Gain: dB
 Receive Gain: dB
 Impedance Selection: ▼
 Tip/Ring voltage: ▼
 Operational loop current Min: ▼
 On-Hook speed: ▼
 Ring frequency Min:
 Ring frequency Max:
 Ring Validation Time: ▼
 Ring Indication Delay: ▼ ms
 Ring Timeout (ms): ▼
 Ring Threshold (vrms): ▼
 Ringer Impedance: ▼

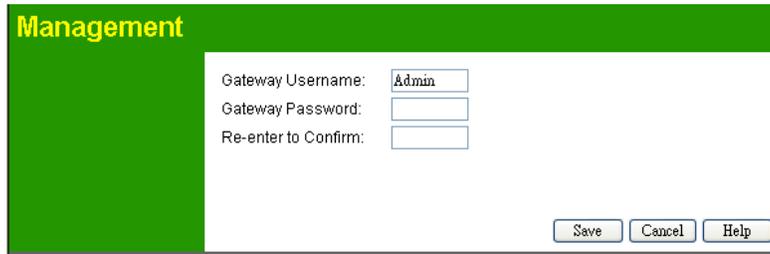
Battery reversal as disconnect signal
 Loop period shut-down as disconnect signal
 Minimum period for disconnect signal: ms
 Tear down FXO port when silence detected for: seconds

Line Settings	
Transmit Gain	The VoIP Gateway may increase or attenuate the power level before transmitting to the telephony port. This field allows you to set this gain level in dB.
Receive Gain	The VoIP Gateway may increase or attenuate the power level of the voice signal presented by the phone set. This field allows you the set this gain level in dB.
Impedance Selection	Select the impedance of the lines connecting to the VoIP Gateway’s telephony ports.
TIP/RING Voltage	Select the desired value. Low-voltage countries should use a lower voltage.
Operational loop current Min	Select the desired value from the drop-down list.
On-Hook speed	Select the speed for the FXO port to go on-hook.
Ring frequency Min	The minimum ring frequency for the FXO port to detect.

Ring frequency Max	The maximum ring frequency for the FXO port to detect.
Ring Validation Time	Select the time for the FXO port to detect a valid ring.
Ring Indication Delay	Select the desired value from the list.
Ring Timeout	Select the desired option for the ring timeout.
Ring Threshold	The minimum voltage level which the incoming ringing signal must present for the VoIP Gateway to detect it.
Ringer Impedance	Choose the desired value to satisfy the maximum ringer impedance specification.
Battery reversal as disconnect signal	Select this radio button if you want the VoIP Gateway to deem battery reversal as line disconnection signal.
Loop period shut-down as disconnect signal	Select this radio button if you want the VoIP Gateway to deem loss of loop as line disconnection signal
Minimum period for disconnect signal	Enter the desired value in milliseconds.
Tear down FXO port when silence detected for	Enter the time when an FXO port detects no RTP packets before hanging up the port.

Management Screen

This page allows you to change the user password for the VoIP Gateway.



The screenshot shows a web interface titled "Management" with a green header. Below the header, there are three input fields: "Gateway Username" with the value "Admin", "Gateway Password", and "Re-enter to Confirm". At the bottom right, there are three buttons: "Save", "Cancel", and "Help".

Figure 8: Management Screen

Data - Management Screen

Management	
Gateway Username	Enter the login name.
Gateway Password	Enter the new password
Re-enter to Confirm	Re-enter the new password here.

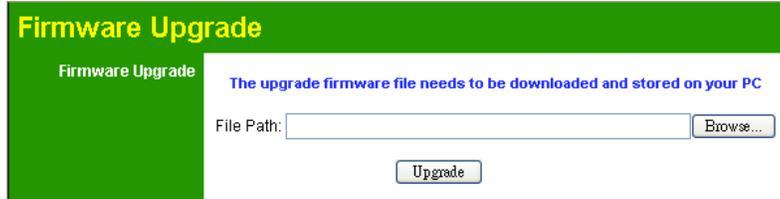
Factory Default Screen

This screen allows you to set the VoIP Gateway back to its factory default configuration. Any existing settings will be deleted.

Factory Default	
Restore factory defaults	Click this button will reset the VoIP Gateway to its factory default settings. WARNING ! This will delete ALL of the existing settings.

Firmware Upgrade Screen

The firmware (software) in the VoIP Gateway can be upgraded using your web browser. You may use this screen to upgrade your VoIP Gateway's firmware.



Firmware Upgrade

Firmware Upgrade

The upgrade firmware file needs to be downloaded and stored on your PC

File Path:

Figure 9: Firmware Upgrade Screen

To perform the Firmware Upgrade:

1. Click the *Browse* button and navigate to the location of the upgrade file.
2. Select the upgrade file. Its name will appear in the *File Path* field.
3. Click the *Upgrade* button to commence the firmware upgrade.



The VoIP Gateway is unavailable during the upgrade process, and must restart when the upgrade is completed. Any connections to or through the VoIP Gateway will be lost.

Reboot Screen

This page allows you to restart (reboot) the VoIP Gateway.



Figure 10: Reboot Screen

Data - Reboot Screen

Button	
Restart System	Click this button to restart the VoIP Gateway. All connections to or through the VoIP Gateway will be lost.

Gateway Screen

This screen displays the status of the VoIP Gateway.

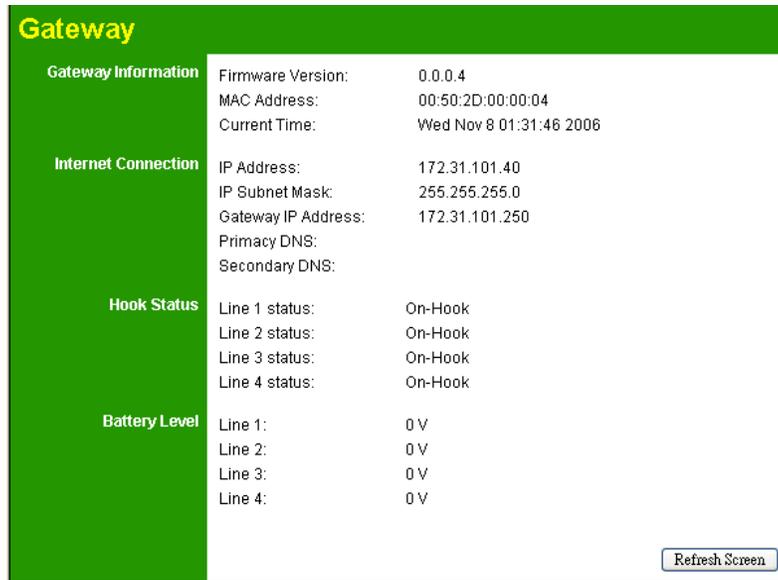


Figure 11: Gateway Screen

Data - Gateway Screen

Gateway Information	
Firmware Version	The version of the current firmware installed.
MAC Address	This shows the MAC Address for the VoIP Gateway
Current Time	It displays the current date and time of the system.
Internet Connection	
IP Address	The IP Address of the VoIP Gateway.
IP Subnet Mask	The Subnet Mask for the IP Address above.
Gateway IP Address	The IP Address of the router.
Primary DNS	The IP Address of the Primary DNS server.
Secondary DNS	The IP Address of the Secondary DNS server.
Hook Status	This indicates the status on the telephone line. ON-Hook indicates the receiver is "on-the-hook", while OFF-Hook indicates the receiver is "off-the-hook".
Battery Level	The voltage level of each telephone line.

VoIP Screen

This screen displays the phone numbers and the status of the SIP registration.



Figure 12: VoIP Status Screen

Data - VoIP Status Screen

Line Status	
Telephone Number	The telephone number associated with this line.
Registration Status	This shows the status of the connection to the SIP Server.

Set Log Level Screen

The Logs record various types of activity on the VoIP Gateway. Use the *Set Log Level* screen to configure this feature.

Figure 13: Set Log Level Screen

Data - Set Log Level Screen

Event Types	
Telephony	Telephony events will be logged
SIP	Events related to SIP server are logged.
DSP	Events related to the DSP will be logged.
Dial Plan	Dial Plan events are logged
Others	Other operations (not covered by the selections above) will be logged.
Log Level	
Off	Suppress logging of the event.
Low	Log all events.
Mid	Log events which are of middle significance.
High	Log most significant event only.

Event Logs Screen

This screen displays the event logs of the VoIP Gateway.

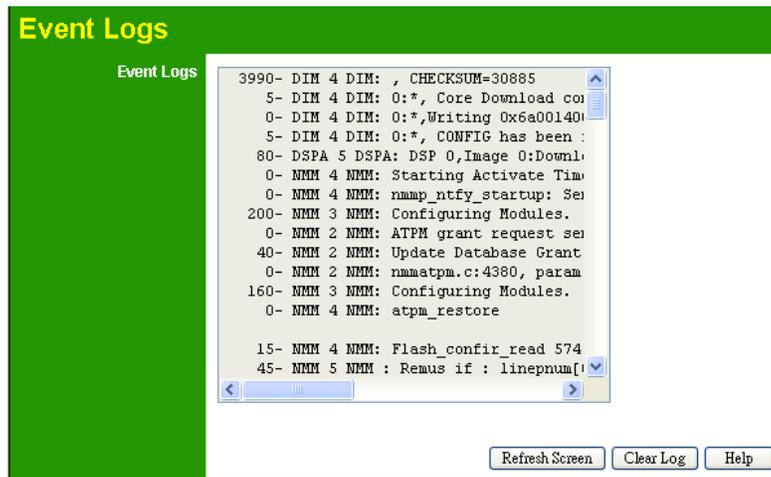


Figure 14: Event Logs Screen

Data - Event Logs Screen

Event Logs	
Event Logs	Current log data is displayed in this panel.
Refresh Screen	Click this button to update the messages shown on screen.
Clear Log	Delete all data currently in the Log. This will make it easier to read new messages.

Appendix A

Troubleshooting



This Appendix covers the most likely problems and their solutions.

Overview

This chapter covers some common problems that may be encountered while using the VoIP Gateway and some possible solutions to them. If you follow the suggested steps and the VoIP Gateway still does not function properly, contact your dealer for further advice.

General Problems

Problem 1: Can't connect to the VoIP Gateway to configure it.

Solution: Check the following:

- The VoIP Gateway is properly installed, LAN connections are OK, and it is powered ON.
- Ensure that your PC and the VoIP Gateway are on the same network segment. (If you don't have a router, this must be the case.)
- If your PC is set to "Obtain an IP Address automatically" (DHCP client), restart it.
- If your PC uses a Fixed (Static) IP address, ensure that it is using an IP Address within the range 192.168.0.1 to 192.168.0.254 and thus compatible with the VoIP Gateway's default IP Address of 192.168.0.250. Also, the Network Mask should be set to 255.255.255.0 to match the VoIP Gateway.

In Windows, you can check these settings by using *Control Panel-Network* to check the *Properties* for the TCP/IP protocol.

- If you are using more than one gateway you may have to clear the cache for the gateways IP address.
 1. Go to Start > Run
 2. Type "cmd" and press enter
 3. On the command line type "ARP -d 192.168.0.250" press enter (if using a different IP than substitute that portion of the command).

Problem 2: Can't connect to the VoIP Gateway, the four Line LED indicators flash simultaneously for 3 seconds and are off instantly.

Solution: The flash memory device that stores the firmware was damaged. It is likely the latest firmware upgrade process was not completed successfully. You'll need to return the unit.

Problem 3: I am using DHCP, and don't know the IP address that the VoIP Gateway obtained from DHCP server.

Solution: There is a Windows-based utility on the CD ROM named ScanIP.exe. This utility can detect the IP address of the VoIP Gateway. To detect the IP

Appendix B

Specifications



VoIP Gateway

Model	IP400
Dimensions	176mm(W) * 115mm(D) * 36mm(H)
Operating Temperature	0° C to 40° C
Storage Temperature	-10° C to 70° C
VoIP Signaling Protocol	Session Initiation Protocol (SIP)
Voice Codecs	G.711, G.729AB, G.726
Ethernet Interface:	1 * 10/100BaseT (RJ45) for LAN
Line Interface	4 * RJ11, loop start FXO ports
LEDs	7
Power Adapter	5 V DC/2A External