

DISCOVERY^{IP}

An Internet Telephony Gateway

TELECONNECT
99 CT EXPO
Best of Show



Technical Manual

DISCOVERY *IP*

Technical Manual

**VODAVI
TECHNOLOGY, INC.**
PN: 9860-00
August, 1999

LIFE SUPPORT APPLICATIONS POLICY

VODAVI Technology, Inc. products are not authorized for and should not be used within Life Support applications. Life Support systems are equipment intended to support or sustain life and whose failure to perform when properly used in accordance with instructions provided can be reasonably expected to result in significant personal injury or death.

VODAVI Technology, Inc. warranty is limited to replacement of defective components and does not cover injury to persons or property or other consequential damages.

Copyright © 1999 VODAVI Technology, Inc.

All Rights Reserved

This material is copyrighted by VODAVI Technology, Inc. Any unauthorized reproductions, use or disclosure of this material, or any part thereof, is strictly prohibited and is a violation of the Copyright Laws of the United States (17 U.S.C. Section 101 et. seq.).

VODAVI reserves the right to make changes in specifications at any time and without notice. The information furnished by VODAVI in this material is believed to be accurate and reliable, but is not warranted to be true in all cases.

Discovery IP™ is a Registered trademark of VODAVI Technology, Inc.

Contents

Chapters

1 Product Description/Overview

IP TELEPHONY	1-1
DISCOVERY IP NETWORK COMPONENTS	1-2
IP TELEPHONY STANDARDS	1-2
DISCOVERY IP NETWORK APPLICATIONS.....	1-3

2 Operational Modes

CALLING FROM POINT A TO POINT B	2-1
ROUTING TELEPHONE/FAX CALLS.....	2-1
Multiple Unit Routing.....	2-1
Point-to-Point (NOMAP) Routing.....	2-2
CALL DETAIL RECORDING	2-3
ACCESSING CDR.....	2-3

3 Prerequisites for Installation

PHYSICAL ENVIRONMENT	3-1
NETWORK INFORMATION	3-1
Firewall Instructions:	3-2
PHONE LINE TYPE SUPPORTED	3-2
OTHER HARDWARE REQUIRED	3-2

4 Hardware Installation

Shutdown Procedure	4-3
--------------------------	-----

5 System Configuration

PRIOR TO CONFIGURING THE Discovery IP	5-1
Instructions for Serial Port Connections	5-1
Discovery IP CONFIGURATION WIZARD.....	5-2
NOMAP Setup.....	5-8
Multiple Routing Setup.....	5-11
MANAGING Discovery IP CONFIGURATION SETTINGS.....	5-18
Configuration Step 1 — General Discovery IP Setup	5-20
Concluding Step 1 of Configuration.....	5-22
Configuration Step 2 — Mapping Address Specifications.....	5-23
Completing Step 2 of Configuration.....	5-24
Configuration Step 3 — Configuration Confirmation.....	5-25
MANAGING CONFIGURATION THROUGH THE WEB INTERFACE	5-25

6 System Operation

THE RUNNING PROGRAMS	6-1
Programs Which Must be Run for Each Configuration.....	6-1
Locations of Running Programs	6-2
MONITORING Discovery IP ACTIVITY.....	6-2
COLLECTING CALL DETAIL RECORDS	6-4
RECORD A VOICE FILE MESSAGE	6-5
DOWNLOADING SOFTWARE UPDATES	6-6
Update Using FTP	6-7
RESTART/SHUTDOWN OF Discovery IP.....	6-8

7 Calling Instructions

ESTABLISHING/MAINTAINING A VoIP CONNECTION.....	7-1
---	-----

Appendices

A Interface Card

ICV-8 CARD	A-1
ICV-8 Layout.....	A-1
Jumper Settings.....	A-2

B Parts Specifications

NETWORK CONNECTION	B-1
10/100BaseT	B-1
POWER SUPPLY	B-1
SBC	B-1
HARD DISK.....	B-1

C Glossary

ABB:	C-1
ADPCM:	C-1
AIS:	C-1
Alarms:.....	C-1
AMI:.....	C-1
ATM:	C-1
B8ZS:	C-1
Baud:	C-1
bps:	C-1
Bps:	C-1
CCITT:.....	C-1
Channel Bank:.....	C-2
Cross Point Switch:.....	C-2
CSU:.....	C-2
D4:	C-2
DCE:	C-2
DS-0:.....	C-2

DS-1:	C-2
DSU:	C-2
DSX:	C-2
DTE:	C-2
ESF:	C-2
FDL:	C-2
FSYNC:	C-2
FT-1:	C-2
FXS:	C-2
ICV:	C-3
ISA:	C-3
LAN:	C-3
LOS:	C-3
Loss of Sync:	C-3
MPP:	C-3
MVIP:	C-3
NIU:	C-3
Null Modem:	C-3
PC:	C-3
PCM:	C-3
POTS:	C-3
SF:	C-3
Slip:	C-3
SNA:	C-3
SNMP:	C-3
SMTP:	C-3
T-1:	C-4
TCP/IP:	C-4
Telnet:	C-4
X.25:	C-4

D Country Specific Information

UNITED STATES OF AMERICA	D-1
FCC Part 15	D-1

E Troubleshooting

INDEX

Figures

Internal Multiple Routing (MAP), and Point-to-Point (NOMAP) Diagrams	2-2
Exterior of the Discovery IP	4-1
Hardware Cable Connections	4-2
System Status Main Screen (Startup)	5-2
Configuration Main Screen	5-3
Configuration Wizard—Machine Name	5-4
Network Setup—IP Address	5-4
Network Setup—Subnet Mask	5-5
Network Setup—IP Gateway	5-5
Timezone Setup	5-6
System Clock Setup	5-7
Number Of VOIP Gateways Routing Method)	5-8
NOMAP Diagram	5-8
Routing Setup. With total of two Discovery IP Gateways.	5-9
End of NOMAP Configuration	5-9
ReStart Of VOIP Services For New Settings To Take Effect	5-10
End of Configuration Wizard	5-10
Multiple Routing Setup	5-11
Mapping Setup. If total of more than two Discovery IP Gateways.	5-11
Mapping Setup. If total of more than two Discovery IP Gateways.	5-12
Mapping Server Setup. If total of more than two Discovery IP Gateways, and Mapping Server exists on this machine.	5-13
Mapping Server Setup. If total of more than two Discovery IP Gateways, and mapping	

Server Exists on this machine.	5-13
Mapping Server Setup. When total of more than two Discovery IP Gateways, and Mapping Server exists on this machine.	5-14
Routing Setup. When total of more than two Discovery IP Gateways, and Gateway Server exists on other machine.	5-15
Port Number Assignment	5-15
Port Number Assignment. When all ports have same number.	5-16
Port Number Assignment. Unique number on each (same prompt on second, third, fourth).	5-16
End of Configuration Process	5-17
ReStart Of VOIP Services For New Settings To Take Effect	5-17
End of Configuration Wizard	5-18
System Status Configuration Options Screen	5-19
Discovery IP Configuration—Step 1	5-20
Discovery IP Configuration—Step 1 (continued)	5-21
Discovery IP Configuration—Step 1 (continued)	5-22
Discovery IP Configuration—Step 2	5-23
Discovery IP Configuration—Step 2 (continued)	5-24
Discovery IP New Configuration Confirmation	5-25
Control Panel of Web Interface	5-26
Discovery IP Configuration Through Web Interface	5-27
Discovery IP Configuration Through Web Interface (continued)	5-28
Port Status Monitoring Through Web Interface	5-29
List of Running Programs as Seen in System Status Screen	6-1
Port Monitoring via dvgststatus	6-3
Updater Main Menu	6-6
FPT Server Address	6-7
FTP Update Menu	6-8
ICV -8 Jumper and Connector Layout	A-1
RJ-14 Pinout	A-2

Tables

Physical Environment	3-1
Firewall Ports	3-2
Cable Connections	4-2
Locations of Running Programs	6-2
Status Messages For Each Port	6-3
Voice Files and Messages	6-5
JP2 and JP3 MVIP Bus Stream Selection	A-2
Troubleshooting Checklist	E-1

1 Product Description/Overview

IP TELEPHONY

The Discovery IP, Vodavi's IP telephony solution, supports communication between conventional telephony devices such as key systems and PBX using an Internet Protocol (IP) data network. The Discovery IP enables the use of an IP path as the connection between distant telephone systems. A traditional telephone connection consists of a constant connection between two phones for the duration of a telephone call. On a Public Switched Telephone Network (PSTN) or trunk circuit, the call occupies 64,000 bits/second (64 kbps) of bandwidth between the two ends, whether anyone is talking or not. IP telephony technology compresses the voice-data or fax-data stream by a factor determined by the algorithm used. Compression may in some cases exceed a 10:1 compression ratio. A benefit of the compression is that it provides a conventional 64 kbps circuit to handle multiple calls.

The prevalence and existing infrastructure of IP connections make it a logical and economical medium for transporting voice and fax data. IP is used worldwide for private and public networks. The global Internet consists entirely of IP connections between millions of systems.

IP is a packet protocol, communicating through the use of data packets which can be interleaved with other packets on the same circuit. IP is independent of the underlying transmission technology – it works equally well on a Local Area Network (LAN), frame relay, and dedicated private lines. Its advantages include:

- connectionless per-packet routing so that intermediate failures of circuits or routers will efficiently and automatically be avoided without failure of the link between two endpoints (as long as an alternate path is available).
- multiple session support, so that more than one communication can be carried on the circuit at the same time.

IP has predominantly been a data protocol used for sending files and messages between computers. IP telephony has the additional advantage of permitting data and voice packets to be interleaved on the same circuits. The global Internet now carries voice/fax as well as email and web pages, without any concern for the type of data in each packet.



It should be noted that the Internet is not the ideal mechanism for telephone calls. Most data communication between computers is not sensitive to small traffic delays between sender and receiver. Voice is very sensitive, in that users prefer a natural-sounding conversation. This requires a minimum of delay, and interference in regard to the transmission of the voice packets. Unfortunately, the Internet is growing rapidly and exhibits random areas of delay and congestion, so it is not a stable medium. Voice conversation can be acceptable or not acceptable when using the internet as the transport medium. A privately-managed intranet will provide the best IP telephony voice quality.

DISCOVERY IP NETWORK COMPONENTS

A Discovery IP network consists of an IP network between at least two endpoints, and devices to convert standard voice signals into IP data packets for transmission on the packet network. The devices known as gateways are the DISCOVERY IP units. Each Discovery IP connects to loop start CO line interfaces on a key system or PBX and to an IP LAN. A conventional router connects the LAN to a Wide Area Network (WAN) with connections to other DISCOVERY IPs. Multiple DISCOVERY IPs can be stackable-mounted to support many simultaneous phone calls.

Additional optional components include the following:

- ❑ Components used for remote management of the processes and configurations of DISCOVERY IPs.
- ❑ An optional Gatekeeper software module to provide H.323 compliance when integrating the Discovery IP with other gateway manufacturers products. The gatekeeper module installs on a separate Microsoft Windows NT based operating system PC located on the same network as the gateways.

IP TELEPHONY STANDARDS

The Discovery IP uses conventional telephony standards for connecting to the telephone network. Foreign eXchange (FX) 2-wire circuits are the predominant types in the USA. Foreign Exchange Station (FXS) emulates a Central Office (CO) and is used to connect to the trunk side of a PBX or keyset.

The compression/decompression algorithms (codecs) used are G.723 for voice, and G.711 for fax. G.723 coding uses 5.3 kbps, with a compression ratio of approximately 12 to 1, G.711 coding uses 64 kbps, with a compression ratio of 1 to 1. Digital Signal Processors (DSP) that are used run at 33 MIPs.

The industry-standard Ethernet 10/100BaseT LAN port provides connection to the data network infrastructure. The voice/fax data packets may be routed, bridged or tunneled through another network to a remote Discovery IP where the voice/fax traffic is sent to a station (phone), CO, or PBX.

DISCOVERY IP NETWORK APPLICATIONS

The Discovery IP has several applications. It is used as a connection between distant telephone circuits, which may be local telephone lines or connections to a company's private phone system. The major ones include:

- Telephone service between two or more locales
- Long-distance circuit replacement
- International connections between overseas countries and the US.

2 *Operational Modes*

CALLING FROM POINT A TO POINT B

The Discovery IP is a conversion node where traditional voice telephone circuits are converted or packetized into digital information (IP packets) which are transmitted across a data network. At the other end of the connection, another Discovery IP converts the packetized voice back to analog information for the telephone network.

The Discovery IP typically connects telephone systems together using the data network as the transport medium. The interconnection between the Discovery IP and the telephone system is done through loop start trunks. The interconnection between the Discovery IP and the data network is typically with a Router over a Local Area Network (LAN) to the leased data line or Internet access line. Each Discovery IP has a unique IP address and can be grouped into a large network, dispersed geographically around the world, or simply placed between two geographically remote locations.

Discovery IP supports two (2) methods of call routing. The first is multiple unit or MAP, and the second is point-to-point, or NOMAP. With multiple unit operation, the user accesses a CO-line connected to the Discovery IP. The Discovery IP then prompts the user for a phone number (programmable) for their desired destination. The user enters a phone number corresponding to the desired Discovery IP destination. The number dialed by the user is compared to a routing table in the Discovery IP. The table maps phone numbers to IP addresses of all the Discovery IP units in the network. The call then routes to the destination Discovery IP unit and rings the phone system as an incoming call on a specific CO line. With point-to-point (NOMAP), the user accesses a CO-line connected to the Discovery IP. The Discovery IP unit then accesses a distant Discovery IP unit programmed in the unit. No prompting is given to the user with this option.

Voice data traverses between the originating Discovery IP and destination Discovery IP in a manner determined by the voice compression/decompression algorithm (codec) used. The algorithms used are G.723 for voice and G.711 for fax. G.723 coding uses 5.3 kbps, with a compression ratio of approximately 12 to 1, G.711 coding uses 64 kbps, with a compression ratio of 1 to 1.

At the end of the call, a Call Detail Record (CDR) may be generated.

ROUTING TELEPHONE/FAX CALLS

Multiple Unit Routing

The Discovery IP can route by prefix, area code, and default mappings when connecting multiple Discovery IP units to the network. CDRs used for billing are written to a text file at the configuration-specified Discovery IP.

This mapping method is used when it is specified in the configuration wizard that more than two Discovery IP gateways are in this application (refer to Figure 1).

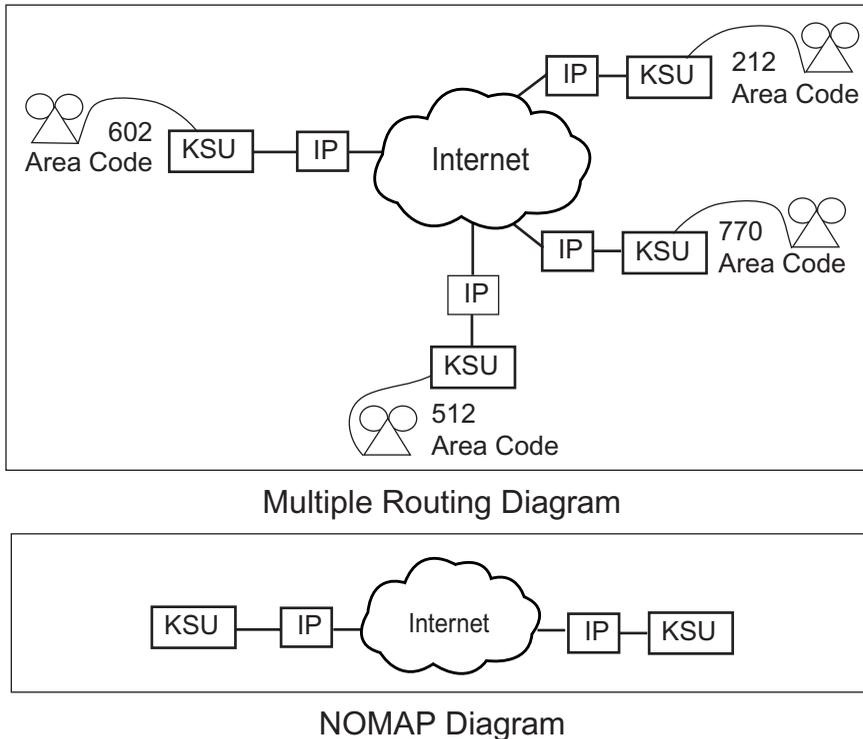


Figure 1: Internal Multiple Routing (MAP), and Point-to-Point (NOMAP) Diagrams

Point-to-Point (NOMAP) Routing

The AutoDial option enables all calls made through this Discovery IP to bypass any prefix and authentication dialing and be placed out of the NOMAP-specified destination Discovery IP. The destination Discovery IP automatically calls the number, or goes off-hook to connect to the attached phone line(s) or switch. NOMAP routes all calls originating at a Discovery IP point-to-point to the Discovery IP at the configuration-specified IP address. The specified Discovery IP is the destination Discovery IP for all calls originating from the first Discovery IP.

This method will allow users to access a line or group of lines connected to the Discovery IP and place a connection to another Discovery IP without dialing any digits. This mapping method is used when it is specified in the configuration wizard that only two Discovery IP gateways are in this application (refer to Figure 1).

CALL DETAIL RECORDING

Information collected in Call Detail Recording (CDR) includes the user identification number, number dialed, time of call, duration of call, type of call, IP address of originating Discovery IP, IP address of destination Discovery IP, and port used on each Discovery IP.

ACCESSING CDR

For internal Gatekeeper/billing, the CDRs are located in the file found in: **tempest/billing/** directory called bills. The format of a CDR is:

<customer ID+PIN>,<<number dialed>,<<duration of call in seconds>,<<time of call:yymmddhhnnss>,<<name of originating Discovery IP>,<<port at originating Discovery IP used>,<<name of destination Discovery IP>,<<port at destination Discovery IP used>

3 Prerequisites for Installation

PHYSICAL ENVIRONMENT

Table 1: Physical Environment

Operating Temperature	5 to 45 °C
Operating Temperature Gradient	10 °C/hr maximum
Operating Humidity	20 to 80 %, non-condensing
Input Voltage, AC Power Supply	115 VAC (90-132 Vms) or 230 VAC (180-264 Vms)
Frequency	50-60 Hz
Maximum Input Current	6.0 A (115 Vms, 60 Hz), 3.0 A (230 Vms, 50 Hz)
Protection	Overvoltage, overcurrent, short-current
Typical Output Power	250 W
Console and Auxiliary Ports	Asynchronous serial, VGA, PS2 keyboard
Internet Access	Dedicated internet connection (not DialUp)
Dimensions	3.5 x 19 x 20.7 in.
Weight	25 lb.

NETWORK INFORMATION

The network configurations must be entered into the Discovery IP configuration program in order for proper communication to occur. The following information is required for Discovery IP network configuration:

- Full hostname of the Discovery IP, including domain name
- IP address of the Discovery IP
- Subnet mask of the Discovery IP
- IP address of the default router/gateway for the Discovery IP
- Timezone of the Discovery IP unit

Firewall Instructions:

The following firewall ports on the router in the network must be open for inbound as well as outbound connections, if a firewall exists:

Table 2: Firewall Ports

TCP Ports	22, 23, 77, 111
UDP Ports	700, 708, 709, 800, 1551, 1556, 1557, 1667, 1670, 1671, 1672, 5004, 5005, 5010, 5011, 5016, 5017, 5022, 5023, 5028, 5029, 5034, 5035, 5040, 5041, 5046, 5047, 5052, 5053, 5058, 5059, 5064, 5065, 5070, 5071, 5076, 5077, 5082, 5083, 5088, 5089, 5094, 5095, 5100, 5101, 5106, 5107, 5112, 5113, 5118, 5119, 5124, 5125, 5130, 5131, 5136, 5137, 5142, 5143

PHONE LINE TYPE SUPPORTED

Loop start trunk circuits from a key/PBX system may connect to the Discovery IP unit.

OTHER HARDWARE REQUIRED

A Video Graphics Adapter (VGA) monitor and a keyboard (not included with the Discovery IP) are necessary to configure, operate and monitor the Discovery IP processes. A laptop computer with hyperterminal (Version 4) may be used to configure the Discovery IP unit.

4 Hardware Installation

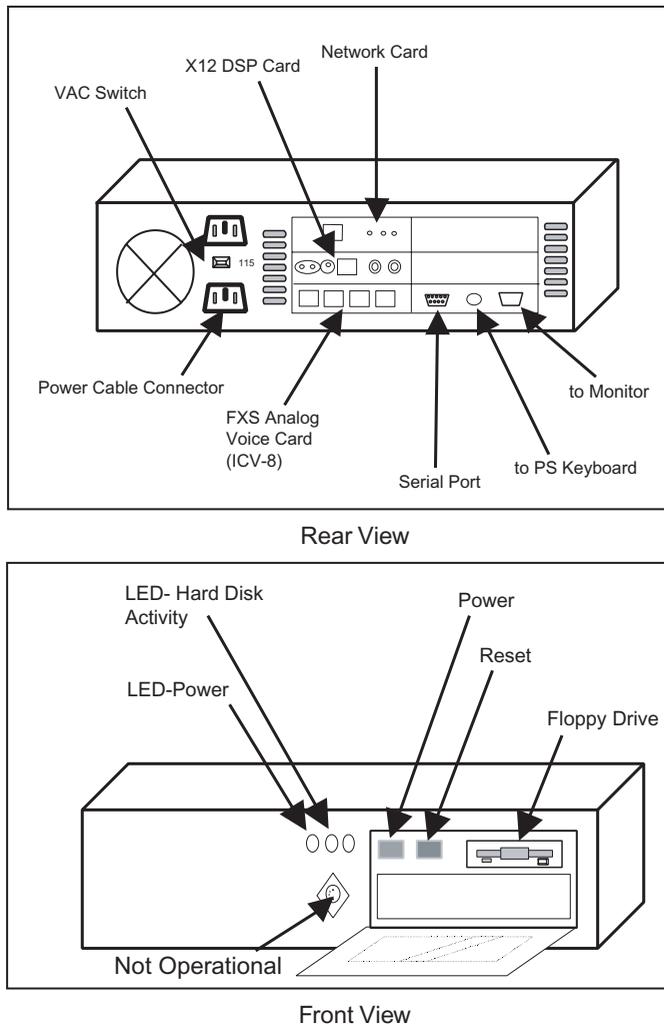


Figure 2: Exterior of the Discovery IP

Table 3: Cable Connections

Keyboard(PS2)/Monitor or Serial Connection (through nullmodem cable)	Required for initialization (not included)
Power	115 or 230 VAC - Be sure to set switch (<i>do not plug directly into wall - surge protection is advised</i>)
Phones	Two lines per RJ-14 connector. RJ-14 connectors are ordered from top to bottom. Ports are numbered beginning 00, 01, 02, ..., etc. Refer to Appendix A for connections to the FXS analog voice card (ICV-8).
LAN/Network	10/100 baseT connection (labeled DATA on rear of Discovery IP box)

Figure 3 illustrates how the cables should be connected:

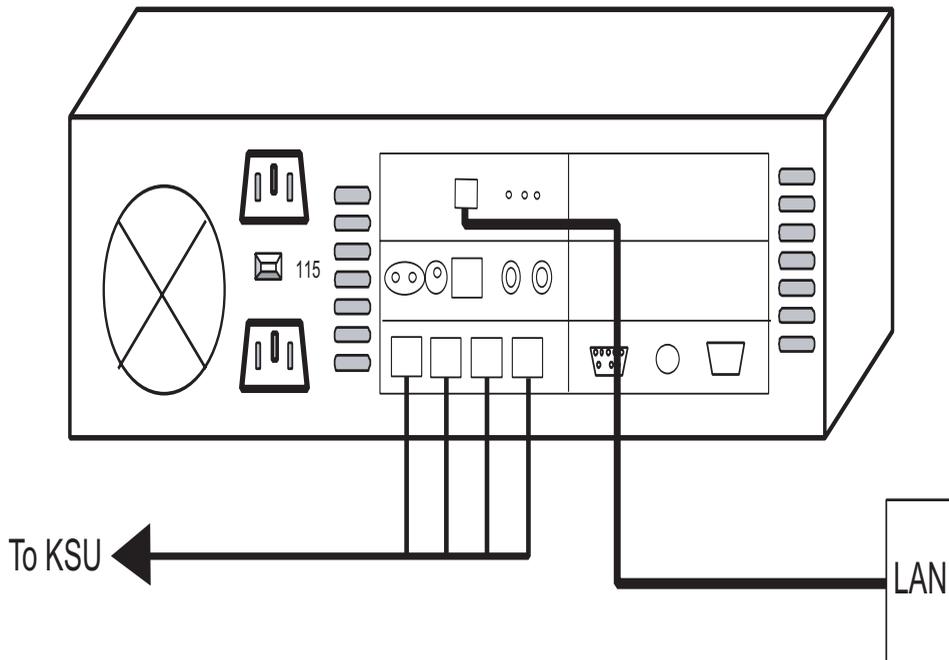


Figure 3: Hardware Cable Connections

To turn unit on for the first time, power on the unit from the rear. Machine will boot and show status messages.



DO NOT turn off the DISCOVERY IP without a proper shutdown procedure. Doing so may result in damage to the hard disk.

Shutdown Procedure

1. Press **CTRL+ALT+DEL** then wait until all processes have closed completely before powering down.
OR
2. Type at the command line prompt **shutdown -h now**, then press **ENTER**; power down only when you can see that all processes have completed shutting down.

5 System Configuration

PRIOR TO CONFIGURING THE Discovery IP



The following information is required for the configuration of each Discovery IP unit. This information should be obtained prior to installation of the units.

To establish network connection for each Discovery IP machine, you must designate:

- Full hostname of the Discovery IP, including domain name
- IP address of the Discovery IP
- Subnet mask of the Discovery IP
- IP address of the default router/gateway for the Discovery IP
- Timezone of the Discovery IP

To configure the Discovery IP, you must designate the:

- Method of mapping
- IP address of the Discovery IP which will serve as the mapping server
- IP addresses of machines to be included in mapping scheme
- Numeric assignment of each Discovery IP unit
- Port number assignments on each Discovery IP

Instructions for Serial Port Connections

Connect your null modem cable to the serial port on the Discovery IP. Connect the other end of the cable to the machine you will use to configure the Discovery IP.

The Hyperterminal program supplied with Windows can be used to configure the Discovery IP unit via the serial connection (must be Version 4 to properly function with the Discovery IP).

Be sure to configure your connection for the correct COM port on the machine you're connecting from. On the machine you are connecting from, configure your connection settings as follows:

- Bits per Second: 9600, Data Bits: 8, Parity: None, Stop Bits: 1, Flow Control: x on/ x off
- In Hyperterminal, Configure Key Macros. In case you need to use the Insert and Delete keys during configuration, perform the following:
 1. Go to **VIEW>KEY MACROS**:
 - [Insert Key] is equivalent to <Esc>/2~; (i.e. escape key, left bracket, 2, tilda)
 - [Delete Key] is equivalent to <Esc>/3~; (i.e. escape key, left bracket, 3, tilda)

- Once connected:
 1. Type **Root** [ENTER]
 2. Type **dvg-passed** [ENTER]
 3. Type **cd /tempest/dvg** [ENTER]
 4. Type **dvgstatus** [ENTER]
 5. Type **c**; and select Configuration Wizard

Discovery IP CONFIGURATION WIZARD

Discovery IP units may be configured through the Configuration Wizard program, which is accessed through the System Status program always running on each Discovery IP unit.

Upon startup of the Discovery IP, the screen for the System Status program appears.

Upon power-on/startup of the Discovery IP, the below screen displays (Figure 4), then:

1. Type **C** to view configuration options.

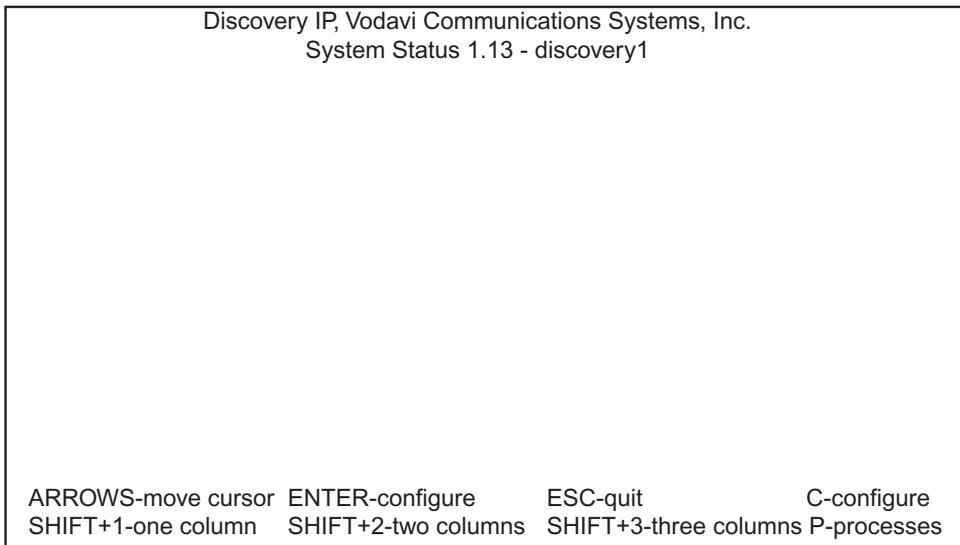


Figure 4: System Status Main Screen (Startup)

2. Select Configuration Wizard using the arrow keys. Press **ENTER** (as shown in Figure 5).

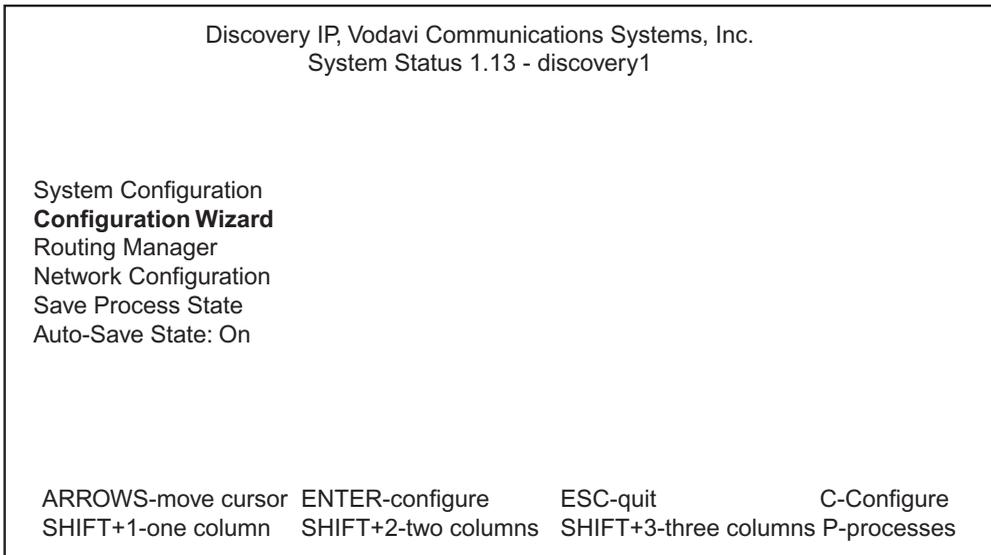


Figure 5: Configuration Main Screen

3. Enter the domain name of the Discovery IP unit as shown in Figure 6.
4. Next, enter the IP address of this Discovery IP unit (Figure 7).

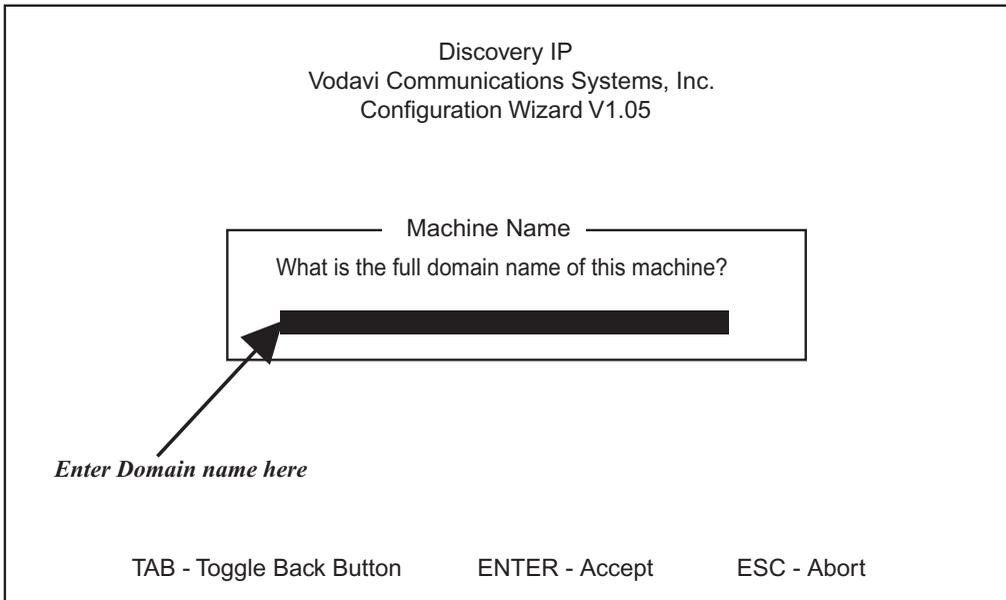


Figure 6: Configuration Wizard—Machine Name

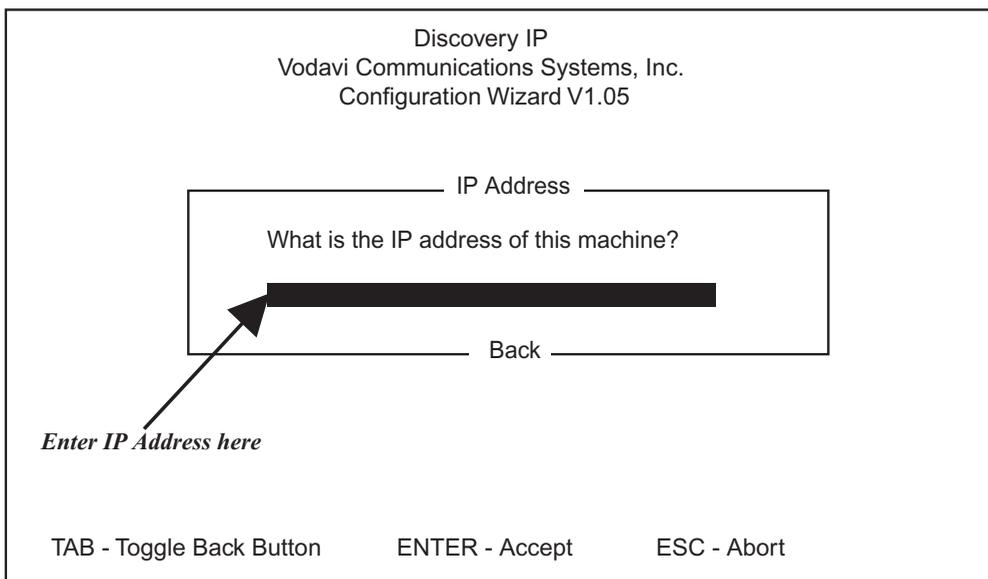


Figure 7: Network Setup—IP Address

5. Enter the Subnet Mask IP Address, as prompted by the screen shown in Figure 8.

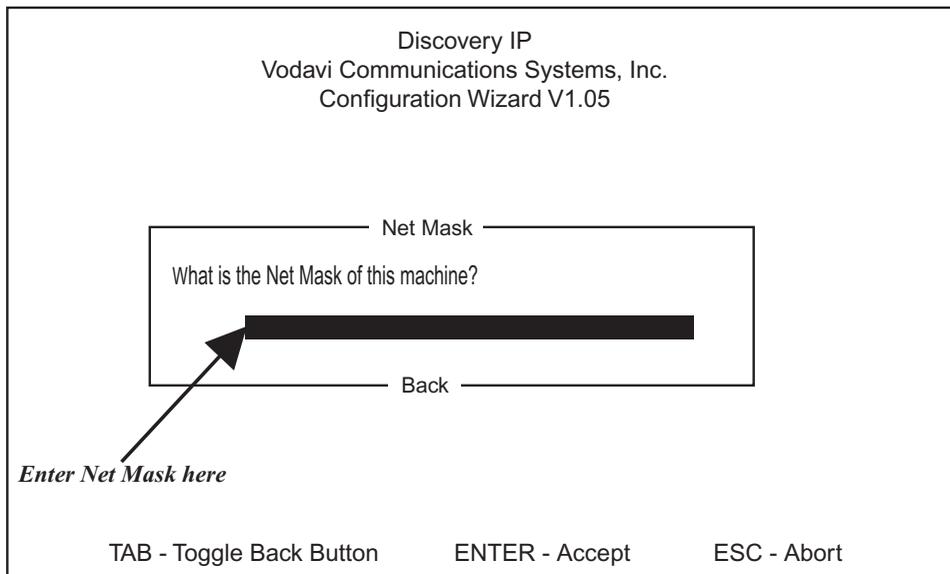


Figure 8: Network Setup—Subnet Mask

6. Enter the address of the IP gateway for this network (Figure 9).

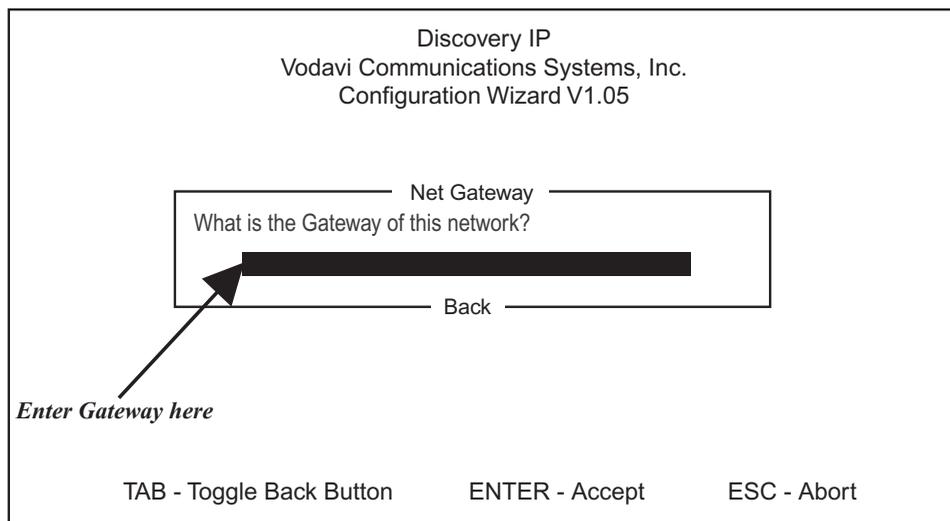


Figure 9: Network Setup—IP Gateway

7. Select the appropriate time zone for this Discovery IP unit (Figure 10).

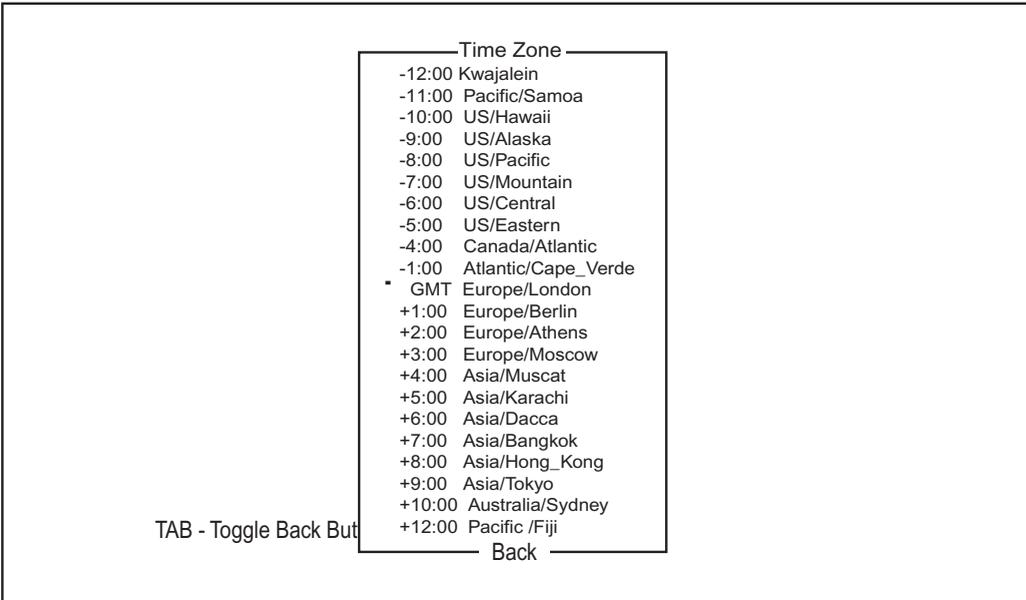


Figure 10: Timezone Setup

8. Enter the current Date and Time to set the Discovery IP System Clock (refer to Figure 11).

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

Set System Clock

Enter the current Date and Time in the following format:
MM/DD/YYYY HH:MM:SS (HH=0-23)

Enter Date and Time here

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 11: System Clock Setup

The routing method of calls is determined by whether two VOIP gateways or more exist in this Discovery IP application. When NO is selected, all calls originating at this Discovery IP machine will be placed directly to the other Discovery IP machine (NOMAP). When YES is selected, a VoIP Mapping Server that keeps the routing information determines from which machine each call will be placed.

9. Select the appropriate response when prompted by the screen shown in Figure 12.

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

Multiple Gateways

Does this application have more than two VoIP gateways on it?

Yes - There are more than two VoIP gateways in this application
No - There are only two VoIP gateways in this application

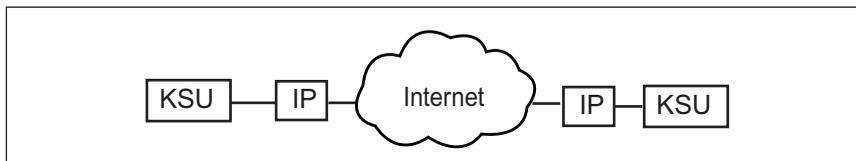
Back

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 12: Number Of VOIP Gateways Routing Method)

NOMAP Setup

Figure 13 depicts the type of setup that is typical in a NOMAP connection. If only two VOIP gateways are in this application (i.e., answered NO in Figure 12), the screen that follows asks for the IP of the other VOIP gateway in this Discovery IP application (Figure 14).



NOMAP Diagram

Figure 13: NOMAP Diagram

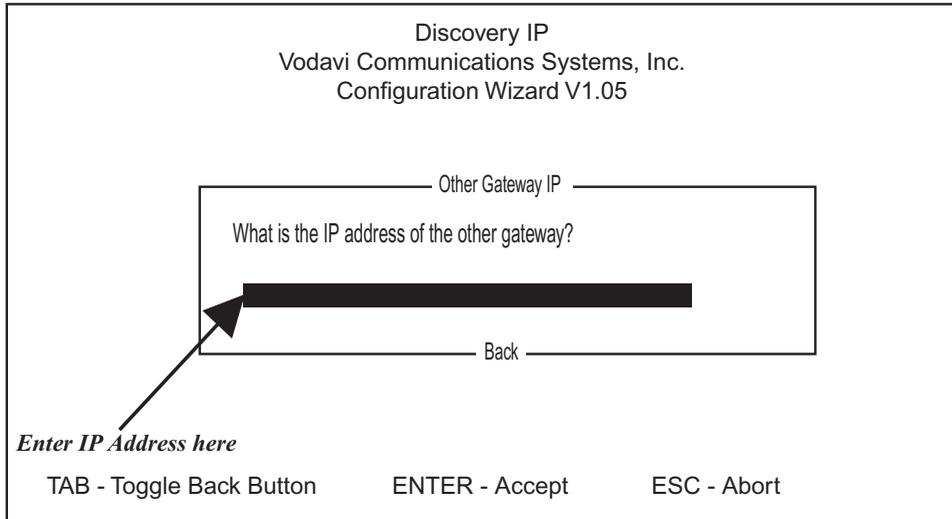


Figure 14: Routing Setup. With total of two Discovery IP Gateways.

Set up then is complete, as shown in Figure 15:

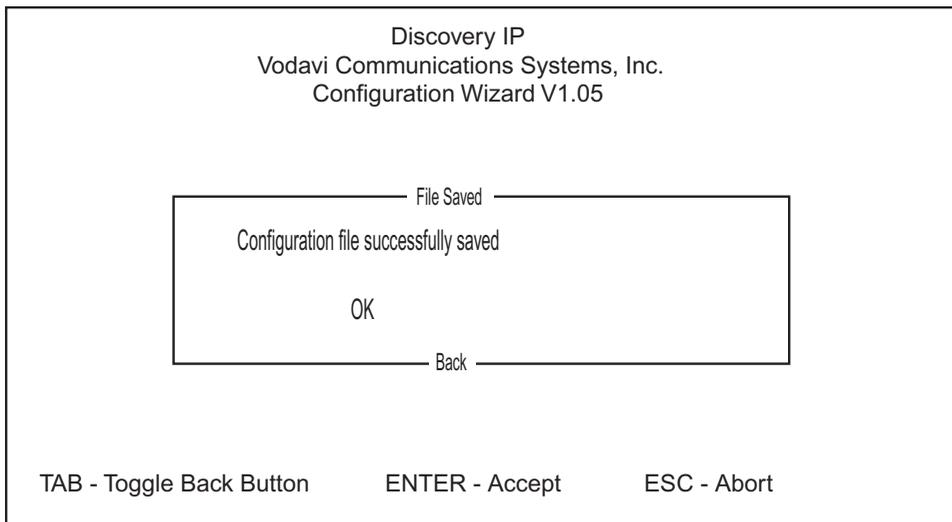


Figure 15: End of NOMAP Configuration

In order for the new configuration options to take effect, the VOIP services must be restarted. The wizard asks whether the VOIP services should be restarted immediately (Figure 16).

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

(Re)start Services

Would you like to (re)start the VoIP services?
(Services must be (re)started for settings to take effect)

Yes
No

Back

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 16: ReStart Of VOIP Services For New Settings To Take Effect

After completing the Wizard questions, the following screen prompts, “Would you like to quit now?” (refer to Figure 17). Selecting YES will result in the appearance of the System Status screen. Selecting NO will display a previous screen of the Wizard.

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

Quit

Would you like to quit now?

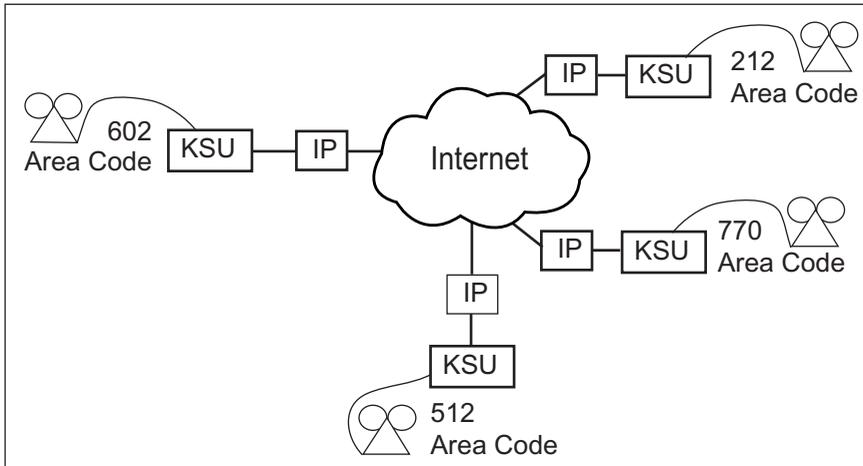
Yes
No

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 17: End of Configuration Wizard

Multiple Routing Setup

Figure 18 depicts what a typical Multiple Routing connection looks like. If YES was selected in Figure 12, the following screen (Figure 19) asks if this machine is the VOIP mapping server (i.e., keeper of routing information). Select **Yes**. All other IP units in the network must be set to NO in regard to mapping server.



Multiple Routing Diagram

Figure 18: Multiple Routing Setup

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

VoIP Mapping Server

Is this machine a VoIP mapping server?

Yes
No

Back

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 19: Mapping Setup. If total of more than two Discovery IP Gateways.

1. Enter the area code or numeric assignment of this Discovery IP unit (Figure 20). This is the number that will be used to access Gateway #1. The numeric assignment must be 1-9 digits.

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

VoIP Gateway ID

What is the Area Code or numeric assignment of VoIP Gateway #1?
(The ID of this machine)

Back

Enter Area code/Numeric Assignment here

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 20: Mapping Setup. If total of more than two Discovery IP Gateways.

If this Discovery IP is the mapping server, routing must be configured on this unit. The screens shown in Figure 21 and Figure 22 prompt for each routing data—numeric assignment/area code and corresponding IP address must be specified for each Discovery IP unit in the network.

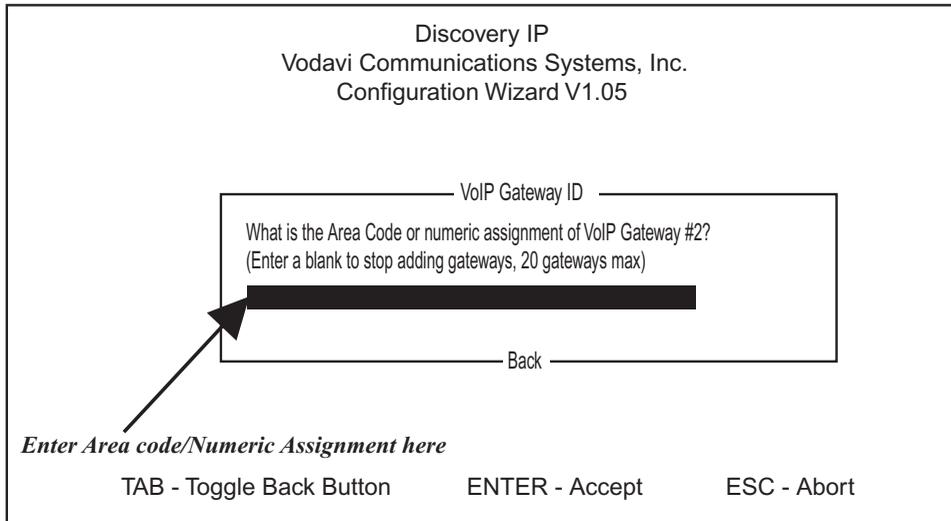


Figure 21: Mapping Server Setup. If total of more than two Discovery IP Gateways, and Mapping Server exists on this machine.

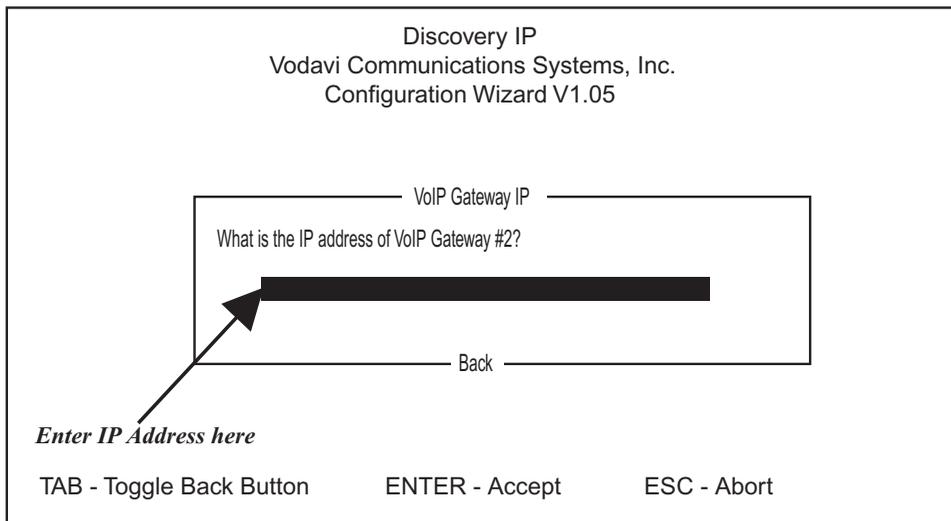


Figure 22: Mapping Server Setup. If total of more than two Discovery IP Gateways, and mapping Server Exists on this machine.

2. To stop adding routes, enter a blank line by pressing **ENTER** when prompted for the numeric/area code for the next Discovery IP unit (refer to Figure 23).

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

VoIP Gateway IP

What is the area code or numeric assignment of VoIP Gateway #7?
(Enter a blank to stop adding gateways, 20 gateways max)

Back

Enter Area Code/Numeric Assignment here

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 23: Mapping Server Setup. When total of more than two Discovery IP Gateways, and Mapping Server exists on this machine.

If there are more than two VOIP gateways in this Discovery IP application, and this machine is not the mapping server, then the following screen asks for the IP address of the mapping server that this Discovery IP unit should use (refer to Figure 24).

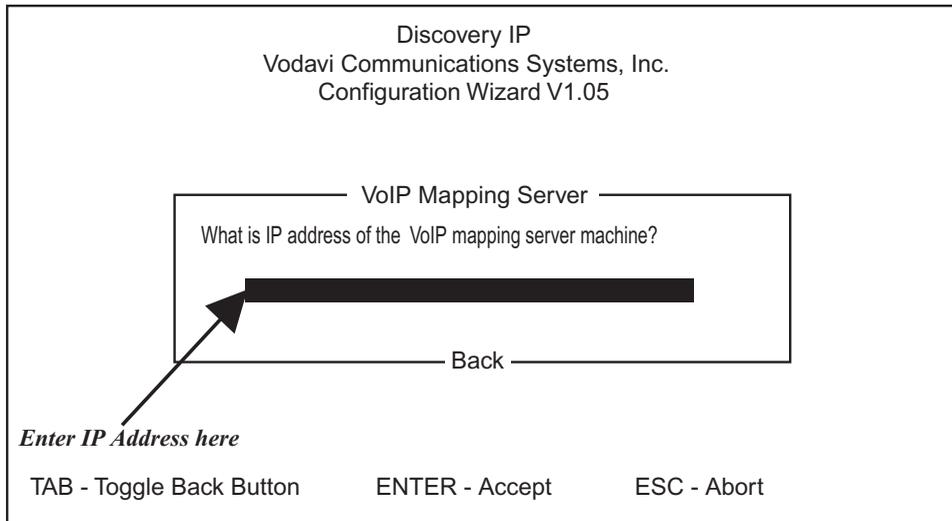


Figure 24: Routing Setup. When total of more than two Discovery IP Gateways, and Gateway Server exists on other machine.

Port number assignment is configured in the following screens. The screen shown in Figure 25 prompts for whether to use a single common number or unique numbers for each of the phone ports of the Discovery IP unit.

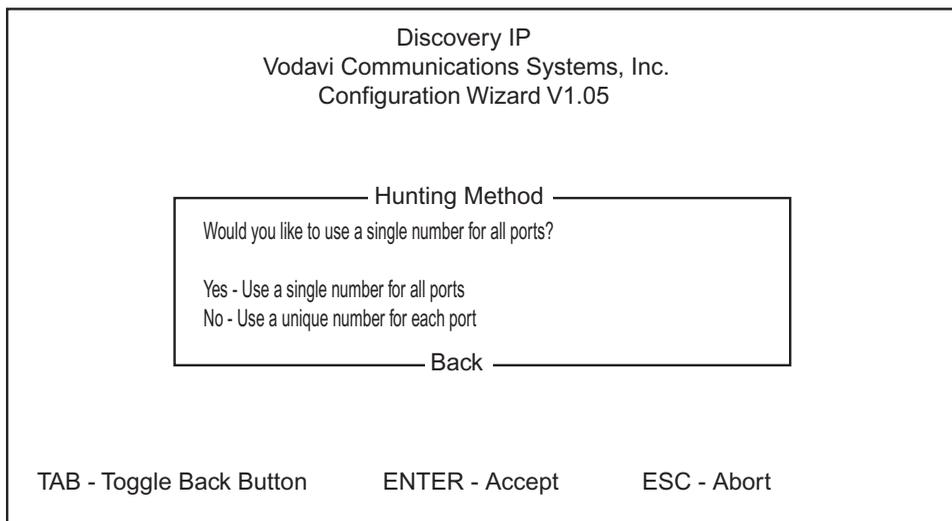


Figure 25: Port Number Assignment

If YES was selected in Figure 25 (i.e., same number for all ports), the wizard asks for the number to correspond to all ports (Figure 26). If NO was answered in Figure 25, then a port number must be specified for each port. The screen in Figure 27 appears for each of the ports.

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

Port Number

What is the single number for all ports?

Back

Enter Number here

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 26: Port Number Assignment. When all ports have same number.

Discovery IP
Vodavi Communications Systems, Inc.
Configuration Wizard V1.05

Port Number

What is the unique number for the first port?

Back

Enter Number here

TAB - Toggle Back Button ENTER - Accept ESC - Abort

Figure 27: Port Number Assignment. Unique number on each (same prompt on second, third, fourth).

At the end of the configuration process, the wizard saves the selected options to respective configuration files, then displays the screen shown in Figure 28.

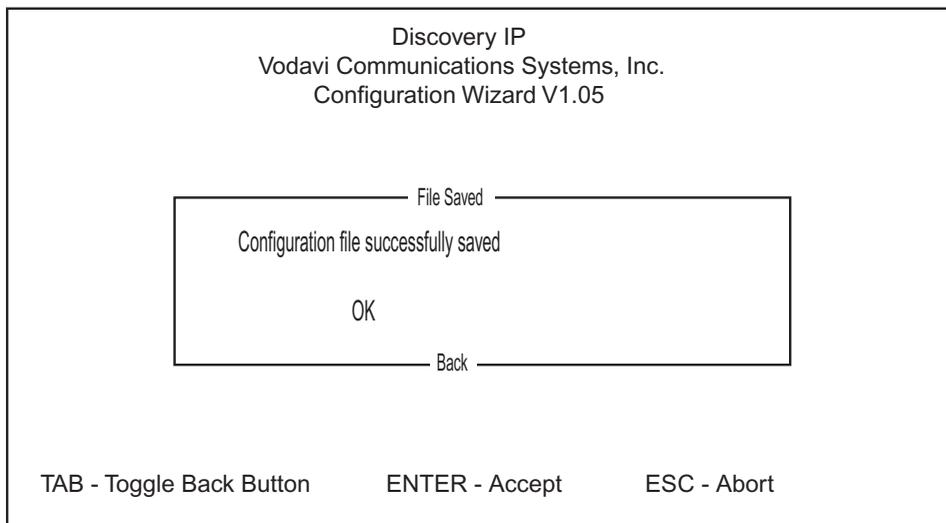


Figure 28: End of Configuration Process

In order for the new configuration options to take effect, the VOIP services must be restarted. The wizard asks whether the VOIP services should be restarted immediately (Figure 29).

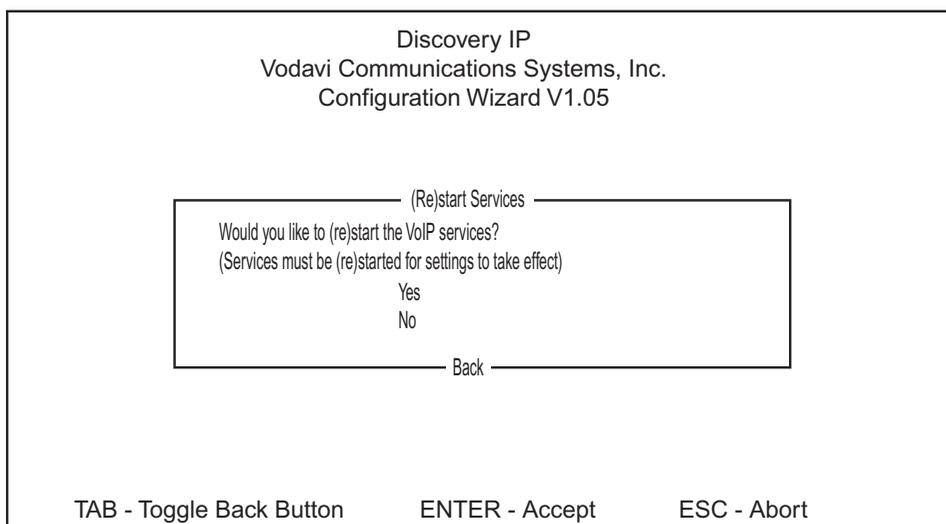


Figure 29: ReStart Of VOIP Services For New Settings To Take Effect

After completing the Wizard questions, the following screen prompts, “Would you like to quit now?” (refer to Figure 30). Selecting YES will result in the appearance of the System Status screen. Selecting NO will display a previous screen of the Wizard.

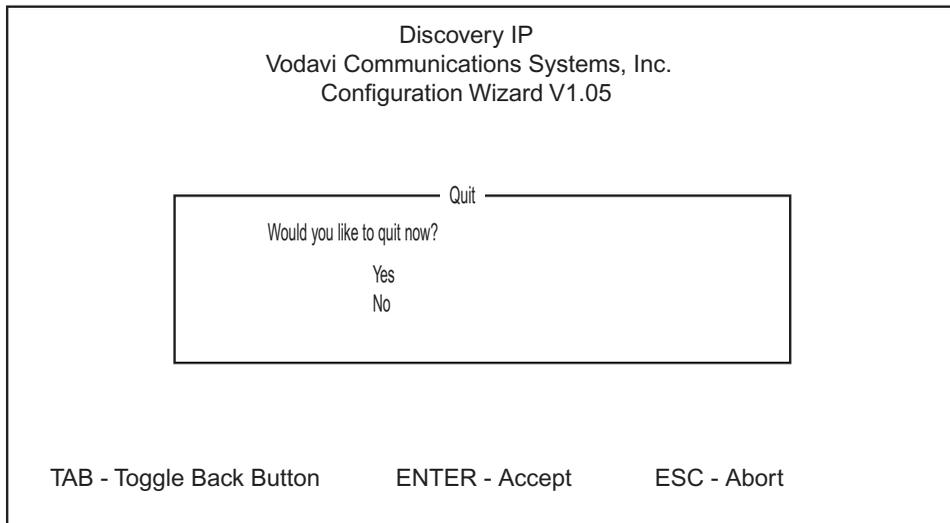


Figure 30: End of Configuration Wizard

MANAGING Discovery IP CONFIGURATION SETTINGS

The configuration interface consists of three steps. The first step includes general Discovery IP settings. The second step includes specifications of mapping address (and autodial number if applicable), as well as interface-specific port configuration. The third step involves the user confirming changes to the configuration, and restarting the Discovery IP machine in order for the new configuration to take effect. At the end of each step, the user may Restore Defaults (cancel changes to configuration), or Proceed to the next step (submit the changes), by selecting the appropriate option.

To view the configuration of each Discovery IP machine:

1. From the System Status screen, type **C**, then select System Configuration (refer to Figure 31).

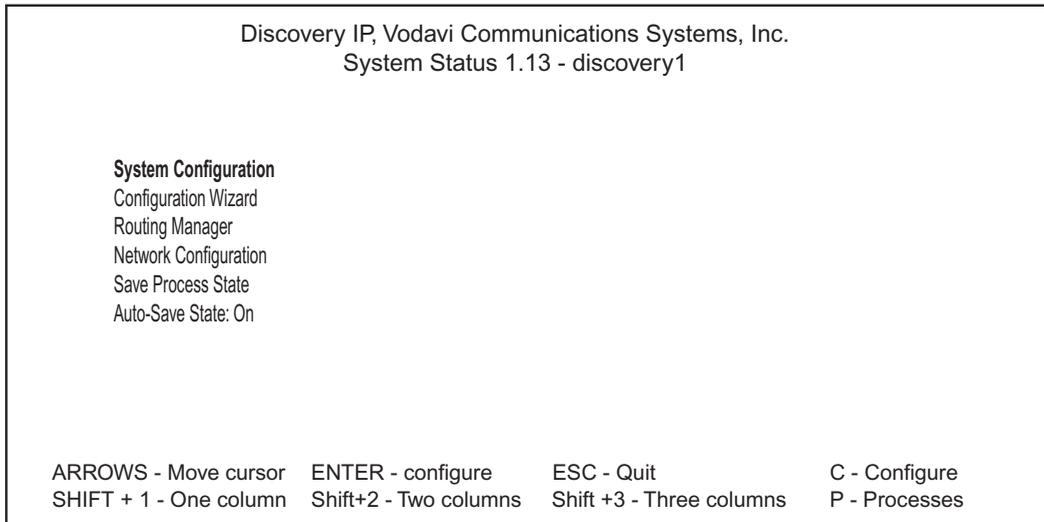


Figure 31: System Status Configuration Options Screen

The configuration interface is for displaying and making changes to the current configuration.

- ❑ To select an item on the main screen, move the cursor using the arrow keys, highlight the item and press **ENTER**.
- ❑ To enter any changes, select the item in the main screen, then type or select the appropriate setting; press **ENTER**.
- ❑ To go back to a previous screen, press **TAB**, then press **ENTER**.

Configuration Step 1 — General Discovery IP Setup

The settings you can edit in Configuration include the following (refer to Figure 32 and 33):

Discovery IP Configuration Step #1 (p1 of 3)
Vodavi Communications Systems, Inc.

Discovery IP Configuration Step #1
Auto Start on Boot: [Yes]

My name: sample1_

Telephone Interface: [Discovery IP Line Cards]

Number of Lines: [4]
Encoding: [Mu Law]

Frames Per Packet: [3]
Gatekeeper: [NOMAP]

Volume: [0]
Local Prefix: [770]

Auto Dial: [Yes]
Account Status Message: [No]

Arrow keys: Up and Down to move. Right to follow a link; Left to go back.
H)elp O)ptions P)rint G)o M)ain screen Q)uit /=search [delete]=history list

Figure 32: Discovery IP Configuration—Step 1

- ❑ **Auto Start on Boot:** Yes or No options. Yes indicates that software should run automatically upon startup/reboot of the Discovery IP machine.
- ❑ **My Name:** Enter full machine name (or domain name). Maximum length is 30 characters, no spaces.
- ❑ **Telephone Interface type:** Discovery IP Line Cards. Or select appropriate interface from the list available when this field is clicked-on.
- ❑ **Encoding:** Mu-law or A-law. Select appropriate encoding for your configuration.
- ❑ **Number of Lines:** Enter the number of telephone lines connected to the Discovery IP machine.
- ❑ **Frames per packet:** Controls quality of speech transmission for varying qualities of network connections. As the quality of the line deteriorates, the number of frames per packet should be increased. Enter values ranging from 1 through 8, or enter 0 to select the default value of 3.
- ❑ **Gatekeeper:** Select the desired method of routing calls originating at this Discovery IP.
- ❑ **Volume:** Refers to default initial volume upon connection of call. Unless your

Discovery IP unit is situated on the trunk side of a telco switch, this setting should be set to Default (by entering nothing). If there is a need to adjust the default voice volume through the Discovery IP (if situated on trunk side), try setting it to **0** first.

- ❑ Discovery IP is set to 0 from the factory. If the Discovery IP unit is initialized, or the software is reloaded, this setting should be changed back to **0**.
- ❑ **Local prefix:** Enter local area code.**Autodial:** Valid only if NOMAP was selected as Gateway type. The autodial number is the number that should automatically be dialed out of the destination Discovery IP.
- ❑ **Account Status Message:** When enabled (only if AMAS is used) callers into this Discovery IP will hear a recording (phone bank) detailing the amount of time remaining before their balance runs out, a restricted period approaching, or when a maximum length of call is reached.

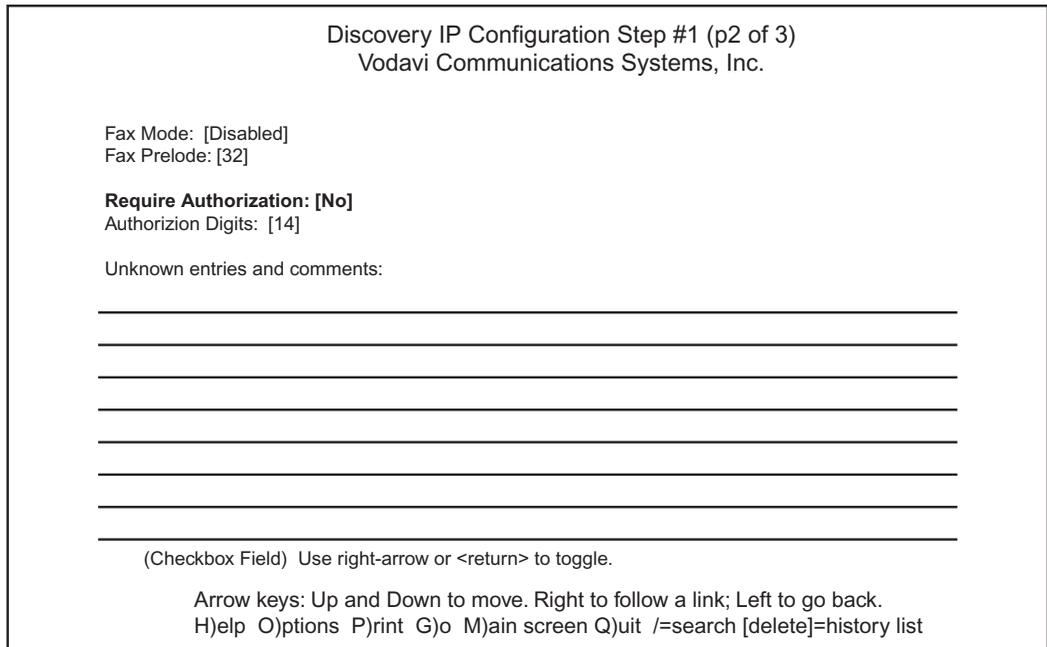


Figure 33: Discovery IP Configuration—Step 1 (continued)

- ❑ **Fax Mode:** Select Disabled or G711 (T38 is not yet available with Discovery IP software release 2.28). When a Discovery IP is in Disabled mode, faxes attempted to be sent through it (as either origination or destination) will fail. In G711 mode, codec for that port will switch to G711 for the duration of a call detected to be a fax.
- ❑ **Fax preload:** Enter the number of buffers that should smooth the transition of the outbound queue between voice-transmission mode and fax mode. Enter values ranging from 1 through 32, or enter 0 to select the default value of 20.

- ❑ **Require Authorization:** Available for use with NOMAP and Gatekeeper/Billing gateway types. With AMAS as gateway, this setting must be **Yes**. When used with NOMAP server type, setting Use Authentication to **No** will cause the 000.voc voice file (prompt for entering ID code) to be skipped so that only prompt is 043.voc message (Enter the number you'd like to dial). No authentication occurs whether the caller is prompted for the ID code or not.
- ❑ **Authorization digits:** Select the expected length of subscriber ID/PIN code (final four digits are always taken as the PIN).
- ❑ **Unknown entries and comments:** This section lists the items found in the existing configuration file, unrecognized by the configuration program. These may include extra settings provided by Vodavi technical support personnel. The text appearing in this section may be edited through this configuration program.

Concluding Step 1 of Configuration

Following input of all configuration changes, you can either (refer to Figure 34):

Discovery IP Configuration Step #1 (p3 of 3)
Vodavi Communications Systems, Inc.

Restore Defaults **Proceed**

(Form submit button) Use right-arrow or <return> to submit.

Arrow keys: Up and Down to move. Right to follow a link; Left to go back.
H)elp O)ptions P)rint G)o M)ain screen Q)uit /=search [delete]=history list

Figure 34: Discovery IP Configuration—Step 1 (continued)

1. Cancel out of the configuration program (cancel any changes made to the configuration), by selecting **Restore Defaults** at the bottom of the Step 1 Configuration screen.

OR

2. Continue with changes to the configuration by selecting Proceed at the bottom of the Step 1 Configuration screen. In this case the setup will continue onto the second step - Mapping Address specifications and interface-specific port configuration.

Configuration Step 2 — Mapping Address Specifications

The settings you can edit in this part of the Discovery IP Configuration include the following (refer to Figure 35):

Discovery IP Configuration Step #2 (p1 of 2)
Vodavi Communications Systems, Inc.

Auto Dial number:

IP Address to sent calls to: XXX.XXX.XXX.X

CAPTION: Line Configuration

Port 0 [FXO] No outbound: [] Dial Prefix: _____

Port 1 [FXO] No outbound: [] Dial Prefix: _____

Port 2 [FXO] No outbound: [] Dial Prefix: _____

Port 3 [FXO] No outbound: [] Dial Prefix: _____

Port 4 [FXO] No outbound: [] Dial Prefix: _____

(Text entry field) Enter text. Use UP or DOWN arrows or tab to move off.
Enter text into the field by typing on the keyboard
Ctrl-U to delete all text in field, [Backspace] to delete a character

Figure 35: Discovery IP Configuration—Step 2

- ❑ **Autodial:** Enter the number which will automatically be dialed for calls mapped to this IP location. Not specifying an autodial number causes the destination Discovery IP phone line to go offhook (FXS line at destination Discovery IP will ring).
- ❑ **IP Address to send calls to:** When NOMAP is selected as the gateway type, this setting specifies which Discovery IP should be the destination box for calls originating at this Discovery IP.
- ❑ **Gatekeeper IP Address:** This address specifies the location of the Gatekeeper and billing services when the gatekeeper is the selected gateway type.
- ❑ **Line Configuration:** Depending on the interface type specified in Step 1, the following needs to be specified for each port on the Discovery IP system.
 - ❑ Each port may be configured to not place outbound calls (accept only incoming calls)

through the No Outbound setting. Each port also may have a dialing prefix associated with it to precede digits dialed for an outbound call; if port is FXS type, telephone number associated with that port should be entered into the Dial Prefix field.

- ❑ All ports existing on the Discovery IP must be configured even if the port is inactive.



Correct configuration of ports is required for proper functioning of Discovery IP.

Completing Step 2 of Configuration

Once all settings have been entered (refer to Figure 36), the new configuration can be saved by selecting **Save New Configuration** from the bottom of the screen, and pressing **ENTER**.

Discovery IP Configuration Step #2 (p2 of 2)
Vodavi Communications Systems, Inc.

Port 22 [FXO] No outbound: [] Dial Prefix: _____

Restore Defaults **Save New Configuration**

(Form submit button) Use right-arrow or <return> to submit ('x' for no cache).
Enter text into the field by typing on the keyboard
Ctrl-U to delete all text in field, [Backspace] to delete a character

Figure 36: Discovery IP Configuration—Step 2 (continued)

Configuration Step 3 — Configuration Confirmation

Step 3 of Discovery IP configuration confirms the new configuration has been saved and instructs the user to restart the Discovery IP machine. At this point, you can quit out of the configuration program (type Q) or return to a previous step (refer to Figure 37).

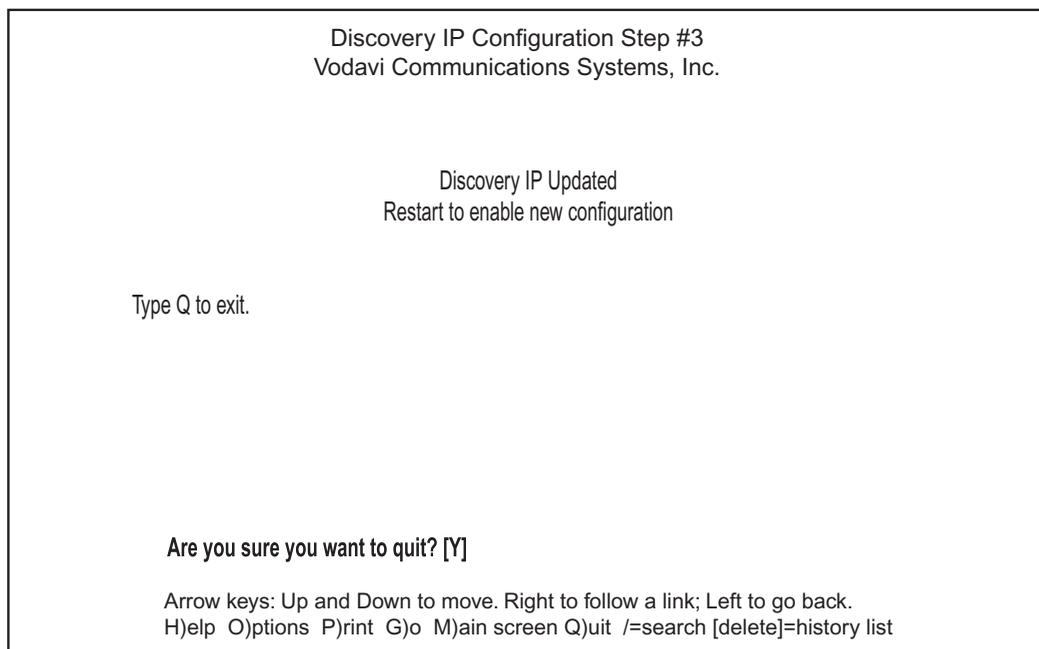


Figure 37: Discovery IP New Configuration Confirmation

MANAGING CONFIGURATION THROUGH THE WEB INTERFACE

As an alternative, Discovery IP may be configured, monitored, software started/stopped, and the machine rebooted through a web interface.

To access the web interface:

1. Direct your browser to the name or IP address of the appropriate Discovery IP.
2. Log in as user= dvg, password = dvg-passed.

3. The main screen is the first screen seen as in Figure 38, the Control Panel:



Figure 38: Control Panel of Web Interface

To configure Discovery IP settings, select Configure from the control panel. The screens containing many of the same settings as described in Figure 32, [Discovery IP Configuration—Step 1](#), are displayed in Figure 39 and 40:

Discovery IP Configuration Step #1

<u>Machine Name:</u>	<input type="text" value="voice.vo"/>	<u>Local Prefix:</u>	<input type="text"/>
<u>Telephone Interface:</u>	<input type="text" value="Discovery IP line cards"/>	<u>Gatekeeper:</u>	<input type="text" value="No Map"/>
<u>Number of Lines:</u>	<input type="text" value="4"/>	<u>Acct Status Message:</u>	<input type="text" value="No"/>
<u>Encoding:</u>	<input type="text" value="Mu Law"/>	<u>Require Authorization:</u>	<input type="text" value="No"/>
<u>Dialtone Detection Delay:</u>	<input type="text" value="0"/>	<u>Authorization digits:</u>	<input type="text" value="14"/>

Figure 39: Discovery IP Configuration Through Web Interface

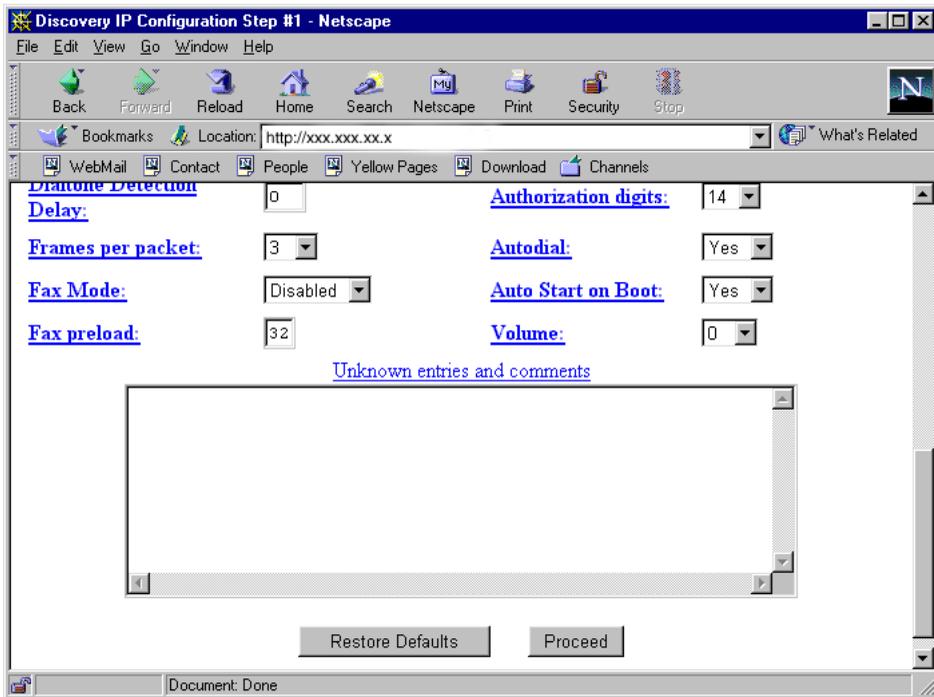


Figure 40: Discovery IP Configuration Through Web Interface (continued)

Current port status may be monitored by selecting Current Status from the Control Panel. the screen that displays enables the resetting of each port (clear port) as well as resetting each port's DSP (reset DSP). Figure 41 displays this screen:

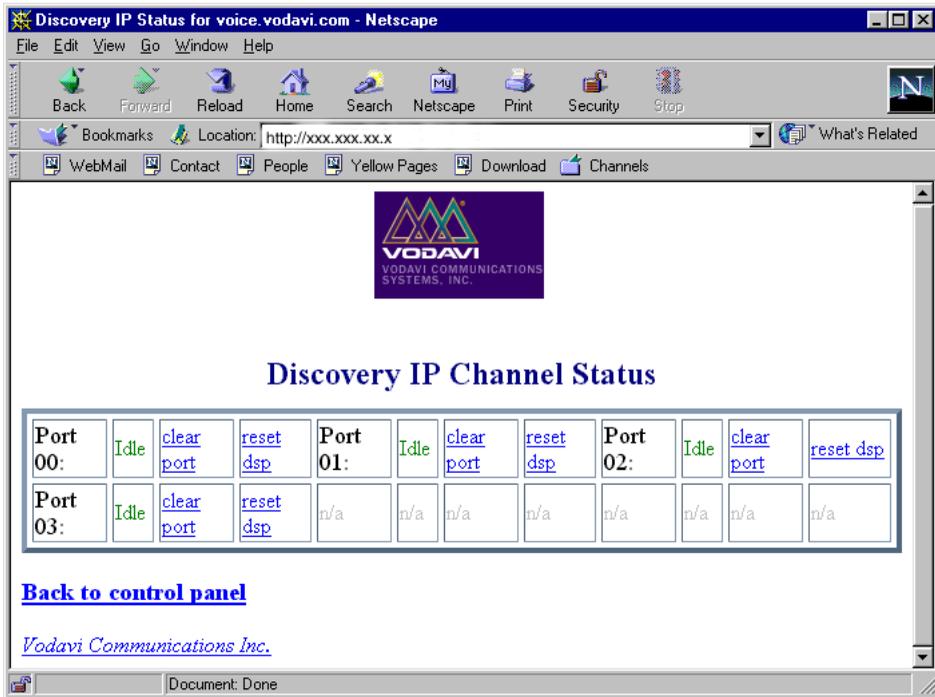


Figure 41: Port Status Monitoring Through Web Interface

6 System Operation

THE RUNNING PROGRAMS

Programs Which Must be Run for Each Configuration

View the started/stopped status of the required running programs by pressing **P** (for “processes”) in the System Status screen. The screen shown in Figure 42 displays these programs.



When choosing to stop *dvg*, specify whether to stop running only when all lines are onhook (Graceful Shutdown – YES) or to stop immediately (Graceful Shutdown – NO). In the case that a Graceful Shutdown is requested, all onhook phone lines are made unavailable, and the remaining offhook lines become unavailable as they go onhook.

Discovery IP, Vodavi Communications Systems, Inc. System Status 1.13 - discovery1			
Process	Status	Description	
dvg	Running	dvg	
vgate	Stopped		
billing	Stopped		

ARROWS - move cursor	ENTER - start/stop	ESC - quit	C - Configure
SHIFT+1 - one column	SHIFT+2 - two columns	SHIFT+3 - three columns	P - processes

Figure 42: List of Running Programs as Seen in System Status Screen

Locations of Running Programs

Table 9: Locations of Running Programs

Program	Location
<i>dvg</i>	/tempest/dvg/
<i>vgate</i>	/tempest/gatekeeper/



- Whenever changing the configuration of any running component, the respective program must be stopped and restarted in order for the changes to take effect.
- Do not run additional copies of a program that is already running. Doing so will cause problems with the original running program.

MONITORING Discovery IP ACTIVITY

View the real-time status of each port of a Discovery IP (each port configured using *dvgconfig*) using the system status screen, as illustrated in Figure 43.



A virtual session cannot be run on a serial connection (laptop computer).

You may choose to display the information in single column (press **SHIFT+1**), two column (press **SHIFT+2**), or three column format (press **SHIFT+3**), depending on the size of your screen and number of ports you wish to view. Figure 43 shows the two-column view of port statuses. The following (Table 10) lists status messages that are displayed for each port:

```

Discovery IP, Vodavi Communications Systems, Inc.
System Status 1.13 - discovery1

                                FI DG

00: 000000 ONHK                01: 000000 ONHK
02: 000000 ONHK                03: 000000 ONHK

ARROWS - move cursor  ENTER - start/stop  ESC - quit  C - Configure
SHIFT+1 - one column  SHIFT+2 - two columns  SHIFT+3 - three columns  P - processes
    
```

Figure 43: Port Monitoring via *dvgstatus*

Table 10: Status Messages For Each Port

One-column	Two Column	Three-column
ONHOOK	ONHOOK	ONHK
VOICE MAIL	VOICEMAIL	VMS
RING ON	RING ON	RGON
OFFHOOK	OFFHOOK	OFFHH
CONNECTED	CONNECTED	CONN
RING OFF	RING OFF	RGOFF
DIALTONE WAIT (at destination Discovery IP)	DIALTONE	DTONE
GATEKEEPER REMOTE (communicating with remote gatekeeper)	GATEKEEPER	GATE

Table 10: Status Messages For Each Port

One-column	Two Column	Three-column
DVG REMOTE (communicating with remote Discovery IP)	DVG	DVG
RECORD FILE (i.e., voice file)	RCRD FILE	RCRDF
VOICE PLAY	PLAY	PLAY
KEY INPUT	INPUT	INPUT

The number of calls placed through each port is displayed preceding the status of the port. Use arrow keys to move between ports, press **ENTER** while a selected port is highlighted to view the long-version status information for that port.



The *dvgestatus* display does not reflect the actual connection/billing time; it reflects the connection time since *dvgestatus* has been viewing the ports (it also resets when the screen is refreshed).

The top right of the screen lists the programs which are running:

- D** for *dvgestatus* (executable)
- G** for *vgate*

COLLECTING CALL DETAIL RECORDS

Call Detail Records (CDR) can only be collected when using Internal Gatekeeper/Billing Server or System State Server for authentication and mapping.

For the Internal Gatekeeper/Billing, the CDRs are in the file located in the **/tempest/billing/** directory called **bills**. The format of these CDRs is as follows:

<customer ID+PIN>, *<number dialed>*, *<duration of call in seconds>*, *<time of call: yyyymmddhhnns>*, *<name of originating Discovery IP>*, *<port at originating Discovery IP used>*, *<name of destination Discovery IP>*, *<port at destination Discovery IP used>*

- To access this file, type **cd /tempest/billing**, then press **ENTER**.
- To view the file, type **less bills**, then press **ENTER**.
- To copy or move the file to a floppy disk, type **mount /mnt/floppy**, then press **ENTER**, then type **cp bills /mnt/floppy/ENTER** or type **mv bills /mnt/floppy**, then press **ENTER** (respectively). Finish by typing **umount /mnt/floppy**, then press **ENTER**.

When using the System State Server, CDRs are located on the AMAS in the “PrimaryBill” SQL database, in the table called “Subrecord”. The Tempest Billing Application retrieves the information in this table and produces bills for the subscriber accounts on the AMAS.

RECORD A VOICE FILE MESSAGE

The user must repeat the entire below procedure to record each voice file.

1. Call the Discovery IP.
2. When prompted to enter a subscriber ID and PIN, press #.
3. To record message mmm (refer to Table 11), enter * * 1mmm#, wait about 3 seconds, then begin speaking.

Table 11: Voice Files and Messages

Voice File	Message
000.voc	Welcome to the TEMpest Gateway. Please enter your 14-digit ID code.
000.gen	Welcome. Please enter your 14-digit ID code.
007.voc	Please enter your 14-digit ID code.
043.voc	Enter the number you'd like to dial, followed by the pound key.
044.voc	Please wait while we connect your call.
050.voc	You have one minute remaining on this call.
900.voc	Your call cannot be connected. Please try again later.
901.voc	No funds are available for this card.
902.voc	We're sorry. Your call cannot be completed as dialed. Please check the number and dial again.
903.voc	All circuits are busy. Please try your call again later.
904.voc	The phone number you dialed is not enabled for this card.
905.voc	This card is currently in use by another caller. Your call cannot be connected.

4. Hang up (quietly) when finished recording the voice file.
5. Restart the *dvg* process in order to hear the recorded files: To listen to message mmm, call in to the Discovery IP, press # when prompted to enter a subscriber ID and PIN. Then press * * 2mmm#.

Voice files are located in the directory called /tempest/dvg/. Each is named mmm.voc (G.723 format).

DOWNLOADING SOFTWARE UPDATES

To download updated versions of Discovery IP software, enter a virtual session **ALT F3**:

1. Log in as *root*. Or in a virtual session already in progress, switch to the **/root** directory by typing: **cd /root** (you are automatically in the **/root** directory upon logging in).
2. Then type: **updater**. The following screen is displayed (refer to Figure 45):

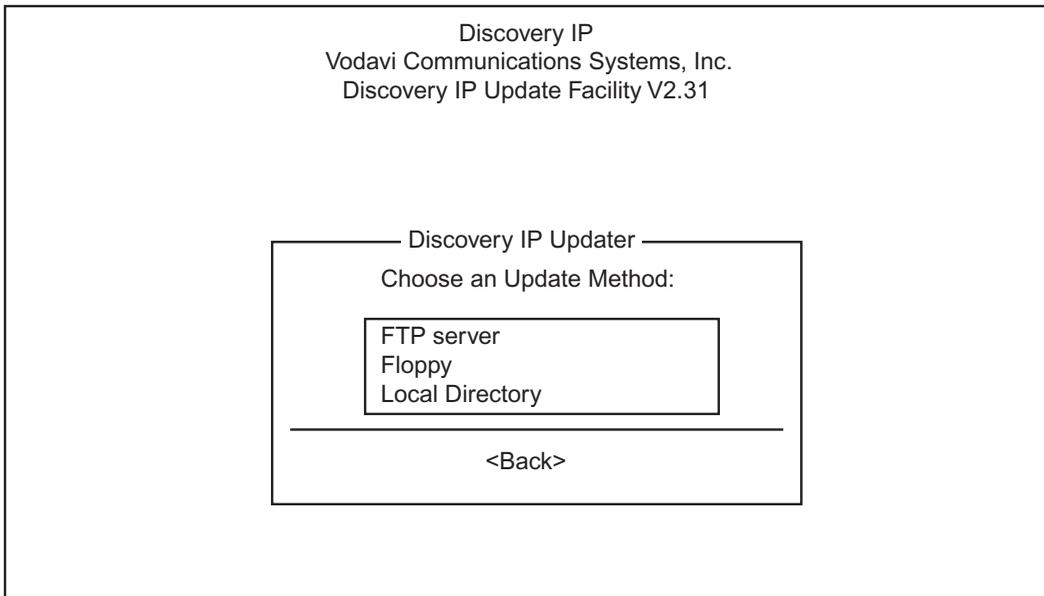


Figure 45: Updater Main Menu

3. In making selections, use the arrow keys: ↓ or ↑ to move between choices, ← or → to implement an action (select, exit or help). [As of software release 2.31V, FTP Server is the only enabled method of updating.]

Update Using FTP

To update through Vodavi's ftp site, press ENTER, or to address the updater to a different ftp site, enter in the appropriate address for that site (refer to Figure 46)

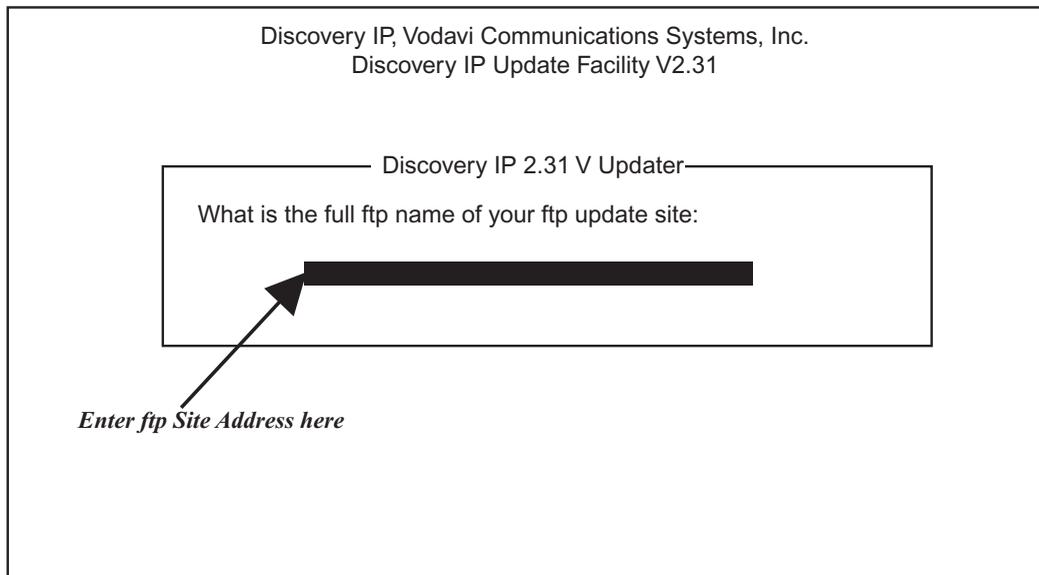


Figure 46: FPT Server Address



To update via FTP, DNS must be configured in Discovery IP's network configuration. Figure 47 shows the screen that is displayed, listing the available versions to update to. Make your selection.

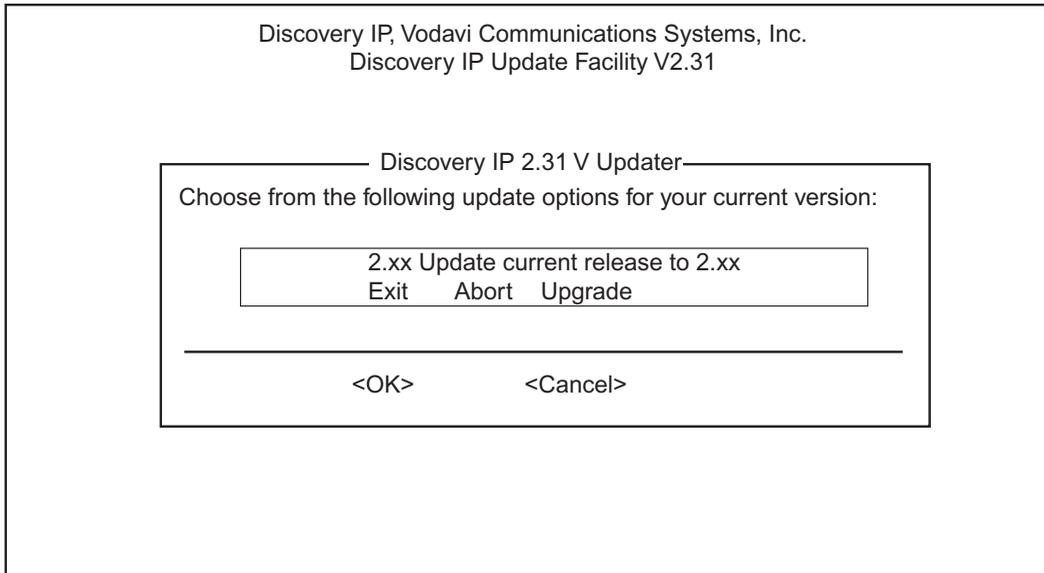


Figure 47: FTP Update Menu

When the update is complete, the Discovery IP must be power-cycled for the changes to take effect.

1. Power off by pressing **CTRL+ALT+DEL** then hitting the power switch.
2. Turn-on the machine again.
3. Review and save a new Discovery IP configuration file to include any additional parameters used with the new version of Discovery IP software.
4. Start all necessary processes as usual.

RESTART/SHUTDOWN OF Discovery IP

To restart a Discovery IP:

1. Press **CTRL+ALT+DEL**,
- OR
2. Type at the command line prompt: `shutdown -r now`, and press **ENTER**.
 3. The operating system will close open files and reboot.

To shutdown a Discovery IP:

1. Type at the command line prompt: `shutdown -h now`, then press **ENTER**; power down only when you can see that all processes have completed shutting down.



Failure to properly restart/shutdown the Discovery IP may result in hard-disk damage, if the buffer is unable to repair itself. If the system is improperly restarted/shutdown, on startup, the machine will display the following message:

dev/hda2 was not cleanly unmounted, check forced.
This will verify that the hard drive was not damaged in the improper restart/shutdown.

7 *Calling Instructions*

ESTABLISHING/MAINTAINING A VoIP CONNECTION

The connection is established as the user accesses a CO line connected to the Discovery IP unit. CO lines can be accessed using a CO line group access code, off hook preference, or direct access:

1. A voice message (message 043) prompts for the phone number to be called or caller is connected directly to another IP unit (NOMAP), followed by a **#**. If the caller does not enter a **#**, after 3 seconds, the entry of number to call is assumed to be completed.
2. What follows depends on whether the caller receives successful authentication.
If mapping route is found and ports are available, a connection is established. The caller may signal the Discovery IP by entering the following:
 - ***1** : increase volume
 - ***2** : decrease volume
 - ***3** : increase latency
 - ***4** : decrease latency
 - ***7** : disconnect from the Discovery IP
 - ***8** : anchor connection to Discovery IP so that another call can be made



Pressing either **#**, or ***** will be heard by the call recipient at the destination Discovery IP.

A Interface Card

ICV-8 CARD

ICV-8 Layout

The ICV Board (refer to Figure A1) provides four analog FXS phone connections to the external world. Two FXS phones can be plugged into each of the four external connectors. The equipment is identified by a model and serial number printed on the printed circuit board. The ICV Board mounts in one slot of a PC/AT chassis ISA Bus.

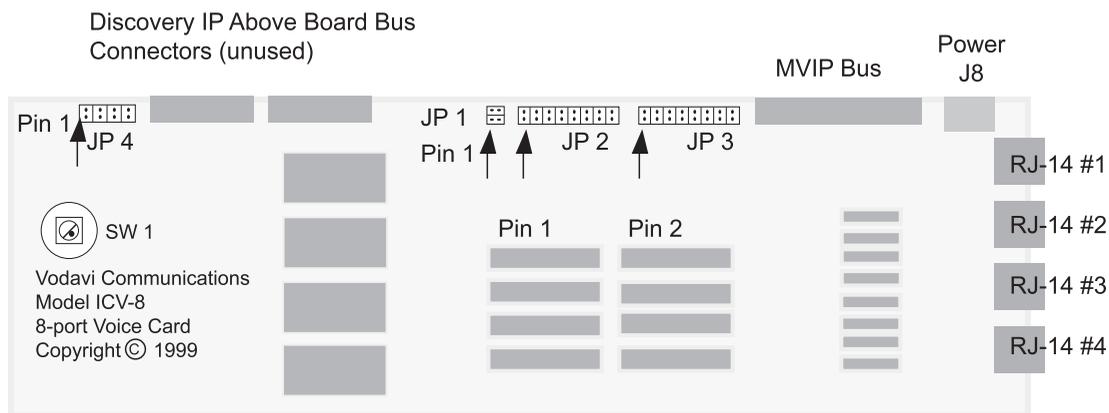


Figure A-1: ICV -8 Jumper and Connector Layout

The analog phone lines are connected to the ICV Board by the RJ-14s shown at the right of the drawing. RJ-14 is the same size and shape as a RJ-11 but four wires are used whereas a RJ-11 supports only two wires. The first line of each ICV Board is the center pair of RJ-14 #1. The second line is the outer pair of the same RJ-14. Each of the eight lines is numbered consecutively (refer to Figure A2).

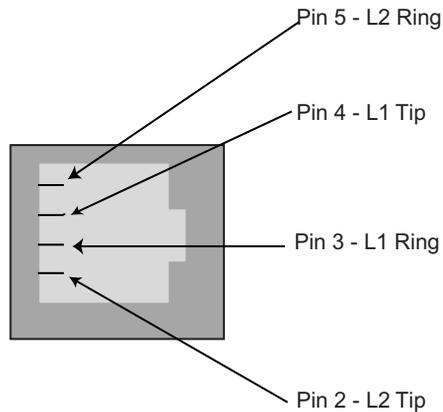


Figure A-2: RJ-14 Pinout

Jumper Settings

JP2 and JP3 select one of eight streams of the MVIP bus. JP2 makes the transmit stream connection, while JP3 makes the corresponding receive connection. These two jumpers are typically set to the same stream number. One jumper is placed on each block according Table A1:

Table A-1: JP2 and JP3 MVIP Bus Stream Selection

Position	Stream in MVIP Bus	Stream in Vodavi ABB
1	0	0
2	1	1
3	2	2
4	3	3
5	Not used	None
6	Not used	None
7	Not used	None
8	Not used	None

B Parts Specifications

NETWORK CONNECTION

10/100BaseT

Data Rate	10 Mbps or 100Mbps
Network Interface Standard	IEEE 802.3
Connector	RJ45

POWER SUPPLY

Data AC Input	115 ~/230 , 6/3 A 60/50 HzV
Network Interface Standard	IEEE 802.3
Approvals	UL, CSA, TUV, CE

SBC

Speed supported	up to 133 MHz
-----------------	---------------

HARD DISK

Capacity	4.3 Gb
----------	--------

C Glossary

ABB: Above Board Bus

ADPCM: Adaptive Differential Pulse Code Modulation

AIS: Alarm Indication Signal, usually all ones—F11111111. Also known as a Blue Alarm which signals that an upstream failure has occurred.

Alarms: Red: refer to Loss of Sync. Yellow: Same as Red, but reported from the other side of the connection. Blue: refer to AIS. Slip: refer to Slip.

AMI: Alternate Mark Inversion. A line coding format for T-1 lines where the condition of the signal alternate between binary positive and binary negative polarity.

ATM: Asynchronous transfer mode. An international ISDN high-speed, high-volume, packet-switching transmission protocol standard. ATM uses short, uniform, 53-byte cells to divide data into efficient, manageable packets for ultrafast switching through a high-performance communications network. The 53-byte cells contain 5-byte destination address headers and 48 data bytes. ATM is the first packet-switched technology designed from the ground up to support integrated voice, video, and data communication applications. It is well suited to high-speed WAN transmission bursts. ATM currently accommodates transmission speeds from 64 Kbps to 622 Mbps. ATM may support gigabit speeds in the future.

B8ZS: Bipolar with eight zero substitution. A protocol used over T-1 interfaces. Clear channel line coding option on DS-1 service allows the DS-1 user to obtain greater throughput and functionality from their DS-1 facilities. The use of B8ZS allows users to transmit data at a rate of 64 Kbps per DS-0, achieving what is referred to as a clear channel. Applied against all 24 DS-0s on a DS-1, the effective data throughput of the DS-1 facility is increased with B8ZS from 1.344 Mbps to 1.536 Mbps, a 14% increase in throughput. CSUs with B8ZS support are required on both ends of the user's circuit.

Baud: Baud (older term being replaced by bps). The number of signaling elements that can be transmitted per second on a circuit. In an average data stream, one baud is roughly equivalent to one bit per second on a digital transmission circuit.

bps: Bits per second.

Bps: Bytes per second. Each byte contains eight bits.

CCITT: Comité Consultatif Internationale de Télégraphique et Téléphonique (International Consultative Committee on Telephones and Telegraphs). The primary international standards body for telecommunications. CCITT is an advisory committee established under the United Nations, within the International Telecommunications Union (ITU), to develop and recommend communications standards.

Channel Bank: A PCM voice frequency terminal that converts analog channels (and associated signaling) into a single T-1 (DS-1) digital circuit.

Cross Point Switch: A device that assigns different channels to different ports (an electronic patch panel).

CSU: Channel Service Unit; manages digital transmission, monitors signals for problems. Responds to Central Office commands. It performs many of the functions that modems do, but it does not have to convert digital signals to/from analog, since the end device and the underlying transmission facility are both digital.

D4: A data transmission (or superframe) format comprised of 12 frames of 192 bits each. A single 193rd bit is used for link control and error checking. As an industry standard, D4, also known as SF, has been superseded by the Extended Super Frame (ESF) format. However, because ESF is not backward compatible and there continues to be a large installed base of channel banks and DS-1 multiplexers that are based upon D4, it is still the default private line formatting technique.

DCE: Data Communications equipment; device designed to connect directly to a network. An example of DCE is the common modem that connects to voice grade lines of a telephone network.

DS-0: Digital Signal Level 0; the designation given to a digital hierarchy of circuits or channels operating at 64 Mbps.

DS-1: Digital Signal Level 1; the designation given to a digital hierarchy of circuits or channels operating at 1.544 Mbps (refer to T-1).

DSU: Data Service Unit; a network interface device between the CSU and the customer's DTE. Usually associated with a CSU, the DSU has a V.35, RS232, RS449, or other interface to the customer equipment. The DSU is also a multiplexer for FT-1 circuits.

DSX: Digital Signal Cross-connect.

DTE: Data Terminal Equipment; any form of computer, peripheral or terminal that can originate or receive data over a communication channel.

ESF: Extended SuperFrame; an enhanced version of D4 formatting, it is the current industry standard. ESF is composed of 24 frames of 192 bits each. ESF provides 16 signaling states in the 193rd bit to ensure synchronization, supervisory control, and maintenance capabilities.

FDL: Facility Data Link

FSYNC: Frame Sync; is bit-signaling that occurs at the beginning of each frame, or each group of 32 channels

FT-1: Fractional T-1; a service that uses a portion of a 24-channel T-1 circuit. FT-1 allows 64 Kbps increments from 2-channel 128 Kbps through all 24 channels at 1.544 Mbps.

FXS: Foreign Exchange Station

August 1999

ICV: ISA Communications Voice card.

ISA: Integrated System Architecture; the standard connector used internally for IBM-PC clone computers to connect adapter cards to the motherboard.

LAN: Local Area Network; a communications network that provides a high rate of data transmission and a low error rate in connecting computer system and terminal devices within a department or establishment.

LOS: Loss of Signal; on a T-1 SmartJack or NIU this LED indicates loss of carrier.

Loss of Sync: Indicates an improper or no signal coming from the other side. This could also be a good indication that the wiring is not properly completed.

MPP: Multi-Protocol Packet Assembler/Disassembler (PAD)

MVIP: Multi-Vendor Integration Protocol; allows multiplexed digital telephony within a computer chassis.

NIU: Network Interface Unit; where a T-1 signal is provided to the customer from the telco.

Null Modem: A device that allows DTE to DTE or DCE to DCE communications.

PC: Personal Computer or Printed Circuit (depending on context).

PCM: Pulse Code Modulation; the technique most frequently used to sample and convert analog signals to a digital format. In telephony, the PCM technique converts analog voice to an 8-bit digital format at an 8 kHz rate, producing an aggregate serial bit stream of 64 kbps.

POTS: Plain Old Telephone Service; refers to a one-party, no frills business or residential line.

SF: Superframe (D4); a data transmission format comprised of 12 frames of 192 bits each. A single 193rd bit is used for link control and error checking. As an industry standard, D4, also known as SF, has been superseded by the Extended Super Frame (ESF) format.

Slip: Synchronization of Clocks on digital channel service failed and recovered automatically. This can cause a noisy connection. High-speed modems will tend to reduce throughput or even fail on continued slip conditions. Frequent or repetitive slips can be caused by improper software settings.

SNA: IBM System Network Architecture; mainframe-centric hierarchical communication protocol.

SNMP: Simple Network Management Protocol; recommended by the Internet Engineering Task Force, a committee of vendors and academics. SNMP is designed to manage inter-networked LANs and packet switched networks. It is most commonly employed in TCP/IP networks.

SMTP: Simple Mail Transfer Protocol; a TCP/IP application utility.

T-1: Any transmission line or connection operating at the DS-1 rate of 1.544 Mbps in the USA or at the E1 rate of 2.048 Mbps in Europe.

TCP/IP: Transmission Control Protocol / Internet Protocol; a protocol suite developed by the Defense Advanced Research Projects Agency (DARPA) for use in the U.S. Military ARPANET, now in commercial use. TCP/IP ensures that packets of data are delivered to their destination in the sequence in which they were transmitted. TCP is the Transport Layer protocol and IP is the Network Layer protocol in this suite. TCP/IP is also the delivery mechanism for associated services, including SNMP, SMTP, FTP and Telnet.

Telnet: A TCP/IP application utility that provides terminal emulation.

X.25: A CCITT recommendation that defines the interface between DTE and a packet-switched network and the service features available when connected to the network. The definition describes the characteristics of the Physical, Data Link and Network Layer

D Country Specific Information

UNITED STATES OF AMERICA

FCC Part 15

The components of this equipment have been tested and comply with the limits for a Class A digital device according to U.S. Code of Federal Regulations, Title 47, FCC Rules and Regulations Part 15. Operation is subject to the following two conditions:

1. This device may cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

E Troubleshooting

Table E-1: Troubleshooting Checklist

Observed Problem	Probable Cause	Suggested Solution
Calls into the Discovery IP on that port(s) are unanswered, OR calls are unable to be placed out of that port(s).	Phone line not connected to the port	Check connectors and connections. Replace connectors/cables if necessary.
Calls into the Discovery IP on that port(s) are unanswered, OR calls are unable to be placed out of that port(s).	Bad connector/connection	Check connectors and connections. Replace connectors/cables if necessary.
Calls into Discovery IP on that port(s) are unanswered, OR calls are unable to be placed out of that port(s).	<i>Dvgconfig</i> ports not set up with correct DID/DOD characteristics.	Check the <i>dvgconfig</i> setup, and if necessary contact the telephone company providing the line to check on type provisioned.
<i>dvg</i> process does not start properly (stops immediately after you attempt to start it).	<i>dvgconfig</i> ports not set up with correct settings or in correct quantity	Check port configuration. Any change while <i>dvg</i> is running require that <i>dvg</i> is stopped/restarted.
<i>dvg</i> does not run properly or smoothly.	Discovery IP configuration requires adjustment	Check all configuration items in <i>dvgconfig</i> . any changes while <i>dvg</i> is running require that <i>dvg</i> is stopped/restarted.
Unable to reach updaters ftp site.	Network configuration is not set up to specify a DNS server with reverse-DNS	Go through network configuration process and check that a valid DNS IP address is specified. Check also that reverse-DNS exists on that network connection.
Log shows segmentation fault while trying to start up the <i>dvg</i> process.	Did not go through <i>dvgconfig</i> (saving the configuration) before restarting Discovery IP unit after running updaters	Whenever running updaters, run <i>dvgconfig</i> , set additional configuration options, save the new configuration, reboot the Discovery IP, start the Discovery IP process again.
Bad voice quality	Network issues: packet loss	Adjust frames per packet setting in <i>dvgconfig</i> .
Bad voice quality	Network issues: latency, loss of connection	Caller may adjust latency by entering *3 or *4

INDEX

B

Billing

Call Detail Recording 2-3

C

Call Detail Recording 2-3

Collecting 6-4

Calling

Instructions 7-1

CDR

refer to Call Detail Recording

Circuits

Loop Start Trunk 3-2

Configuration 5-1, 6-1

Managing Settings 5-18–5-25

Port 5-23, 5-24

Port Number 5-15, 5-16, 5-20

Settings 5-18

Setup 5-1

System 5-19

Web Interface 5-25

Wizard 5-3, 5-10, 5-18

Machine Name 5-4

D

Discovery IP

Billing

Call Detail Recording 2-3, 6-4

Calling 2-1, 2-2, 5-9–5-15, 7-1

Routing 2-1

Configuration 5-2, 5-15–5-18, 5-20, 5-23,
5-24, 6-1

Options 5-19

Web Interface 5-25

Wizard 5-3, 5-10, 5-18

Connections 5-1

Description 1-1

Gatekeeper Module 1-2

Hardware 4-1, B-1

Requirements 3-2

Installation 3-1

Requirements 3-1, 3-2

Internet Protocol 5-5, 5-8–5-15

Module

Gatekeeper 1-2

Monitoring 6-2

Network 2-1, 3-1, 3-2

Applications 1-3

Components 1-2

Operation 6-1

Reboot 6-8

Setup 5-4–5-15

Setup/Configuration 5-1

Software

Updates 6-6, 6-7

System

Configuration 5-1

Troubleshooting E-1

G

Gatekeeper Module 1-2

Glossary C-1

I

Installation

Hardware 4-1

Requirements 3-2

Prerequisites 3-1

Requirements 3-1

Interface Card A-1

Internet Protocol 1-1

Gateway 5-5, 5-8–5-15

Telephony Standards 1-2

IP Address 5-4

IP Telephony 1-1

L

LAN

refer to Local Area Network

Local Area Network (LAN) 1-1

M

Microsoft Corporation

Windows NT 1-2

Monitoring 6-2

N

Network 3-1

Applications 1-3

Firewall 3-2

Multiple Unit Routing 2-1

Setup 5-5

IP Address 5-4

Network Components 1-2

NOMAP

refer to Point-to-Point Routing

O

Operation 6-1

P

Parts Specifications B-1

Point-to-Point Routing 2-2

Port

Serial Port Connections 5-1

Product Description 1-1

Product Overview 1-1

Public Switched Telephone Network 1-1

R

Reports

Call Detail Recording 2-3, 6-4

S

Software

Updates 6-6, 6-7

T

Telephone Network

Public Switched (PSTN) 1-1

Telephony

Standards 1-2

Timezone

Setup 5-6

Troubleshooting E-1

V

Voice Message 6-5

Voice Packetizing

G.711 1-2

G.723 1-2

W

WAN

refer to Wide Area Network

Wide Area Network 1-2



WE'RE TALKING
TECHNOLOGY

www.vodavi.com

©1999 *Vodavi Technology, Inc.*
VODAVI is a registered trademark of Vodavi Technology, Inc.

9860-00 8/99