Internet Telephony Gateway

2 & 4 Port Desktop Version User's Guide

FCC Notice

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

CE Declaration of conformity

This equipment complies with the requirements relating to electromagnetic compatibility, EN 55022 Class A for ITE and EN 50082-1. This meets the essential protection requirements of the European Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Trademarks

All brand, company and product names are trademarks or registered trademarks of their respective companies.

How to Use This Manual

This manual was designed for the non-technical users of the Internet telephony gateway (ITG). It contains information about the functions operation and basic instructions for its installation.

Chapter 1: Overview

This chapter provides conceptual overview and description of the ITG, explanation of how the ITG interacts with each for enabling VoIP services, and an overview of the required tasks

Chapter 2: Installing the ITG

This chapter describes required steps to properly and safely install and configure the ITG on your network

Chapter 3: ITG Concepts

This chapter gives information about the ITG technology and describes basic concepts using ITG for providing telephony services over IP network

Chapter 4: Configuring ITG from Web Browser

This chapter explains procedures for configuring the ITG from a web browser

Chapter 5: Making a Call with ITG

This chapter explains how to make Internet calls from telephony devices connected to the ITG directly or indirectly.

Chapter 6: Application Samples

This chapter provides some application examples and information on how to configure the ITG under these samples.

Chapter 7: Troubleshooting Tips

This chapter provides troubleshooting information in case the user has problems installing or maintaining the ITG.

Important Safety Instructions

Before you plug the ITG into an electrical outlet, carefully read all the installation instructions in Chapter 2.

For your own safety and the safety of your equipment, always take the following precautions:

- Follow instructions and warnings in the documentation.

- Never push any object through the fan vent or other openings in the equipment. Such action may produce a short circuit, causing fire, electric shock, or equipment damage.

- Keep the ITG away from all chemicals and sources of liquids.

- "CAUTION – Always disconnect all telephone lines from the wall outlet before servicing or disassembling this equipment."

- "CAUTION – Do not connected the TNV-2 connectors (P1, P2) to wall TNV outlet."

- "CAUTION – To reduce the risk of fire, use only No. 26 AWG or larger, telecommunication line cord."

<u>Warning</u>

- Connection of the RJ45 connector from an ITG to TNV circuits can cause permanent damage to the ITG.

- Incorrectly connecting telephony devices to the RJ11 port on the Telephony Interface Module can cause permanent damage to the module.

Documentation Abbreviations

Throughout this guide, the user will come across a number of abbreviations that are common throughout the industry. The user should be familiar with the following abbreviations:

ATPM	Address Translation and Parsing Manager
CLI	Command Line Interface
DSP	Digital Signal Processor
DTMF	Dual Tone Multi-Frequency
FXO	Foreign Exchange Office
FXS	Foreign Exchange Station
H.323	ITU specification for multimedia transmission over IP networks
ICMP	Internet Control Message Protocol
IMTC	International Multimedia Telecommunications Consortium
IP	Internet Protocol
ITG	Internet Telephony Gateway
KTS	Key Telephone System
LAN	Local Area Network
NVS	Non-Volatile Storage
LED	Light Emitting Diode
PBX	Private Branch Exchange
PSTN	Public Switched Telephone Network
RTP	Real-Time Transport
TCID	Telephony Channel Identifier
TFTP	Trivial File Transfer Protocol
TIM	Telephony Interface Modules
TNV	Telephone Network Voltage
UDP	User Datagram Protocol
UTP	Unshielded Twisted Pair
VAD	Voice Activity Detection
WAN	Wide Area Network

Notation Conventions

Throughout this guide, different type styles and characters are used. These serve a variety of purposes as described below:

Convention	Description
boldface	Commands and keywords are in **boldface.**
italic	Arguments for which you supply values are in italics.
courier	Messages that the ITG CLI displays are in plain courier font.
[ ]	Elements in square brackets are optional.
{ x | y | z }	Alternative but required elements are grouped in braces ({ }) and separated by vertical bars (|).
[x | y | z]	Optional alternative keywords are grouped in brackets ([ ]) and separated by vertical bars (|).
string	A non-quoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
key	A key on the VT-100 terminal of terminal emulator. For example <Enter> denotes the Enter key

Table of Contents

List of Figures

Chapter 1 Overview

This chapter gives an overview of the 2 ports & 4 ports desktop version Internet Telephony Gateway (ITG) and a detailed description of its front panel and rear panel.

1.1 Features

The ITG is a cost-effective and highly reliable analog Voice over IP (VoIP) Gateway that offers toll quality voice and real-time fax data over IP networks. With its embedded architecture, the gateway is ideal for VoIP applications associated with Remote Office and Branch Office (ROBO) environments. With its built-in user-friendly interface, the gateway may be installed easily and conveniently to yield immediate cost savings. One Internet Telephony Gateway supports up to eight voice or Fax communications simultaneously.

Implemented with an efficient Real-Time Operating System (RTOS) and flash memory, the ITG provides upgradeable capabilities, so it may be programmed with updated firmware locally or via the network at any time. It comes equipped with remote management capabilities, configurable signaling to work with PBX, KTS, and/or telephone. The ITG utilizes advanced VoIP related technology. It includes various voice coders and fax algorithms, echo cancellation, Voice Activity Detection (VAD) , Comfort Noise Generation (CNG) , and lost packet recovery algorithms.

1.2 Networking Protocols

The ITG supports several industry-standard networking protocols required for voice communication. The following table describes these protocols.

Networking Protocol	Description
Internet Protocol (IP)	IP is a messaging protocol that addresses and sends packets across the network. To enable IP protocol, the ITG must have a Real IP address, subnet, and gateway assigned to it.
Voice over IP Protocol (VoIP)	VoIP enables the ITG to transfer voice communications over an IP network. The ITG employs ITU-T H.323 protocol for setting up call with one another.
Trivial File Transfer Protocol (TFTP)	TFTP allows you to transfer files over the network. The ITG implements a TFTP client allowing you to download new revision firmware from a TFTP server. The TFTP client requires a TFTP server in your network.
Real-Time Transport (RTP)	RTP is a standard for transporting real-time data over IP network. The ITG uses RTP protocol to send digitized and compressed voice packets.

1.3 Package Contents

The contents of your product should contain the following items:
- Internet Telephony Gateway 2 port or 4 port desk top version
- 100-240V Power Adapter
- 9-pin straight through RS-232 cable
- User's guide

1.4 Front Panel

The front panel of the ITG contains a push button and LED indicators. The following figure illustrates the front panel of the ITG.
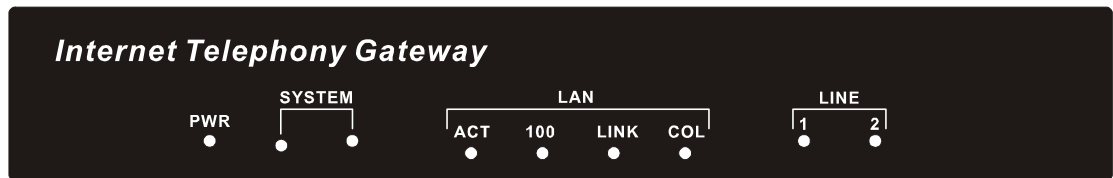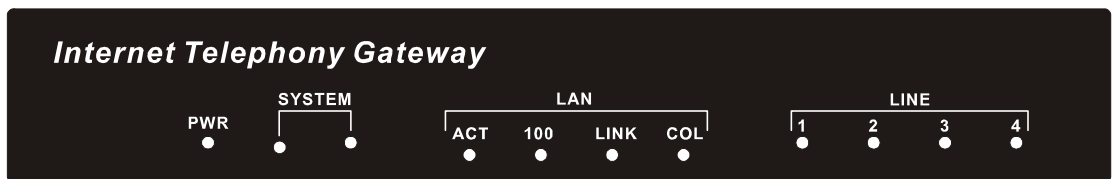

Figure 1-1 2 ports ITG Front Panel

Figure 1-2 4 ports ITG Front Panel

LED Indicators

When the ITG powers on, it switches the state of COL, LNK, 100 and ACT LED indicators in red color per 200 ms in a manner shown in the following table

ACT	100	LNK	COL	Boot loader State
solid on	solid on	solid on	solid on	Execution start
blink	off	off	solid on	Memory test
blink	blink	off	solid on	Loading application code
blink	blink	blink	solid on	Loading TFTP loader code
blink	blink	blink	blink	Failed loading application code and TFTP loader
off	off	blink	off	Memory test fail

The LED indicators on the front panel display the current status of the ITG as described in the following table:

Indicator	Color	Activity	Indication
PWR	Green	On	Power is supplied to the gateway.

SYSTEM	Green	Blinking	The system is running. (Heartbeat LED)
LAN • ACT • 100M • LNK • COL	Green Green Green Green	On On Off On On	Data is presented on LAN. The gateway is connected to LAN at 100Mb/s. The gateway is connected to LAN at 10Mb/s. The gateway is connected to LAN. Data collision is occurring on the network connection.
LINE Channels 1-4	Green	Off On Blinking	The line is idle. The line is being used. The line is ringing.

Reset Button

There is a push button located behind a small hole next to the SYSTEM LED. This button allows you to reset the ITG or force the ITG to enter firmware upgrade mode.

To reset the gateway, push a small, stiff object into the hole until the SYSTEM LED stops blinking, then release the button.

Powering on the gateway while pressing down the button for 5 seconds forces the ITG to enter download mode

1.5 Rear Panel

The rear panel of the ITG has two FXS ports for 2 ports ITG and four ports with two FXO and two FXS ports for 4 ports ITG. Depending on the type of the telephony interface. The telephony interface ports may be connected to telephony devices, such as PBX, KTS, and telephone sets of central office. In addition to the telephony interface ports, there is an power adapter connection hole on the rear panel.

Figure 1-1 2 ports ITG Rear Panel

Figure 1-2 4 ports ITG Rear Panel

LAN / Console Ports

The ITG is equipped with an Ethernet interface with 10/100 Mbps auto-negotiation capability. The Ethernet interface port is located on the rear panel. In addition to the Ethernet

interface port, there is a 9-pin RS-232 interface port on the rear panel. Their functions are described below:

Port	Label	Function
RJ45	LAN	Connecting the ITG to a 10/100 Mbps Ethernet network
9-pin RS-232	User Console	Connecting the ITG to a VT-100 terminal or terminal emulator for configuring the ITG

Chapter 2 Installing the ITG

This chapter gives information on how to install the ITG.

2.1 Network Requirements

For the ITG to successfully operate in your network, your network must meet the following requirements:

1. A working 10/100 Base-T Ethernet. The ITG connects to Internet via an Ethernet LAN.

2. IP network that supports gateway, and subnet mask. You'll need static IP address to assign the ITG.

2.2 Installing the ITG

Due to the ITG is used in a desktop configuration. Ensure that the ITG is placed in a clean, well-ventilated, and vibration-free environment.

When the ITG is used, be certain that the unit is placed on a sturdy, flat surface, near a grounded power outlet. At least three inches of clearance must be provided on both sides of the ITG for good ventilation.

2.3 Connecting to the telephony devices

The ITG supports two types of TIM. One is FXO and the other is FXS. 2 ports ITG supports FXS only, and 4 ports ITG supports 2 FXO and 2 FXS. Each port has RJ11 ports for connecting to telephony devices.

The FXO module is designed for connecting to PBXs or central office switches.

The FXS module is designed for connecting to analog telephone sets or G3 fax machines. Connecting the telephony devices to the appropriate RJ11 ports on the TIM.

Warning: connection of incorrect telephony devices to the ports on the TIM can cause permanent damage to the TIM and/or the ITG.

2.4 Connecting to the Network

The RJ45 network port on the rear panel supports 10/100 Mbps half-duplex connections to Ethernet. You can use either Category 3 or 5 straight-through UTP cable for 10 Mbps connection, but use Category 5 for 100 Mbps connection. To connect to Ethernet, insert one end of the Ethernet cable to the RJ45 port on the rear panel of the ITG and other end of the cable to an Ethernet switching hub or repeater hub.

2.5 Providing Power to the ITG

To provide power to the ITG complete the following steps:

1. Connect one end of the power adapter that came with the ITG to the power receptacle on the rear panel.

2. Connect the other end of the power adapter to an AC power outlet.

3. The ITG will execute the memory testing and application code automatically..

2.6 Assigning IP address to the ITG

The IP address is the unique logical address identifying each IP node, such as the ITG, on an IP network. An IP address is a 32-bit number expressed as four decimal numbers from 0 to 255 separated by periods. The ITG needs static IP address and be aware of the subnet mask and default gateway (typically a router) of your network to be able to send to and receive data from the IP network. Consult your network manager to obtain a unique and static IP address for the ITG, the IP subnet mask and default gateway of your network, and fill out the work sheet in Appendix A before configuring the gateway. Procedures for assigning IP address, default gateway and subnet mask is available in Chapter 4.

Chapter 3 ITG Concepts

The ITG enables the transmission of voice and fax traffic over any IP network by digitizing voice and fax signals, encapsulating the information within IP packets, and then sending the packets across the IP network

3.1 How the ITG Operates

1. The TIM inside the ITG digitizes analog voice signals at 8 Kbps.

2. ITG system software handles the:

   • Capture of telephone number presented as DTMF tones.

   • Mapping the telephone number to the IP address of remote ITG.

   • Setting up calls with remote ITGs utilizing H.323 call control protocol.

   • Digitizing, compressing and encapsulating the voice into IP packets and transmission of the IP packets onto the Ethernet LAN.

3. A router attached to the LAN forwards the IP packets across the WAN, where they will be received by another ITG at the remote.

4. The process is reversed at the remote ITG.

3.2 ATPM

To allow you to easily dial a telephone or fax on the network, the ITG maps a series of dialed digits to the IP address of the remote ITG whose phone or fax you are calling. This mapping information is contained in a database inside each ITG called the dial plan.

Based on the dial plan the Address Translation and Parsing Manager (ATPM) inside the ITG translate telephony numbers to IP addresses of remote ITGs. The ATPM collects telephone number dialed by users, decides whether the dial string is part of the dial plan and, if it is, maps it a remote ITG. When the call is set up to the destination, a sub-string of the original dial string will be sent along to the remote ITG.

3.3 Destination

The destination is where a call is terminated. Typically, for inbound calls from IP network, the ITG terminals the call at one of the telephony ports. The destination for the call is the telephony port where the call terminated. For calls initiated from telephony ports, the ITG forward the call to a remote ITG via IP network, and the remote ITG terminal the call. The destination of the call is the remote ITG.

3.4 Hunt Group

Instead of directly mapping a phone number to a destination, the ATPM first maps the phone number to a group of destinations known as a Hunt Group. A hunt group is a group of destinations that are equivalent. For example, the customer support group of a company

might have 20 people who can handle support calls. Access to customer support is through a single phone number but the next available support person is actually connected upon each incoming call. These 20 phones would be configured as a hunt group. A hunt group consists of a phone number and a list of destinations (members of the group). When an incoming phone number matches the phone number of the hunt group, the ITG attempts to terminate the call at each of the destinations in the hunt group, one at a time until a call is successfully completed.

Every destination that can be reached by dialing a phone number is a member of at least one hunt group. When an address is presented to ATPM for lookup, the output is a hunt group ID number. As a second step, the hunt group ID is presented to ATPM to get the list of members. To effectively bypass the hunt group feature, simply make a unique hunt group for each destination and one member in each hunt group.

3.5 Dial Plan (FXO2S2)

The dial plan is a database inside the ITG for the ATPM to map telephony numbers users dialed to the IP address of remote ITGs. The dial plan consists of the destination table, hunt group table and the address table. Users need to setup these tables, so that the ITG knows how to setup calls with remote ITGs.

Address Table

The address table maps a phone number to a hunt group. The table contains entries that specify the following information:

- Telephone number

- The hunt group the phone number maps to.

- The minimum number of digits to collect before the ATPM starting address lookup.

- The maximum number of digits the ATPM collects before it considers the dial string is complete.

- Number of digits forward to the destination.

- Address table sample:

Address Entry	Hunt Grp_Id	Min. Digits	Max. Digits	Prefix strip	Prefix Address
201	3	3	3	3	None
301	4	3	3	3	None
8	1	3	3	0	None
0	1	1	1	0	None
20	11	5	5	2	None

Hunt Group Table

The hunt group table maps a hunt group to a list of destinations. Hunt group sample

```
Group id   Type  #Members   Member ids
--------------------------------------------------------------------------------
    1        2      1           1
    3        2      1           3
```

```
    4      2     1          4
   11      2     1          11
```

Destination Table

The destination table maps a destination to a telephony port or the IP address of a remote ITG.

Destination table sample

```
 Dest id   Mode     Destination
 ----------------------------------------------------------
    1     Local     PORT = 0
    3     Local     PORT = 2
    4     Local     PORT = 3
   11     H.323     Dest = 192.168.0.55/1720 TCP
```

3.6   DTMF Relay

Voice from PSTN is compressed by the ITG before sending across the IP network and then decompressed by the destination ITG. The voice coders supported by the ITG are designed for ideally compressing and decompressing human voice. If the compression / decompression process is performed on DTMF tone which needs to be conveyed across IP network, distortion might be too significant to be not cognizable in the receiving end. To overcome the shortcoming that the voice coders can not perfectly encode DTMF tone, the ITG encodes DTMF tone into special packets. The packets are then sent to the destination ITG via a separate IP connection. The destination ITG decodes the packets, generates the DTMF tone, and then sends the tone to the PSTN. The way the ITG handles DTMF tone is so called DTMF relay.

The ITG handles DTMF relay per H.323 specifications. Certain third party VoIP devices may handle DTMF relay per IMTC standard. For the ITG to interoperate with those VoIP devices, users need to specify which remote VoIP devices uses IMTC conforming DTMF relay technique. Refer to CLI command on Chapter 8 for detailed information on how to select DTMF relay mode.

3.7   Voice Codecs

Voice codecs supported by the ITG include G.711, G.723.1 5.3kbps, G.723.1 6.3kbps and G.729 AB. When setting up a call, two ITG automatically negotiate with each other until an agreed upon codec is determined.

Chapter 4 Configuring ITG from a Web Browser

This chapter explains procedures for configuring the ITG from the web browser.

4.1   Http setting mode

This section describes the processes for setting up Internet Telephony Gateway once it has been installed. Microsoft Explorer version 4 or higher, or Navigator version 4.5 or higher can be used in this section to view and change parameters.

PC Setup

In order to configure the ITG, PC needs to have TCP/IP protocol and a compatible IP Address.
1.   Connect the ITG to network with a RJ-45 UTP cable. Power it on.
2.   Find a PC, for example, Windows 95/98. Under Windows 95/98, select the *Network Neighborhood* icon on the desktop, then select *Properties*. We will see a screen like below:
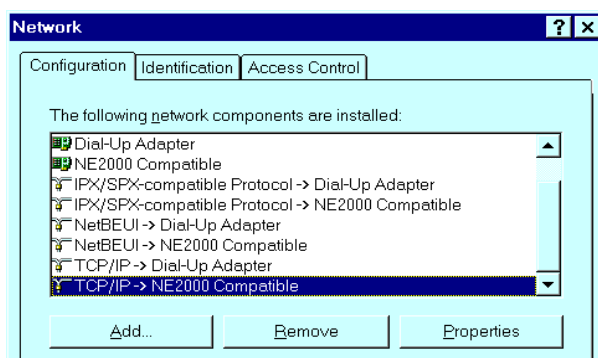
3. If a line like the one highlighted ("TCP/IP -> Network Card") is not listed , select A*dd-Protocol-Microsoft-TCP/IP-OK* to add it.
4. Select *Properties* for the "TCP / IP -> Network card" entry. You will see a screen like the following:
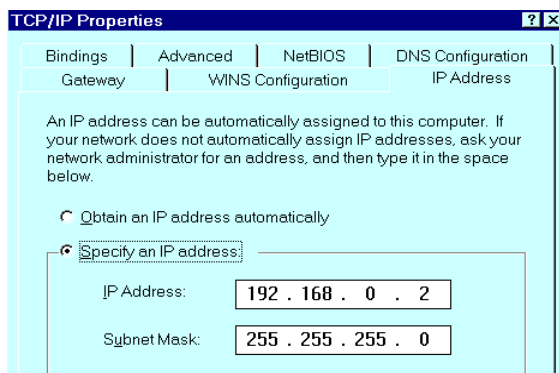
5. On the *IP Address* table, enter values as follows:

- *Specify an IP address* set ON.
- *IP Address*: 192.168.0.2
- *Subnet Mask*: 255.255.255.0

Restart your PC and Start your WEB browser.

6. In the *Address* box, enter the following:

HTTP://192.168.0.1 (This is a default IP in the gateway from factory)

7. Press enter to confirm and you should find the screen below.
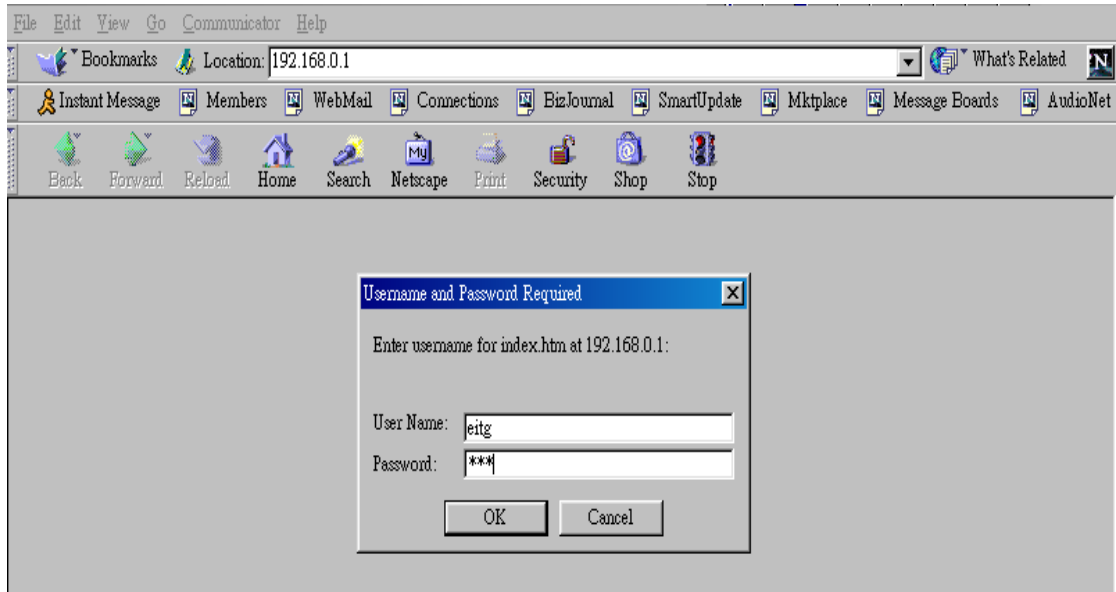
8. The User Name is **eitg** (all lower case). P assword is **123**. Both **eitg** and **123** are default strings from factory. For security reasons, please change and memorize the new password after this first setup.

9. Click "OK". The main screen will appear as b e l o w .

Main Menu Function Briefings

1. Dial Plan Settings, which helps you configure the dial plan. You should complete the dial plan work sheets before working on this menu.

2.View System Configurations, which includes the specific information related to version, network, H.323, coder, and the channel of the gateway you are using.

3.Configure System Settings, which allows you to modify the system parameters as you wish.

Select Main Menu\Dial Plan Settings, we can find the following Dial Plan Menu.

Dial-Plan Menu

- Phone/Hunt Group/Destination Settings
- Common Parameter Settings
- Clear All Dial Plan Settings
- Restore All Dial Plan Settings
- Store Settings To Flash

Help

Back To Main Menu

Dial Plan Settings Function Briefings

The following options are available and shown on the left frame.

1. Telephone Settings, which allows one to Add, Delete, Find, or List telephone numbers.
2. Hunt Group Settings, which allows one to Add, Delete, Find, or List hunt group settings
3. Destination Settings, which allows one to Add, Delete, Find, or List destination settings
4. Common Parameter Settings, which defines the desired total dial time, first digit wait time, inter-digit wait time, and the termination digit.
5. Clear All Entries, which clears all telephone numbers, hunt groups, and destinations settings, both old and new ones
6. Restore All Entries, which retrieves all dial plan settings from the flash, temporary settings cleared
7. Store Settings To Flash, which stores all settings that you have specified permanently.

To ensure your new settings are actually accepted, please check the configuration page carefully after your submit the new settings. If the new settings are not present, it probably conflicts with the old settings. Or, there is not enough space for storing your settings.
For more details, please refer to the User's Guide.

Dial Plan Settings Function Briefings
1.Telephone Settings, which allows one to Add, Delete, Find, or List telephone numbers.
2.Hunt Group Settings, which allows one to Add, Delete, Find, or List hunt group settings
3.Destination Settings, which allows one to Add, Delete, Find, or List destination settings
4.Common Parameter Settings, which defines the desired total dial time, first digit wait time, inter-digit wait time, and the termination digit.
5.Clear All Entries, which clears all telephone numbers, hunt groups, and destinations settings, for both old and new ones
6.Restore All Entries, which retrieves all dial plan settings from the flash, temporary settings will be cleared
7.Store Settings To Flash, which stores all settings that you have specified permanently.

To ensure your new settings are actually accepted, please check the configuration page carefully after your submit the new settings. If the new settings are not present, it probably conflicts with the old settings. Or, there is not enough space for storing your settings.

Please select Main Menu\Dial Plan\Phone/Hunt Group/Destination Settings, we can find Phone/Hunt Group/Dest . Setting Menu. We are doing ITG telephone address table management.

We can add (delete, find or list) desired telephone number mapping to hunt group at this menu.

Telephone Number Telephone number to match. This is only part of the total dialed string.

Hunt Group ID For each hunt group ID, you need to assign it a unique identifier between 0 and 99.

Min. Digits Minimum number of digits to be collected before the ATPM starting matching the dial string with entries in the address table.

Max. Digits Maximum number of digits to be collected before the ATPM starting matching the dialed string with entries in the address table.

Strip Length The number of digits to be stripped at the beginning of the collected dial string before forwarding the string to the destination.

Append Prefix (Optional) Digit to be added before the beginning of the collected dial string before forwarding it to the destination.

Please select Main Menu\Dial Plan\Phone/Hunt Group/Destination Settings, we can find Phone/Hunt Group/Dest . Setting Menu. We are doing the ITG hunt group table management.

We can add (delete, find or list) desired hunt group ID mapping to destination ID at this menu.

Please select Main Menu\Dial Plan\Phone/Hunt Group/Destination Settings, we can find Phone/Hunt Group/Dest. Setting Menu. We are doing the ITG destination table management. One is Remote Destination IP and the other is Local Destination Channel.

We can add (delete, find or list) desired destination ID mapping to Remote Destination IP or Local Destination Channel at this menu.

Please back to Dial Plan Menu.

Please select Main Menu\Dial Plan\Common Parameter Settings

This Common Parameter Settings is the same as previous ATPM system parameters description. .

Please select Main Menu\Dial Plan\Clear All Dial Plan Settings

Clear All Dial Plan Settings will clear all the settings you made before. However, the 'Clear All' is only temporary if you do not store to the Flash Memory afterwards.

That is, to restore all the settings from the Flash Memory, you need only to click on the 'Restore All Entries' on the left frame, or to reboot the system (the settings can be restored ONLY IF YOU DID NOT STORE the entries).

Please select Main Menu\Dial Plan\Restore All Dial Plan Settings
Retrieve all dial plan settings from the flash memory. All temporary settings will be cleared.

Please select Main Menu\Dial Plan\Store Settings To Flash.
Ready to store Dial Plan settings to Flash Memory

Please Back To Main Menu

Please select Main Menu\View System Config.

View System Config. Function Briefings. Five options available

1.Firmware Version Information, which shows the versions of each firmware component

2.Network Settings, which shows the IP-related settings, and the status of associated management tools

3.H.323 Parameter Settings, which shows the H.323-related parameters associated with the gateway

4.Coding Profile Information, which shows the configurations related to a specific coding profile

5.Channel Settings, which shows the configurations associated with a specific channel

6.DHCP Settings, which shows the status of DHCP

7.PPPoE Settings, which shows the status of PPPoE

8.Dynamic DNS Settings, which shows the status of Dynamic DNS

Please select Main Menu\View System Config.\Firmware Version Info.

This will show current ITG firmware version information.

Firmware Information:

    Internet Telephony Gateway Version: 3.23
    Boot Loader Version: 4.13
    RTOS Version: 2.5.0./BE
    H323 Stack Version: 3.0.9.0
    DSP image Version: 8.1.2.1.
    TSG Version : R8.0 gateway(Build 4)

Please select Main Menu\View System Config.\H.323 Parameter Settings

The H.323 Parameters Settings:
    h323 display_name = 'Customer'

Configuring ITG from a Web Browser

> h323 h245_term_type = 60
> h323 rtp_port_base = 30000
> h323 out_fast_start = off
> h323 in_fast_start = off
> h323 h245_tunneling=off
> h323 cisco_t38=on
> h323 callSignalPort=1720
> h323 nat_call = on
> h323 call_name=
> h323 local_alert=off
> h323 default_dtmf = H323 V2 Signal
> No Alternate IP Defined!
> h323 dns_ip = 0
> h323 gk_mode = off
> h323 h245_timeout = 30000
> h323 term_id =
> h323 wan_refresh=120
> h323 nat_name=
> h323 wan _mode=off
> h323 wan_port_gk=0
> h323 wan_port_gw=0
> h323 wan_max_retries=10
> h323 wan_lost_timer=1
> h323 wan_serv_ip=0.0.0.0

Please select Main Menu\View System Config.\Coder Type Selected
Voice Coder Selected is G.723

Please select Main Menu\View System Config.\Coder Parameters Information

Please select Main Menu\View System Config.\Channel Settings

This command can show the desired TCID setting of ITG, value is from 0 to 1 for 2 ports ITG and 0 to 3 for 4 ports ITG. Please refer the appendix C to find the factory default setting.

Please Back To Main Menu
Please select Main Menu\Configure System Settings

System Config. Settings Function Briefings

The following options are available and shown on the left frame.

1. IP Settings, which allows one to set the gateway's IP address, its subnet mask, and its Default Gateway IP address.
2. H.323 Parameter Settings, which allows one to set the H.323 parameters, such as Fast Start Mode, Gatekeeper Mode, etc.
3. Port Parameter Settings, which allows one to set parameters associated with each port, such as transmission/receive gains, comfort noise level, etc.
4. Voice Coder Selection, which allows one to set the desired coder type, such as G.711, G.723 or G.729A, in a per line module base
5. DHCP Settings, which allows one to set the status of DHCP
6. PPPoE Settings, which allows one to set the status of PPPoE
7. Dynamic DNS Settings, which allows one to set the status of Dynamic DNS

System Config. Settings Function Briefings
1.IP Settings, which allows one to set the gateway's IP address, its subnet mask, and its Default Gateway IP address.
2.H.323 Parameter Settings, which allows one to set the H.323 parameters, such as Fast Start Mode, Gatekeeper Mode, etc.
3.Port Parameter Settings, which allows one to set parameters associated with each port, such as transmission/receive gains, comfort noise level, etc.
4.Voice Coder Selection, which allows one to set the desired coder type, such as G.711, G.723 or G.729A, in a per line module base.
5.DHCP Settings, which allows one to set the status of DHCP
6.PPPoE Settings, which allows one to set the status of PPPoE
7.Dynamic DNS Settings, which allows one to set the status of Dynamic DNS

Configuring ITG from a Web Browser

Please select Main Menu\Configure System Settings\ITG IP Settings

This screen can setup your ITG IP Address, Subnet Mask and Default IP Gateway Address. These values will be valid after ITG reboot.

Please select Main Menu\Configure System Settings\H.323 Parameter Settings
There are H.323 General Parameter Settings, H.323 GateKeeper Settings, H.323 Aliases Settings.

Please select Main Menu\Configure System Settings\H.323 Parameter Settings\H.323 General Parameter Settings
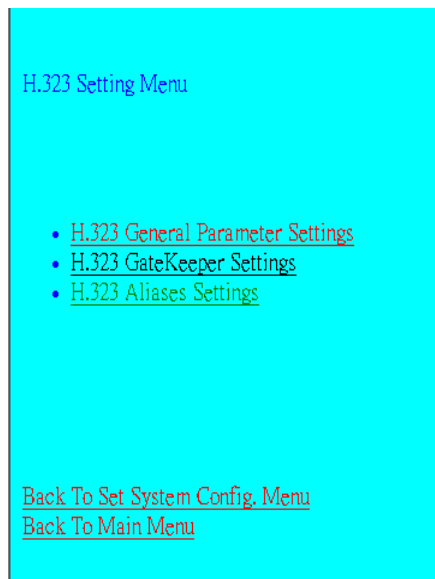
1. Display Name: The default string is "Customer".
   This field is to set the display name information that is carried in the H.323 setup messages. Up to 48 characters can be entered.

2. Terminal Type: The default value is 60.
   This field is to set the H.245 terminal type, which is used as part of the master/slave determination process of H.245. Typically, setting a value of less than 50 will force slave operation, and a value of greater than 200 will force the master operation. For more details, please refer to H.323-related standard documents.

3. RTP Port Base: The default value is 30000.
   This field is to select the starting port number for assignment of RTP and RTCP ports. According to the H.323 specification, RTP port number should be even in value, and the RTCP port number should be one greater than the RTP port. Typically, numbers from 0 to 1023 are reserved on most systems.

4. Outgoing Fast Start: The default setting is off.
   This field is to enable or disable the Fast start mode on the outgoing side of the link.

5. Incoming Fast Start: The default setting is off.
   This field is to enable or disable the Fast start mode on the incoming side of the link.
   You'll have to reboot the system to make your changes active!

6. Frame Rate = 2 frames/packet

7. Auto-Answer: Enables quick H.225 to H.245 transition without waiting for receiver picking up the phone, default is on

8. NAT Call Mode: Enables calls from remote sites which use NAT routers with private IP networks behind, default is on:

9. Default DTMF Mode: H323 V2 Signal or IMTC. The default is H323 V2 Signal

10. DNS IP Address

11. Alternate DTMF IP Address

12. DTMF Duration: default is 300

Please select Main Menu\Configure System Settings\H.323 Parameter Settings\H.323 GateKeeper Settings

1.Gate Keeper Mode: The default setting is off. This field is to select the co-operation mode with some gatekeeper(s). Three options available:
- off: disables gatekeeper co-operation,
- auto: enables auto-discovery of the gatekeeper,
- manual: enables gatekeeper co-operation in manual operation (the gatekeeper address must be properly assigned).
The following fields must be filled up when the Gate Keeper Mode is set to either auto or manual.

2.Gate Keeper Address: Specify the gatekeeper address when configured to manual mode. When auto mode is desired, this field should be set to auto.
3.Allow Calls Without Gate Keeper: This field is to inform the H.323 stack to allow calls when the endpoint is not registered with a gatekeeper.
4.Registration Type: This field is to set the endpoint registration type. This specifies how the endpoint will register itself with the gatekeeper.
5.Max Registration Retries: This field is to control how many registration attempts will be made before the endpoint considers itself to have failed registration.
6.Time To Live:
7.Endpoint Prefix: This command is used to set the H.323 prefix that the ITG uses when registering to an H.323 gatekeeper.
8.Terminal ID: To specify GW's ID.
9.GateKeeper ID: To specify Gate Keeper's ID.

You'll have to reboot the system to make your changes active!

Please select Main Menu\Configure System Settings\H.323 Parameter Settings\H.323 Aliases Settings
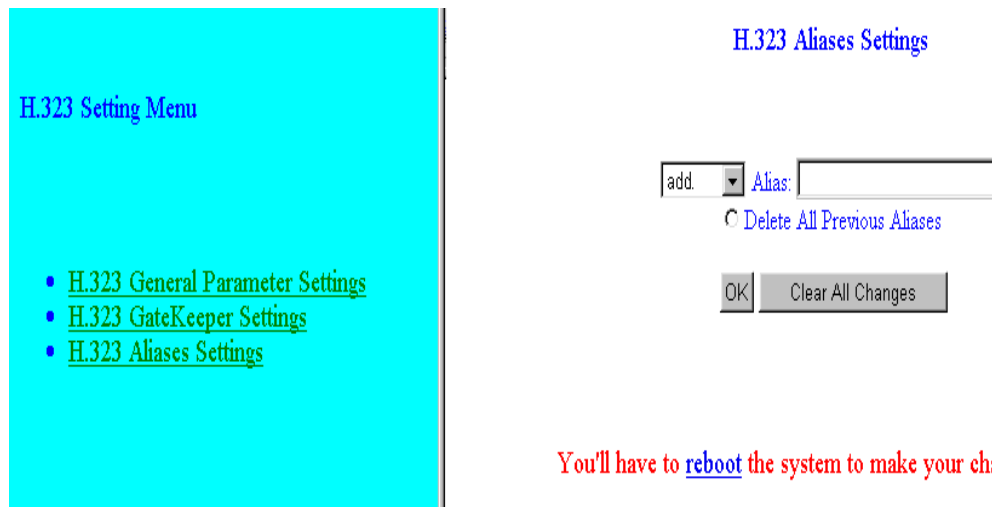
Alias: This field is to create or delete aliases that are registered with the gatekeeper.

4.2   Web Browser setting sample

This section describes how to use web browser to build a sample scenario dial plan in ITG. We suggest some steps to setup dial plan at web browser setting,

1.   Please draw down scenario to have a VoIP call application
2.   Local gateway: IP setup
3.   Local gateway: local telephone number setup
4.   Local gateway: remote gateway IP & remote telephone number setup

Please draw down scenario to have a VoIP call application
In order to describe the dial plan of Internet Telephony Gateway, we would like to have the following scenario to step by step the gateway setting by web browser. In case, you don't have PBX on hand, please ignore GW A Port 1 setting.
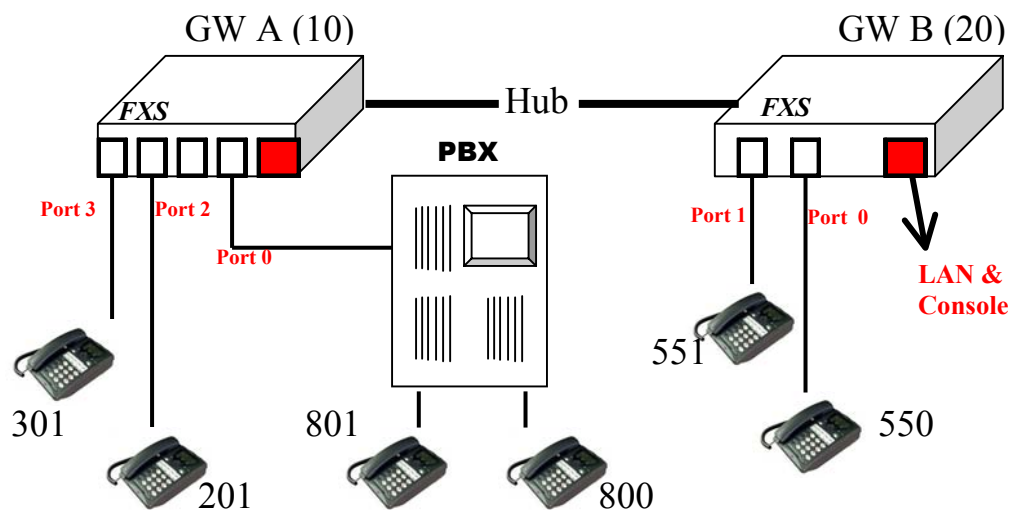
Scenario description: There are two gateways connected by a Hub.
Gateway A, 4 ports ITG, is configured as following:
1.   Gateway A, ID=10, IP: 192.168.0.20, mask IP: 255.255.255.0, gateway IP 0.0.0.0 (virtual IP)
2.   Port 0 of FXO is connected to PBX. There are two telephone sets connected by PBX, their phone numbers are 800 and 801.
3.   Port 2 of FXS has a telephone set connected, its phone number is 201
4.   Port 3 of FXS has a telephone set connected, its phone number is 301

Gateway B, ID=15, 2 ports ITG, is configured as following:
1.   Gateway B IP: 192.168.0.55, mask IP: 255.255.255.0, gateway IP 0.0.0.0 (virtual IP)
2.   Port 0 of FXS has a telephone set connected, its phone number is 550
3.   Port 1 of FXS has a telephone set connected, its phone number is 551

Local gateway: IP setup, we are setting gateway A.
1.   Please select Main Menu\ Configure System Settings\ ITG IP Settings from Main Menu

2. Key-in IP Address: 192.168.0.20, Subnet Mask: 255.255.255.0 and Default IP Gateway Address: 0.0.0.0 in the related fields.
3. And push "Save The Change" button

Local gateway: local telephone number setup
Gateway A FXO to PBX's extension number 8XX setting. 8XX locates at PBX side and via Port 0 of FXO, we can access PBX's extension.
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\
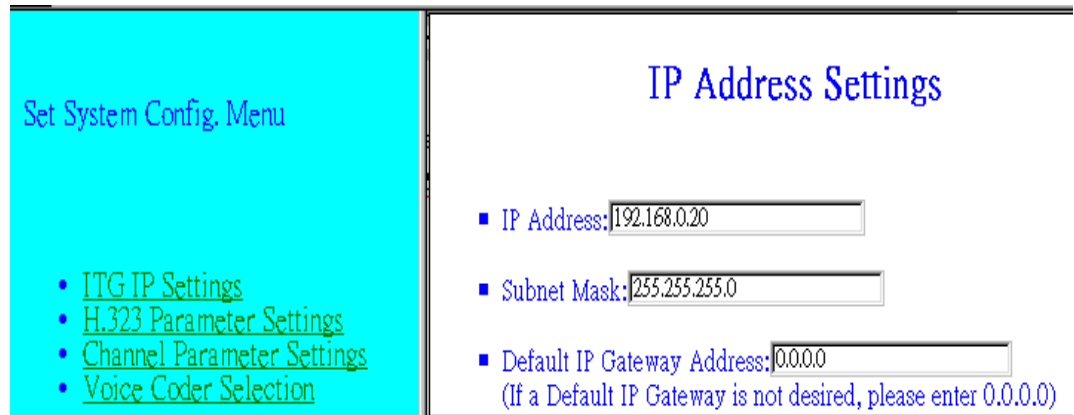
Phone/Hunt Group/Dest**.** Setting Menu\ Add telephone" from Main Menu
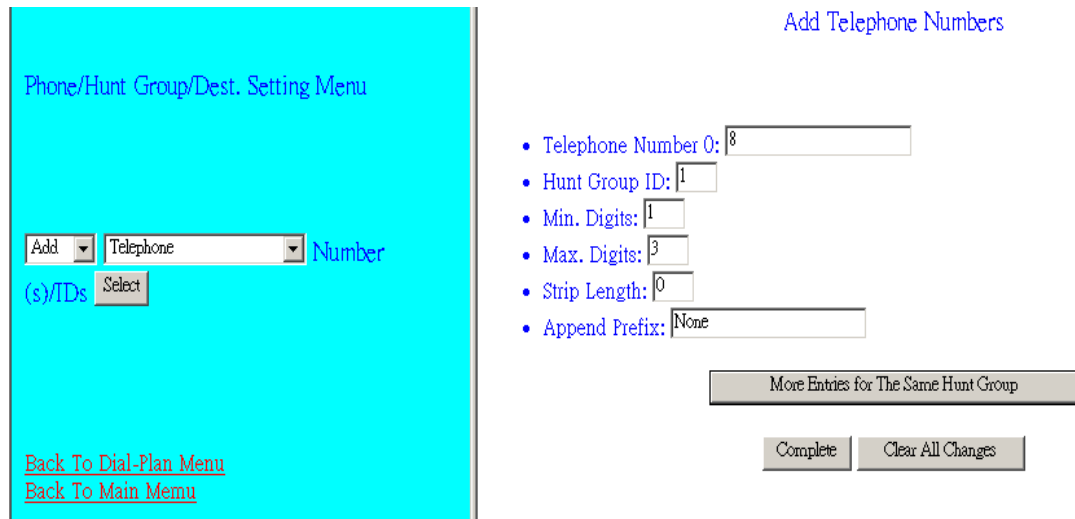
2. Push "Complete" button. And screen will show "Telephone Number Added 8 OK" table. Telephone numbers 800, 801 are added in gateway dial plan.
3. Purpose: add telephone to hunt group mapping table of phone number 8 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest**.** Setting Menu\ Add Hunt Group" from Main Menu

2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to destination ID mapping table of phone number 8 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Local_Destination_Channel" from Main Menu

2. Push "Complete" button. And screen will show "Add Destination ID Result:" table
   The Destination ID 1 is bound to local channel 0.
3. Purpose: add destination ID to Local channel number ID mapping table of phone number 8 into dial plan. Channel Number can have values from 0 to (number of ports –1)

Back To Dial-Plan Menu
Gateway A's telephone number 201 setting. 201 locates at Port 2 of FXS
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add telephone" from Main Menu

Configuring ITG from a Web Browser

2. Push "Complete" button. And screen will show "Telephone Number Added 201 OK" table. Telephone number 201 is added in gateway dial plan.

3. Purpose: add telephone address to hunt group mapping table of phone number 201 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Hunt Group" from Main Menu

2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to destination ID mapping table of phone number 201 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Local_Destination_Channel" from Main Menu

2. Push "Complete" button. And screen will show "Add Destination ID Result:" table
   The Destination ID 3 is bound to local channel 2.
3. Purpose: add destination ID to Local channel number mapping table of phone number 201 into dial plan

Back To Dial-Plan Menu
Gateway A's telephone number 301 setting. 301 locate in Port 3.
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt
   Group/Dest. Setting Menu\ Add Telephone" from Main Menu
2. Push "Complete" button. And screen will show "Telephone Number Added 301 OK" table.
   Telephone number 301 is added in gateway dial plan.

3. Purpose: add telephone address to hunt group mapping table of phone number 301 into dial
   plan

Back To Dial-Plan Menu

1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt
   Group/Dest. Setting Menu\ Add Hunt Group" from Main Menu
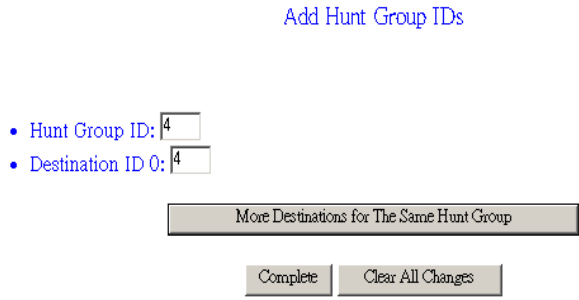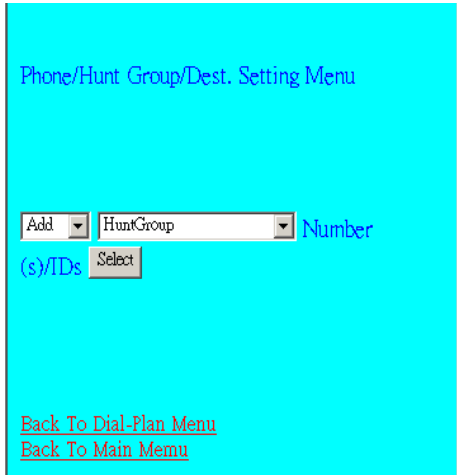
2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to Local channel number mapping table of phone number 301 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Local_Destination_Channel" from Main Menu
2. Push "Complete" button. And screen will show "Add Destination ID Result:" table
   The Destination ID 4 is bound to local channel 3.
3. Purpose: add destination ID to destination IP mapping table of phone number 301 into dial plan

Local gateway: remote gateway IP & remote telephone number setup

Gateway A's remote gateway IP & remote telephone number 550 & 551 setting

Back To Dial-Plan Menu
Remote Gateway ID number setting. Due to 20 is remote gateway B ID, we usually define its hunt group number is beginning at number 11 at this dial plan setting.

1. Please select "Main Menu\Dial Plan\Phone/Hunt Group/Destination Settings\Phone/Hunt Group/Dest. Setting Menu" from Main Menu

2. Key-in 20, and related information in each field.
3. Push "Complete" button. And screen will show "Telephone Number Added 20 OK" table. Remote ID number 20 is stored in gateway dial plan.
4. Purpose: add telephone address to hunt group mapping table of the number 20 into dial plan

Back To Dial-Plan Menu
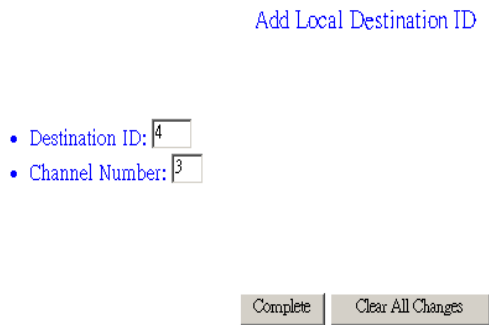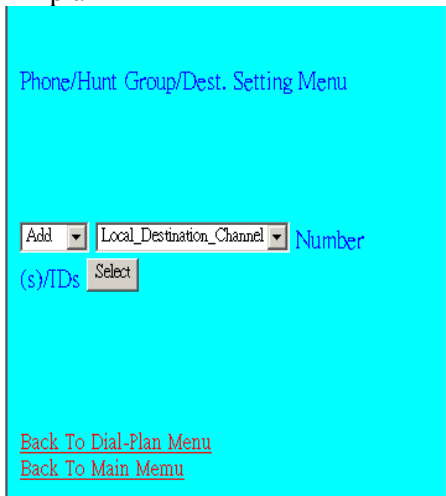　　　1.　Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Hunt Group" from Main Menu

2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to destination ID mapping table of the number 20 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Remote_Destination_IP" from Main Menu

2. Push "Complete" button. And screen will show "Add Destination ID Result: The Destination ID 11 is bound to IP address 192.168.0.55 for H.323 VoIP application."
3. Purpose: add destination ID to destination IP mapping table of phone number 550 & 551 into dial plan

Back To Dial-Plan Menu
Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ List Telephone" from Main Menu, we can list the above telephone number setting.

Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ List Hunt Group" from Main Menu, we can list the above hunt group setting.

Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu" from Main Menu and select List Remote_Destination_IP or Local_Destination_Channel, we can list the above destination ID setting.

Please select Main Menu\Dial Plan\Store Settings To Flash. The above setting will be stored to flash memory.

At this moment we have finished gateway A VoIP call application setting. We are going to have the same process to setup gateway B.

Local gateway: IP setup, we are setting gateway B.

1. Please select Main Menu\ Configure System Settings\ ITG IP Settings from Main Menu
2. Key-in IP Address: 192.168.0.50, Subnet Mask: 255.255.255.0 and Default IP Gateway Address: 0.0.0.0 in the related fields.
3. And push "Save The Change" button

Local gateway: local telephone number setup

Gateway B's telephone number 550 setting. 550 locates at Port 0 of 2 ports ITG

1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Telephone" from Main Menu

2. Push "Complete" button. And screen will show "Telephone Number Added 550 OK" table. Telephone number 550 is stored in gateway dial plan.

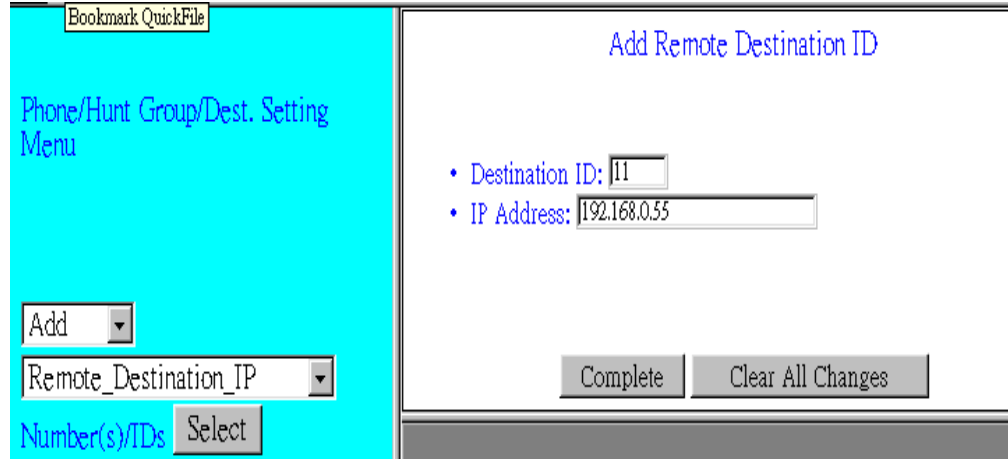3. Purpose: add telephone address to hunt group mapping table of phone number 550 into dial plan

Back To Dial-Plan Menu

1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Hunt Group" from Main Menu

2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to destination ID mapping table of phone number 550 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest**.** Setting Menu\ Add Local_Destination_Channel" from Main Menu

2. Push "Complete" button. And screen will show "Add Destination ID Result:" table
   The Destination ID 1 is bound to local channel 0.
3. Purpose: add Local channel number to destination IP mapping table of phone number 550 into dial plan

Gateway B's telephone number 551 setting. 551 locates at Port 1
1.   Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings \ Phone/Hunt Group/Dest**.** Setting Menu\ Add Telephone" from Main Menu
2.   Push "Complete" button. And screen will show "Telephone Number Added 551 OK" table. Telephone number 551 is stored in gateway dial plan.
3.   Purpose: add telephone address to hunt group mapping table of phone number 551 into dial plan

Back To Dial-Plan Menu

1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Hunt Group" from Main Menu

2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to destination ID mapping table of phone number 551 into dial plan

Back To Dial-Plan Menu

1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Local_Destination_Channel" from Main Menu
2. Push "Complete" button. And screen will show "Add Destination ID Result:" table
   The Destination ID 2 is bound to local channel 1.
3. Purpose: add Local channel number to destination IP mapping table of phone number 551 into dial plan

Local gateway: remote gateway IP & remote telephone number setup

Gateway B's remote gateway IP & remote telephone number 301 & 201 & 800 & 801 setting

Back To Dial-Plan Menu

Remote Gateway ID number setting. Due to 10 is remote gateway A ID. Due to 301 & 201 & 800 & 801 locate in remote gateway, we usually define its hunt group number is beginning at number 11 at this dial plan setting.
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest **.** Setting Menu\ Add Telephone" from Main Menu
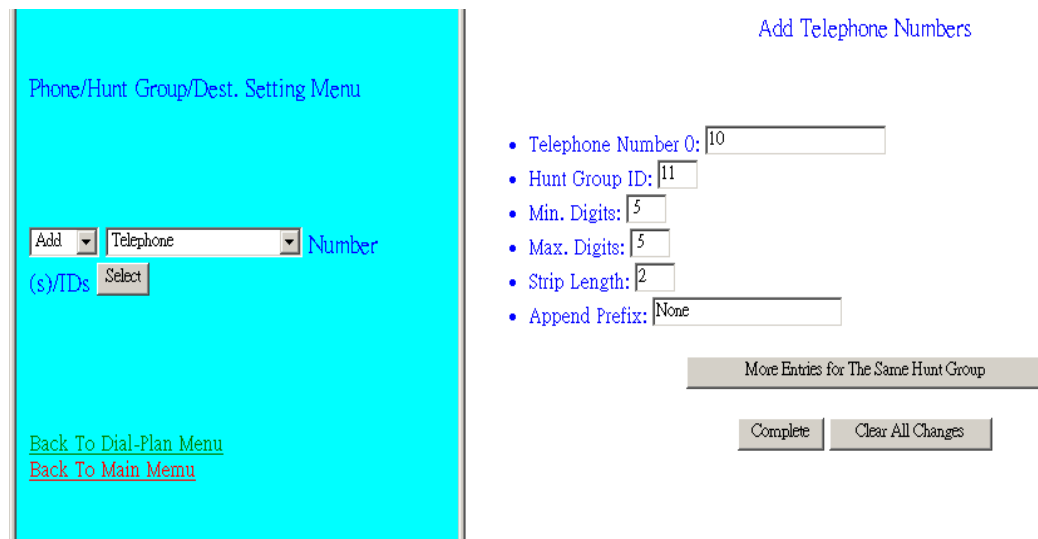
2. Key-in 10 firstly, and related information in each field..
3. Push "Complete" button. And screen will show "Telephone Number Added 10 OK" table. GW ID number 10 is stored in gateway dial plan.
4. Purpose: add telephone address to hunt group mapping table of ID number 10 into dial plan
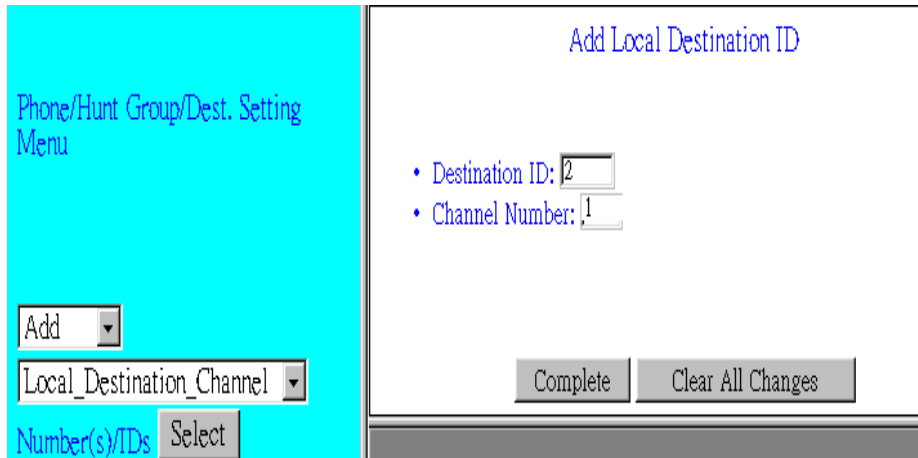
Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Hunt Group" from Main Menu

2. Push "Complete" button. And screen will show "List All Hunt Group IDs Result:" table.
3. Purpose: add hunt group to destination ID mapping table of number 10 into dial plan

Back To Dial-Plan Menu
1. Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ Add Remote_Destination_IP" from Main Menu

2. Push "Complete" button. And screen will show "Add Destination ID Result: The Destination ID 11 is bound to IP address 192.168.0.20 for H.323 VoIP application."
3. Purpose: add destination ID to destination IP mapping table of number 10 into dial plan

Back To Dial-Plan Menu
Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ List Telephone" from Main Menu, we can list the above telephone number setting.

Configuring ITG from a Web Browser

Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu\ List Hunt Group" from Main Menu, we can list the above hunt group setting.

Please select "Main Menu\ Dial Plan\ Phone/Hunt Group/Destination Settings\ Phone/Hunt Group/Dest. Setting Menu" from Main Menu and select List Remote_Destination_IP or Local_Destination_Channel, we can list the above destination ID setting.

Please select Main Menu\Dial Plan\Store Settings To Flash. The above setting will be stored to flash memory.

We have finished gateway B VoIP call application setting. We can enjoy VoIP call between gateway A and gateway B application now.

Chapter 5 Making a Call with ITG

This chapter how to make phone calls from telephony devices connected to the ITG directly or indirectly.

5.1   Making a call with ITG FXS Module

ITG has two slide-in modules. FXS module can connect to analogue phone directly, and FXO module can connect to PBX.

Connection: analogue telephone set connects to FXS module port
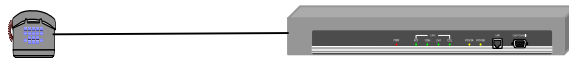
Operation:

1. Pick up this analogue telephone set, you can hear the ITG dial tone at the telephone set

2. The related LED will be lighted at the green color when the telephone set is pick up.

    For Example: If the telephone set is connected to the second port of FXS. When you pick up the telephone set, the second LED will be lighted at the green color.

3. We can dial the desired destination phone number at the telephone set. If the desired destination phone number is legal, the ITG will play two quick address ack tones, Du Du, to destination. If the desired destination phone number is illegal, the ITG will play three out of service tones, please check the dial plan and your desired destination phone number.

5.2   Making a call with ITG FXO Module

Connection: analogue telephone set connects to FXO module port
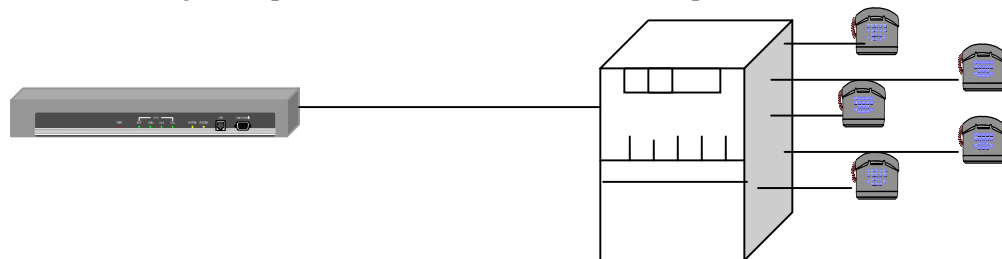
Operation:

1. Pick up this analogue telephone set, you can hear the PBX dial tone at the telephone set. In some cases, you have to dial a specific number to get the connection between telephone set and PBX.

2. Dial the phone number which is connected between PBX and ITG FXO module port.

3. When the ITG is connected, the related LED will be lighted green.

   For Example: If the telephone set is connected to the second port of FXO. When the PBX is connected to ITG FXO port, the second LED will be green.

4. We can dial the desired destination phone number on the telephone set. If the desired destination phone number is legal, the ITG will plan two quick sounds, "Du Du", to destination. If the desired destination phone number is illegal, the ITG will play three out of service tones, please check the dial plan and your desired destination phone number.

5.3 Making a call with ITG Application Sample
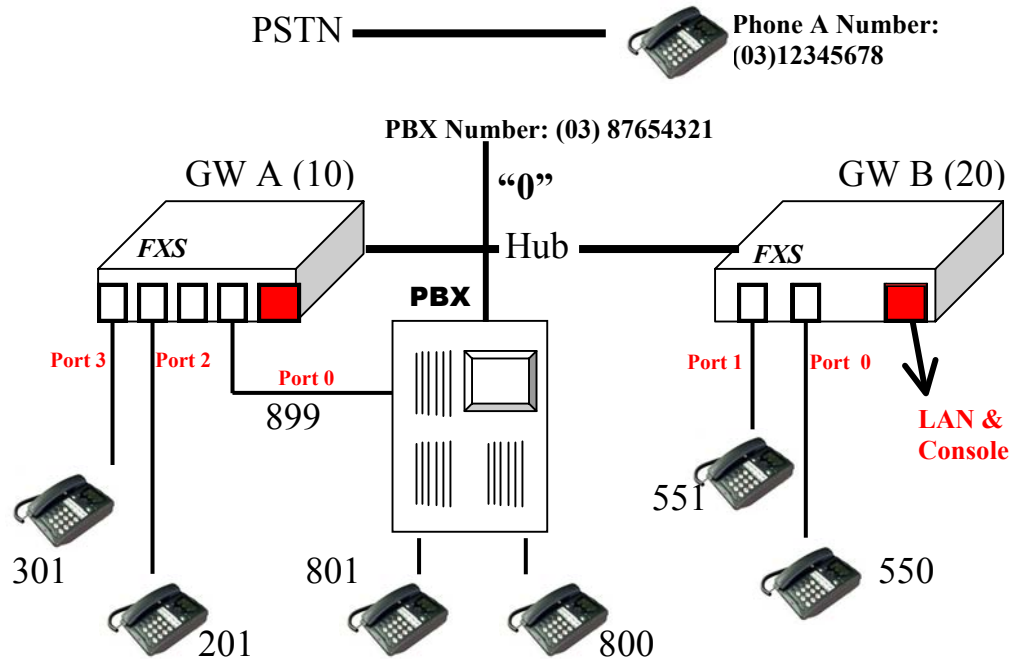
Scenario description:

There are two gateways connected by a Hub.
Gateway A, 4 ports ITG, is configured as following:
2. Gateway A IP: 192.168.0.20, mask IP: 255.255.255.0, gateway IP 0.0.0.0 (virtual IP)
3. GW A ID=10
4. Port 0 of FXO is connected to PBX. There are two telephone sets connected by PBX, their phone numbers are 800 and 801.
5. PBX has a number, 899, is connected to Port 0.
6. PBX has an outside call to PSTN. Digit 0 is connected to outside call.
7. Phone number: (03) 87654321 is an PBX representative number. 03 is an area code.
8. There is telephone set, define phone A, its number is (03) 12345678.
9. Port 2 of FXS has a telephone set connected, its phone number is 201
10. Port 3 of FXS has a telephone set connected, its phone number is 301

Gateway B, 2 ports ITG, is configured as following:
1. Gateway B IP: 192.168.0.55, mask IP: 255.255.255.0, gateway IP 0.0.0.0 (virtual IP)
2. GW B ID=20
3. Port 0 of FXS has a telephone set connected, its phone number is 550
4. Port 1 of FXS has a telephone set connected, its phone number is 551

Gateway A and Gateway B dial plan setting

Gateway A address translation table

Address Entry	Hunt Grp_Id	Min. Digits	Max. Digits	Prefix strip	Prefix Address
201	3	3	3	3	None
301	4	3	3	3	None
8	1	3	3	0	None
0	1	1	1	0	None
20	11	5	5	2	None

Gateway A hunt group table

Group id	Type	#Members	Member ids
1	2	1	1
3	2	1	3
4	2	1	4
11	2	1	11

Gateway A destination table

Dest id	Mode	Destination
1	Local	PORT = 0
3	Local	PORT = 2
4	Local	PORT = 3
11	H.323	Dest = 192.168.0.55/1720 TCP

ITGB address translation table

Address Entry	Hunt Grp_Id	Min. Digits	Max. Digits	Prefix strip	Prefix Address
550	1	3	3	3	None
551	2	3	3	3	None
10	11	5	5	2	None

ITGB hunt group table

Group id	Type	#Members	Member ids
1	2	1	1
2	2	1	2

11   2   1   11

ITGB destination table

    Dest id   Mode   Destination

1	Local	PORT = 0
2	Local	PORT = 1
11	H.323	Dest = 192.168.0.20/1720 TCP

Making a call between gateway A and Gateway B

Case 1: Gateway Phone to Gateway Phone,

Gateway B phone 550 calls to Gateway A phone 201

Human operation at GW B Caller side	Equipment operation	Human operation at GW A Called Side
Pick up phone 550	1.ITG dial tone is heard. 2.the first LED will be on at GW B.	
Dial 10201	1.Du Du is heard 2.VoIP communication is going	
Ring back tone is heard	1.The third LED is flashing at GW A.	Phone 201 is ringing
		Pick up phone 201
Enjoy VoIP		Enjoy VoIP

The above process is the same as Gateway B phone 550 calls to Gateway A phone 301, 800 and 801.

Case 2: Gateway Phone to PSTN Phone,

Gateway B phone 550 calls to phone A number (03) 12345678

Human operation at GW B Caller side	Equipment operation	Human operation at Phone A Receiver Side
Pick up phone 550	1.ITG dial tone is heard. 2. the first LED will be on at GW B	
Dial 100	1.Du Du is heard 2.VoIP Communication is going	
Ring back tone is heard	1. The first LED is flashing at GW A.	
PSTN dial tone is heard	1.Gateway B is connected to gateway A by Hub 2.Gateway A is connected to PSTN	
Dial 12345678	1.PSTN communication is going	Phone 12345678 is ringing

Ring back tone is heard		Phone 12345678 is ringing
		Phone 12345678 picks up
Enjoy VoIP		Enjoy VoIP

The above process is the same as Gateway A phone 201 (301) calls to phone A number (03) 12345678

Case 3: PSTN Phone to Gateway Phone,

Phone A number (03) 12345678 calls to Gateway B phone 551

Human operation at Phone A, Caller side	Equipment operation	Human operation at Gateway B phone 551, Receiver Side
Pick up phone A	1.PSTN dial tone is heard.	
Dial 87654321	1.Communication is going 2.PBX plays voice greeting	
Dial 899		
	1. The first LED is on at GWA 2.ITG dial tone is heard	
Dial 20551	1.Du Du is heard 2.VoIP Communication is working	
Ring back tone is heard		
	1. The second LED is on at GWB	Phone 551 is ringing
		Pick up phone 551
Enjoy VoIP		Enjoy VoIP

The above process is the same as Phone A calls to phone numbers 201, 301, 800, 801 or 550

Chapter 6 Application Samples

This section discusses the various environments and situations where you can use the Internet Telephony Gateway.

6.1   Module Configuration

Internet Telephony Gateway supports FXS and FXO modules.

FXS (Foreign Exchange Station)
FXS provides power and ringing signals to its interfacing equipment. It is *not* intended for connection to the Public Switched Telephone Network. It is a station loop start operation that provides a connection to:
1. a standard, single-line analog telephone system
2. the line circuit of a key telephone system
 3. a loop start trunk circuit of a Private Branch Exchange (PBX) that normally connects to incoming Central Office circuits

FXO (Foreign Exchange Office)
FXO recognizes signals and draws current to indicate an active state. It is a trunk loop start operation that emulates a single-line telephone to:
1. Central Office lines
2. PBX station

There are three basic environments that the ITG can be applied to. They are described in the following sections.

Application A: FXS

Application-A has two possible connections. The A-1 connection shows the connection between the gateway to telephone set (POTS) or FAX machine. The FXS module is used in the A-1 connection. The other connection A-2, on the right hand side, is used to connect the gateway and PBX that has the CO trunk interface. FXS is also used in this connection. The telephone sets connected to PBX can be either POTS or digital telephone depending upon the PBX capability.
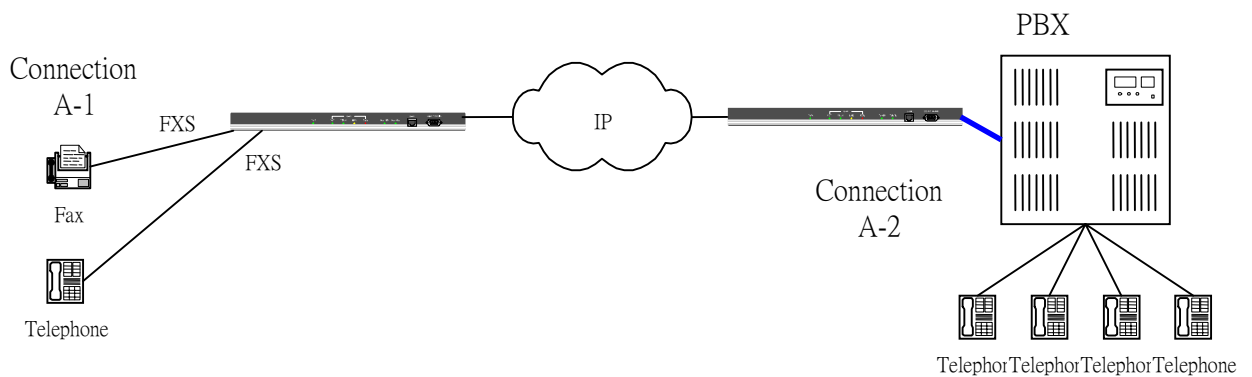
Application B: FXS / FXO combination

Application-B has three possible connections. The B-1 connection is a normal trunk connection between the CO switch and PBX. The B-2 connection is identical to the A-1 connection mentioned in Application A. The B-3 connection is used to connect the PBX and gateway through the internal analogue lines provided by the PBX. In this case, the FXO module has to be used, and the FXO ports will serve the same roles as the analogue telephone sets.

Note: If the PBX used in the B-3 connection is a digital type, a certain analog terminal adapter is needed to provide an analog interface to the FXO module.

In this application, The caller in the B-2 connection can use the Gateway through its FXS module to communicate with the party on the other end in the B-3 connection.   The phone call is forwarded through the FXS module in the B-2 Gateway and is received by the FXO module in the B-3 gateway, which is connected to the PBX, which will then switch to the dedicated terminal.

The same caller can also use the feature that the Gateway provides to redial the local number through the PBX, to the public switch, in order to reach the person inside the region that the public switch serves.
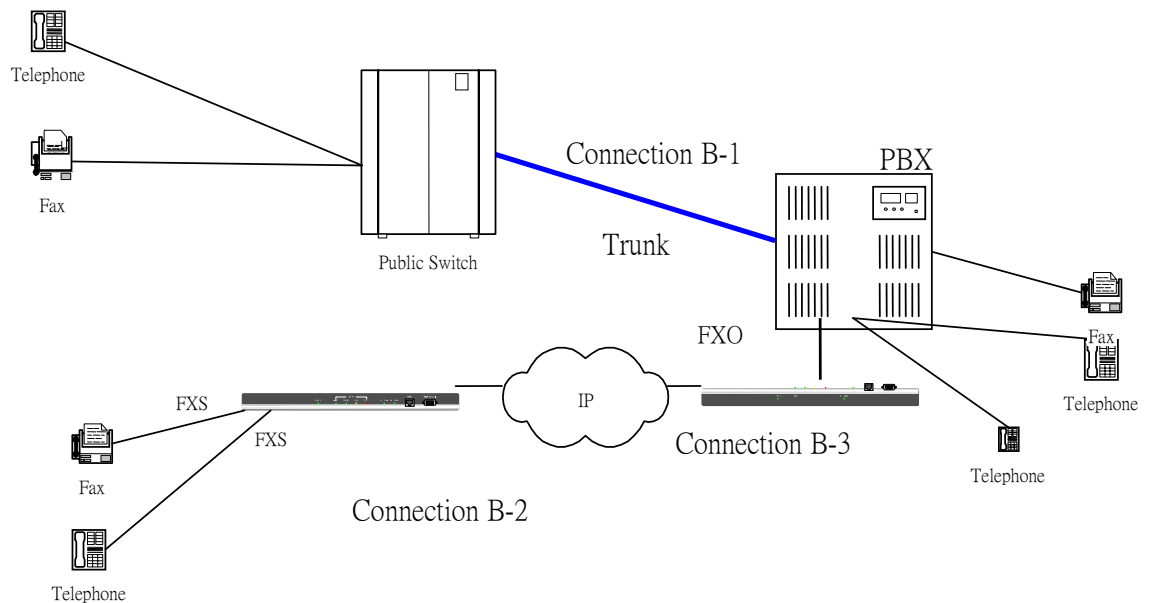
Chapter 7 Troubleshooting Tips

This section provides solutions for problems you may possibly encounter while installing and connecting your Internet Telephony Gateway.

Power (PWR) LED is not illuminate
1. Check the power adapter connection.
2. If the power adapter or power cord is connected to the gateway, check that the cord is securely plugged into the power socket on the rear of the console.
3. Check that the other end of the power adapter or power cord is securely plugged into the power outlet.
4. If both ends of the power cord are properly connected and there is still no power, the gateway might have a faulty power outlet, power adapter, or power cord.
5. Change to another power outlet or obtain another power adapter or power cord.

LNK LED is not illuminate
1. Check the ITG was connected correctly:
   a. Powered on
   b. Correctly connected
2. Check if the cable connects to an end device is a standard straight through network Ethernet cable.
3. Make sure connectors at both ends are securely seated.
4. Check the ITG IP setting is correct

Line module port LED is not illuminate when pick up the phone
1. Check the RJ11 telephone line is connected correctly between phone set and line module port

There is no dial tone when pick up the phone
1. Check line module port LED illuminate
2. Check the RJ11 telephone line is connected correctly between phone set and line module port

There is an out-of-service tone when dialing destination phone number
1. Check the dial plan setting (address table, hunt group table and destination table) at the destination phone number

There is no connected tone when dialing destination phone number
1. Check the IP network (Ethernet cable, Ethernet port and GW IP setting) is connected correctly

2. Check the destination ITG and phone is available

Final Steps
If the procedures in this section have not solved the problem, reset the gateway several times by turning the power on and off. If the problem still exists, contact customer support.

Appendix A   Worksheets

A.1 IP Parameters

IP address

_____

IP subnet mask

_____

Default gateway

_____

A.2 ATPM Address Table

Digits to Match	Min. # of Digits to Collect	Max. # of Digits to Collect	Hunt Group	No. of Digits to Strip	Prefix String

A.3 ATPM Hunt Group Table

Hunt Group ID	Hunt Type		List of Destination IDs
	1	2	

A.4 ATPM Destination Table

Local Destinations

Port#	Mode	Destination ID
0	port	
1	port	
2	port	
3	port	

Remote Destinations

Destination ID	Mode H323 or DNS	IP port (optional)	IP address