Internet Telephony Gateway
ITG-1/2/4/8 Port with Router
User's Guide

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FCC Warning

This equipment has been tested and found to comply with the limits for a Class A (8xxR) or a Class B (1/2/4xxR) digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause radio interference in which case the user will be required to correct the interference at his or her own expense.

CE-mark Warning

This is a Class A (8xxR) or a Class B (1/2/4xxR) product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Revision

USER'S GUIDE

Part No.: 06310051011

TABLE OF CONTENTS

1.ABOUT THIS GUIDE

This Guide uses ITG-400R as a general example and contains the following information:

Start Up Preparation: This chapter illustrates how to prepare for the Internet Telephony Gateway (ITG) set up through console interface or network interface.

WAN Configuration: You will learn how to set up IP address and related configuration for your ITG-400R in the WAN side environments such as static IP address and dynamic IP address.

LAN Configuration: You will learn how to set up IP address and related configuration for your ITG-400R in the LAN side environments such as static IP address and DHCP IP address.

Advanced Features: You will learn how to set up advance features for LAN access management and DDNS configuration for your ITG-400R.

Dial Plan Setup: We will provide necessary procedure to guide you step by step for a typical dial plan set up.

Configuration Example: This chapter shows you how to use the default settings to start up your first call. Examples will be given to show you how an ITG may be working with telephony devices such as PBXs and phone sets.

ⓘ **Hint**	Bypass the Advanced Features chapter if you do not want to do any LAN access management.

1.1 Before Start up

Before setting up your ITG-400R the first time, you need the following:

- A PC that may run a web browser program such as Netscape, Internet Explorer, etc.
- A 10/100 BaseTX Cat. 5 Ethernet LAN cable with RJ-45 connector.
- A console cable, where you may find it in the ITG package (for 4/8xxR).

And later on, you are required to get familiar with your environment, your TCP/IP network and your phone systems.

1.2 Notation Conventions (for console or telnet settings)

This document uses the following conventions:

- Examples that contain system prompts denote interactive sessions, indicating that the user enters commands at the prompt.
- 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.**
Bold Arial	User input (anything you are expected to type in) is set in **bold Arial**.
italic	Arguments for which you supply values.
[ ]	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 or terminal emulator. For example <Enter> denotes the Enter key.

2.START UP PREPARATION

This chapter shows you how to prepare for the ITG-400R set up for your network and/or Internet. We will focus on the web browser usage.

Since the ITG-400R comes with two default IP addresses, one is for LAN side that is "**192.168.0.1**" and the other is for WAN side that is "**172.16.0.1**". You may use any PC to connect to the LAN port of ITG-400R, and then follow the steps below:

1) Set up the PC with an IP address in the "192.168.0.x" IP domain, say, "**192.168.0.2**" with subnet mask address "255.255.255.0" or choose "Obtain an IP address automatically"

2) Start up the browser. In the address field, key in the address **http://192.168.0.1**. The pop-up screen should appear and prompt for user name and password. The default values are:

   User name: **eitg** (all lower case)
   Password: **123**

Now you are ready to perform the Network configuration set up described in the next chapter.

3.WAN CONFIGURATION

We will show you the basic steps for a typical ITG-400R connection in various environments. It includes static IP address environment and dynamic IP address environment.

3.1 Static IP Address Environment

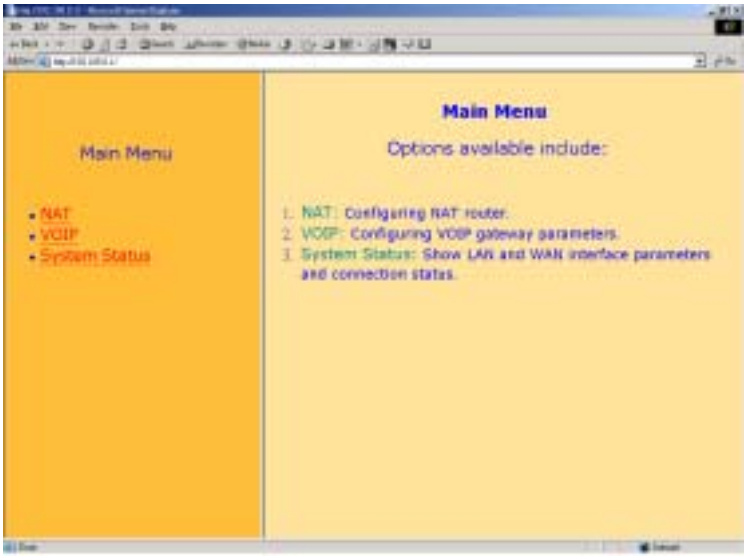
There are several typical static IP address environment where the following procedure may apply, such as popular broadband application with ADSL or Cable network.

Run Web Browser such as Netscape or Internet Explorer. Set

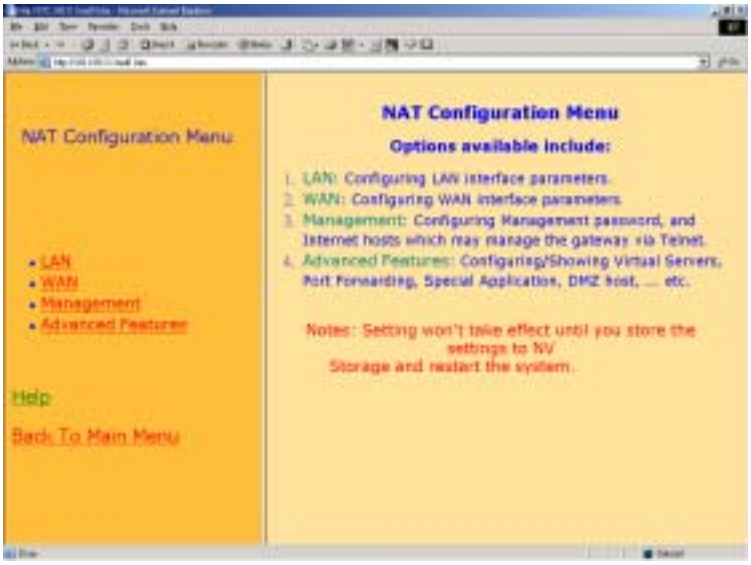
the address field to 192.168.0.1, hit the enter key, then

ITG-400R will respond with the following page.

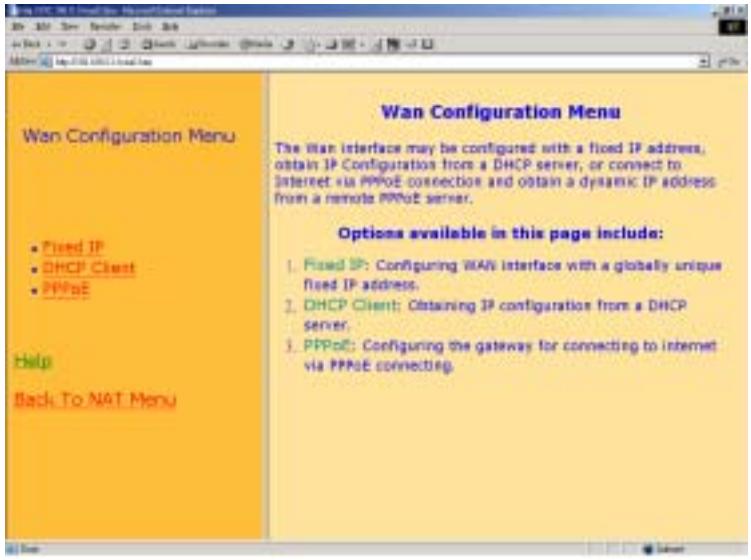
Enter **eitg** in “User Name” field and **123** in “Password” field, then select “OK”, ITG-400R will show the “Main Menu” as follows:



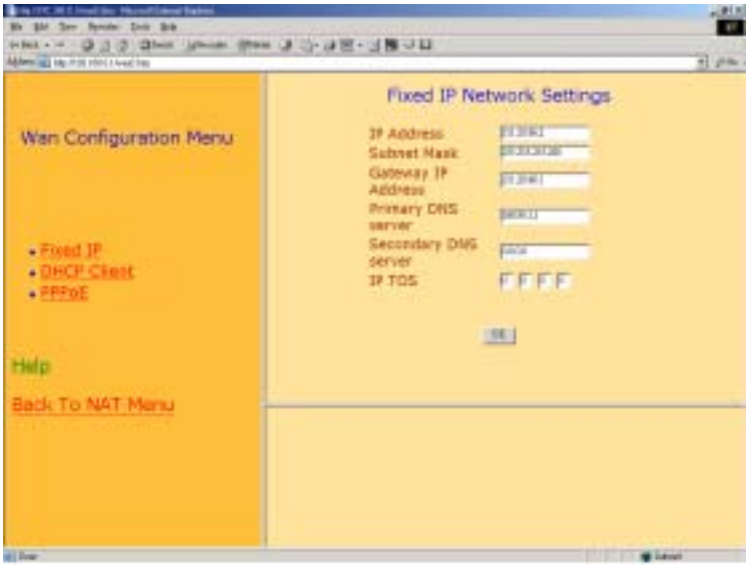
Click “NAT” for all the WAN/LAN related settings, and ITG-400R will display the following:



Click “WAN” for WAN Configuration Menu, and ITG-400R will display the following screen:



Click “Fixed IP” to enter all fix IP related information:



Fill in “IP address”, “Subnet Mask”, and “Gateway (Router) IP address” associated with this ITG-400R.

Fill in “Primary DNS server” and/or “Secondary DNS server” with IP address that ISP has provided.

Fill in “IP TOS” parameter for ‘Precedence’, ‘Delay’, ‘Throughput’ and ‘Reliability’ if your ISP provides. The ranges of these parameters are:

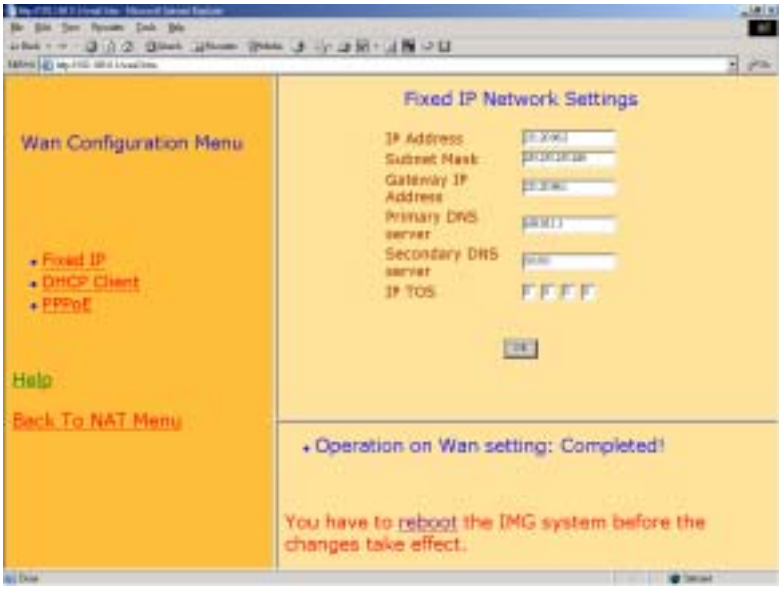
Precedence: 0 to 7, 0= Routine(Low), 7= Network Control(High)

Delay :0= Normal, 1= Low.

Throughput :0= Normal, 1= High

Reliability :0= Normal, 1= High

Click ‘OK’ to store all above information.



Reboot the ITG when the above information is stored successfully.

3.2 Dynamic IP Address Environment

In this section we will show you how to obtain a valid host name in the dynamic IP address environment first, followed by the way to set up a typical ITG-400R connection in the dynamic IP address environment via built-in PPPoE, DHCP, and DDNS clients.

3.2.1 Applying for a host name in the dynamic IP environment

First, it is required to apply for a DDNS host name from http://www.dyndns.org for the ITG. (For example, the name you may obtain is mary01.dyndns.org for the ITG.)

mary01.dyndns.org is applied for the ITG.

If you have already obtained a valid host name with your user name and password from the dynamic DNS server such as www.dyndns.org, you may skip the following and go to Section 3.2.2 directly.

1) Go to the dyndns web page

   www.dyndns.org

2) Click “Sign Up Now”

3) Click “Agree” on Acceptable User Policy.

4) Create NIC User Account

   Example:

   User Name: Mary

   Email Address: mary01@Yahoo.com

   Password: hbear

   Click “Create Account”

5) Wait for DYNDNS email for confirmation of your account.

6) Go to the www.dyndns.org web page again

7) Click “login”

8) Type in your user name and password

9) Click “Dynamic DNS” and “Add New Host”

10) Type in ‘New Host Name’ and select ‘dyndns.org’

    For example: mary01.dyndns.org

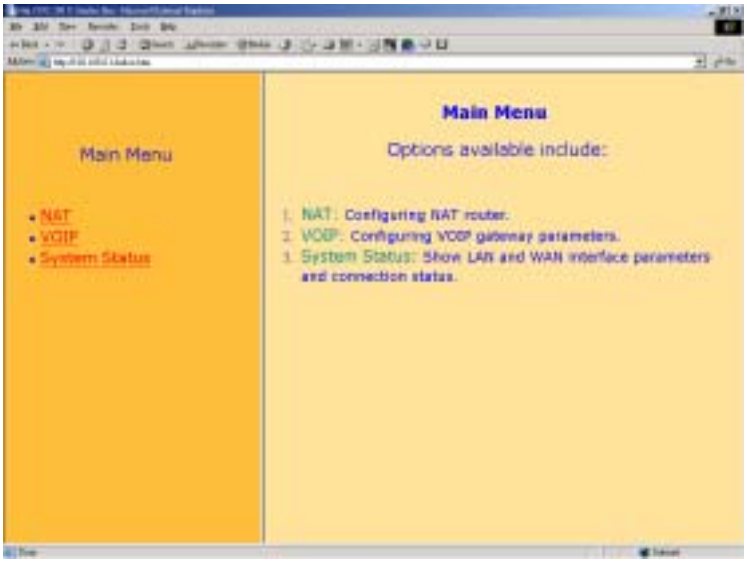
11) Click “Add Host” if another host name is needed and go to Step 10, otherwise the host name application is done.

Hint	Please refers to Chapter 5.7 for details related to the DDNS configuration.

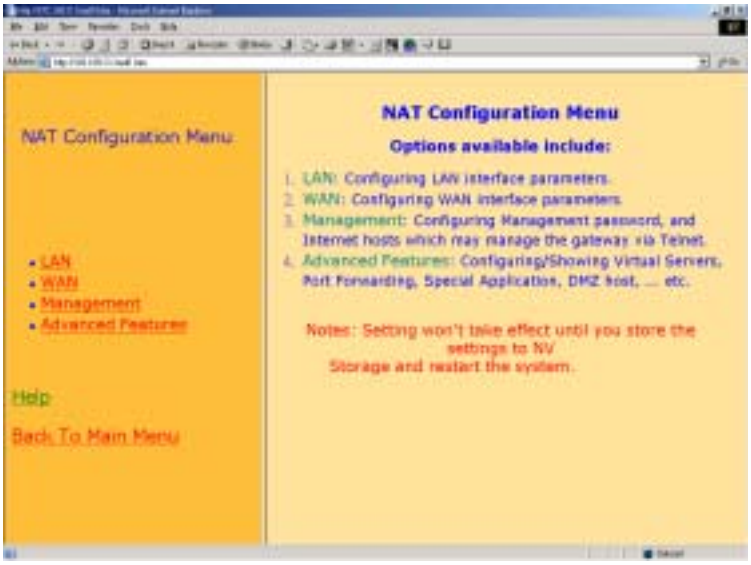
3.2.2 PPPoE application set up

In this section we’d like to introduce steps to setup the PPPoE application for dynamic IP address environment.

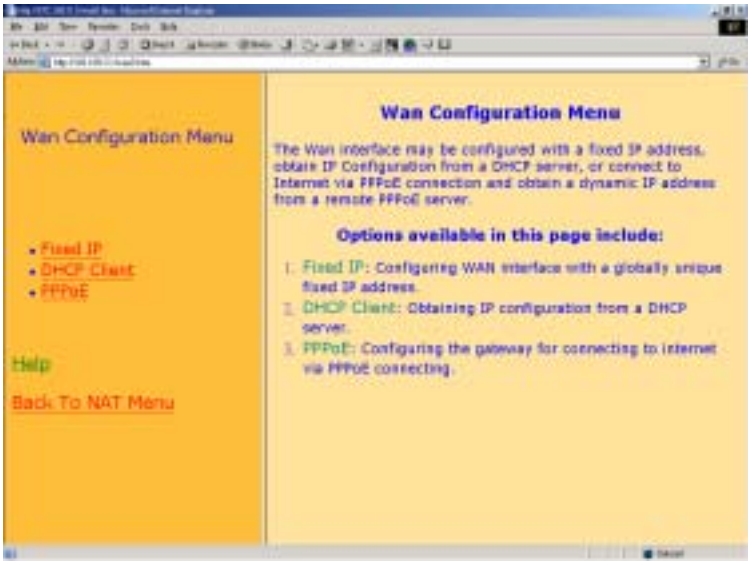
Use Browser to get into the “Main Menu”:



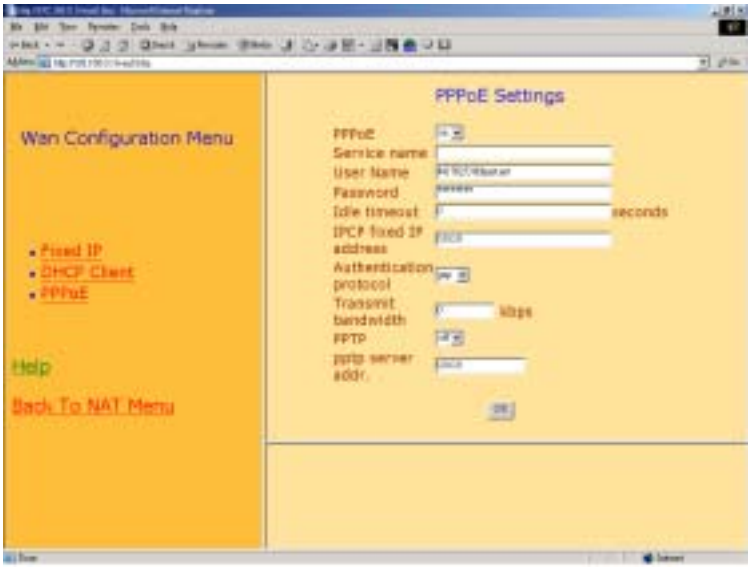
Click “NAT” for all the WAN/LAN related settings, and ITG-400R will display as follows:



Click “WAN” for WAN Configuration Menu, and ITG-400R will display the following screen:

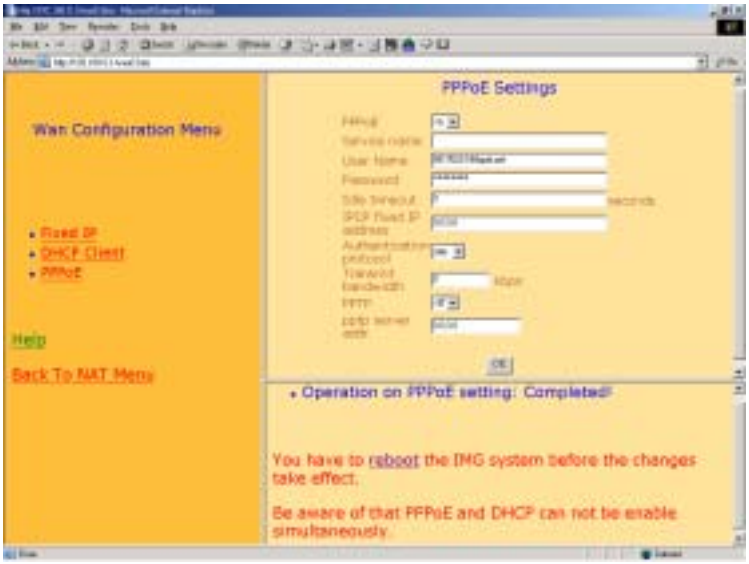


Click “PPPoE” and prepare to key in all PPPoE related information:



Select “ON” for PPPoE, key in “User name” and “Password” that ISP has provided. “Service name” may be entered if your ISP has also provided it.

Click “OK” to store all the above information.

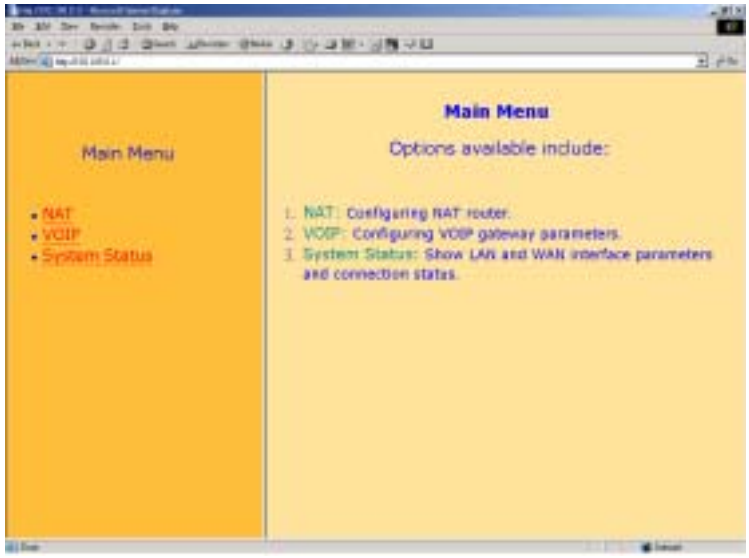


Reboot the ITG when all the above settings are stored successfully.

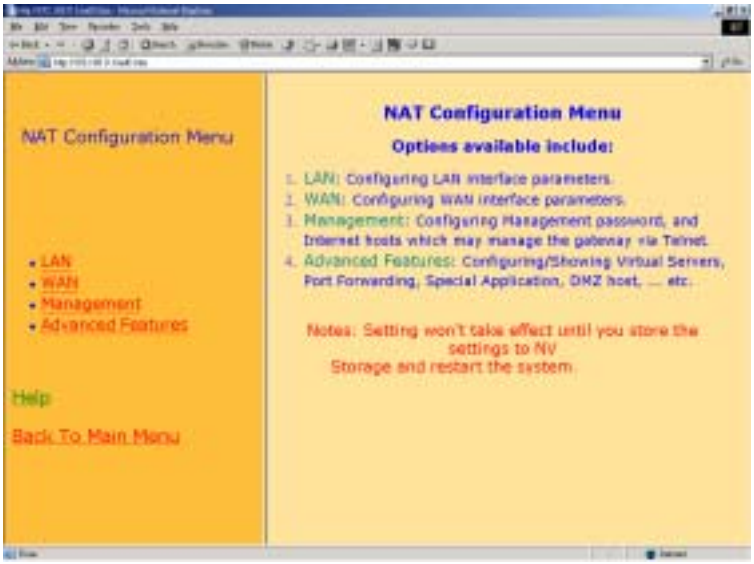
3.2.3 DHCP application set up

In this section we'd like to show you how to configure the DHCP Client application for dynamic IP address environment.

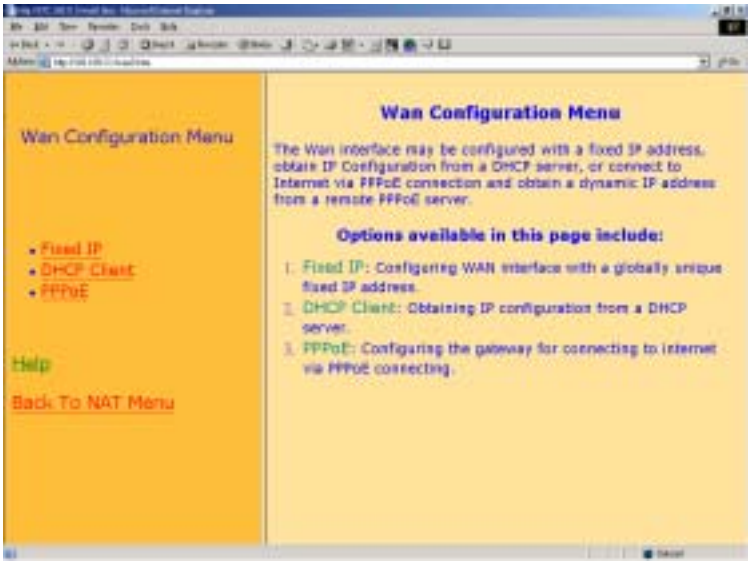
Use Browser to get into the "Main Menu":



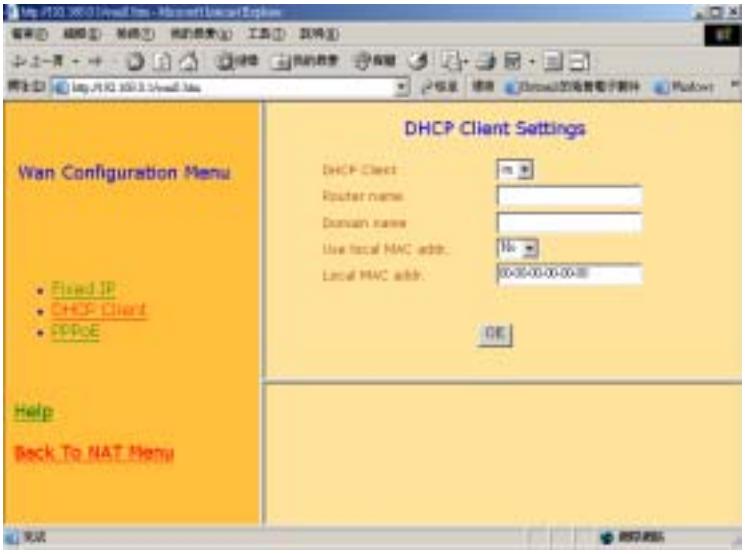
Click “NAT” for all the WAN/LAN related settings, and ITG-400R will display the following screen:



Click “WAN” for WAN Configuration Menu, and ITG-400R will display the following screen:



Click "DHCP Client" for DHCP Client Settings, and ITG-400R will display the following screen:

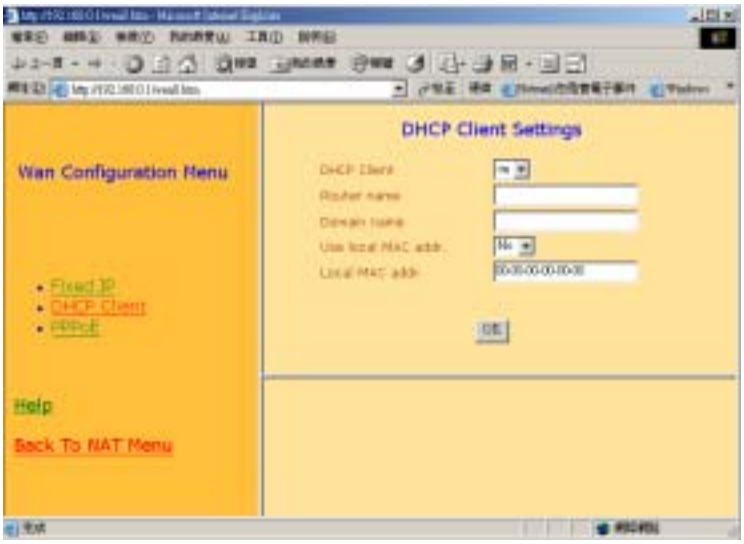


At “DHCP Client” field, select “on” for enable DHCP client.

Key in “Router name” and “Domain name” if ISP requires.

At “Use local MAC addr.” field, select “Yes”, if ISP requires Local MAC addr. for link authentication, and fill in the following “Local MAC addr. field ” with your Local MAC address.

Click “OK” to store all the above information.



Reboot the ITG when all the above settings are stored successfully.

4.LAN CONFIGURATION

We will show you the basic steps to configure a typical ITG-400R in the LAN environment.

4.1 LAN Interface Configuration

Run Web Browser such as Netscape or Internet Explorer. Set

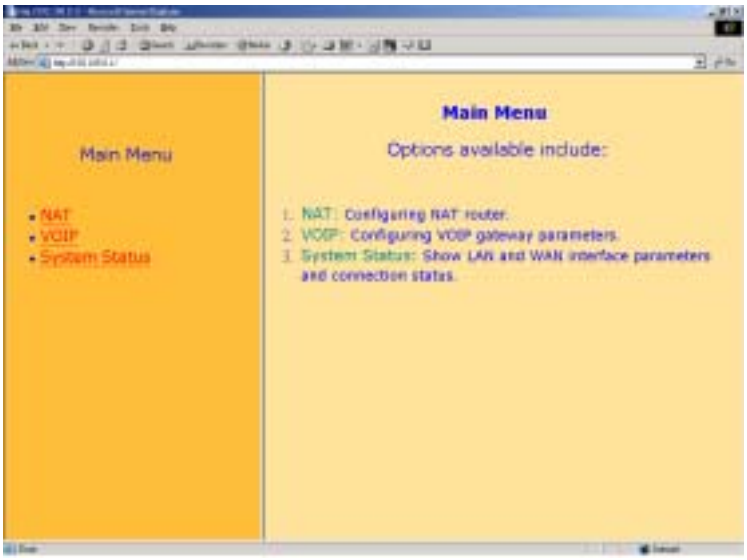
the address field to 192.168.0.1 then hit the enter key.

ITG-400R will respond with the following page.

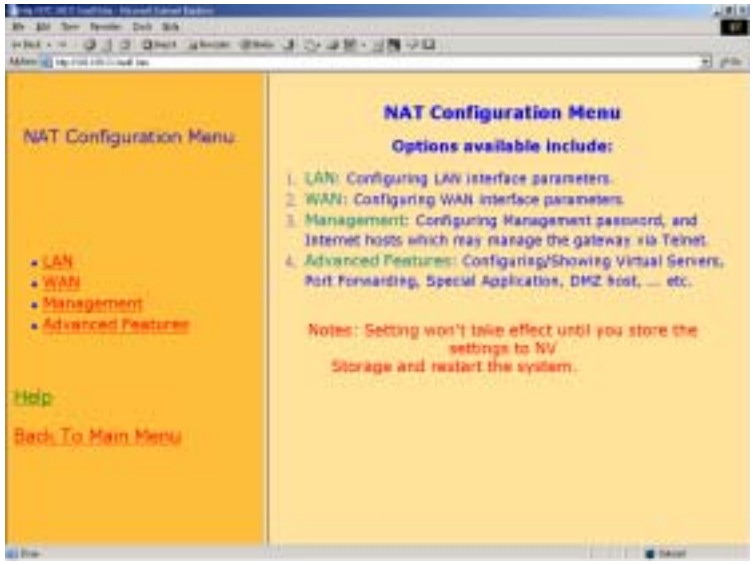
Enter **eitg** in “User Name” field and **123** in “Password” field.

Then select “OK”. ITG-400R will show the “Main Menu” as

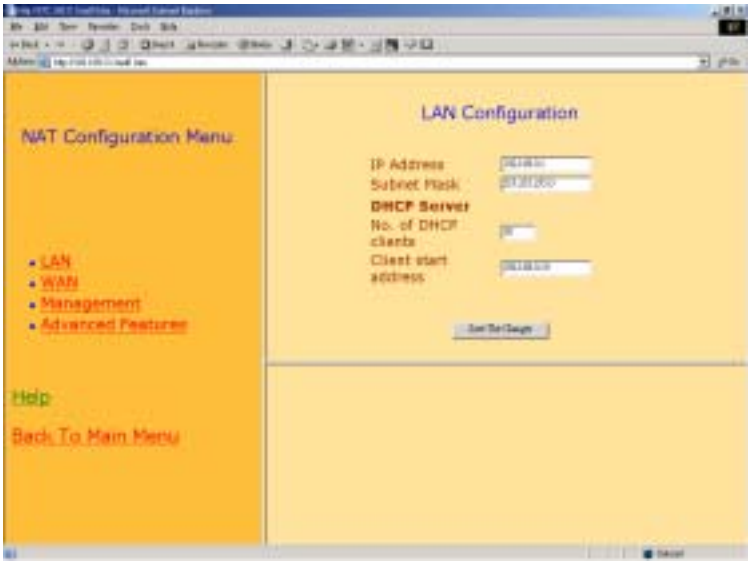
follows.



Click “NAT” for all the WAN/LAN related settings, and ITG-400R will display the following screen:



Click “LAN” for LAN Configuration Menu

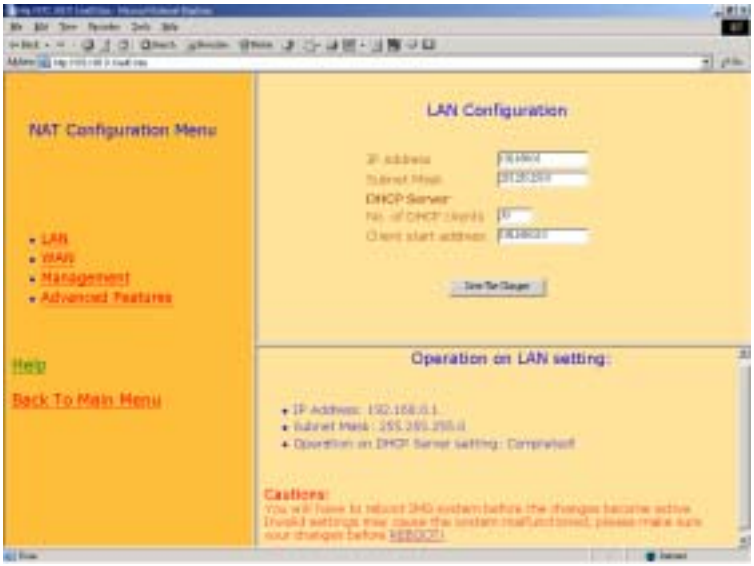


Specify the LAN Port IP Address, and Subnet Mask.

About DHCP Server setting, you can specify the number of DHCP clients, the range is ‘1’ to ‘253’ and ‘0’ will disable DHCP Server.

Fill in the “Client start address” to specify the start IP address if DHCP Server is enable.

Click “Save The Changes” to save all input information.



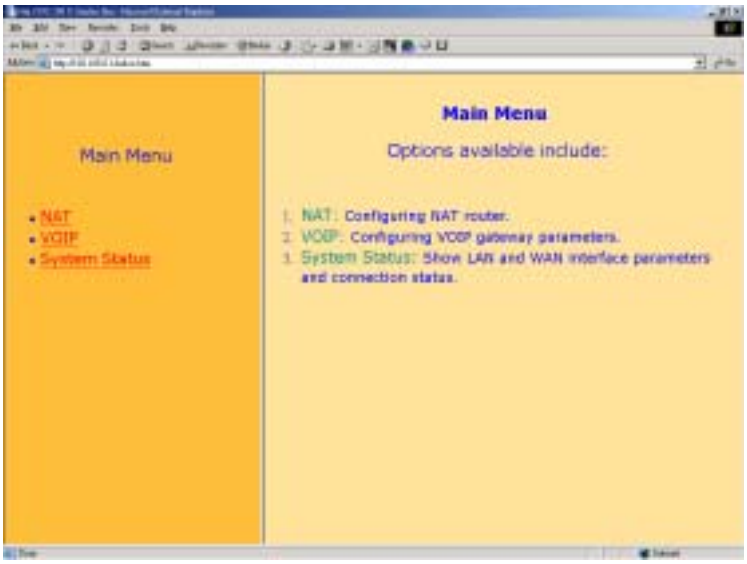
Reboot the system if all the above settings are saved.

5.ADVANCED FEATURES

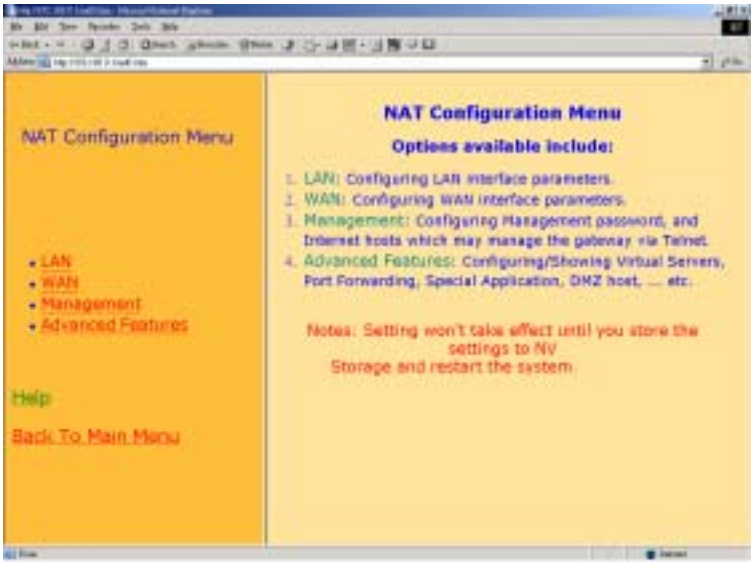
This chapter shows you the advanced features offered by ITG-400R and helps you to configure your ITG step-by-step for LAN access management.

5.1 Access to Advanced Features Menu

Use Browser to get into the “Main Menu”:



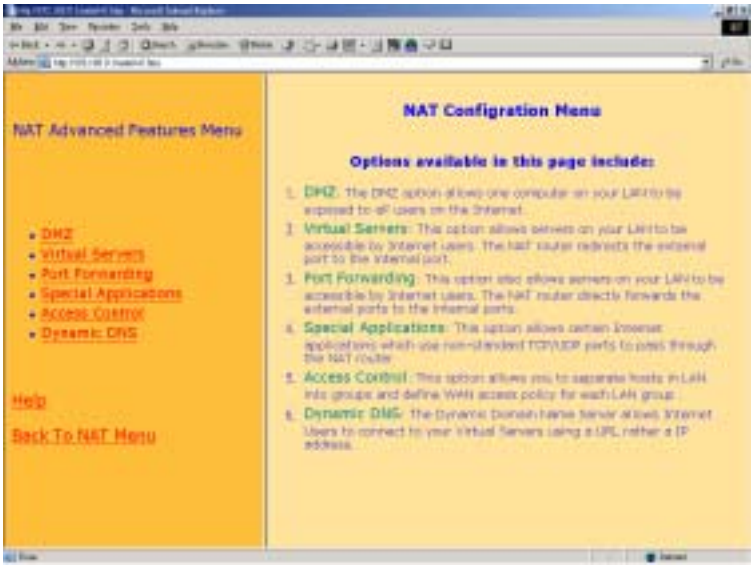
Click “NAT” for all the WAN/LAN related settings, and ITG-400R will display the following screen:



Click “Advanced Features” for the Advance Features Menu, and start the Advanced Features settings.

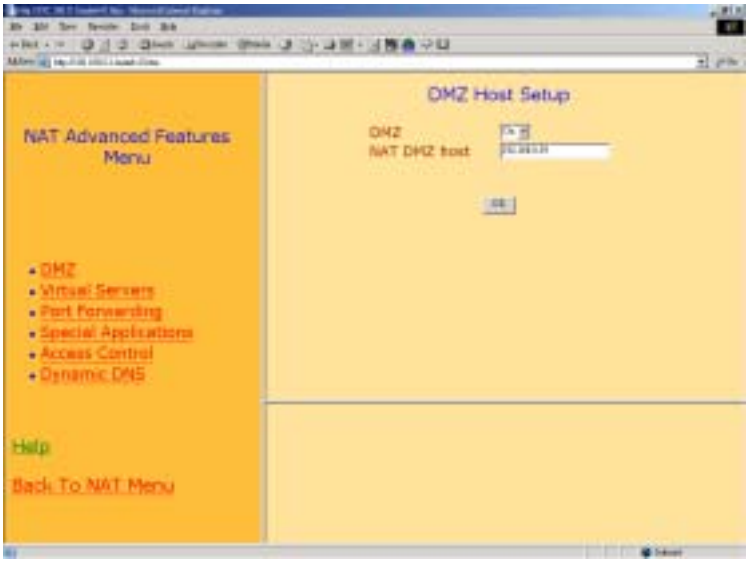
5.2 DMZ Configuration

This option allows one computer on your LAN to be exposed to all users on the Internet.



Get into “Advanced Features”

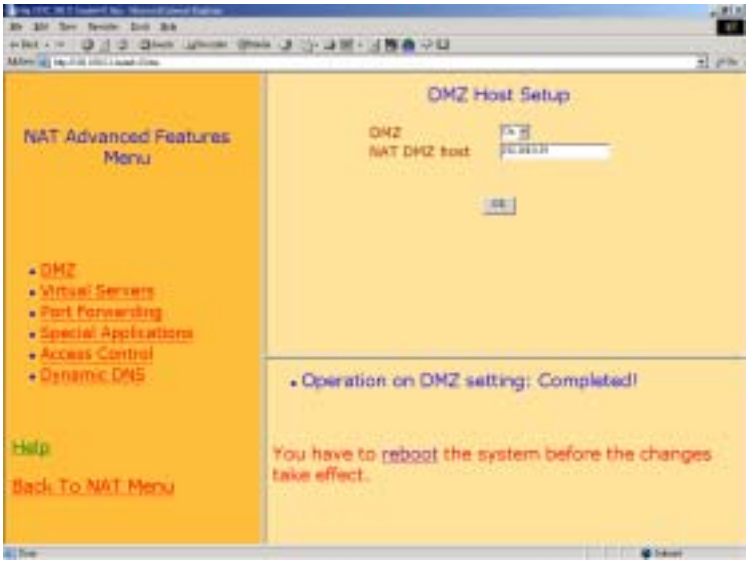
Click “DMZ” and prepare to key in all related information:



Switch “DMZ” field to ‘on’.

Enter the destination device’s IP address in “NAT DMZ host” field.

Click “OK” to store all above data.

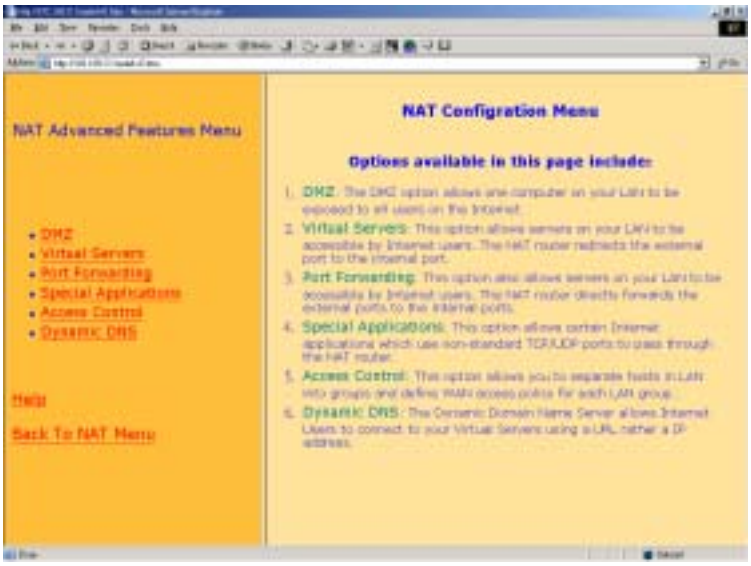


Reboot the system to make these changes effective.

5.3 Virtual Servers Configuration

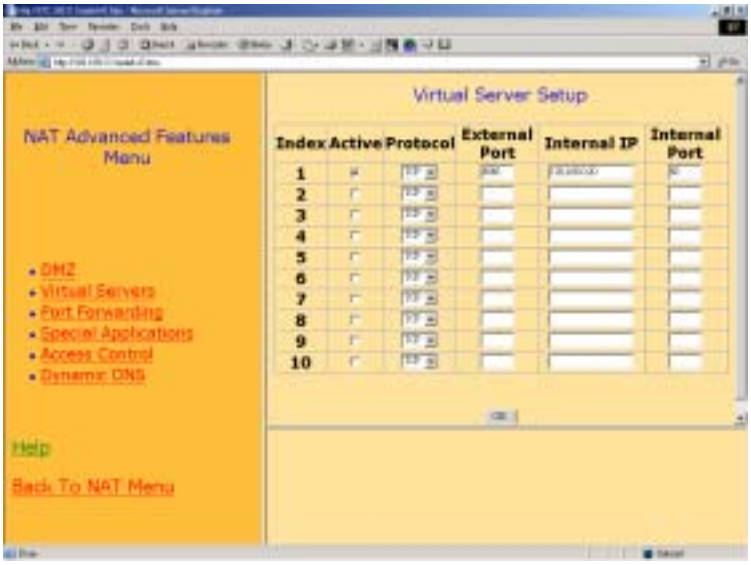
This option allows servers on your LAN to be accessible by Internet users. The NAT router redirects the external port to the internal port.

If a web server 192.168.0.20 (port number 80) is behind the NAT router, and could be accessed by Internet users via TCP port 8080, the following steps should be taken:



Get into “Advanced Features”

Click “Virtual Servers” and prepare to key in all related information:



Enter 8080 in “External Port #” field.

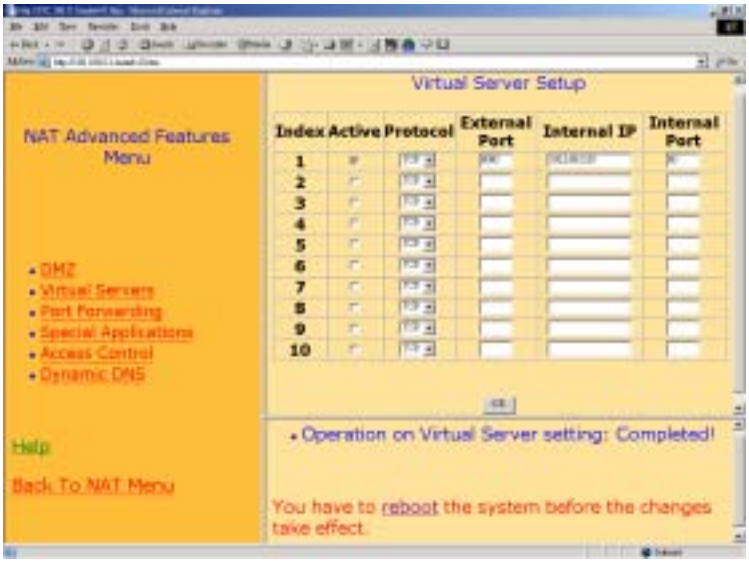
Enter 192.168.0.20 in “Internal IP” field.

Enter 80 “Internal Port #” field.

Choose the TCP in “Protocol” field.

Tick the “Active” field to enable Virtual Server function.

Click “OK” to store all above data.

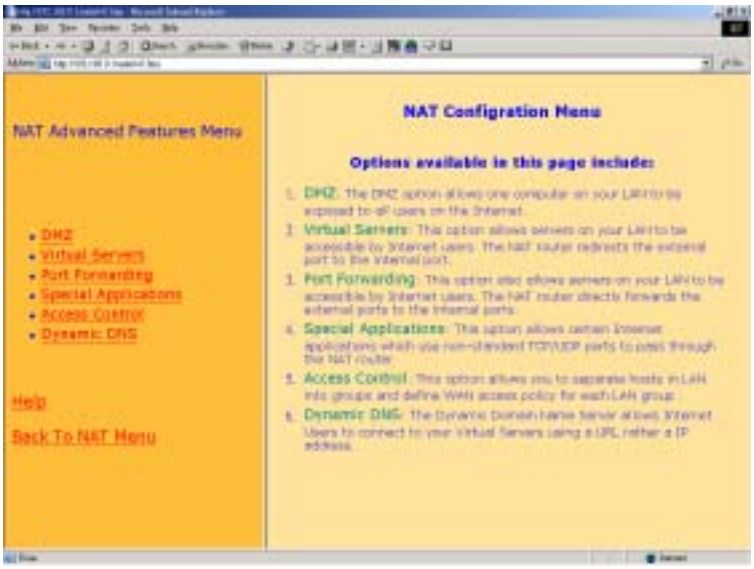


Reboot the system to make these changes effective.

5.4 Port Forwarding Configuration

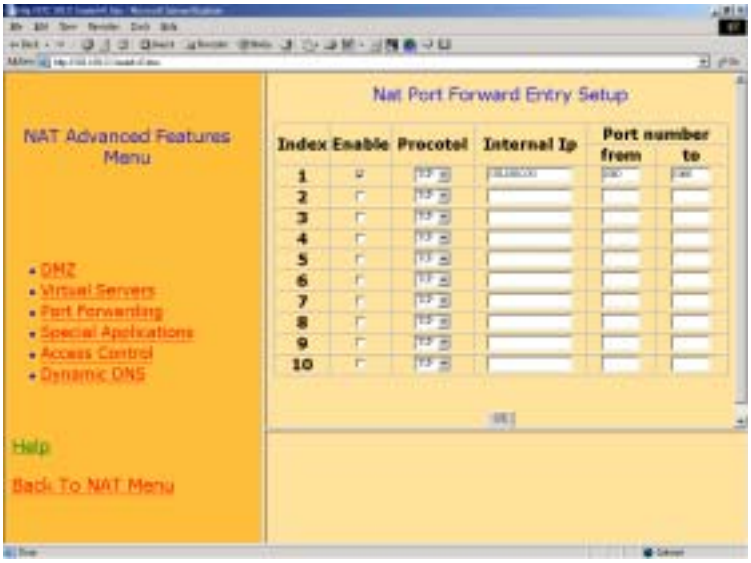
This option also allows servers on your LAN to be accessible by Internet users. The NAT router directly forwards the external ports to the internal ports.

If a server 192.168.0.30 (port 1040 to port 1060) is behind a NAT router, and could be accessed by Internet users via TCP port 1040 to port 1060, the following steps should be taken:



Get into “Advanced Features”

Click “Port Forwarding” and prepare to key in all related information:



Enter 192.168.0.30 in “Internal IP” field.

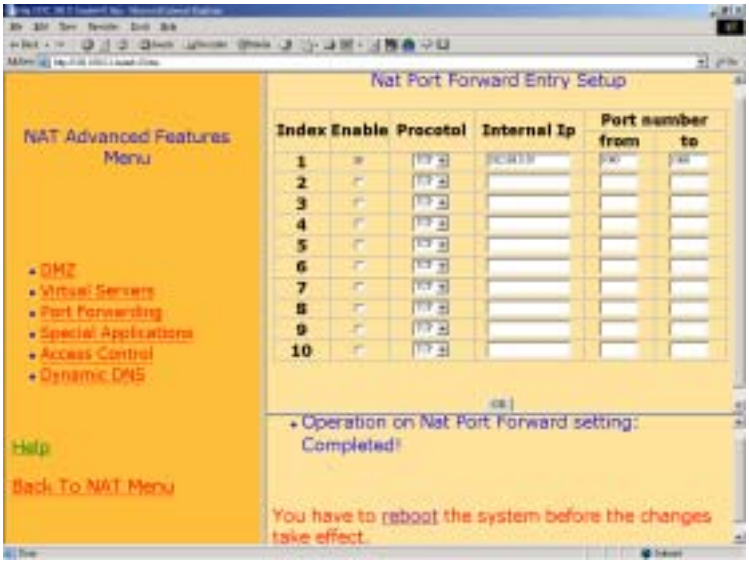
Enter 1040 in “Port number from” field.

Enter 1060 in “Port number to” field.

Choose TCP in “Protocol” field.

Tick “enable” field to enable Port Forwarding function.

Click “OK” to store all above data.

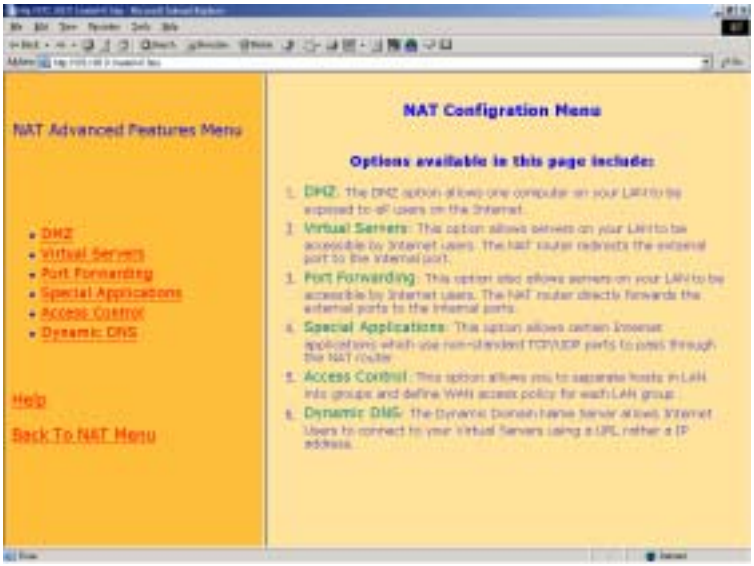


Reboot the system to make these changes effective.

5.5 Special Applications Configuration

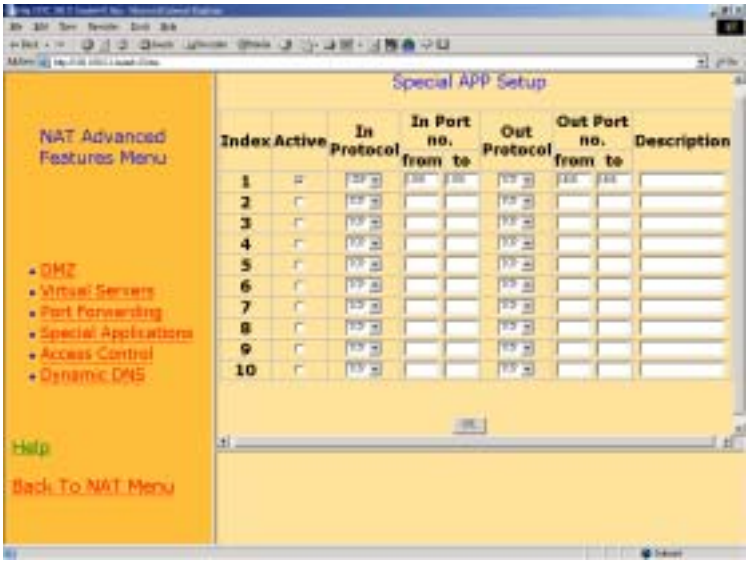
This option allows certain Internet applications, which use non-standard TCP/UDP ports to pass through the NAT router.

If a PC 192.168.0.20 is behind the NAT router, it will use TCP port 1400 to port 1404 as source port to access an Internet server, and the Internet server will respond to the PC with UDP packets of port number 1300 as destination port, then the following steps should be taken:



Get into “Advanced Features”

Click “Special Applications” and prepare to key in all related information:



Enter 1300 in “In Port no. from” field.

Enter 1300 in “In Port no. to” field.

Choose UDP in “In Protocol” field.

Enter 1400 in “Out Port no. from” field.

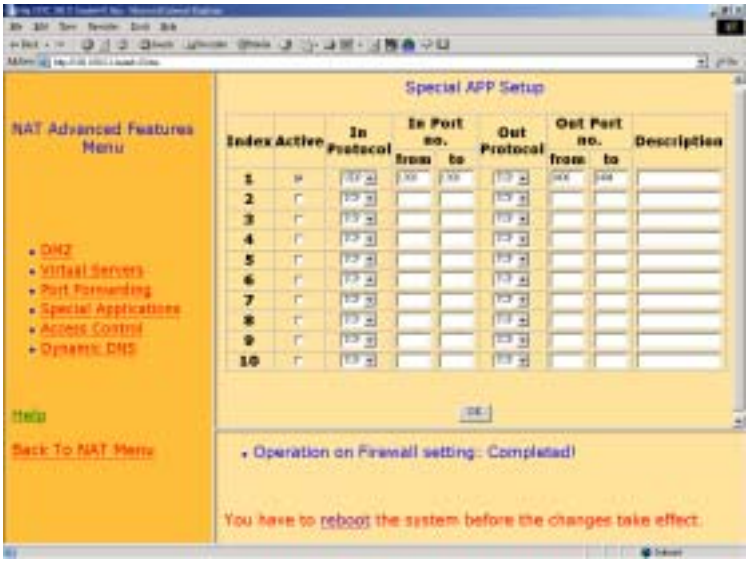
Enter 1404 in “Out Port no. to” field.

Choose TCP in “Out Protocol” field.

Enter the description in “Description” field.

Tick the “Active” field to enable this special App. setup.

Click “OK” to store all above data.



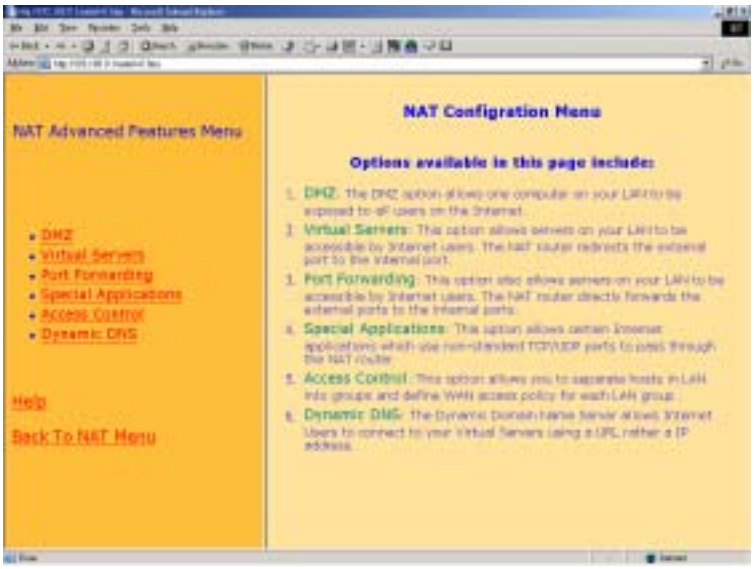
Reboot the system to make these changes effective.

5.6 Access Control Configuration

This option allows you to cluster hosts in LAN into groups and to define WAN access policy for each LAN group.

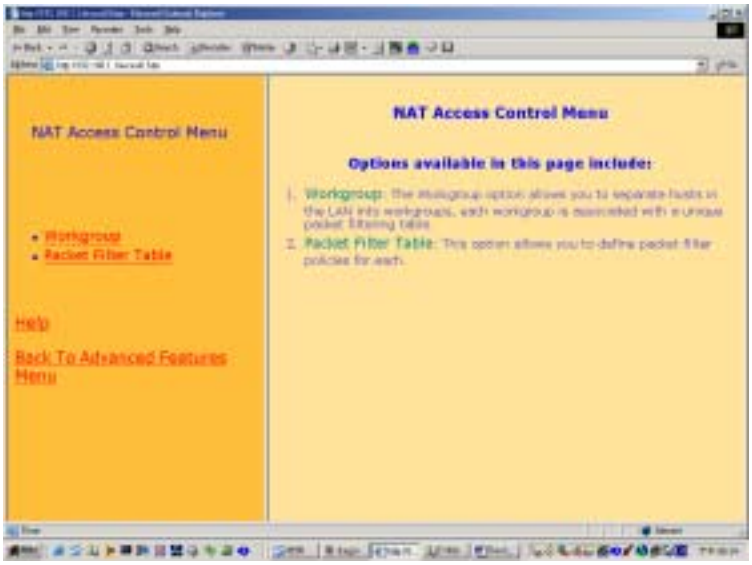
Each Workgroup has its own packet filter table, which specifies how to block the PC or LAN devices.

For example a PC 192.168.0.10 belongs to Workgroup 1, and Workgroup 1 is not allowed to access any HTTP server in the Internet, then the following steps should be taken:



Get into “Advanced Features”

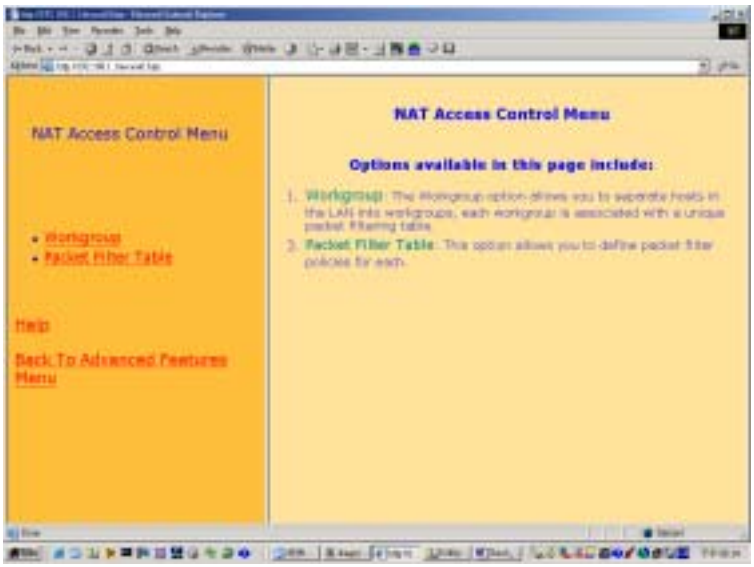
Click “Access Control” for Access Control menu.



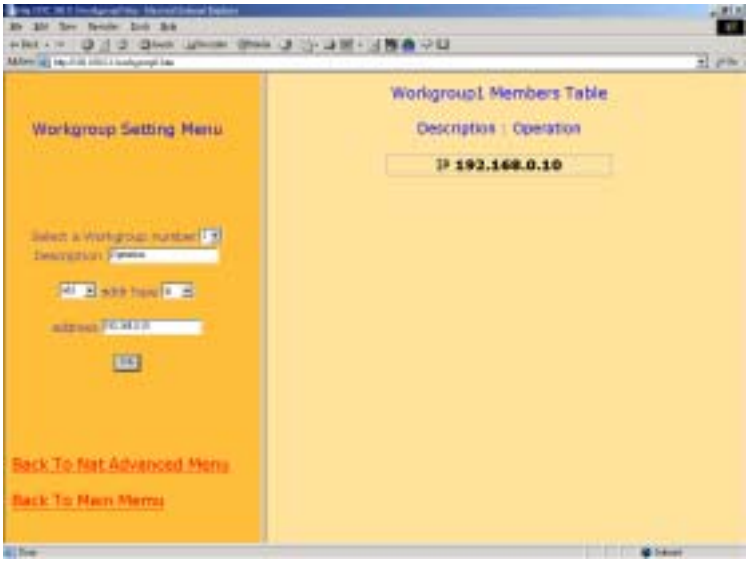
Use Workgroup and Packet Filter Table settings to control the user's access authority.

5.6.1 Workgroup Access Configuration

This option allows you to cluster hosts in the LAN into workgroups; each workgroup is associated with a unique packet filter table.



Click “Workgroup” and prepare to define the workgroup.



Enter 1 in “Select a Workgroup number” field.

Enter Operation in “Description”

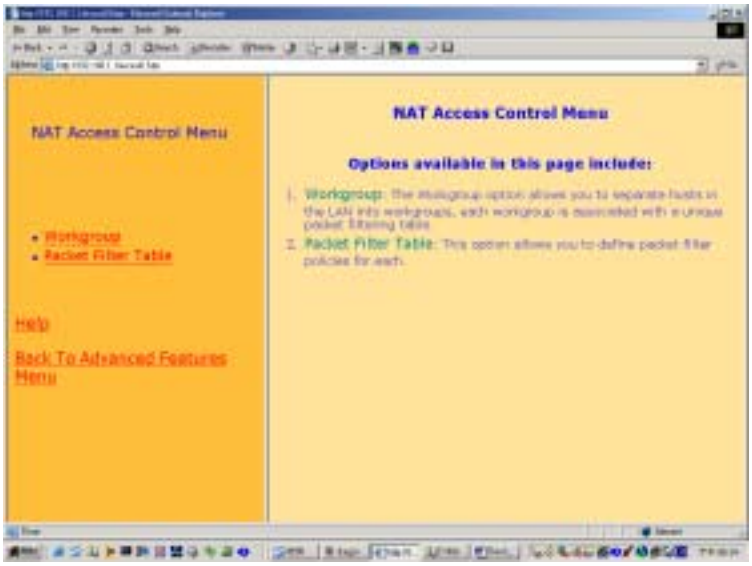
Choose ”add” and “IP” in “addr type” field

Enter 192.168.0.10 “Address” field.

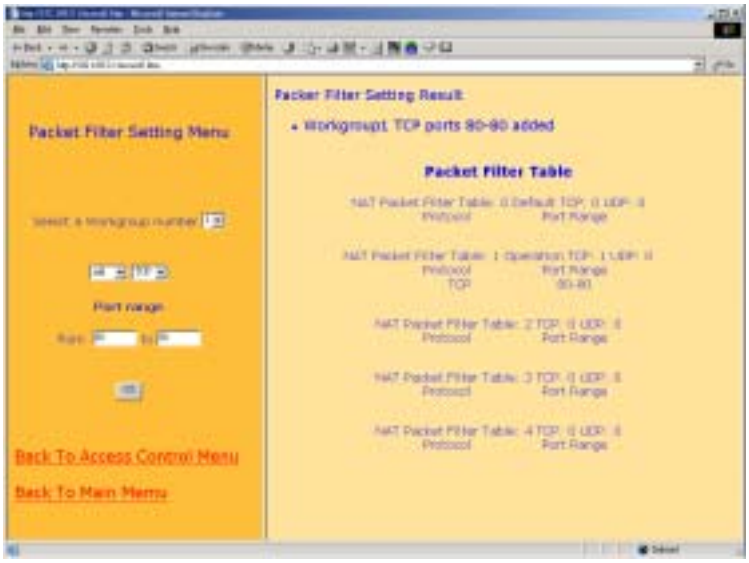
Click “OK” to store all above data.

5.6.2 Packet Filter Table Configuration

This option allows you to define packet filter policies for each workgroup.



Click “Packet Filter Table” and prepare to key in all related information:



Enter 1 in “Select a Workgroup number” field.

Choose ”add” and “TCP” that you want to block.

Enter the starting block port number 80 in “Port range from” field.

Enter the ending block port number 80 in “Port range to” field.

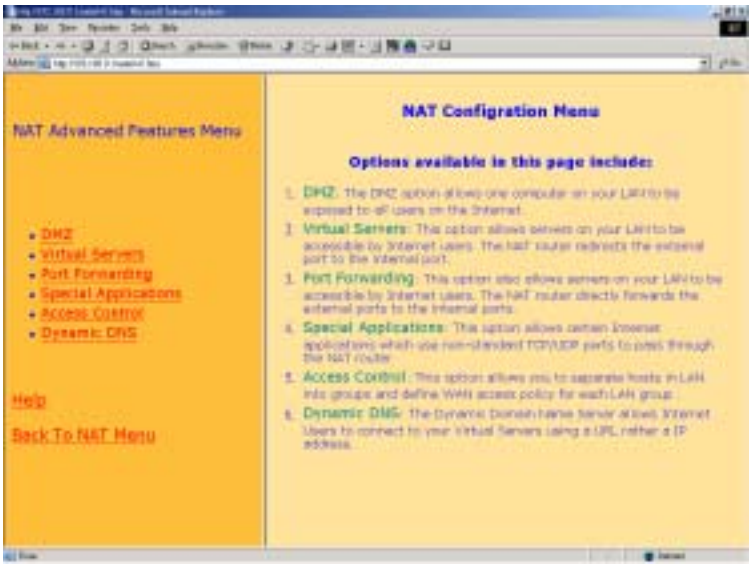
Click “OK” to store all above data.

A list for the packet filter setting result will be displayed.

Packet filter table 0 is the default filter table, if a PC is not belong to any packet filter table, then the policy of packet filter table 0 will be applied to this PC.

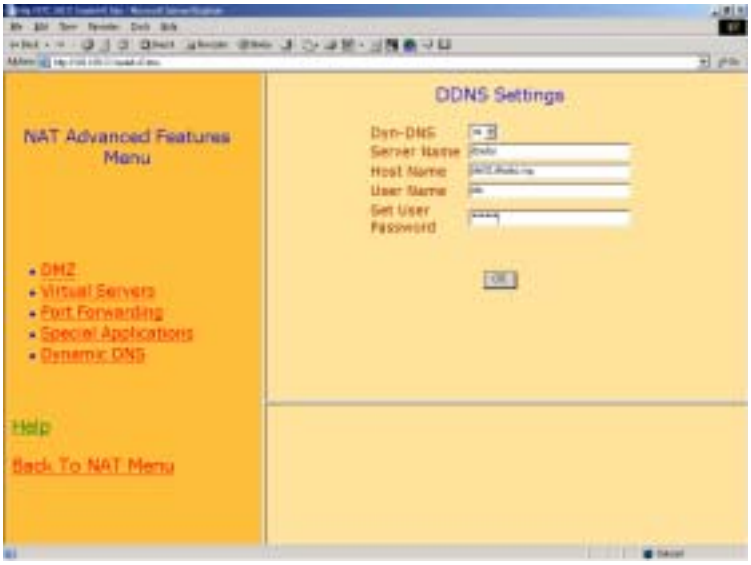
5.7 Dynamic DNS Configuration

The Dynamic Domain Name Server allows Internet Users to connect to your Virtual Servers using a URL rather an IP address.



Get into “Advanced Features”

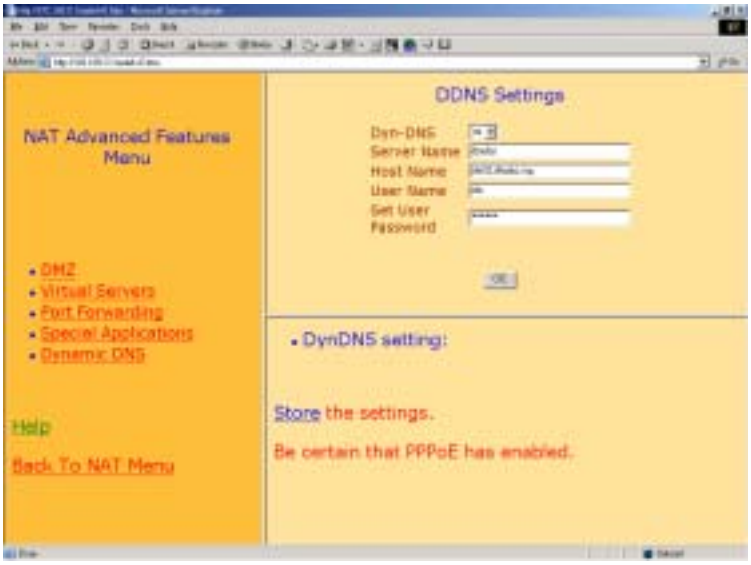
Click “Dynamic DNS” and prepare to key in all DDNS related information:



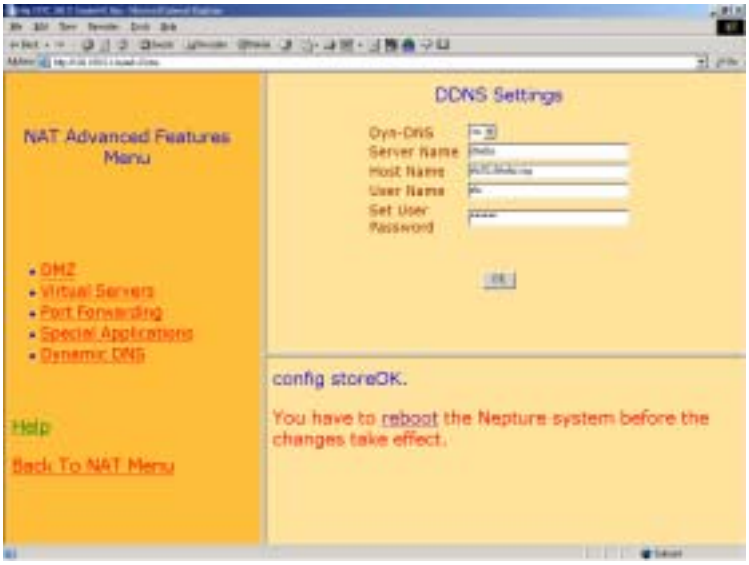
Choose “ON” for enable DDNS in Dyn-DNS field.

Key in “Server Name”, “Host Name”, “User Name”, and “User Password” provided by your Dynamic DNS service provider.

Click “OK” to store all the above information.



Click “Store” to store information in the Flash memory.



Reboot the ITG when all the above settings are stored successfully.

6.DIAL PLAN SET UP

This chapter shows you the basic concept and steps to help you configure your ITG through the LAN port. It includes the ITG-400R voice port and Dial Plan.

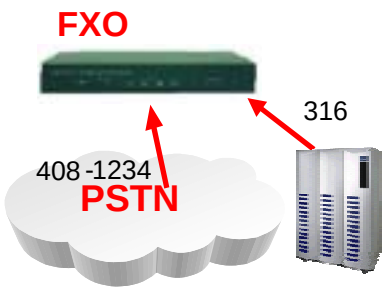
6.1 Concepts

6.1.1 The Voice Port

There are two types of voice port, **FXO** (**F**oreign e**X**change **O**ffice) and **FXS** (**F**oreign e**X**change **S**tation). You should locate them at the labels of the RJ-11 ports.

FXO port

The FXO port allows connecting to a device which is associated with a phone number and which can generate a ring signal; say 316, or 408-1234. So the only connection for FXO port will be to your local PSTN Line or one of the analog extension line associated with your PBX system.



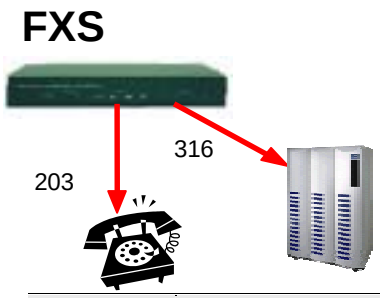
When your FXO port connects to a PSTN Line, the VoIP call can be made to the local number (408-1234). Or, vise versa you may make a VoIP call through the phone number 408-1234.

The same is applied to a PBX system. You are required to know which extension number will be assigned to the FXO port. Your PBX users will need to know this number to make a VoIP call.

Hint	The FXO port cannot connect to a device such as telephone or fax machine since they do not provide any phone number / extension and cannot generate any ring signal. If you connect those to the FXO port, you may hear nothing once you pick up the handset.

FXS port

The FXS port allows the connection to a device such as telephone, fax machine, or trunk line of a PBX system (For 4-port and 8-port model only).



The FXS port is like your local phone service provider that can generate and provide ring signal. It is easy to tell if you have connected a device to the FXS port and you may hear the dial tone provided by the FXS port once the handset is off-hook.

Warning	The FXS port is with voltage and current. **DO NOT** connect the port to any PBX extension line or PSTN line. This may result in the FXS port or your PBX extension port malfunction.

6.1.2 The Dial Plan

Before you start setting up the dial plan for the ITG, it is required to know the following basic concept associated with the ITG.

- Phone number
- Hunt Group ID
- Destination ID

- Destination

1) Phone Number

The “Phone number” associated with the ITG is a set of digits. You may look at that as an area code associated with your phone number. This number will only map to one Hunt Group in this example. You may reference to Section 7 for more details regarding configuration and Dial Plan examples.

Number	➔	Hunt Group
One	To	One
‘408’	➔	‘10’

2) Hunt Group ID

The “Hunt Group ID” here is an interpreter between phone number and Destination ID. The ITG phone table will be based on the number you dial to find the related hunt group. So, different numbers may map to the same hunt group. A Hunt group consists of at least one Destination ID. It means that when a call is placed the first available Line Destination ID will be connected.

Hunt Group	➔	Destination ID
One	To	One
‘10’	➔	‘10’

Hint

In this guide, we will only set up **one** Hunt Group to **one** Destination.

This will be convenient for you to trace the relations.

3) Destination ID and Destination

The “Destination ID” here is an interpreter between Hunt Group and physical Destination. Hunt Groups may map to the same destination ID.

The destination is either a local physical port or a remote IP address that ITG should make a call to. Each Destination ID maps to a physical destination. There are two types of physical destination.

- A physical port on the ITG, i.e. the FXO/FXS port
- A H.323 VoIP gateway with a fixed IP address or a host name.

Destination ID	➔	Destination
One	To	One
‘1’	➔	‘0’
‘10’	➔	‘mary01.dyndns.org’

Hint

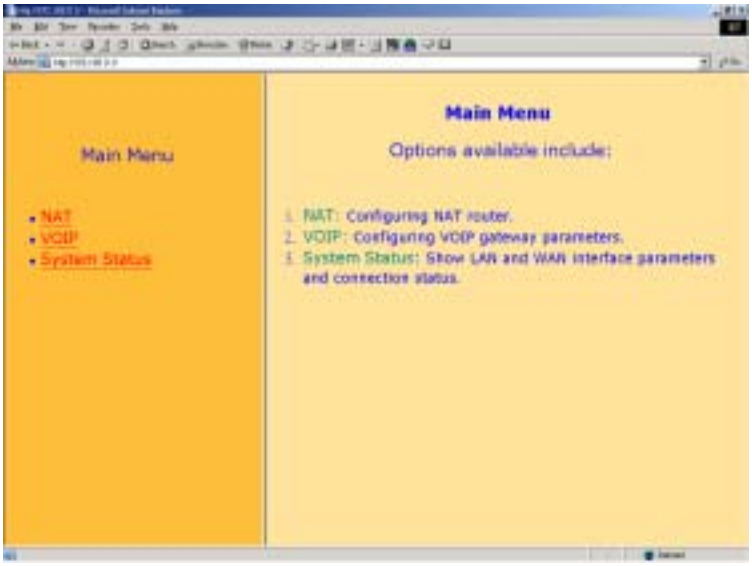
In this guide, we will use a dial plan table as below for illustration purpose.

Number	Hunt Group	Dest. ID	Destination
201	1	1	0
408	10	10	mary01.dyndns.org

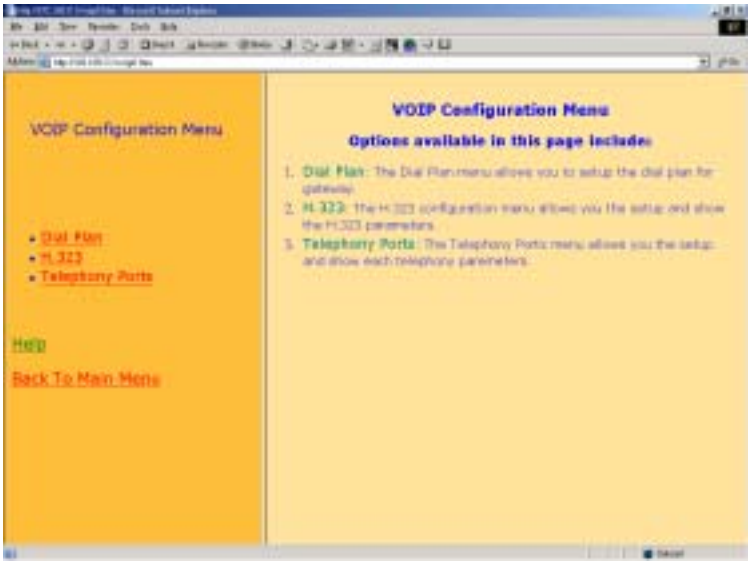
‘201’ is a default number, ‘408’ is a new number we will add onto the table.

6.2 Web Browser Configuration

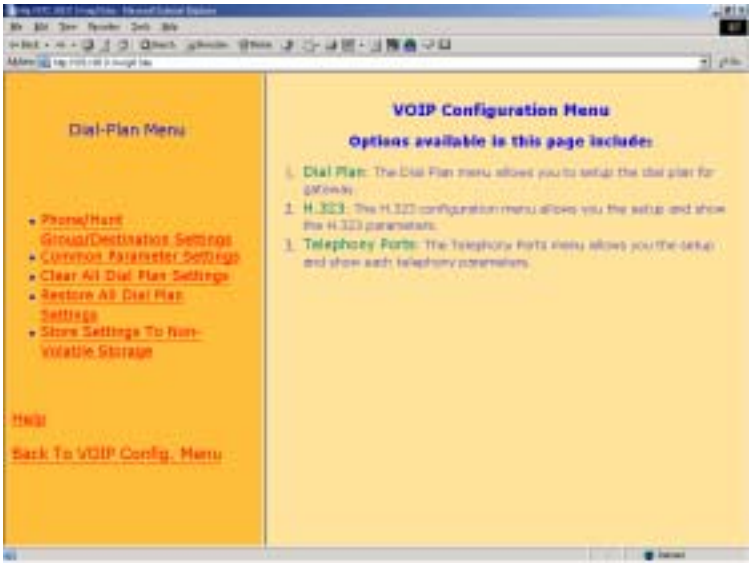
Use Browser to get into the “Main Menu” as follows, the default IP address of ITG-400R is 192.168.0.1.



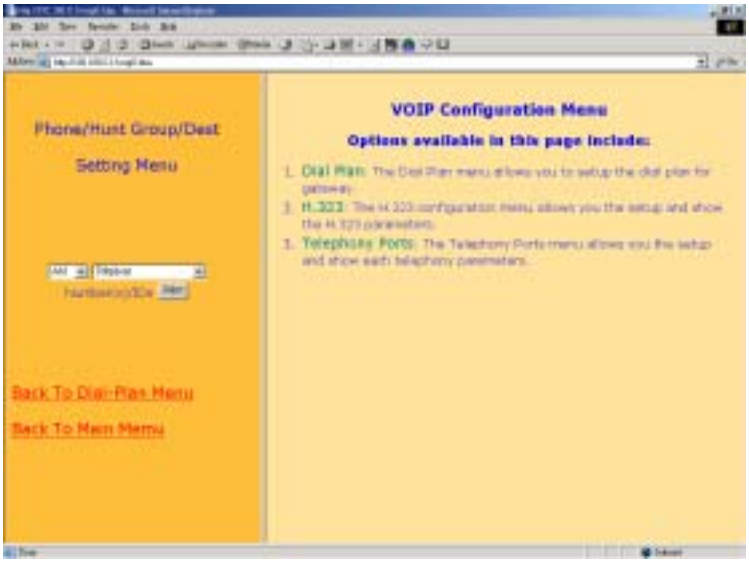
Click “VOIP” for all the telephony related settings, and ITG-400R will display as follows:



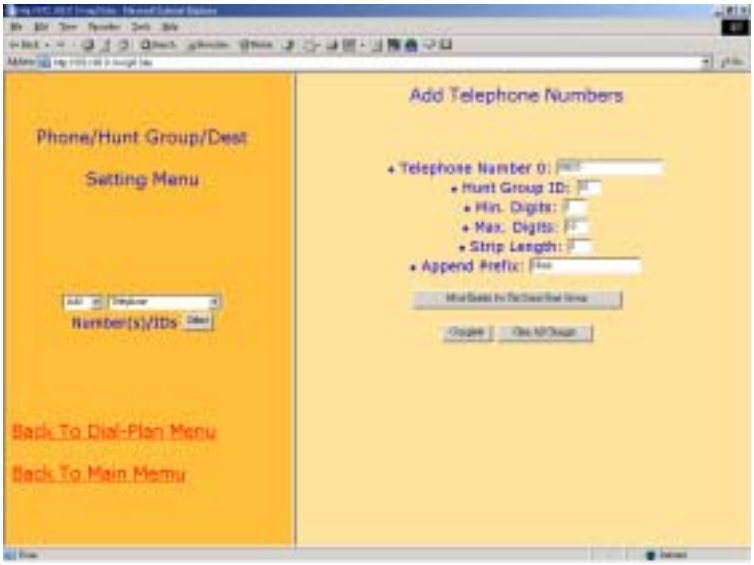
You are advised to set up your Dial Plan associated with the ITG first before dialing any number and making a VoIP phone call. Click ”Dial Plan”, it will display as follows:



Click “Phone/Hunt Group/Destination Settings” and prepare to enter phone numbers, and ITG-400R prompts the following:



Choose “Add”, “Telephone”, and “Select”, and ITG-400R will display the following screen:



Fill in the information associated with “Telephone Number”, “Hunt Group ID”, “Min. Digits”, “Max Digits”, and “Strip Length”. Make sure the above data is correct then click “Complete”.

Telephone Number – A set of digits. You may look at that as an area code associated with the remote Gateway.

Hunt Group ID – An interpreter between Telephone Number and Destination ID.

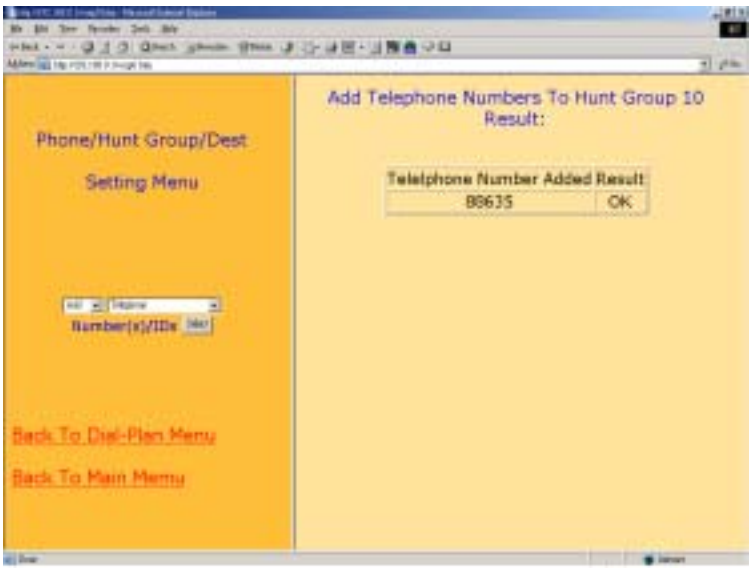
Min. Digits – The minimum number of digits need to dial for remote Gateway, usually is the number of digits of Telephone number above.

Max. Digits –The maximum number of digits need to dial for remote Gateway. The difference of “Max. Digits” and “Min. Digits” is the total phone numbers that you can assign to the remote Gateway.

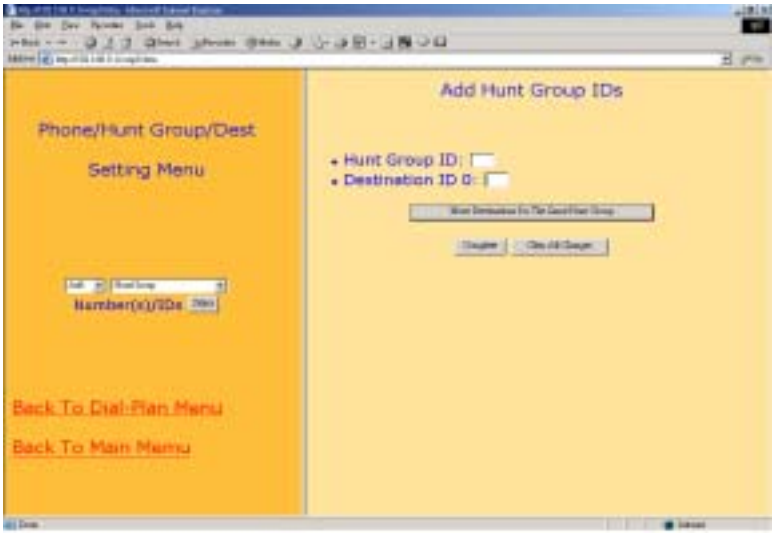
Strip Length – The number of digits needed to be strip off from the beginning of the dialing digits.

Append prefix – The digits needed to be appended in front of the dialing digits after it is stripped for the strip length.

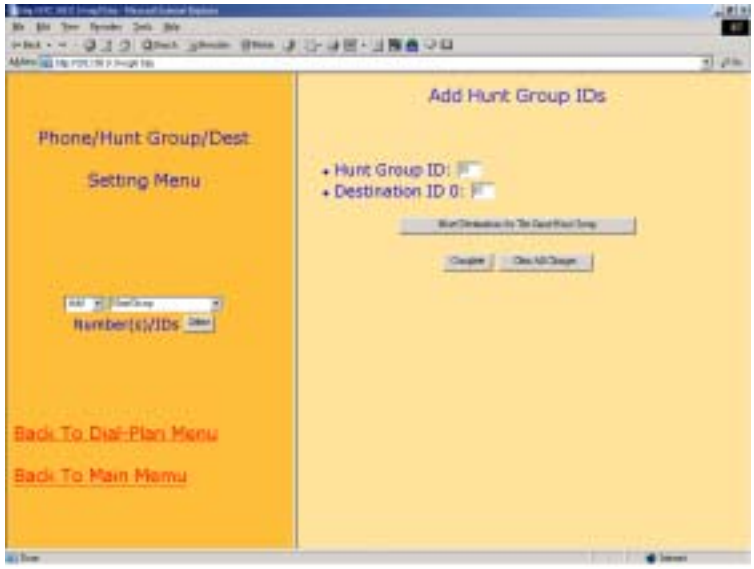
The newly added telephone number will be displayed for confirmation as follows:



Choose “Add” and “Hunt Group” then click “Select”, and prepare to add Hunt Group ID. The ITG-400R will show the following:



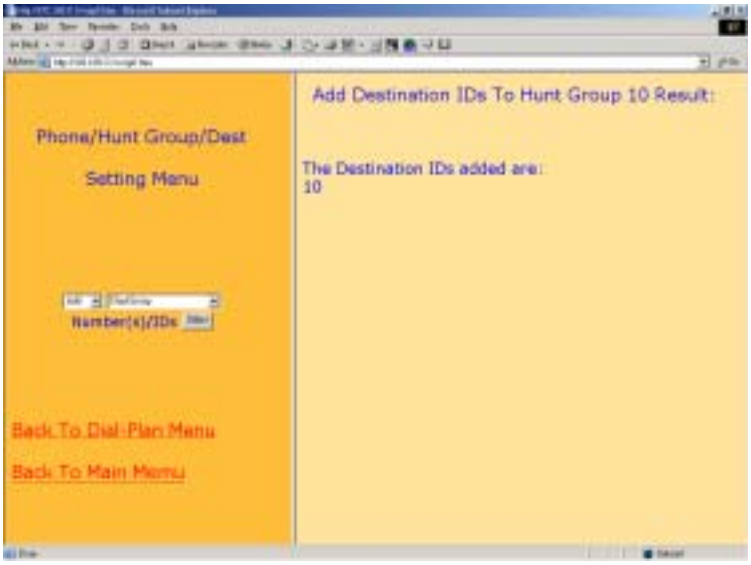
Enter the information related to “Hunt Group ID” and “Destination ID”, then click “Complete”. The newly added Hunt Group ID and Destination ID will be displayed for confirmation as follows.



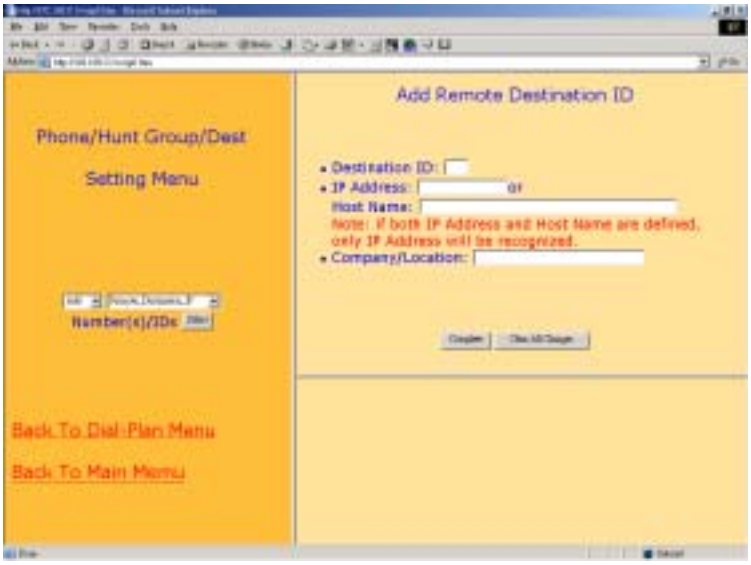
Hunt Group ID – An interpreter between a Hunt Group and a Destination.

Destination ID – The destination is either a physical port or a remote IP address that ITG should make a call to. Each Destination ID maps to a physical destination. There are two types of physical destination.

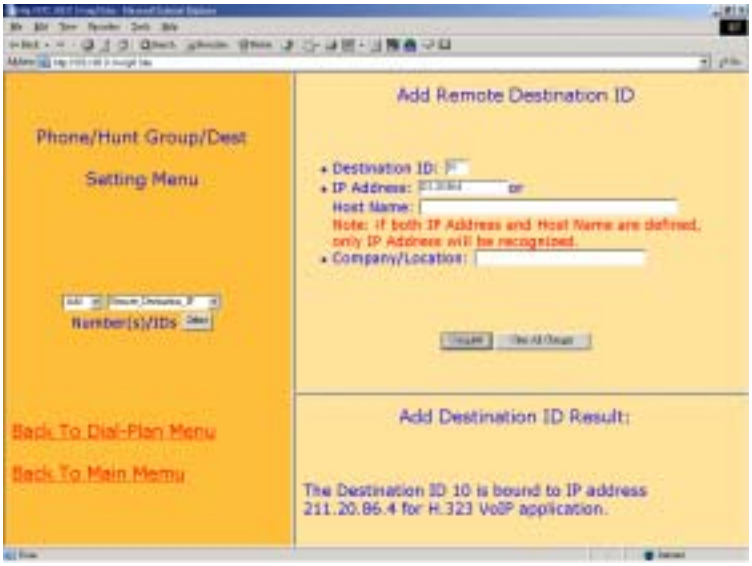
- A physical port on the ITG, i.e. the FXO/FXS port
- A H.323 VoIP gateway with a fixed IP address or a host name.



Now choose “Add” and “Remote_Destination_IP” for setting up the Destination IP address. Click “Select”, and the ITG-400R prompts as follows:



The information associated with “Destination ID” and “IP Address” of the remote Gateway should be filled in. Click “Complete”. The newly added remote IP address will be displayed for confirmation as follows:



Now you may test the phone connected to the remote Gateway (211.20.86.4) with phone number “88635xxx” from your local phone.

7.CONFIGURATION EXAMPLES

7.1 The Default Dial-plans

Before any configuration set up, your ITG should have the following basic default information.

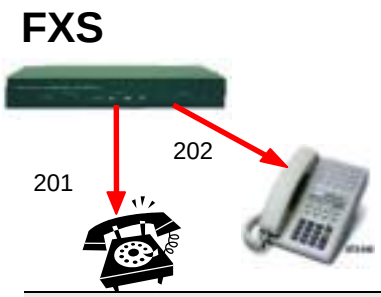
Network:

IP : 192.168.0.1
Mask: : 255.255.255.0
Gateway : 0.0.0.0

Dial Plan:

No.	Hunt Group	Dest. ID	Dest.
201	1	1	0 (local port #1)
202	2	2	1 (local port #2)
203	3	3	2
204	4	4	3
20X	X	X	(X-1)

(X is from 1 to 8, and it varies depending on your ITG model)

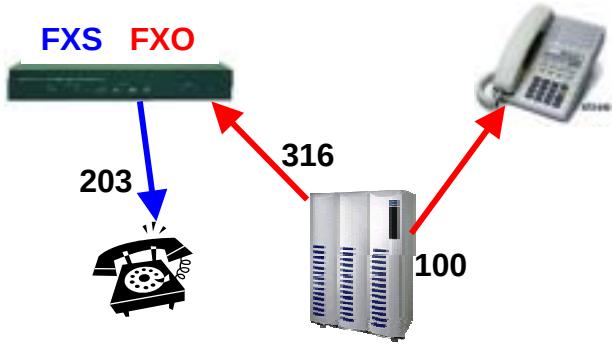


Suppose two telephones are connected to two of your ITG FXS ports, say port 1 and port 2 respectively, you just pick up phone 1 and dial '202' directly, phone 2 should ring.
☎ ☝202 ⇨ ITG ⇨ local port #2⇨ ☎)))

ⓘ **Hint**	You may also check the LED indicators on the ITG. When it rings, the related LED should flash. After you pick up the handset, it should remain on and off

when the phone is on hook.

Now let's test your ITG that is equipped with FXO interface. Assume you have one extension line associated with your PBX system, say, **316** as the designated extension number, we connect this line to ITG port 1 (FXO port), then connect a telephone phone set to ITG port 3 for example.



Pick up your extension handset, for example, 100 and dial '316'. After two rings, you should hear a dial tone. Now dial '203' the telephone connected to the ITG FXS port should ring.

Hint	If you do not hear the dial tone, please check the line impedance of your PBX. You should find a Guide for setting the appropriate line impedance in your package if your ITG is equipped with FXO port. Please set it up accordingly to adjust your FXO port.

Now let's make a call to your extension. Pick up the handset connected to the FXS port and dial '**201**', you should hear a dial tone (This means that ITG picks up the line connected to your PBX). Then dial **'100**', your extension handset should ring right away.

Hint	This guide only uses the default values. Once you are familiar with the dial plan set up, you may design your own. You may set it up with only one digit if you wish, say '**1**', and '**100**' rings.

7.2 ITG to ITG in the Static IP Address Environment

The previous section shows you how to test your ITG without modifying any settings. This section will show you how to connect two ITGs together and make VoIP calls.

Assume that we have another ITG, say ITG B, with the default settings as well. Now, let's set up the IP address of ITG B to, e.g. '192.168.0.2' and connect it to ITG A with the following three steps.

Step 1.

ITG B:

Configure the WAN IP (Please refer to Chapter 3.1.)

Step2.

Connect ITG A and ITG B to the same Ethernet switch or hub.

Step3.

ITG A:

Ping ITG B Ping (192.168.0.2) 56 data byte 192.168.0.2 is alive

ITG B:

Ping ITG A
Ping (192.168.0.1) 56 data byte 192.168.0.1 is alive

After these three steps, both ITGs should find each other on the same network.

Now let's set up the remote H.323 gateway for this two ITGs.

ITG A:

Refer the following dial plan information to configure ITG A dial plan (Please refer to Chapter 6.2.)

ITG B:

Refer the following dial plan information to configure ITG B dial plan (Please refer to Chapter 6.2.)

The dial plan associated with these two ITGs should have the following new record after the above commands.

ITG A:

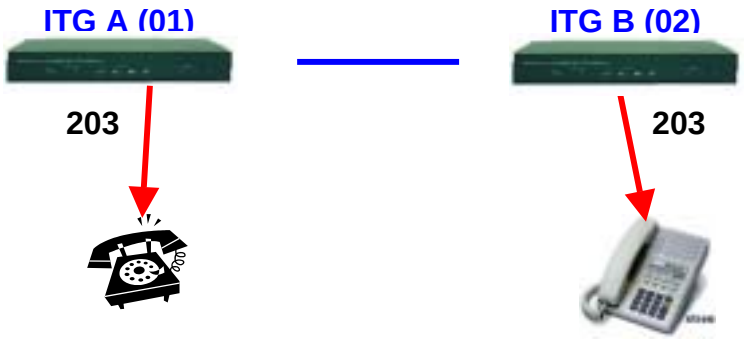
No.	Hunt Group	Dest. ID	Dest.
02	10	10	192.168.0.2

ITG B:

No.	Hunt Group	Dest. ID	Dest.
01	10	10	192.168.0.1

Now, once ITG A gets a dialed number "02" it will direct the call to ITG B. The same is true for ITG B. The dialed number '01' will be mapped to ITG A accordingly.

Assume both ITGs have a FXS port corresponding to port#3



each with a phone set connected to it.

ITG A:

Pick up handset and dial “02203”, where ‘02’ points to ITG B and ‘203’ for port 3 of ITG B. The phone attached to ITG B should ring.

ITG B:

Pick up the handset and dial “01203”, where ‘01’ points to ITG A and ‘203’ for port 3 of ITG A. The phone attached to ITG A should ring.

ⓘ **Hint**	In this example, we assign each ITG with an unique number. You may treat that number as an area code. Each ITG represents a different area. ITG A is with area code 01 and ITG B is 02. So If you have more, you may assign to other ITGs with, 03, 04, etc.

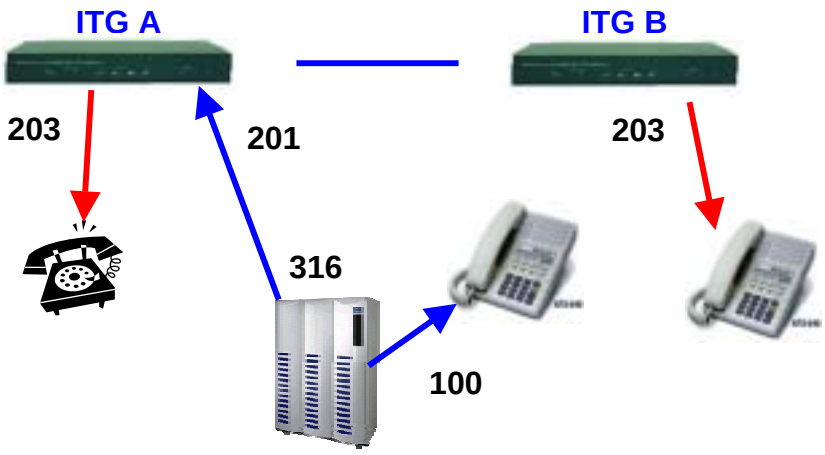
ⓘ **Hint**	If you can not hear the ring signal, please do make sure of the following: 1) Both ITGs can ping each other 2) Phone sets are connected to the correct ports. In this example, it should be the FXS port. Also

the phone number will be “20X” where X corresponds to the location of the port.

3) Make sure you’ve stripped the number as specified in the command “atpm aadd” correctly.

4) The LED associate with the phone line should turn on(pick up the phone) or flash(ringing).

We may continue to use the configuration mentioned in Section 7.1 for PBX connections.



ITG A:

The user at ext. 100 wants to make a call to ITG B, 203. What we need to do is to pick up the handset with extension ‘100’ and dial ‘316’. After you hear the dial tone again, dial ’02-203’. Then, the phone attached to ITG B should ring.

ITG B:

If users at ITG B want to make a call to ext 100 through ITG A, one should dial, ’01-201’ where the PBX line is connected to port 1. After hearing the dial tone, just dial the extension number ‘100’.

Hint	Imagine how we use the PBX with associated extension handsets. We pick up the handset and dial any extension number directly to your colleagues, and dial ‘0’ or ‘9’ to make a call to PSTN network. The same is with ITG B, after you dial “01-201”, you can do the same thing because “01201” connects you to the extension handset 316. In this scenario the handset with extension 203 connected to ITG B may also be looked as an extension of the PBX.

After all of the above, your ITG should perform normally. Let’s do the following two things:

A) Modify the IP address, Mask, and Gateway to your network so that the ITG may connect to the Internet. Do the same thing to your second, and third ITG so they may connect to the Internet as well.

B) Check the bandwidth, and the router. Normally, if you can ping each other, it means that they should talk to each other via VoIP calls.

Warning	The average bandwidth for each channel is from 12kbps to 16kbps by default. In a heavy traffic network, the available bandwidth between two nodes may affect the voice quality.

7.3 ITG to ITG in the Dynamic IP Address Environment

The previous section shows the steps regarding how to set up a typical ITG-to-ITG connection in the static IP address environment without modifying any settings. This section we will show you how to connect two ITGs in a dynamic IP address environment via built-in PPPoE, DHCP, and DDNS clients.

Assume there is another ITG, say ITG B, located at Site B with default settings. First of all, it is required to apply for a DDNS host name from http://www.dyndns.org for ITGs at Site A and Site B. *(Please refer Chapter 3.2.1 Applying for a host name in the dynamic IP environment)*.

For example, the names are *mary01.dyndns.org* for ITG at Site A, and *mary02.dyndns.org* for ITG at Site B.

mary01.dyndns.org is applied for ITG at Site A,

mary02.dyndns.org is applied for ITG at Site B.

Other parameters associated with this topology are:

ITG at Site A has **PPPoE**, and **DDNS** clients enabled

ITG at Site B has **DHCP**, and **DDNS** clients enabled.

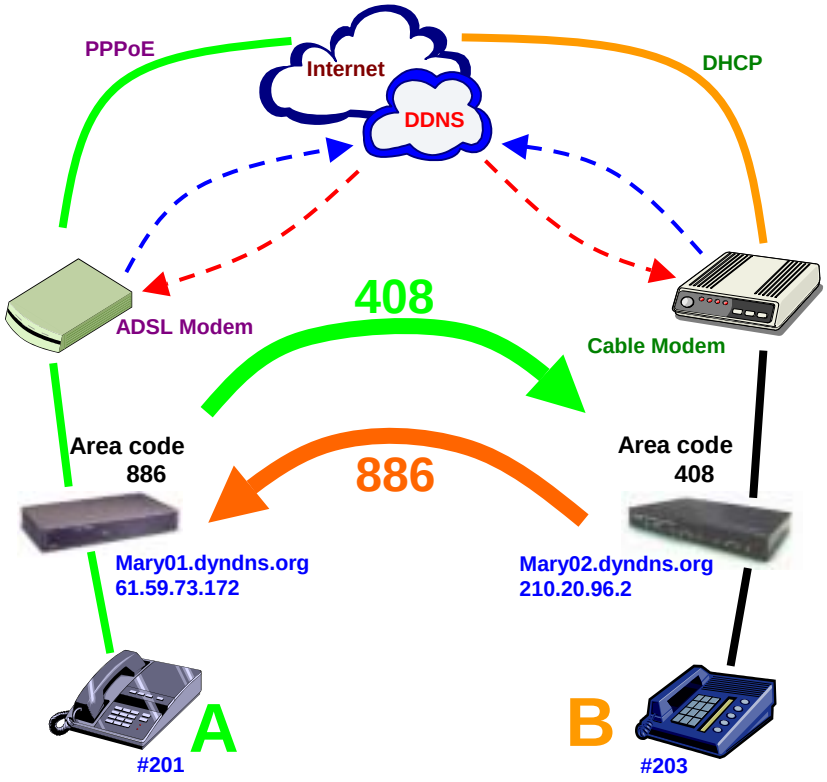
The dial plan and network topology can be shown as follows:

Site A:

No.	Hunt Group	Dest. ID	Dest.
408	10	10	mary02.dyndns.org

Site B:

No.	Hunt Group	Dest. ID	Dest.
886	10	10	mary01.dyndns.org



ITG configuration (ADSL PPPoE connection) at Site A:

PPPoE section:

Refer the PPPoE application set up procedure to configure Site A dynamic connection (Please refer to Chapter 3.2.2.)

DDNS client section:

Refer the Dynamic DNS configuration procedure to configure Site A dynamic dns (Please refer to Chapter 5.7.)

Dial plan settings:

Refer the dial plan configuration to configure Site A dial plan (Please refer to Chapter 6.2.)

ITG configuration (cable connection) at Site B:

DHCP section:

Refer the DHCP application set up procedure to configure Site B DHCP connection (Please refer to Chapter 3.2.3.)

DNS server section:

Refer Chapter 3.1 page 9, WAN IP set up section to configure Site B DNS server.

DDNS client section

Refer the Dynamic DNS configuration procedure to configure Site B dynamic dns (Please refer to Chapter 5.7.)

Dial plan section:

Refer the dial plan configuration to configure Site B dial plan (Please refer to Chapter 6.2.)

After these modifications, users at Site A are able to dial “408 + telephone number” to call users at Site B and conduct VoIP voice conversation. Users at Site B are able to perform VoIP voice communication by dialing number “886 + telephone number” toward users at Site A. (Please note that there is a Max. digits (8) limitation of dial string in this case. Users may modify this parameter to meet different needs.)

Warning	If calls can not be made, please check: a. Connectivity between ITGs is valid. (This may be checked via *ping* command in ITG.) b. DDNS name is correctly updated.

7.4 PBX related issues

There are some issues related to PBX system. There are: 1) CP (Call Progress) Tone detection, and 2) Call Security.

7.4.1 CP Tone Detection

You may encounter a problem when your call goes to PBX via a VoIP connection, such as the caller may already hang up the phone but the PBX port is still active.

The cause of this problem may be due to the CP tone mismatch. The ITG cannot understand the Tone from PBX. So it still considers the line is on and never hangs up.

Once this has happened, you may find a technical document provided by your vendor that contains the corresponding information and guides you to fix this problem.

7.4.2 Call Security

The ITG is a standard H.323 VoIP gateway that will allow any standard H.323 device to make a VoIP connection to it. That means no matter where you are, once you have a H.323 device such as another ITG, or a software package like Microsoft NetMeeting, you may make a VoIP call to this ITG any time once it connects to the Internet.

If the ITG is only equipped with FXS port, then it should be very little concerns regarding the unauthorized use of the VoIP link. But once it is connected with either a PBX or PSTN line, you may be opening a phone line for any Internet users to make an unauthorized phone call. For example, one may make an International call from Hong Kong to Europe through your ITG located in Singapore.

To prevent this from happening, you are advised to do the following:

1) **Restrict the right to use associated with the line**. For example, if the line goes to an extension number associated with a PBX, ask the PBX manager to restrict this line from dialing to certain numbers. Or ask the PSTN service provider to limit the line usage as well.

2) **Re-check the dial table.** Check the dial plan table that only allows certain numbers may make calls. That is, remove the unnecessary numbers and restrict the maximum digit or prefix the allowed number inside ITG so the unauthorized phone call may not be made through the ITG.

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