ARTDio

The Voice Gateway

User Manual
IPE 1000 Series

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ARTDio Company Inc.

ARTDIO
Intelligent Communication

Terminology

- **FXS interface:** A Foreign Exchange Station (FXS) interface is used to connects to a standard telephone, fax machine, trunk side of PBX, or to other FXO interfaces. It will supply ring, voltage, and dial tone. So it is very important not to connect the FXS interface to the wrong device that are not listed above, it will damage the voice gateway or the voice gateway will damage the device on the other end.
- **FXO interface:** A Foreign Exchange Office (FXS) interface is used to make a connection to be directed at the PSTN central office or to a analog PBX extension line. It will supply hook off, hook on and flash signal that act like a standard analog phone. On the contrary with FXS interface, FXO do not have line power on it.
- **Access Code:** A user defined string of digits, stands for access different voice path, call control or to activate special function for making a call. For example, users can define the access code to make a transit call, a circuit connect call or a MGCP call.
- **Soft Key:** A string of digits defined for each channel, that this soft key will be send out or activated while detect the pre-defined trigger events for this channel. Soft key can alos be activated with a pre-defined access code.
- **Circuit Connect:** A special function provide by PBX gateway, while applying this function the channel from caller to the channel of called party is connected as if there was a real circuit line between. After the connection is made, all the number user dial will be send to the other side transparently.
- **MGCP:** MGCP (Media Gateway Control Protocol) is a protocol for the call control of Voice over packet networks by out-of-band call-control elements known as media gateway controllers (MGCs) or call agents (CAs). It is described in the IETF RFC2705.
- **FXO Outgoing Prefix:** A prefix (numbers that can allow pause key) that will be send out from FXO interfaces before any number. This is used while voice gateways are connected to PBX extension lines with FXO interfaces.
- **T.38 Fax Relay:** T.38 fax relay is a ITU standard that allow fax being transmitted over IP service network. Differ from T.37 store and forward fax relay that T.38 is defined for real time fax transmission.

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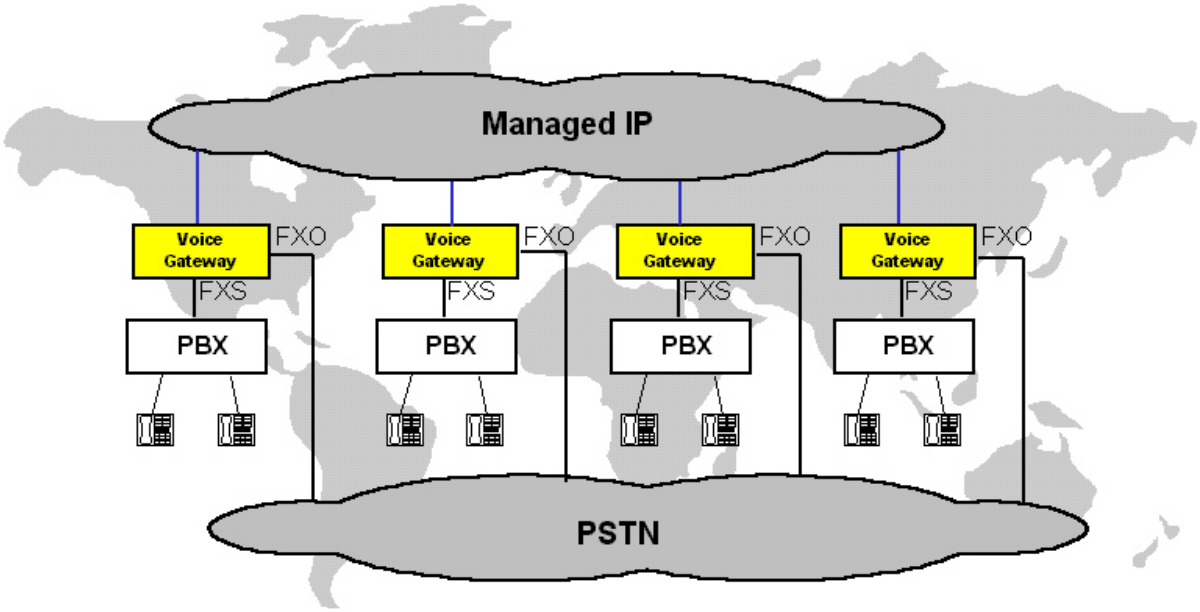
Table of Contents

1.Introduction

This guide explains how to configure the PBX VoIP gateway using the system console commands and web management interface. This manual is designed for the technicians responsible for configuring the gateway. The candidates should have technical networking background and PBX VoIP gateway experience. They must also have a working knowledge of VOIP fundamentals.

1.1 Functions of the PBX VoIP Gateway



1.1.1 Removes the heterogeneous PBX system barrier

For multi-national enterprises or companies that have multiple offices located at different sites, it is difficult to have a mutual interoperable PBX system for the whole group of offices. For it is difficult to have all related offices using the same PBX system or even one that is compatible.

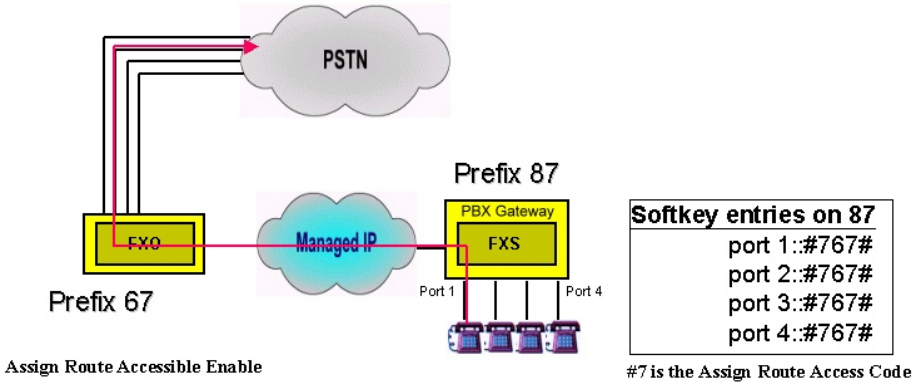
The PBX VoIP gateway is designed for functioning as the PBX tie trunk as well as maintaining interoperability with different PBX or KTS systems.

1.1.2 Enables Toll-Bypassing advantages

The PBX VoIP gateway utilizes modern VoIP technology, enabling toll-bypassing advantages with flat rate data access fees. This can save an enormous expense, especially for a large amount of phone communication hours between offices.

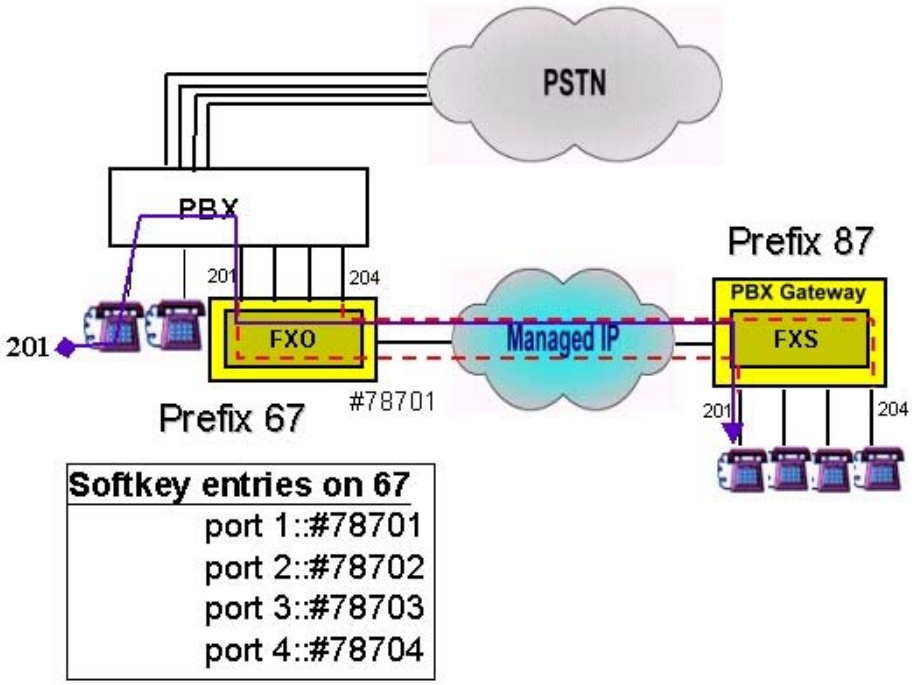
1.1.3 Foreign Exchange Advantages

The toll-free advantage can also be extended to access remote PSTNs. A Company can set up a PSTN line in a remote office in a foreign country. Domestic users can then access the remote PSTN through the PBX gateway while paying local or long distance phone rates instead of International phone rates.



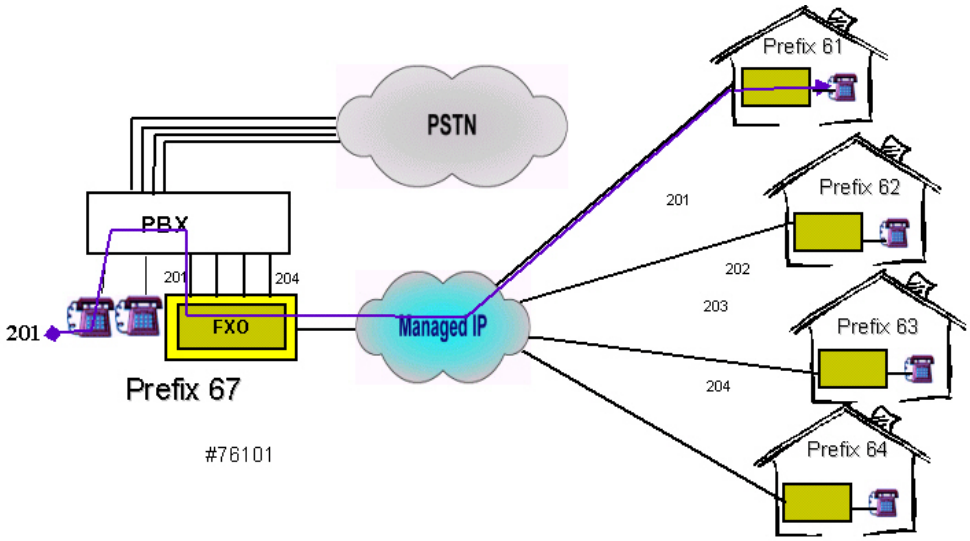
1.1.4 Hot-Line Application

With the soft key and circuit connect function, it is easily to implement the hot-line application. The remote office can accesses to the PBX in headquarter as if it is in main office.



1.1.5 Telecommuter Application

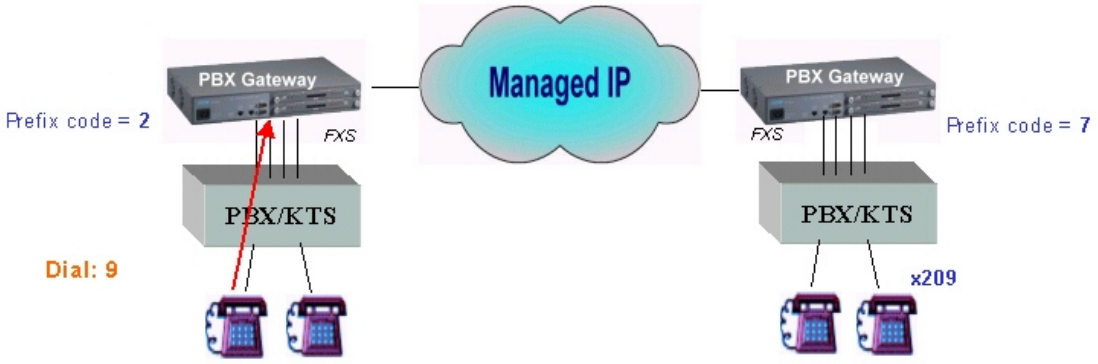
In a company, some of the people are asked to travel around or work at home. With PBX gateway, can provide the application to allow the user take a small box travel around or install in home, the user can receive the phone that call to his desk wherever.

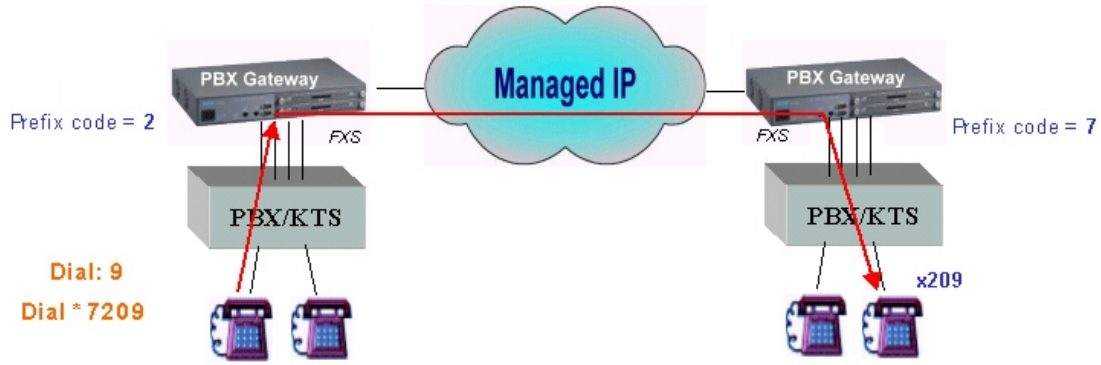


2. Basic Applications of the PBX VoIP Gateway

2.1 Internal Calls

The VoIP Gateway is designed to be the tie trunk of the PBX, which means that when two or more PBXs are tied with VoIP connections, the extension line on the remote PBX will function as an extension of the local PBX. The following graphic is an example of this concept. The user at the extension on the PBX VoIP gateway with the prefix code "2" can dial "9" plus "*7209" to connect to extension 209 of the PBX that has the PBX VoIP gateway with the prefix "7", where “9” is the trunk group select code of PBX.





2.2 Calling From Stations To Remote PSTNs

PBX VoIP gateways that have the FXO interface are able to make phone calls from extensions of the PBX to remote PSTN users through an IP network. The following example demonstrates how a user on extension "209" at an office in Shenzhen , can communicate with a user in Taipei with the phone number "886-2-8691-9470" via a PSTN by picking up his desk phone and dialing "9" plus "00886286919740".

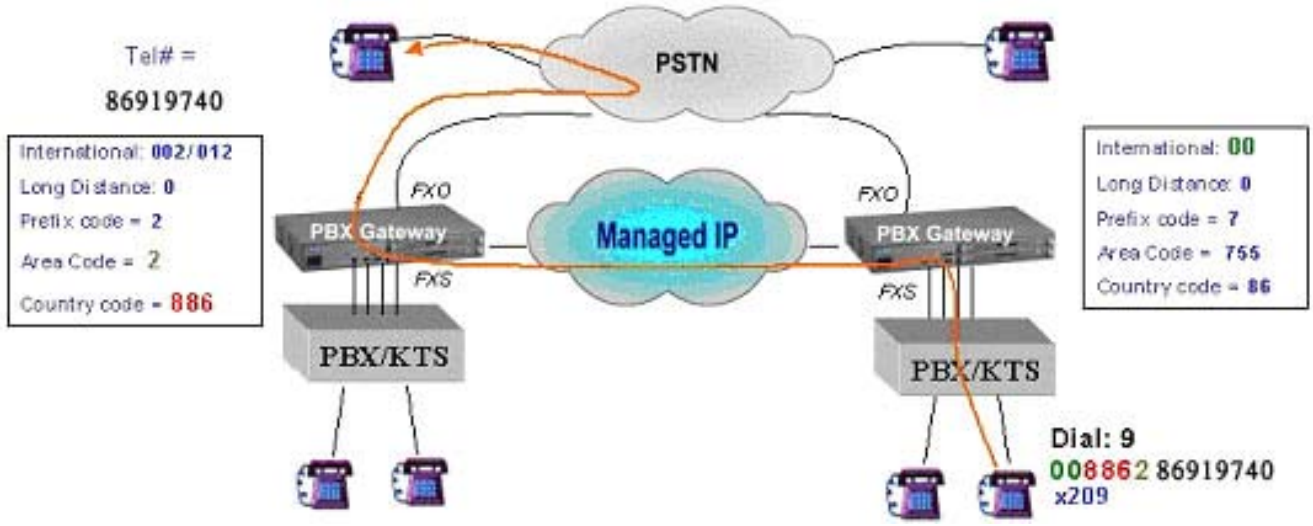


Fig 1 Call From Local Station to Remote PSTN

2.3 Calling From PSTNs to internal Stations

The PBXs are tied as a group, therefore the internal station at this location will have (I). Local station: the stations collocated with the PBX VoIP gateway that PSTN users dial in to. (II). Remote station: the station that is on the other PBX VoIP gateway that is connected to the IP network.

To call the local station, the PSTN user can dial the main office number "2322-2222", after hearing the greeting message, the user would dial "508" so that the phone can connect to extension 508 of the local PBX. To call the remote station, the local PSTN user can dial the main office number "2322-2222". After hearing the greeting message, the user would dial "*7209" so that the phone can connect to extension 209 of the remote PBX.

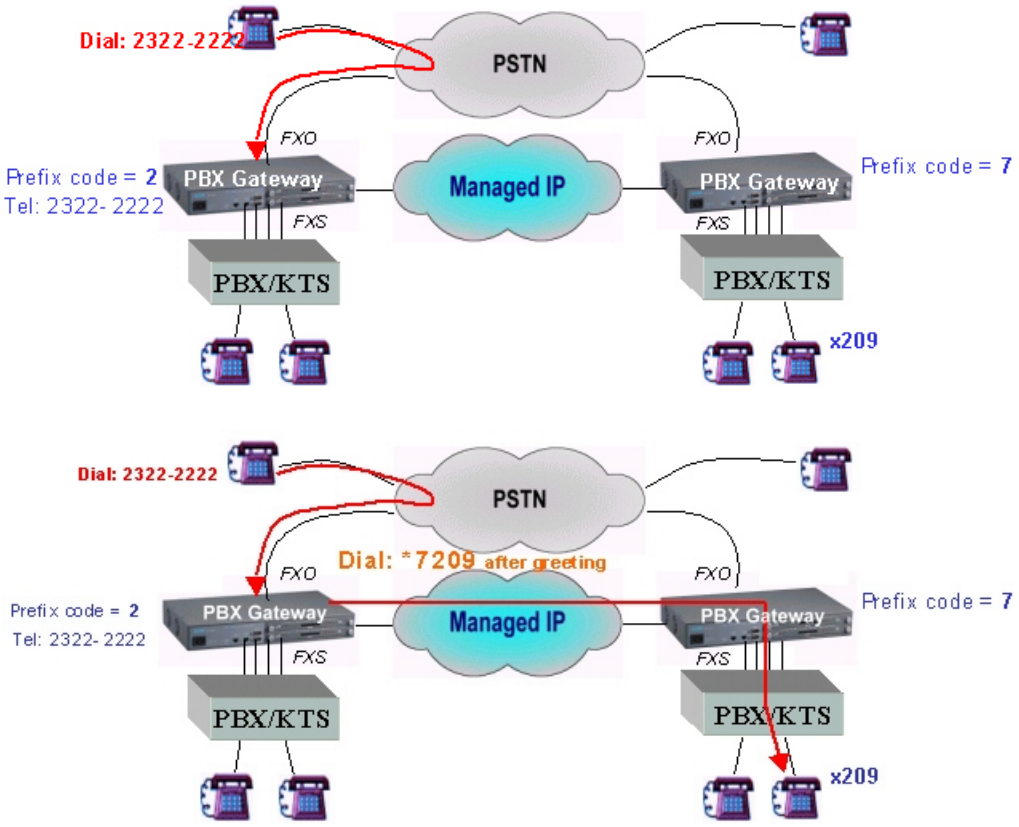
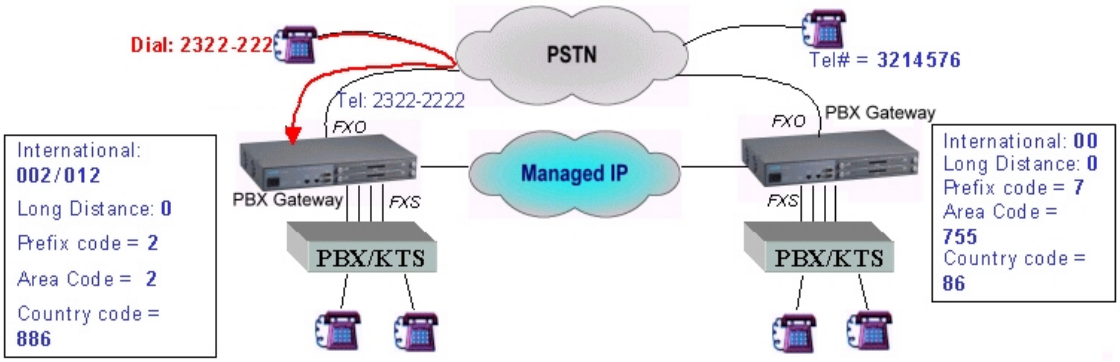


Fig 2 Example of calling from PSTN to internal stations

2.4 Transit Calls From PSTNs to Remote PSTNs

The following example is designed for telecommuters or administrative users that need to access the remote PSTN in another office. This application allows the user to call from a local PSTN to a remote PSTN through the PBX VoIP gateway. To maintain company security, the PBX VoIP gateway requires that a pin code be entered before a transit call is placed.



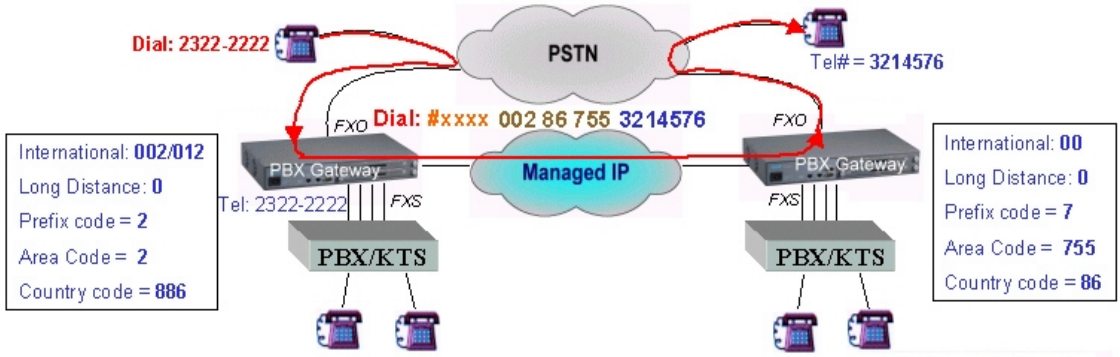


Fig 3 Example of making transit calls from PSTNs to remote PSTNsQuick Installation

3. Quick Installation

3.1 Quick Start

1. Plug in the Ethernet Cable, Null Modem cable and switch on the device to begin the configuration procedure.
2. Configure the IP Address, subnet mask, Default Gateway to make the device reachable from the network.
3. Configure the device's prefix .
4. Decide the role (master or slave) of the device and configure the Group ID.
5. Add the MAC address of the slave that will join the group to the master.
6. Configure the IP address of the master gateway to the slave device.
7. Restart the device so that the configuration changes can take effect.

3.2 Basic Topology

The PBX VoIP gateway is based on master/slave architecture, which means the gateway will work with a group of slave gateways as a master gateway or join a group that is registered on a particular master gateway. The master gateway is the core of all common and control information in the same group.

- The master keeps a list of all the members of the group, while keeping the whole group's information updated by polling each slave device with routing information and group table. As a result of this function, when a new device joins the group, it will receive the entire group's information from the master. The other members in the group will then also be updated.
- A new slave must join the group by synchronizing the group information with the master device. Unless this step is completed, the slave cannot be used to make phone calls to any other devices.
- After a slave joins the group, it will receive a member list of the entire local group. The device can now make calls to other slave devices even if the master device loses its connection (the Ready LED light is off). However if the master device has lost its connection, it will be unable to receive new slave updates .
- Each device in the group will have a common prefix number as an ID for the entire group.
- The Master also play the role as Real IP Resolver for the Salves that work under NAT environment to find its real IP address and port number in the public IP network.

The PBX VoIP gateway is designed to work over an IP network. Before it connects to an IP network, you must assign the Gateway an IP address. Like the regular settings of an IP network, you also need to configure the subnet mask and the default gateway. The different aspects in configuring the master and slaves begin after the initial IP address configuration has been completed.

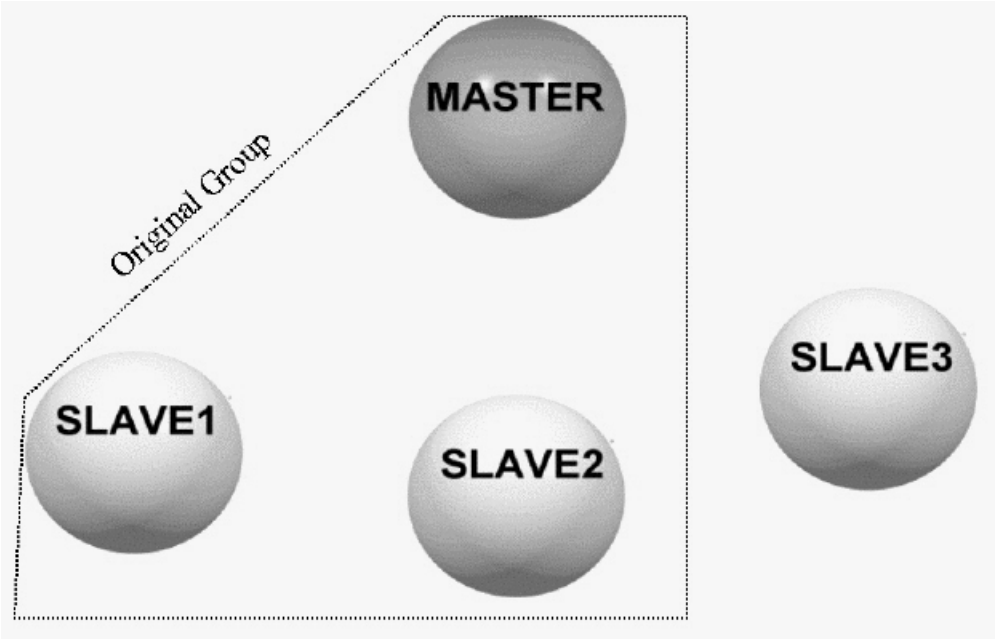


Fig 4 The master is responsible for maintaining the member list

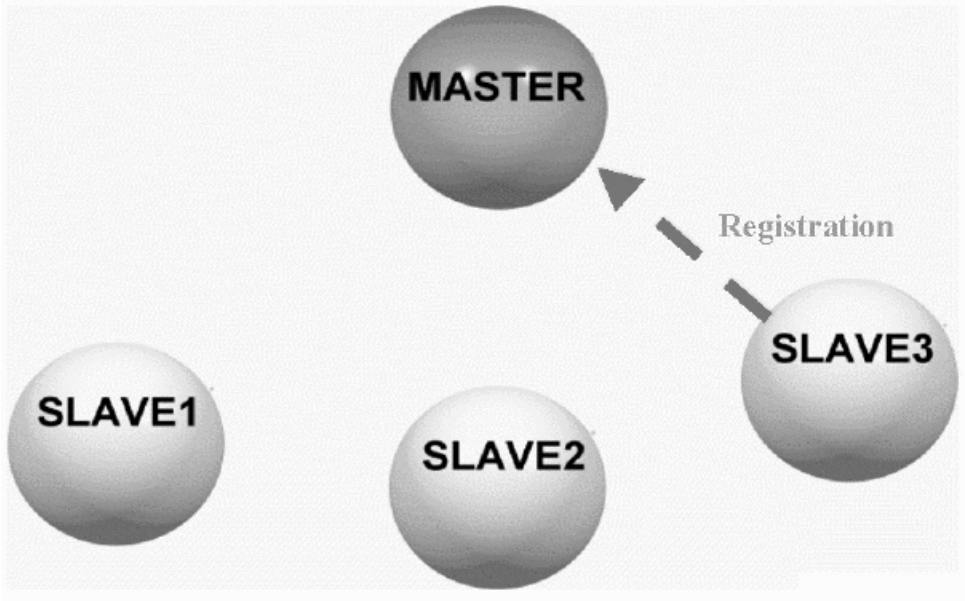


Fig 5 When a new Slave is added to the group registrar.

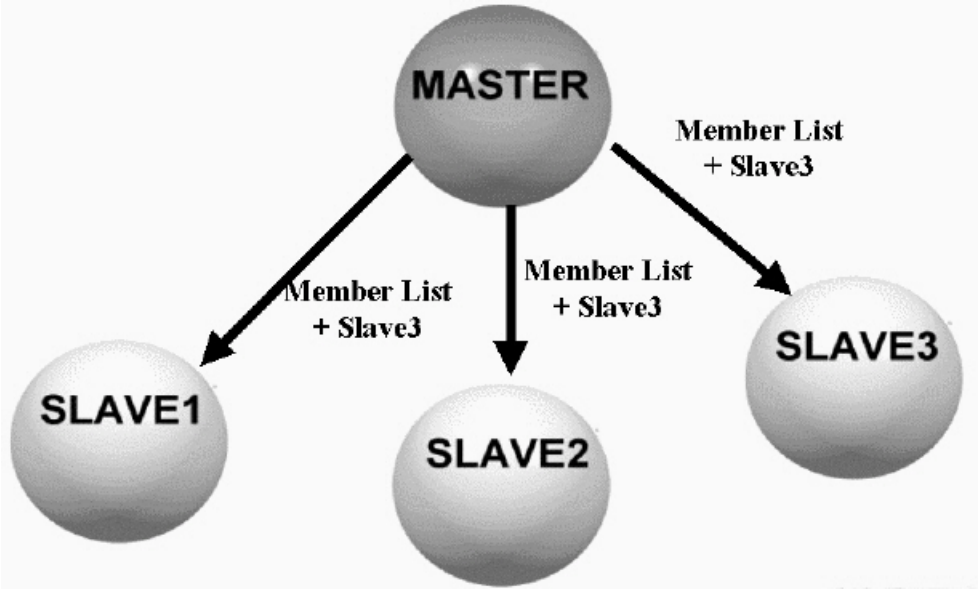


Fig 6 The master updates the new member list and sends it to each member

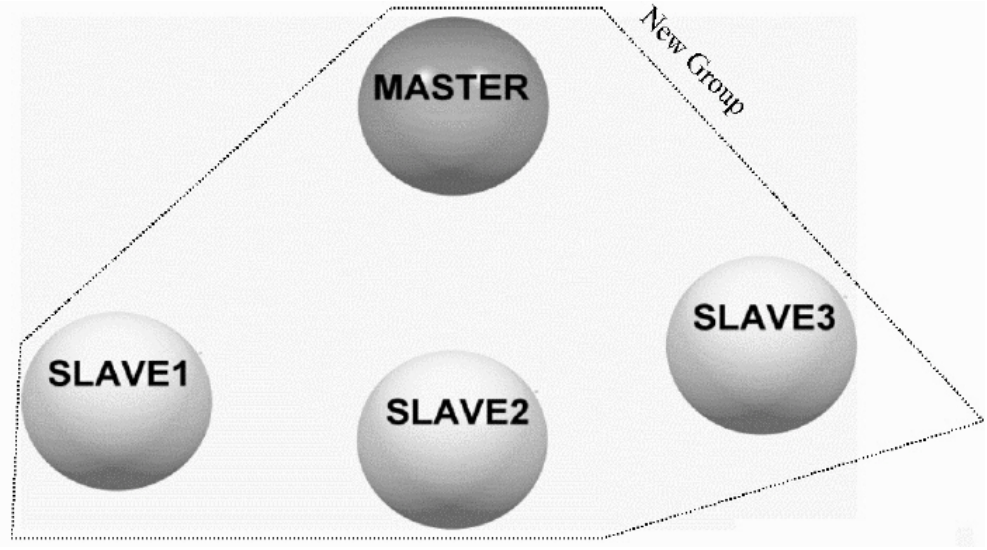


Fig 7 The master will synchronize the member information with each member.

Device Role	MUST Parameters
Master	■ Prefix ■ Group ID ■ MAC address of Slave devices
Slave	■ Prefix ■ Group ID ■ IP address of Master Device

Note 1 If a slave has successfully joined the group; the ready LED will be lit.

3.3 Working Under a NAT Networking Environment

IP addresses are limited; because of this, not all devices on the Internet can have their own public IP address. An application is available that allows users to use a private IP address by utilizing a NAT (Network Address Translation) server. When the packets are sent out from the local area network, the IP header will be replaced with a public IP address. This is very useful in conserving IP address usage on the Internet. Most VoIP devices cannot support NAT , since NAT servers only replace the IP headers. However, VoIP packets have IP information in the data area of every voice packet. So while the voice packet has been replaced with a real IP header, the data inside is still using a private IP address.

The PBX Gateway is able to use private IP addresses by applying NAT. Most of time, you will not need to change any configuration settings on the NAT server or even on the PBX Gateway itself. The one essential condition is that the master device of the group should use a public IP address.

Since there are currently so many NAT servers on the market , there is no set standard in addressing how to develop NAT servers or how to test the interoperability of NAT servers with other applications. Therefore, depending on your NAT server, you may have to adjust some of the configurations to specify the In-bound/Out-bound rules in order to give your NAT server the ability to work with various special applications.

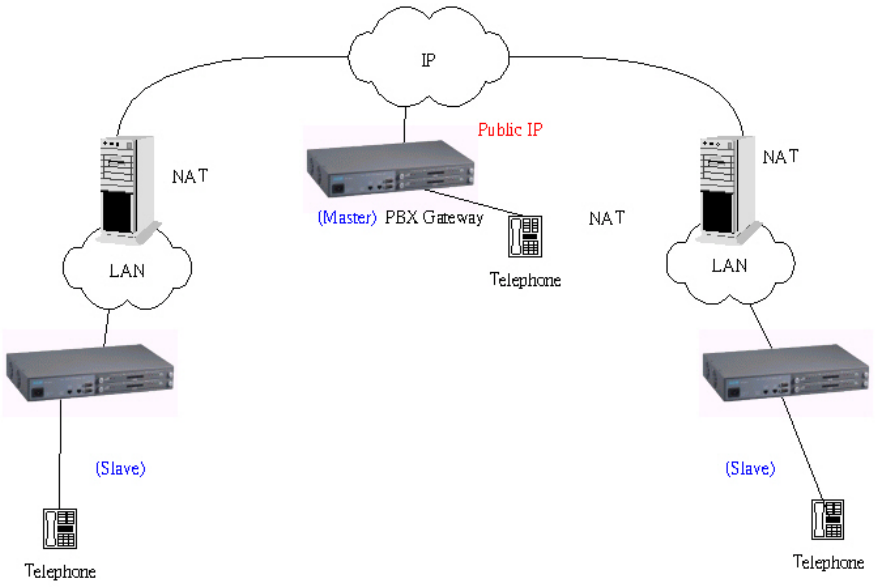


Fig 8 Supports VoIP under a NAT environment

- Guaranteed only for tested NAT servers or software
- Some of the NAT configuration settings need to specify the In-bound/Out-bound rules, however

some settings do not need an adjustment on the NAT server, such as the SMC barricade

- The master must have a public IP address
- Only one slave device with a private IP address may be installed on each NAT domain. This means that cascading to increase the density of channels by using private IP addresses is not supported
- Some In-bound/Out-bound address translation rules may time out on a NAT server. In this instance, users may need to restart the voice gateway.

Management Interfaces under NAT

Since the device works with private IP addresses, users cannot access the management interfaces (Web or Telnet) from the Internet if they do not specify the redirection settings on the NAT server. Even if you are able to specify redirection rules to redirect these (Web or Telnet) requests to the voice gateway, some of the well known ports (such as TCP port 80 for Web, TCP port 23 for Telnet and TCP port 21 for FTP) will already be occupied by public servers that are using private IP addresses. In this instance , you will need to change the port numbers to gain access to the voice gateway as well as to maintain public access to internal servers. You will then need to change the service port numbers for Web and Telnet on the voice gateway. The commands are as follows (you can only use Telnet or Console to modify the service port information):

1. Show the current service port information

   PBX Gateway>*enable*

   PBX Gateway#*show service_port*

   FTP Service Port: 21

   Telnet Service Port: 23

   Web Service Port: 80

   PBX Gateway#

2. Modify the service port

   PBX Gateway#*config*

   Enter configuration commands, one per line. End with CTRL/Z

   PBX Gateway(config)#*service port*

   PBX Gateway(config)#*service_port ?*

   ftp Set ftp service port number

   telnet Set telnet service port number

   web Set web service port number

   PBX Gateway(config)#*service_port web* <new port number i.e.88>

3.4 Utilizing QoS advantages

The PBX voice gateway is equipped with QoS capabilities. This provides higher priority for voice than data from the LAN. However you must install the device according to the following diagram in order to give voice output a higher priority than data output from a LAN. The "To WAN" Ethernet port on the front panel is used to connect to the router. The "To LAN" Ethernet port that is near the RS-232 port on the front panel is used to connect to the HUB or Switch on the LAN. This will give voice output a higher priority than data output.

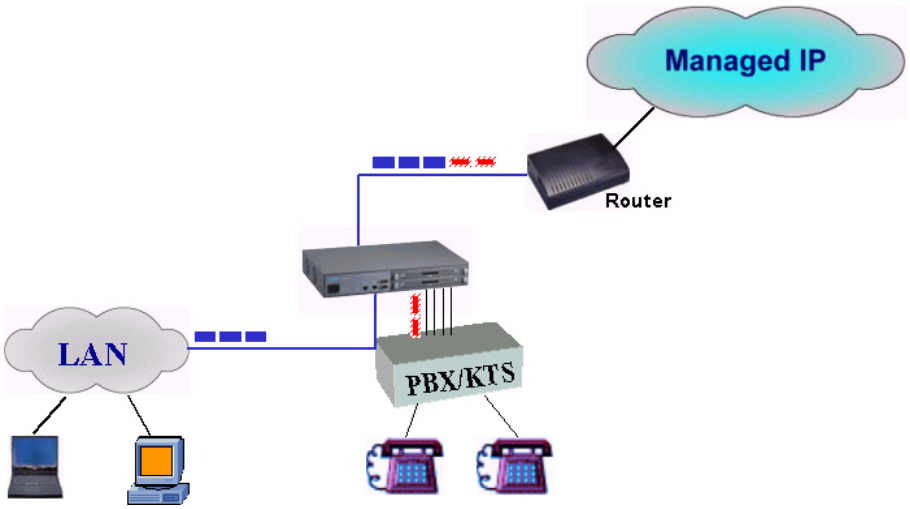


Fig 9 Diagram shows the utilization of embedded QoS capabilities. To maintain QoS functions while stacking the devices, you need to connect the LAN port of the primary PBX gateway (that connects to the router) to the WAN port of the secondary PBX gateway. Likewise the LAN port of the secondary PBX gateway connects to the HUB or Switch on the LAN.

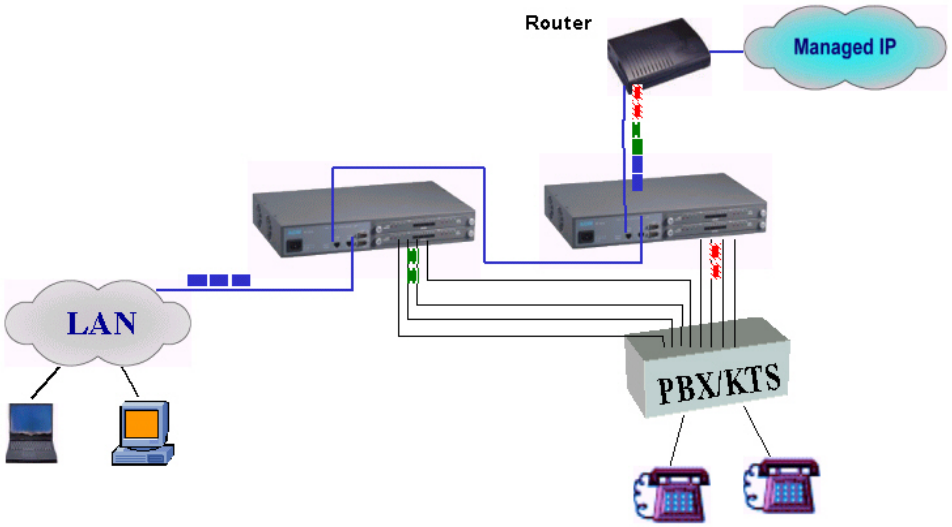


Fig 10 Diagram showing utilization of embedded QoS functions while stacking the devices

3.4.1 Connectors and LED Indicators

WARNING: Please ensure that the cables that will be connected to the FXS interfaces on the PBX VoIP gateway are not connected to any power source ("0" voltage).

Front Panels

19-inch models

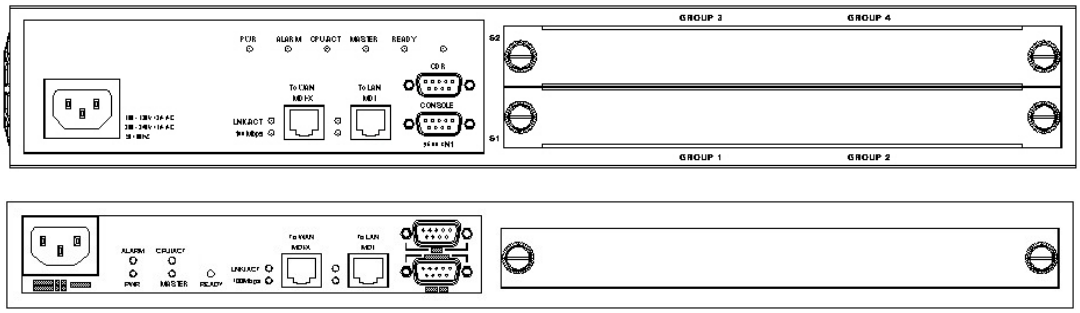


Fig 11 19-inch models Front Panel

7-inch models

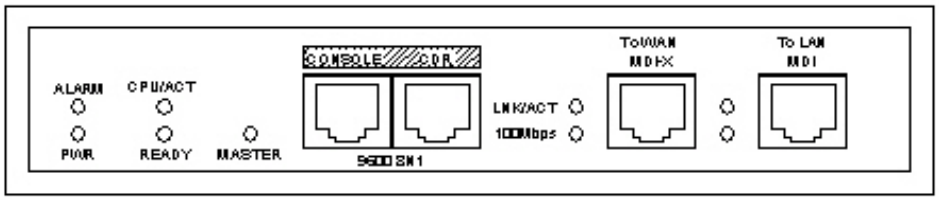


Fig 12 7-inch model Front Panel

Rear Panels

19-inch 1.5U model

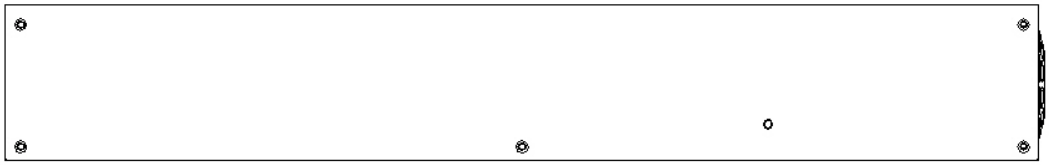
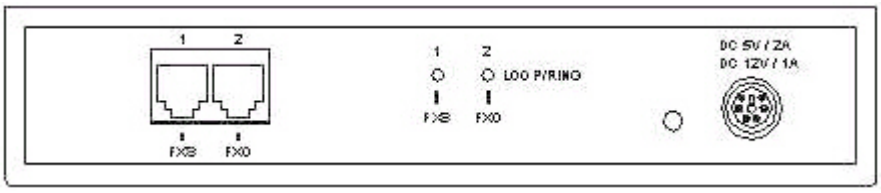
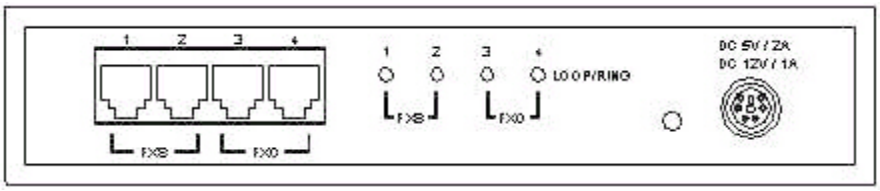


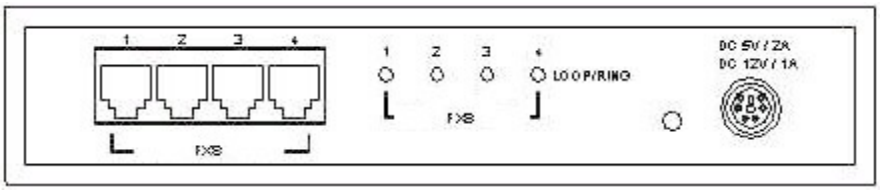
Fig 13 19-inch model Rear Panel



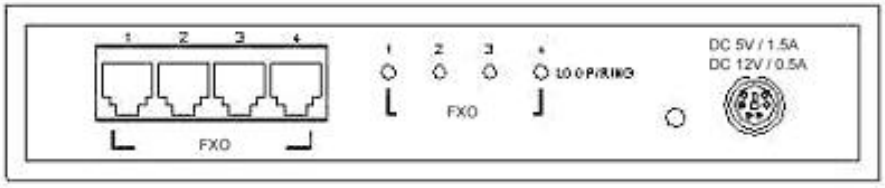
1 FXS and 1 FXO Model



2 FXS and 2 FXO Model



4 FXS Model



4 FXO Model

Fig 14 7-inch model Rear Panel

Connectors Description

Connectors	Type	Description
To WAN 10/100 Ethernet	RJ45 with MDI-X	Designed to connect to the Ethernet port on the router.
To LAN 10/100 Ethernet	RJ45 with MDI	Designed to connect to one of the LAN's HUB/Switch ports.
EIA-232	DB-9 DTE	Can be connected to a VT100 terminal or system console. The terminal should be configured to 9600 baud, 8 bits, 1 stop bits and none parity check.
POTS Ports	IDC Jack or RJ-11 jack	Where analog telephone lines are connected
Power		AC 90-120 Volt, 220~250Volt

LED Description

LED	Label	Description
10/100 Ethernet	LNK/ACT	When lit, indicates a network connection. The LED will flash when network traffic is detected.
	100Mbps	Indicating the network is running at 100Mbps
Port Information	LOOP/ RING	When lit, indicates a loop has been detected. Flashing indicates an outgoing call on the FXS interface or an incoming call on the FXO interface.
Device	Power	Indicates stable power.
	Alarm	The device will halt and the indicator will stay lit if a system test failure is detected, or if there are loop current lost counted on FXO interfaces.
	Master	If this device is configured as the master, this green LED will be on. If configured as a slave , it will remain off .
	Ready	This green LED will be on when this device is configured as the master or if configured as a slave , is connected with the remote master.

3.5 Initial configuration of the Gateway

You must configure the Gateway to allow you to distinguish multiple PBX VoIP gateways from each other. You may also want to configure a password for the gateway to prevent any unauthorized access.

3.5.1 Using the System Console

The following process shows how the host name and password can be configured via the system console. Before you begin, make sure to perform the following:

- Connect a VT100 terminal to the console port: 9600, 8, 1, N
- Switch on the gateway and wait until it displays "`Press Enter…`"

Step 1: Enter Privileged Mode

```
PBX GATEWAY>enable
Password: ******
PBX GATEWAY#
```

There is no (factory default) password set

Step 2: Enter configuration mode

```
PBX GATEWAY#configure terminal
Enter configuration commands, one per line.  End with CTRL/Z
PBX GATEWAY (config)#
```

Step 3: Modify the name of the gateway for easy reference

```
PBX GATEWAY (config)#hostname PBX Gateway
PBX Gateway (config)#
```

Step 4: Change the privileged mode password.

```
PBX Gateway (config)#password console read <password>
To configure the password for read-only privilege
or
PBX Gateway (config)#password console write <password>
```

To configure the password for read and write privileges

The privileges are divided into read-only and read-write with a different password for each privilege.

After you have issued this command, you will then be asked to enter this password each time you enter privileged mode. Any combination of characters and digits are allowed with a maximum of 6 characters/digits. Here is an example:

```
PBX Gateway (config)#password read console psw
PBX Gateway (config)#
```

3.6 IP Configuration

You must configure the IP address, subnet mask and default gateway so that the PBX VoIP Gateway is able to connect to the IP network. Since the device provides a 10BASE-T/100BASE-TX Ethernet interface with a default auto-negotiation setting, it should work like a plug-and-play device; therefore a manual configuration should seldom be necessary.

The system provides two types of IP assignment:

1. Manually assigned (static)[1]
2. DHCP server assigned

You can use the ***IP state*** command to select the appropriate mode that is used by your network. The default value is set to manually assigned. On the first time of setting up the gateway, you must assign the IP address manually. If you want the gateway to receive the IP address from a DHCP server, you must set the IP state mode to DHCP mode. If a DHCP server is used, it will request the IP address from the server. However, if the DHCP server does not respond within one minute, the system will attempt to use the manually assigned IP address.

Please note that when the system is in DHCP mode, the IP address received from the DHCP server will be saved in the configuration file, so if the PBX Gateway is unable to request an IP address from the DHCP server during the next boot up, this IP address will then be used.
Modifications will not take effect until after your system is restarted .

3.6.1 Assigning the User IP Address

Using the System Console Interface or Telnet

Step 1: Enter privileged mode

```
PBX GATEWAY>enable
Password: ******
PBX GATEWAY#
```

Step 2: Enter Configuration Mode

[1] While operating under a NAT environment, it is better to have a static IP address and redirect the port number to this static IP to provide remote managed access from the Internet.

```
PBX GATEWAY#configure
Enter configuration commands, one per line.  End with CTRL/Z
PBX GATEWAY (config)#
```

Step 3: Assign the IP address and the subnet mask

Command: PBX GATEWAY (config)#**ip address** <*ip-address*> <*subnet-mask*>

```
PBX GATEWAY (config)#ip address 203.79.238.144 255.255.255.128
System must then be restarted
PBX GATEWAY (config)#
```

Step 4: Assign the default gateway

Command: PBX GATEWAY (config)#**ip default-gateway** <*address*>

```
PBX GATEWAY (config)#ip default-gateway 203.79.238.186
PBX GATEWAY (config)#
```

Step 5: Save the configuration to non-volatile memory immediately. If you power the device off immediately, your new configurations will be lost when you switch the power off. However, the system will automatically save the configuration if no input has been detected within one minute.

```
PBX GATEWAY (config)#dbflush
PBX GATEWAY (config)#
```

Step 6: Switch back to privileged mode

```
PBX GATEWAY (config)#exit
PBX GATEWAY#
```

Step 7: You must now restart the system in order for your changes to take effect. After the restart command is issued, the system will prompt for a confirmation.

```
PBX GATEWAY#restart
This command resets the system.  System will restart operation code agent.
Reset system, [Y]es or [N]o? Yes
```

Using Phone Set Interface

Step 1: Take the handset off the phone

Step 2: Dial the PROG Access Code after hearing the dial tone (default is ##)

Step 3: Enter the Password (default is 0000)

Step 4: Enter code "02".

Step 5: Enter the IP address as "203","*","79","*","238","*","144" and "#" as the ending prompt. You will then hear the confirmation tone.

Step 6: Enter code "03" to begin the subnet mask configuration.

Step 7: Enter the subnet mask as "255", "*", "255", "*", "255", "*", "128" and "#" as the ending prompt. You will then hear the confirmation tone.

Step 8: Enter code "04" to begin configuring the IP address for the default gateway.

Step 9: Enter the IP address of the default gateway as "203", "*", "79", "*", "238", "*", "186" and "#" as the ending prompt. You will then hear the confirmation tone.

System must now be restarted

Step 10: Enter code "98" then press "1" and "#" as the ending prompt. You will then hear the confirmation tone, and the system will restart automatically.

Place the handset on the phone to end your configuration session.

3.6.2 Obtaining an IP Address From a DHCP Server

Using System Console Interface

Step 1: Enter Privileged Mode

```
PBX GATEWAY>enable
Password: ******
PBX GATEWAY#
```

Step 2: Enter Configuration Mode

```
PBX GATEWAY#configure
Enter configuration commands, one per line.  End with CTRL/Z
```

```
PBX GATEWAY (config)#
```

Step 3: Enable DHCP Mode

```
PBX GATEWAY (config)#ip state dhcp
PBX GATEWAY (config)#
```

Step 4: Back to Privileged Mode

```
PBX GATEWAY (config)#exit
PBX GATEWAY#
```

Step 5: Restart the system to enable DHCP mode. After the restart command is issued, the system will prompt for a confirmation.

```
PBX GATEWAY#restart
This command restarts the system.  The system will now restart operation code
agent.
Reset system, [Y]es or [N]o? Yes
```

Using Phone Set Interface (please refer to the **Phone Set Interface Configuration Procedures** for more detailed information)

Step 1: Take the handset off the phone. **Step 2:** After hearing the dial tone dial the PROG Access Code.

Step 3: Enter the Password.[2]

Step 4: Enter code `"01"` to begin configuring the DHCP state.

Step 5: Enter `"1" to enable DHCP client` and `"#"` as the ending prompt. You will then hear the confirmation tone. (Or enter `"0" to disable the DHCP client` and `"#"` as the ending prompt).

`System must now be restarted`

Step 6: Enter code `"98" then press "1" and "#" as the ending prompt`. You will then hear the confirmation tone, the system will then restart automatically.

```
Place the handset on the phone to end your configuration session.
```

[2] The (default) password for the Phone Set Interface is "0000".

3.7 Configuring the Master Device

Using the System Console Interface or Telnet

Step 1: Enter Privileged Mode

```
PBX GATEWAY>enable
Password: ******
PBX GATEWAY#
```

Step 2: Enter Routing Mode

```
PBX GATEWAY#routing
PBX GATEWAY (routing)#
```

Step 3: Configure this device as the master gateway by setting its value to 0.0.0.0[3]

```
Command: PBX GATEWAY (routing)#master_ip 0.0.0.0
PBX GATEWAY (routing)#
  (System must be restarted before the new configurations will take effect )
```

Step 4: Configure the group ID that is used for the entire group

```
Command: PBX GATEWAY(routing)#group_id <the group ID for the entire group, same
value for master and slaves that are in the same group>
PBX GATEWAY(routing)#group_id 2000
 System must now be restarted
PBX GATEWAY(routing)#
```

Step 5: Go back to Privileged Mode

```
PBX GATEWAY (routing)#exit
PBX GATEWAY#
```

Step 6: Restart the system in order for the settings to take effect. After the restart command is issued, the system will prompt for a confirmation.

```
PBX GATEWAY#restart
This command restarts the system. The system will now restart operation code
```

[3] The default master IP address is 0.0.0.0 and the default role of each device is to act as the master device. To change a slave device back into a master, just change the IP address to "0.0.0.0".

agent.

Reset system, [Y]es or [N]o? Yes

Step 7: Configuring the Prefix for the gateway

The prefix for the gateway should be assigned by the network administrator and configured to the device. It will be carried in the routing messages to notify the master device of its prefix for other gateways to route its calls.

Command: PBX GATEWAY (routing)#**prefix** <prefix for this gateway>

PBX GATEWAY (routing)#**prefix** 99

PBX GATEWAY (routing)#

Step 8: Configuring the Internal Call Access code for the gateway

Command: PBX GATEWAY(routing-code)#**internal_ac** <Internal Calls Access code for this gateway>

PBX GATEWAY(routing)#**code**

PBX GATEWAY(routing-code)#

PBX GATEWAY(routing-code)#**internal_ac** *

Step 9: Configuring the Extension Number Length of the PBX

Command: PBX GATEWAY(routing-code)#**extension_len** <length of extension number of PBX>

PBX GATEWAY(routing)#**code**

PBX GATEWAY(routing-code)#

PBX GATEWAY(routing-code)#**extension_len** 3

(System must be restarted in order for the new configurations to take effect)

Using the Phone Set Interface (please refer to **Phone Set Interface Configuration Procedures** for more detailed information)

Step 1: Take the handset off the phone.

Step 2: After hearing the dial tone, dial the PROG Access Code.

Step 3: Enter the Password.

Step 4: Enter code "06" to begin configuring the IP address of the master gateway.

Step 5: Enter the IP address for the master gateway as "0", "*", "0", "*", "0", "*", "0"

and "#" as the ending prompt. You will then hear the confirmation tone.

Step 8: Enter code "05" to begin the group ID configuration.

Step 9: Enter the group ID as "2009" and "#" as the ending prompt. You will then hear the confirmation tone.

System must now be restarted

Step 10: Enter code "98" then press "1" and "#" as the ending prompt. You will then hear the confirmation tone and the system will restart automatically.

Step 11: Enter code "09" to begin configuring the prefix for this gateway.

Step 12: Enter the prefix as "99" and "#" as the ending prompt. You will then hear the confirmation tone.

Step 13: Enter code "14" to begin configuring the Internal Call Access code for this gateway.

Step 14: Enter the Internal Call Access Code as "*" and "#" as the ending prompt. You will then hear the confirmation tone.

Step 15: Enter code "28" to begin configuring the Extension Number Length of the PBX for this gateway.

Step 16: Enter the Extension Number Length of the PBX as "3" and "#" as the ending prompt. You will then hear the confirmation tone.

System must now be restarted

Step 17: Enter code "98" then press "1" and "#" as the ending prompt. You will then hear the confirmation tone and the system will restart automatically.

Replace the handset on the phone to end your configuration session.

3.8 Adding A New Slave Device to the Group

Since the master PBX gateway keeps a list of slaves, you need to join your new slave into the group by adding an entry in the master for this slave gateway . To add an entry you have to input the MAC address into the member list of slave devices.

Add the MAC address of the New Slave to the Master Device's slave list

Using the System Console Interface or Telnet on the Master

Step 1: Enter Privileged Mode

PBX GATEWAY>**enable**

```
Password: ******
PBX GATEWAY#
```

Step 2: Enter Routing Mode

```
PBX GATEWAY#routing
PBX GATEWAY (routing)#
```

Step 3: Create an entry for this slave gateway

```
Command: PBX GATEWAY (routing)#slave add <ffffff-ffffff, the MAC address of
this Slave Device>

PBX GATEWAY (routing)#slave add 000362-000004
PBX GATEWAY (routing)#show slave
0001. 00-03-62-00-00-01
0002. 00-03-62-01-00-01
0003. 00-03-62-01-00-1B
0004. 00-03-62-01-00-30
0005. 00-03-62-00-00-04
0006. 00-03-62-01-00-06
```

Using the Phone Set Interface to create an entry for the Slave Gateway on the Master Gateway
(please refer to the **Phone Set Interface Configuration Procedures** for more detailed information)

Step 1: Takethe handset off the phone.
Step 2: After hearing the dial tone Dial the PROG Access Code.
Step 3: Enter the Password.
Step 4: Enter code `"22"` to begin creating an entry for the slave gateway.
Step 5: Enter the **last** 6 characters of the MAC address of the slave gateway (00-03-62-00-00-04) as `"000004"` and `"#"` as the ending prompt. You will then hear the confirmation tone.

```
Place the handset on the phone phone to end your configuration session.
```

Configure the Group ID and the MasterIP Address on the Slave

Using the System Console Interface or Telnet on the Slave Device

Step 1: Enter Privileged Mode

```
PBX GATEWAY>enable
Password: ******
PBX GATEWAY#
```

Step 2: Enter Routing Mode

```
PBX GATEWAY#routing
PBX GATEWAY (routing)#
```

Step 3: Configure this device as the master gateway

```
Command: PBX GATEWAY (routing)#master_ip 211.21.40.180
PBX GATEWAY (routing)#
```

Step 4: Configure the group ID that is used for the entire group

```
Command: PBX GATEWAY(routing)#group_id <the group ID for the whole group, same
value for master and slaves in the same group>
PBX GATEWAY(routing)#group_id 2000
 System need to restart
PBX GATEWAY(routing)#
```

Step 5: Go back to Privileged Mode

```
PBX GATEWAY (routing)#exit
PBX GATEWAY#
```

Step 6: Restart the system for the new settings to take effect. After the restart command is issued, the system will prompt for a confirmation.

```
PBX GATEWAY#restart
This command restarts the system.  The system will now restart operation code
agent.
Reset system, [Y]es or [N]o? Yes
```

Step 7: Configuring the prefix for the gateway

The prefix of the gateway should be assigned by the network administrator and configured to the device. It will be carried in the routing messages to notify the master device of its prefix for other gateways to route its calls.

```
Command: PBX GATEWAY (routing)#prefix <prefix for this gateway>

PBX GATEWAY (routing)#prefix 33
PBX GATEWAY (routing)#
```

Step 8: Configuring the Internal Call Access code for the gateway (default is "*")

```
Command: PBX GATEWAY(routing-code)#internal_ac <Internal Calls Access code for this gateway>
PBX GATEWAY(routing)#code
PBX GATEWAY(routing-code)#
PBX GATEWAY(routing-code)#internal_ac *
```

Step 9: Configuring the Extension Number Length of the PBX

```
Command: PBX GATEWAY(routing-code)#extension_len <length of extension number of PBX>
PBX GATEWAY(routing)#code
PBX GATEWAY(routing-code)#
PBX GATEWAY(routing-code)#extension_len 3
```

(System must be restarted in order for the new configurations to take effect)

Using Phone Set Interface to Set the IP Address of the Master Gateway on the Slave Gateway

(please refer to the **Phone Set Interface Configuration Procedures** for more detailed information)

Step 1: Take the handset off the phone.

Step 2: After hearing the dial tone Dial the PROG Access Code.

Step 3: Enter the Password.

Step 4: Enter code `"06"` to begin configure the IP address of the master gateway.

Step 5: Enter the IP address of the master gateway as `"211", "*", "21", "*", "40", "*", "180"` and `"#"` as the ending prompt. You will then hear the confirmation tone.

Step 8: Enter code `"05"` to begin the group ID configuration.

Step 9: Enter the group ID as `"2009"` and `"#"` as the ending prompt. You will then hear the

confirmation tone.

System must now be restarted

Step 10: Enter code "98" then press "1" and "#" as the ending prompt. You will then hear the confirmation tone andthe system will restart automatically.

Step 11: Enter code "09" to begin configuring for prefix for this gateway.

Step 12: Enter the prefix as "33" and "#" as the ending prompt. You will then hear the confirmation tone.

Step 13: Enter code "14" to begin configuring the Internal Call Access code for this gateway.

Step 14: Enter the Internal Call Access Code as "*" and "#" as the ending prompt. You will then hear the confirmation tone.

Step 15: Enter code "28" to begin configuring the Extension Number Length of the PBX for this gateway.

Step 16: Enter the Extension Number Length of the PBX as "3" and "#" as the ending prompt. You will then hear the confirmation tone.

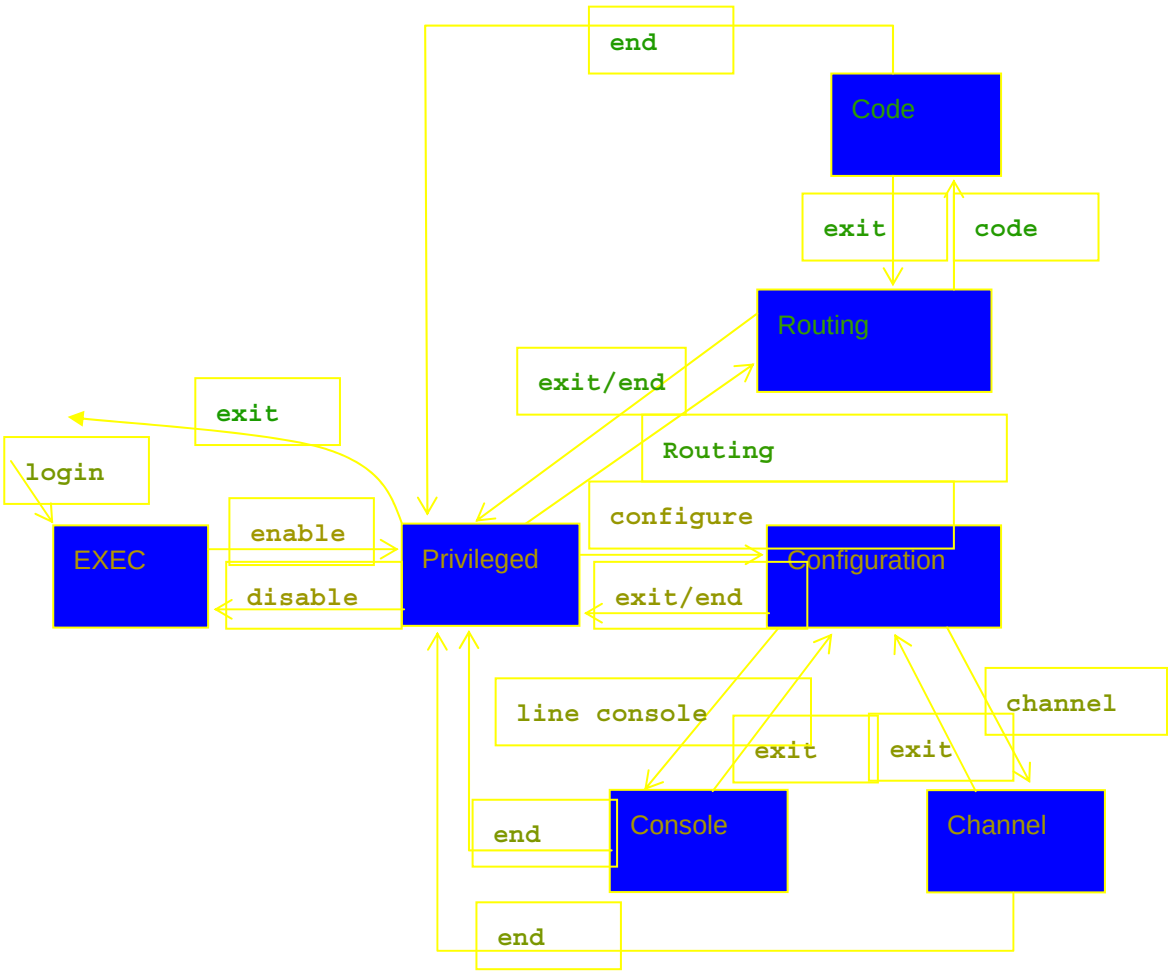
System must now be restarted

Step 17: Enter code "98" then press "1" and "#" as the ending prompt. You will then hear the confirmation tone andthe system will restart automatically.

Place the handset on the phone phone to end your configuration session.

4. Basic Configuration

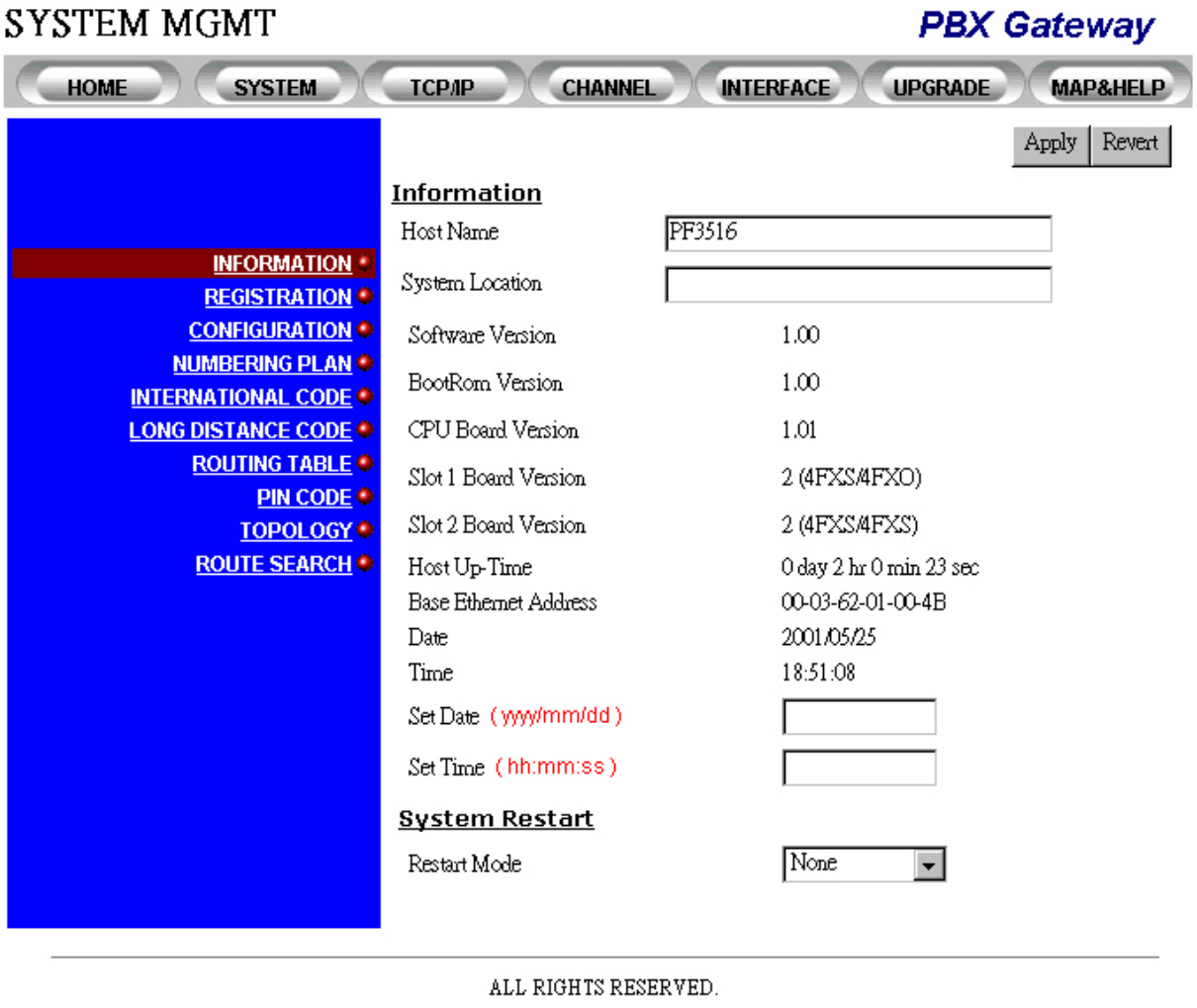
4.1 System Console Modes



4.2 System Management

The following general information is needed to configure the system with the appropriate routing information to route calls between PBXs and voice gateways. You must configure the prefix and group ID that will be used inside the group of PBX VoIP gateways. The master gateway IP address is essential for a PBX VoIP gateway to synchronize the routing information.

4.2.1 Information-Web Management



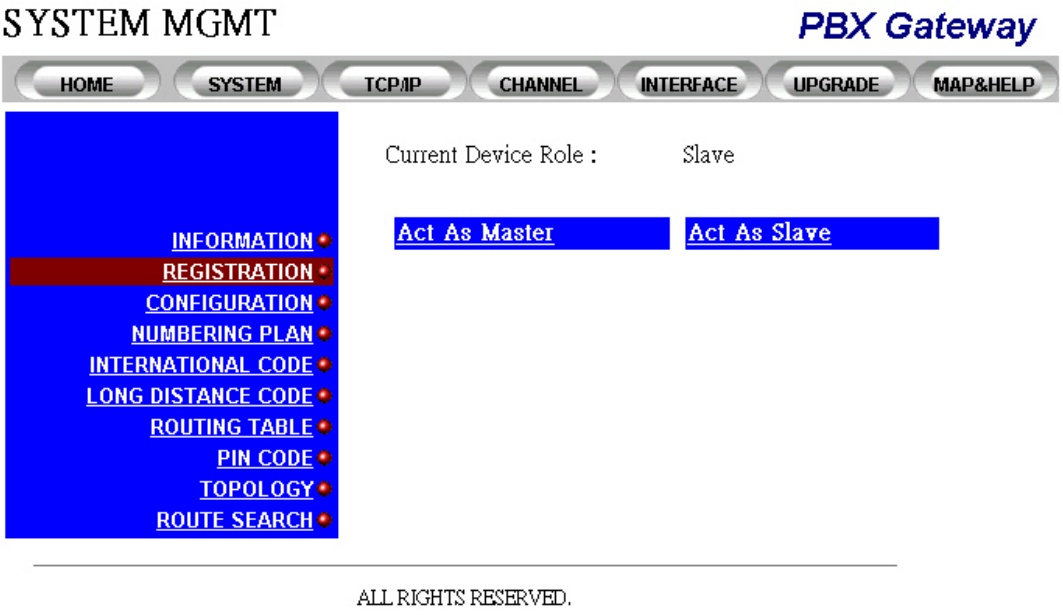
Category	Entry	Description	Data Type	Range
Information	Host Name	Name of the gateway for the system administrator to distinguish this gateway from others. It will also be used as a prompt in the system console.	RW	Any string up to 48 characters in length can be used. You may input a total of 255 characters. However, once a length of 48 is reached, any characters above that will be truncated.
	Location	This entry allows the system administrator to identify the gateway's location.	RW	Any string up to 48 characters in length can be used. You may input a total of 255 characters. However, once a length of 48 is reached, any characters above that will be truncated.
	Software Version	Current software version	RO	X.XX
	BootRom Version	Current BootRom Code version	RO	X.XX
	CPU Board Version	Current CPU Board version	RO	X.XX
	FXS Board Version	Current FXS Board version	RO	X.XX
	Host Up-Time	System Up-Time since the last Warm Start	RO	X.XX
	Base Ethernet Address	The Ethernet Address of this device	RO	XX-XX-XX-XX-XX-XX
	Date	Current date	RW	yyyy/mm/dd

Category	Entry	Description	Data Type	Range
	Time	Current Time	RW	hh:mm:ss
System Restart	Restart Mode	This pull-down menu allows you to select the restart mode: **None**: No system restart will be issued: **Cold Start**: The system will restart from the beginning. The running code will be decompressed from the flash memory and initiate all the system parameters. **Warm Start**: The system will restart but the running code will not be decompressed.	RW	NONE Cold Start Warm Start

4.2.2 Console Commands -System Information

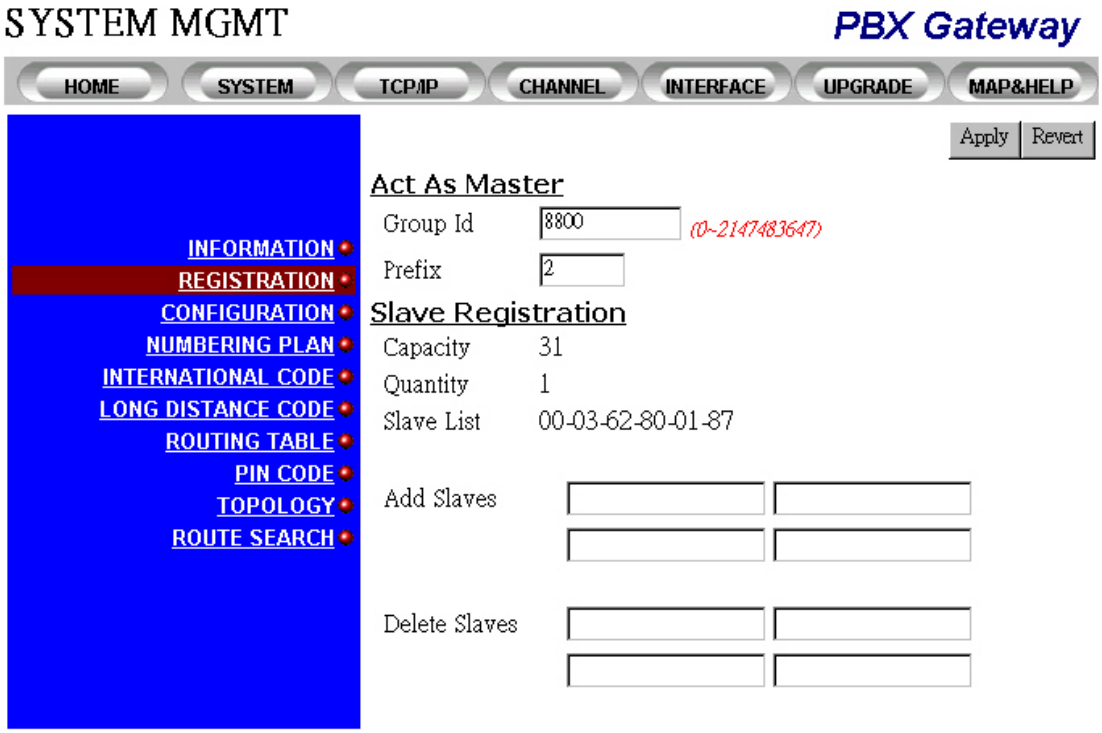
Category	Entry	Console Mode	Console Command	Data Type
Information	Host Name	Configuration	**hostname** *<string>*	RW
	Location	Configuration	**location** *<string>*	RW
	Software Version	EXEC/Privilege	**Show Version**	RO
	BootRom Version	EXEC/Privilege	**Show Version**	RO
	CPU Board Version	EXEC/Privilege	**Show Version**	RO
	FXS Board Version	EXEC/Privilege	**Show Version**	RO
	Host Up-Time	EXEC/Privilege	**Show Version**	RO
	Base Ethernet Address	EXEC/Privilege	**Show Version**	RO
	Date	EXEC/Privilege	**Show date**	RO
	Time	EXEC/Privilege	**Show time**	RO
	Date	Configuration	**date** *<yyyy/mm/dd>*	RW
	Time	Configuration	**time** *<hh:mm:ss>*	RW
System Restart	Restart Mode	Privilege	**restart** for warm start **reload** for cold start	WO

4.2.3 Registration-Web Interface



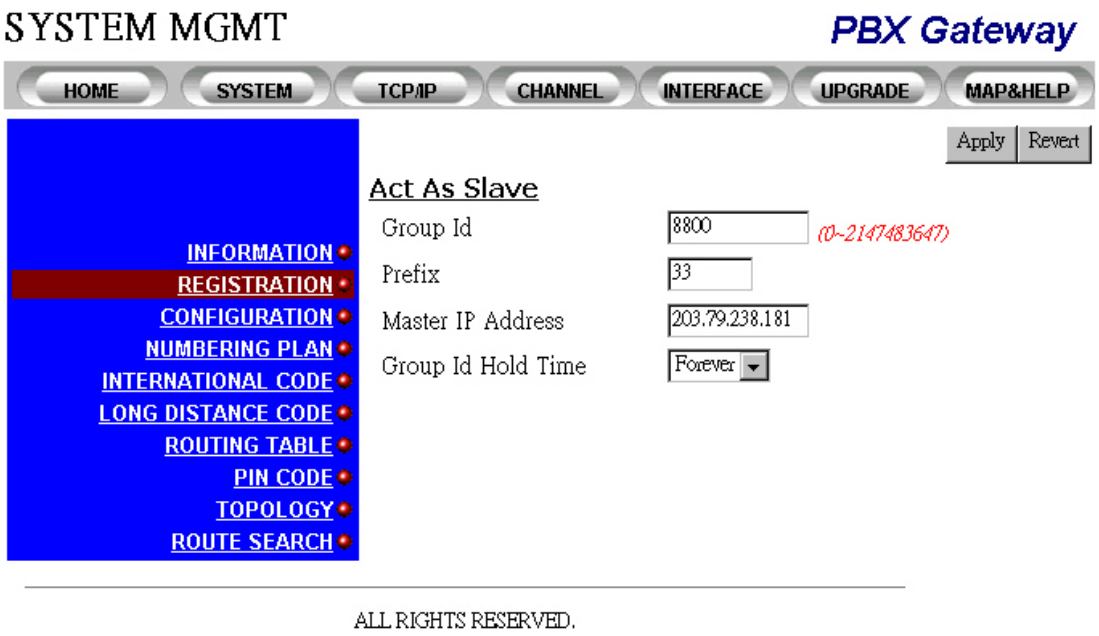
Category	Entry	Description	Data Type	Range
Registration	Current Device Role	Slave: This device is currently configured as a slave gateway. Master: This device is currently configured as a master gateway.	RO	
	As Master / As Slave	Name of the gateway for the system administrator to distinguish this gateway from others. It will also be used as a prompt in the system console.	RO	

As a Master



Category	Entry	Description	Data Type	Range
Act As Master	Group ID	The Group ID for PBX VoIP Gateway	RW	0~2147483647
	Prefix	The prefix is the code used to route a call to this gateway	RW	1~9999
Slave Registration	Capacity	The allowed capacity for slave entries	RO	31 not including the Master
	Quantity	Current registered slaves	RO	0~31
	Slave List	The list of MAC addresses of slaves currently registered.	RO	
	Add Slaves	Entry to add the MAC address of a slave	RW	XX-XX-XX-XX-XX-XX
	Delete Salves	Entry to delete the MAC address of a slave	RW	XX-XX-XX-XX-XX-XX

As a Slave



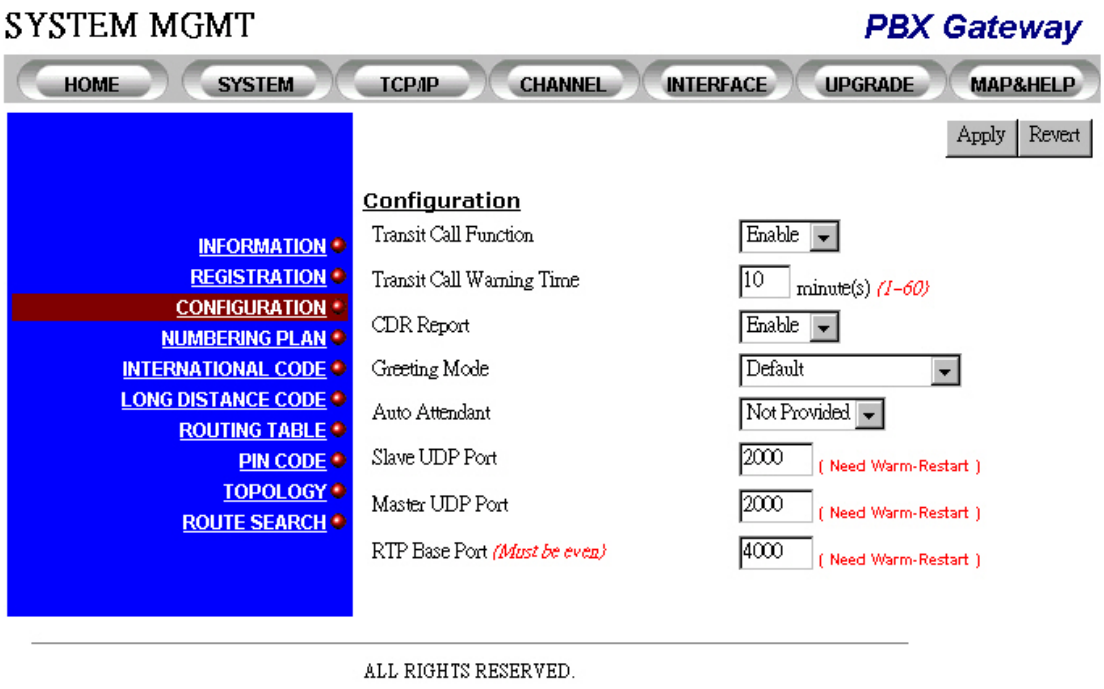
Category	Entry	Description	Data Type	Range
Act As Slave	Group ID	The Group ID for the PBX VoIP Gateway	RW	0~2147483647
	Prefix	The code used to route a call to this gateway	RW	1~9999
	Master IP Address	The IP Address of the Master gateway	RW	XXX.XXX.XXX.XXX
	Group ID Hold Time[4]	The Hold Time for the Group ID in the device when it is switched off	RW	Forever|0.5 hr|1.0 hr|1.5 hr|2.0 hr|2.5 hr|3.0 hr|3.5 hr|4.0 hr|4.5 hr|5.0 hr

[4] The Group ID Hold time is used to protect the group ID, as well as to deter any would be intruders from stealing the device and re-installing it at another location.

4.2.4 Registration Information- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
Registration	Group ID	Routing	**group_id** *<number>*	RW
	Prefix	Routing	**prefix** *<number>*	RW
	Master IP	Routing	**master_ip** *<xxx.xxx.xxx.xxx>*	RW
	Add Slave	Routing	**Slave add** *<ffffff-ffffff>*	RW
	Delete Slave	Routing	**Slave del** *<ffffff-ffffff>*	RW
	Group ID Hold Time	Routing	**gid_tmr** *<0-255>*	RW
	Slave List	Routing	**show slave**[5]	RO

4.2.5 Configuration-Web Interface



[5] The “show slave” option is only available using the console interface on the master gateway. .

Category	Entry	Description	Data Type	Range
Configuration	Transit Call Function	Enable or disable Transit Calls	RW	Enable/Disable
	Transit Call Waiting Time	The timer for sending a warning tone to the caller while a transit call is taking place.	RW	(1~60) min (Default=3)
	CDR Report	Enables or disables CDR report output[6]	RW	Enable/Disable
	Greeting Mode	There is no message recorded by default. You can record your own greeting message and select how many times to play the recording.[7]	RW	**Default**(Not to play), Play Recording Once, twice, 3, 4, 5, 6, 7, 8 times
	Auto Attendant	Shows whether or not your PBX is equipped with the Auto Attendant function	RW	Provided/Not Provided
	Slave UDP Port No.	The UDP port number which carries Call Control signaling from this slave devices with other gateways	RW	0~65535 (**default value is 2000**)
	Master UDP Port No.	The UDP port number which carries Port Information signals to the master device	RW	0~65535 (**default value is 2000**)
	RTP Base Port No.	The Base RTP port number which carries voice streaming data between gateways	RW	0~65535 (must be even)

Note 2 The master UDP port number on slave devices should be the same as the definition on the master device. But the slave UDP port number for each slave may be different for each device.

The configurations of the UDP port number and the RTP port number are related to the firewall settings of your network (refer to chapter 6 Firewall Configuration). Please consult your network administrator before making any changes.

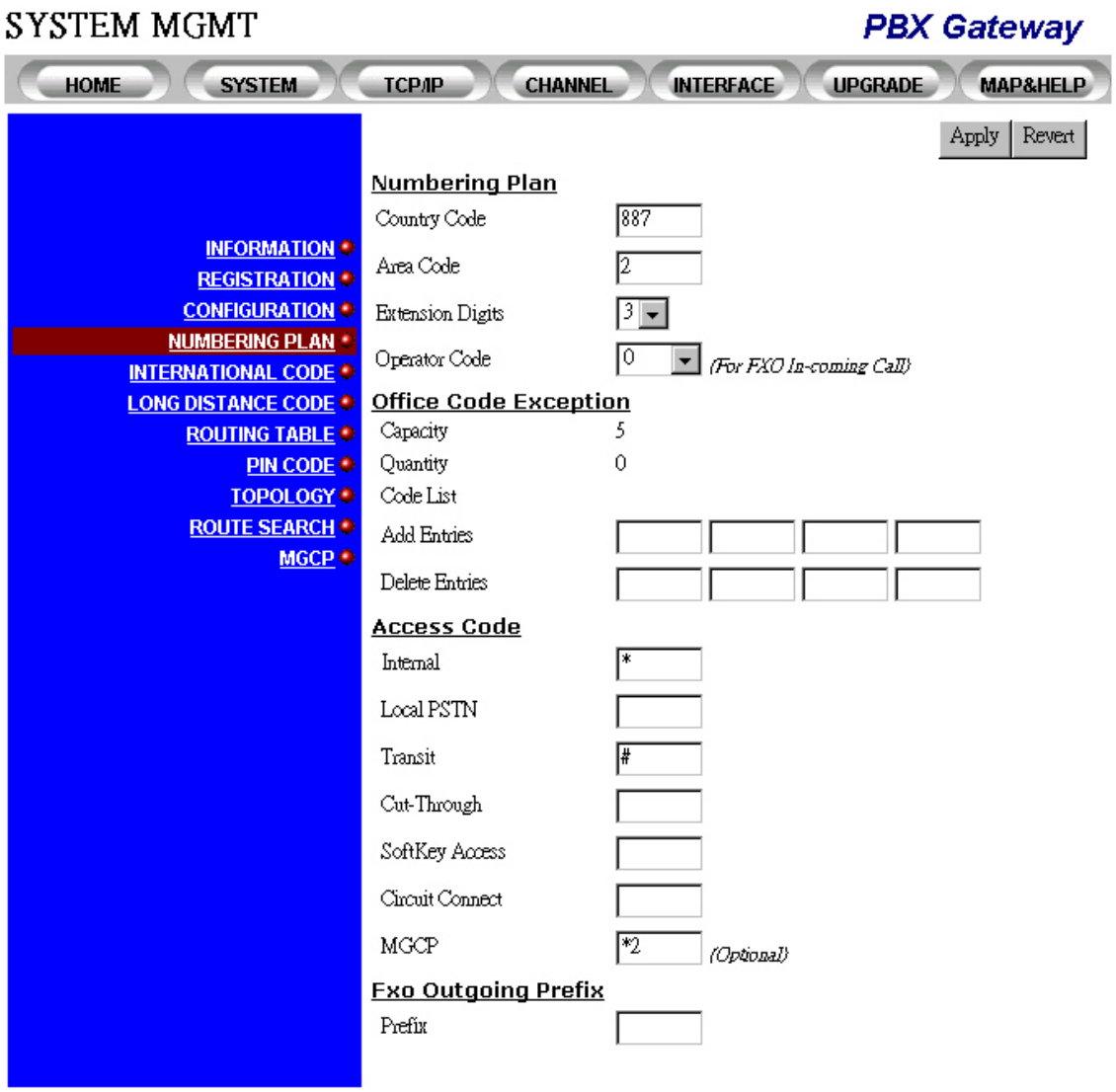
[6] CDR report works only on models that are equipped with the extra RS-232 CDR output interface
[7] You can use the Phone Set Interface to configure the Skip Greeting Access Code (item code 30) to specify the access code while trying to bypass the greeting message recorded in the device.

4.2.6 Configuration Information- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
Routing	Transit Call Function	Routing	**transit_call** *<enable/disable>*	RW
	CDR Report	Routing	**cdr**[8] *<enable/disable>*	RW
	Greeting Mode	Routing	**greet_mode** *<default/recoding>*	RW
	Auto Attendant	Routing	**auto_attn** *<enable/disable>*	RW
	Master UDP Port No.	Routing	**udp_port master** *<0-65535>*	RW
	Slave UDP Port No.	Routing	**udp_port slave** *<0-65535>*	RW
	RTP Base Port No.	Routing	**rtp_base** *<0-65535>*	RW

[8] The CDR function is not provided in FXS only models.

4.2.7 Numbering Plan-Web Interface



Category	Entry	Description	Data Type	Range
Numbering Plan	Country Code	The Country Code where this gateway is located. Used for receiving incoming calls from other countries	RW	1~999
	Area Code	The Area Code where this gateway is located. Used for receiving incoming calls from other areas	RW	1~999
	Extension Digits	The number of digits for the PBX lines	RW	1-9
	Operator Code[9]	The number that the PBX assigns that is used to connect to the operator	RW	NONE, 0-9
Office Code Exception[10]	Capacity	The number of Exceptional Office Code entries that are allowed to be specified on this gateway	RO	5
	Quantity	The number of Exceptional Office Code entries that are currently specified on this gateway	RO	0-5
	Code List	The list of Exceptional Office Codes that are currently configured in this gateway	RO	[0~9], example "0349", "0343"
	Add Entries	The Exceptional Office Codes to be added to the Code List	WO	[0~9], example "0349", "0343"
	Delete Entries	The Exceptional Office Codes to be removed from the Code List	WO	[0~9], example "0349", "0343"
Access Code	Internal	The Access Code used to make a call in-between the PBX gateways in the same group (See application in 2.1 Internal Calls)	RW	[0~9,*,#][0~9], example "*12345" (Default=*)
	Local PSTN	Define the Access Code to force a call in from local FXS and out from local FXO interface on the PBX gateway to PSTN[11]. (FXS to FXO ;bypass of routing selection)	RW	[0~9,*,#][0~9], example "*12345"
	Transit	The Access Code used to make a call from the PSTN to the FXO port on this device and call out from the FXO interface on the remote PBX gateway to the PSTN (This function takes effect only when you have FXO interfaces existing in your group) [12]	RW	[0~9,*,#][0~9], example "*12345" (Default=#)

[9] If you assign "0" as the operator access code, please ensure that "0" is not also the long distance access code. If both the operator access code and the long distance access codes are assigned "0", the PBX gateway will treat the number as a call to operator of your PBX.
[10] Office Code Exception are the Area Codes of other locations that have first few digits are exactly the same as the Area Code for this PBX Gateway, it should take as a long distance call if we wants to make a calls to those area.
[11] This function works only on models that come with the FXO interface.
[12] This function works only on models that come with the FXO interface.

Category	Entry	Description	Data Type	Range
	Cut Through	While access the FXO ports, in order to dial out directly bypass to the FXS ports of this device without listen to the Greeting Message that recorded in the device, then press this Access Code. (FXO to FXS)	RW	[0~9,*,#][0~9], example "*12345" (Default is Blank)
	Softkey Access	Define the Access Code to trigger the soft-key defined for each channel manually	RW	[0~9,*,#][0~9], example "*12345" (Default is empty)
	Circuit Connect	Define the Access Code for logical circuit-connect dialing. With this access code plus the prefix and port number, the port that start this circuit connect action will connected to the remote port similar that there are circuit between.	RW	[0~9,*,#][0~9], example "*12345" (Default is empty)
	MGCP	Define the Access Code to make a call to remote MGCP registered entries. Example: *2 is the MGCP access code, 30002300 is the number of entry that registered in Call Agent. Dial "*2" first, after hearing the dial tone, dial "30002300" user can hear the ring back tone that connecting to this entry.	RW	[0~9,*,#][0~9], example "*12345" (Default is empty)
FXO Outgoing Prefix	Prefix	Define the prefix that whenever dial out from FXO port, it is useful for connecting under the lines of PBX	RW	[0~9,*,#][0~9][P[13]], example "9P" (Default is empty)

[13] "P" in large capital means pause for one second, while connecting the voice gateway to extension lines of PBX, it will take seconds for PBX to find an available PSTN connection for you. User can apply multiple "P" if user wants take pause for more than one second.

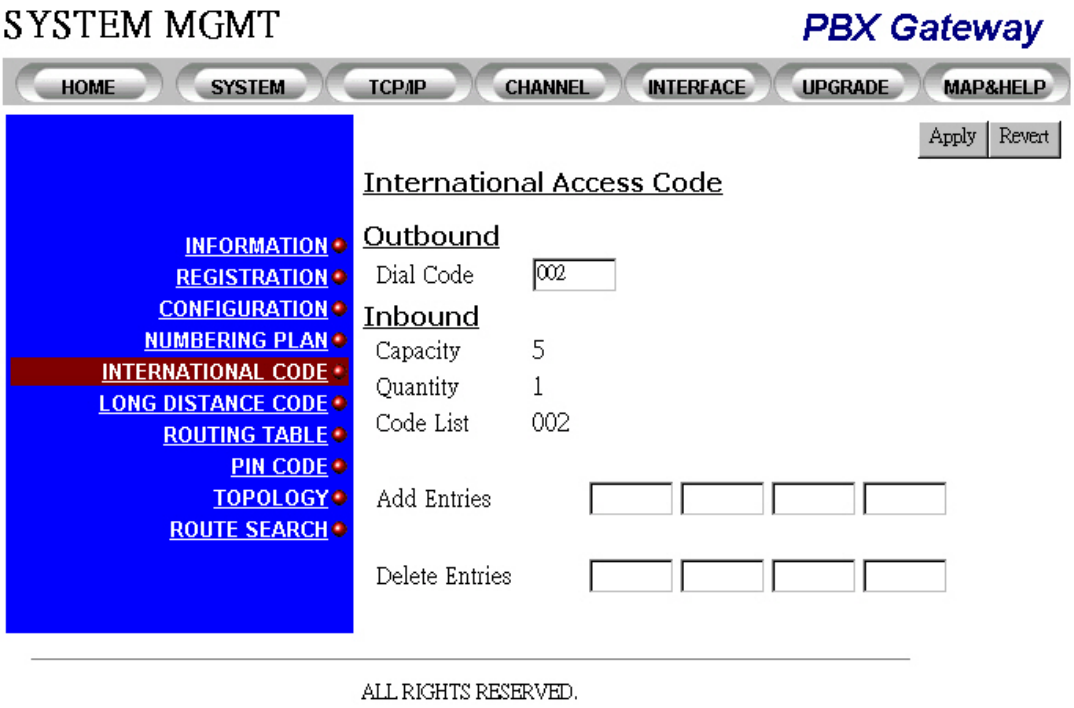
4.2.8 Numbering Plan Information- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
Routing Configuration	Country Code	Code	**country** *<1-999>*	RW
	Area Code	Code	**area** *<1-999>*	RW
	Circuit Connect	Code	**circuit_connect** *<Access Code>*	RW
	Cut_Through	Code	**Cut_Through** *<Access Code>*	RW
	Dial Code	Code	**Dial_code <**international| long_distance> *<1-999>*	RW
	Extension Digits	Code	**extension_len** *<1-9>*	RW
	FXO Outgoing Prefix	Code	**fxo prefix** *<Access Code|P*[14]*>*	RW
	Internal Access Code	Code	**internal_ac** *<Access Code>*	RW
	International Call Access Code	Code	**intn_code** *<1-999>*	RW
	Long Distance Call Access Code	Code	**long_distance** *<1-999>*	RW
	Local PSTN Access Code	Code	**local_pstn_ac** *<Access Code>*	RW
	Office Code Exception	Code	**office_excp** *<1-999>*	RW
	PBX Operator Access Code	Code	**oper_code** *<d|1~9>* (d is the default value, that stands for None Operator Code)	RW
	Phone Set Program Access Code	Code	**prog_ac <***Access Code***>** (Default=##)	RW
	Softkey Access	Code	**soft_start <***Access Code***>**	RW
	Transit Call Access Code	Code	**transit_ac <***Access Code***>**	RW
	MGCP Call	Code	**voiptk_ac**	RW

Note 3 An access Code can be characters ranging from [*|#|0~9] or the character plus a number between 1 and 5 digits. For example, you can set your access code to "*", "*1", "*999" ,etc...

[14] After the FXO outgoing prefix code, you can add “P” which means pause for one second. If multiple “P” are specified, the number of “P” will be the number of seconds before sending the reset of digits.

4.2.9 International Code-Web Interface



Category	Entry	Description	Data Type	Range
International Access Code (Outbound)	Dial Code	The number that is added before the Country code, Area Code and subscriber's telephone number to gain International Call access. Applies to PBX Gateway with FXO interface only.	RW	0-999
International Access Code (Inbound)	Capacity	The number of In-bound International Access Code entries that are allowed to be specified on this gateway	RO	5
	Quantity	The number of In-bound International Access Code entries that are currently specified on this gateway	RO	0-5
	Code List	The list of Inbound International Access Codes that are currently configured on this gateway	RO	[0~9], example "012", "002"
	Add Entries	The Access Codes that you are going to add to the Code List	WO	[0~9], example "012", "002"

	Delete Entries	The Access Codes that you are going to remove from the Code List	WO	[0~9], example "012", "002"

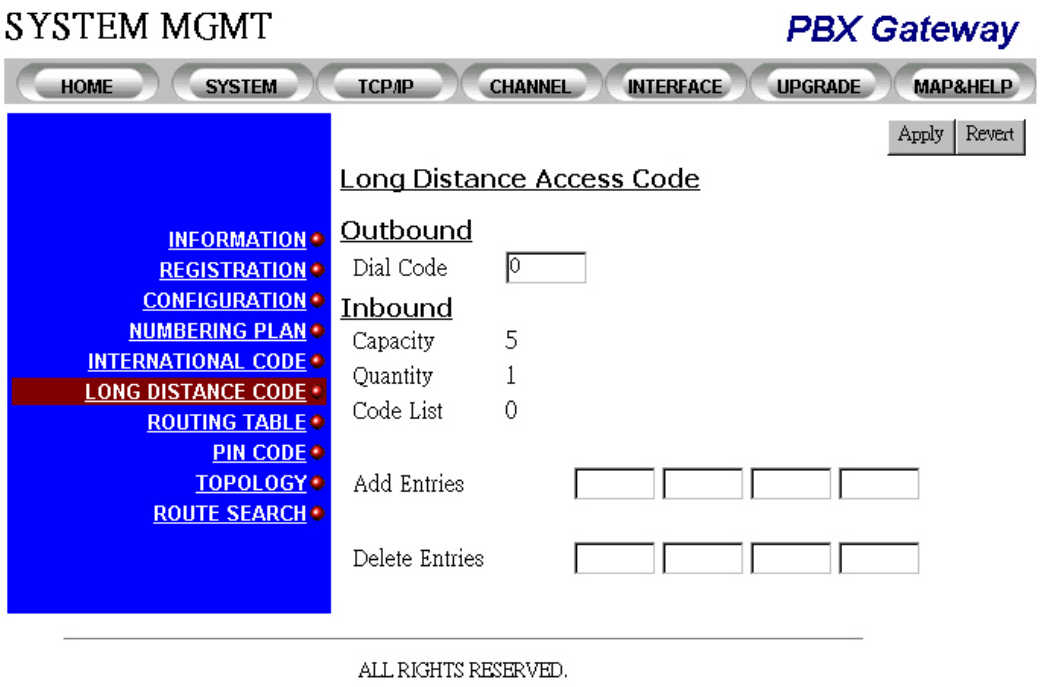
Note 4 The Inbound International Access Code is used to analyze the number that the gateway is receiving from analog voice interfaces. The received numbers are carried with this specified Inbound International Access Code, and the call will be routed to the remote gateway through the FXO interface to its PSTN. The user will then only need to pay domestic phone fees instead of international phone fees. Or, an international call will be sent directly through the local FXO interface as an international call from a local PSTN and will not be able to benefit from the Toll-bypass advantage. *If your gateway is not permitted to make international calls through the remote gateway, leave the In-bound International Access Code entry blank*.

4.2.10 International Code Information- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
International Access Code (Outbound)	Dial Code	Code	**dial_code international** *<1-999>*	RW
International Access Code (Inbound)	Code List	Code	**show ac_summary**	RO
	Add Entries	Code	**intn_code add** *<1-999>*	RW
	Delete Entries	Code	**intn_code del** *<1-999>*	RW

Note 5 The Access Code here is the same as the code that you would be dialing locally to make an international call.

4.2.11 Long Distance Code-Web Interface



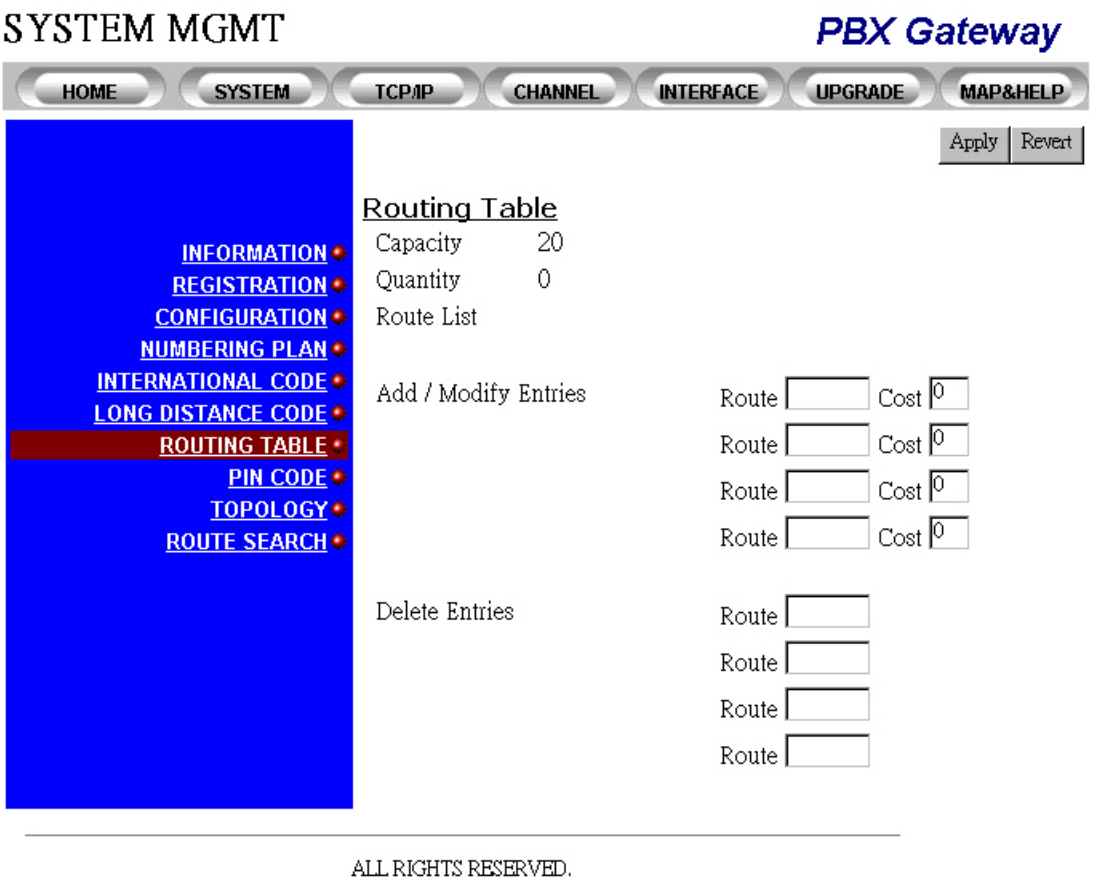
Category	Entry	Description	Data Type	Range
Long Distance Access Code (Outbound)	Dial Code	The number plus the Area Code and the subscriber's telephone number. Applies to PBX Gateway with FXO interface only.	RW	0-999
Long Distance Access Code (Inbound)	Capacity	The number of In-bound International Access Code entries that are allowed to be specified on this gateway	RO	5
	Quantity	The number of In-bound International Access Code entries that are currently specified on this gateway	RO	0-5
	Code List	The list of Inbound International Access Codes that are currently configured on this gateway	RO	[0~9], example "012", "002"
	Add Entries	The Access Codes that you are going to add to the Code List	WO	[0~9], example "012", "002"
	Delete Entries	The Access Codes that you are going to remove from the Code List	WO	[0~9], example "012", "002"

4.2.12 Long Distance Code Information- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
Long Distance Access Code (Outbound)	Dial Code	Code	**dial_code long_distance** *<1-999>*	RW
Long Distance Access Code (Inbound)	Code List	Code	**show ac_summary**	RO
	Add Entries	Code	**long_distance add** *<1-999>*	RW
	Delete Entries	Code	**long_distance del** *<1-999>*	RW

Note 6 The Access Code here is the same as the code that you would be dialing locally to make a Long Distance call.

4.2.13 Routing Table-Web Interface



Category	Entry	Description	Data Type	Range
Routing Table	Capacity	The number of allowed entries used for routing a call to the PSTN via the gateway[15]	RO	20
	Quantity	The number of routing entries that are currently configured on the gateway	RO	0-20
	Route List	List of route entries with their corresponding route costs	RO	Format: [*Routing Entry - Cost*]
	Add /Modify Entries	To add or modify a routing entry and/or its cost	WO	*Routing Entry:* 0-999999; *Cost:* 1~99

[15] This function works only on gateways that are equipped with the FXO interface. For FXS only gateways, you will not be able to see the members list under the Topology icon using the Web Interface.

	Delete Entries	To delete a routing entry	WO	0-999999

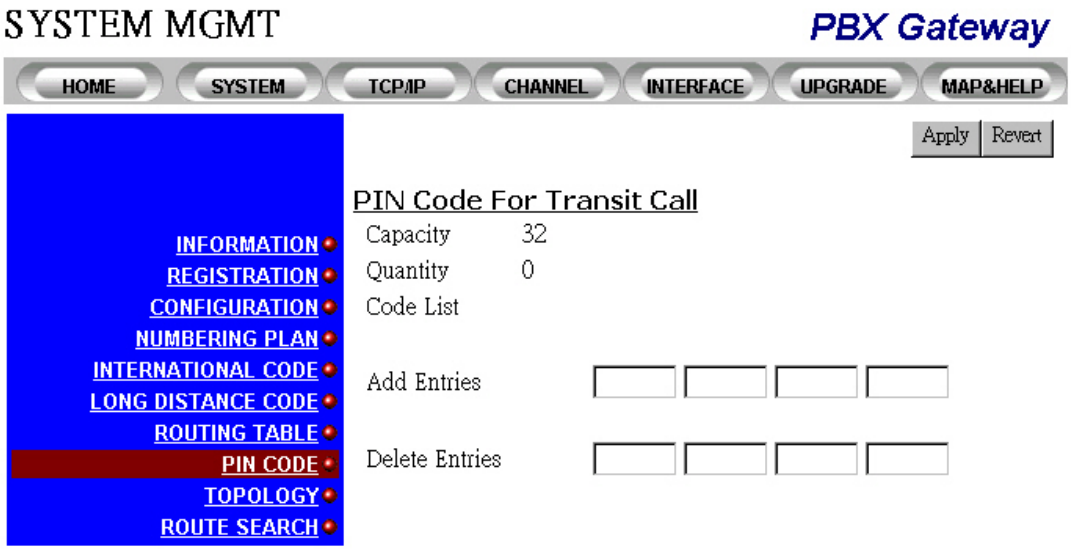
Note 7 For example, if a gateway is installed in the USA and is assigned to be the routing gateway for all calls in the group to Ottawa, Canada, the routing entry for this example will be 1613 with cost 1 . You will also need to specify the outbound International Access Code 011. So calls from a gateway in Hong Kong will be routed to a PSTN in the USA using the dial out number 011-1-613-xxxx-xxx to Ottawa-Canada.

4.2.14 Routing Table- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
Routing Table	Route List	Routing	**show call_route**	RO
	Add /Modify Entries	Routing	**call_route add** *<0-999999> <1-99>*	WO
	Delete Entries	Routing	**call_route del** *<0-999999>*	WO

Note 8 To modify a routing entry in the Console Interface, you must delete that entry and replace it with the new value that you want to modify.

4.2.15 Pin Code Assignment-Web Interface



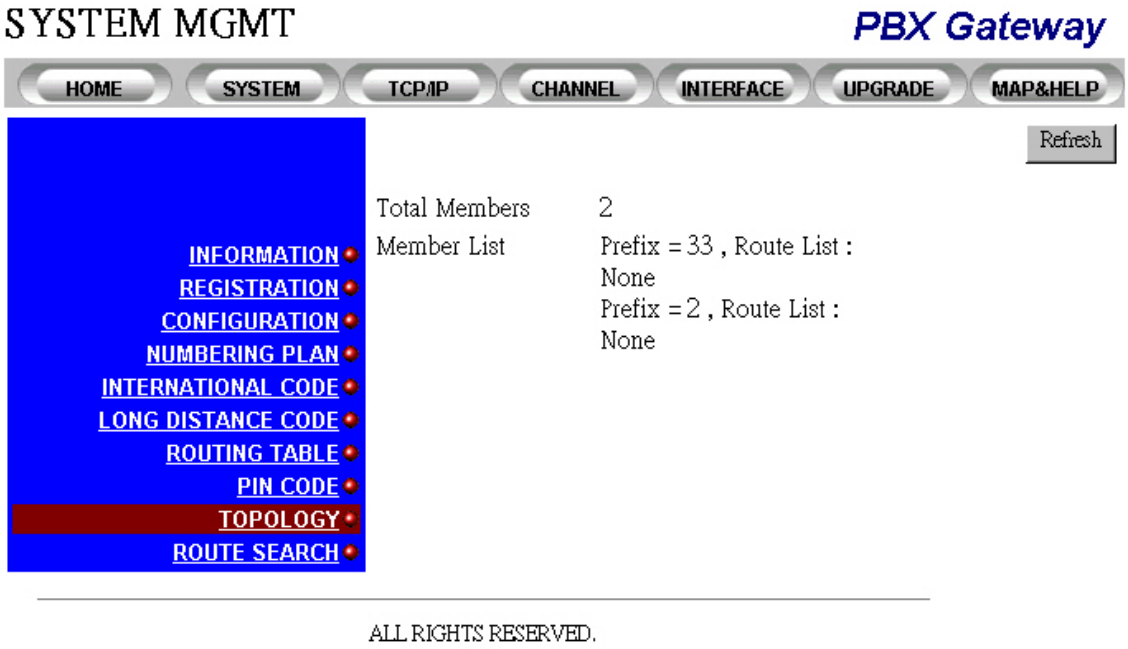
Category	Entry	Description	Data Type	Range
PIN Code For Transit Call	Capacity	The allowed amount of entries for PIN codes that are used when making transit calls via the gateway	RO	32
	Quantity	The number of PIN codes that are currently configured on this gateway	RO	0-32
	Code List	The list of PIN codes that are configured on this gateway	RO	
	Add Entries	To add a PIN Code entry	WO	*0-99999999*
	Delete Entries	To delete a PIN Code entry	WO	*0-99999999*

The PIN Codes are needed to make calls that dial from a PSTN, which then go through an IP network to a remote PBX gateway and then to the PSTN where the remote gateway is located.

4.2.16 Pin Code Assignment- Console Interface

Category	Entry	Console Mode	Console Command	Data Type
Routing Configuration	Code List	Routing	**show pin**	RO
	Add Entries	Routing	**pin add** *<0-99999999> <1-99>*	WO
	Delete Entries	Routing	**pin del** *<0-99999999>*	WO

4.2.17 Topology-Web Interface



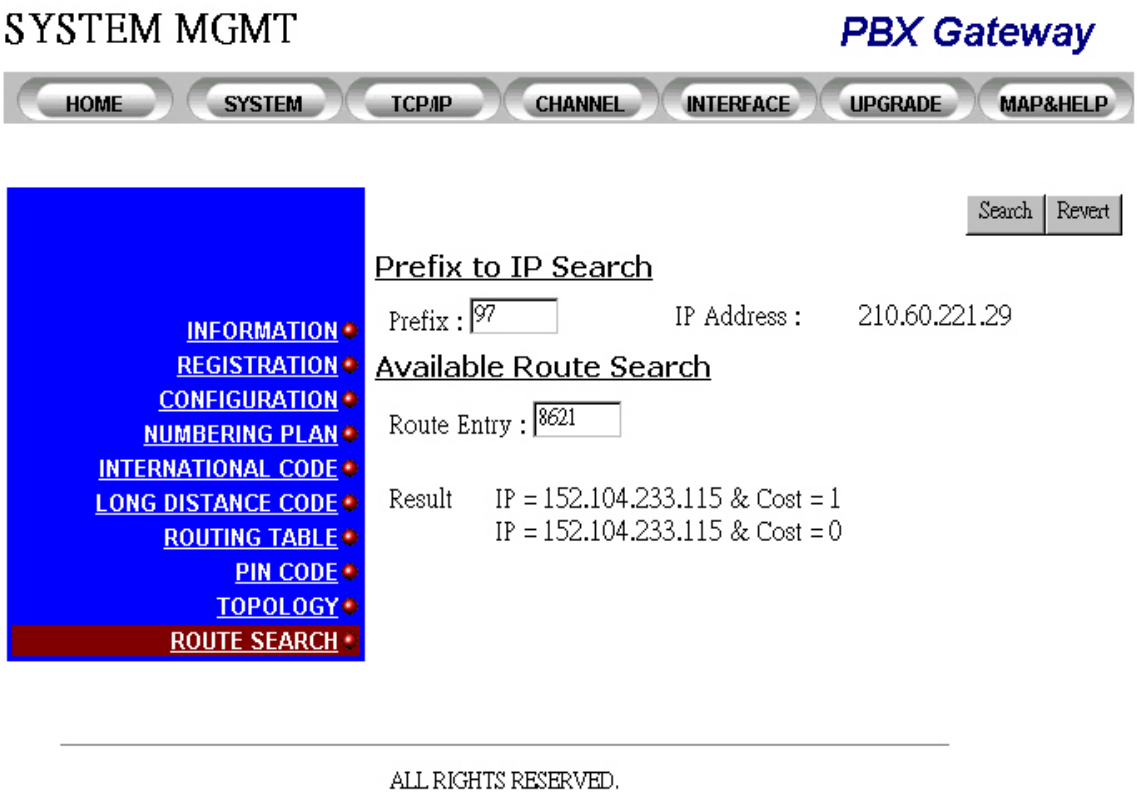
Category	Entry	Description	Data Type	Range
Topology	Total Members	The number of members in the same group	RO	
	Member List	The list of gateways in the same group. Displays the corresponding prefix that is specified for each gateway[16]	RO	

4.2.18 Topology- Console Interface

Note 9 There is no similar function in the Console Interface

[16] For models that are equipped with the FXO interface, the route list with the prefix will be displayed in the Member List.

4.2.19 Route Search-Web Interface



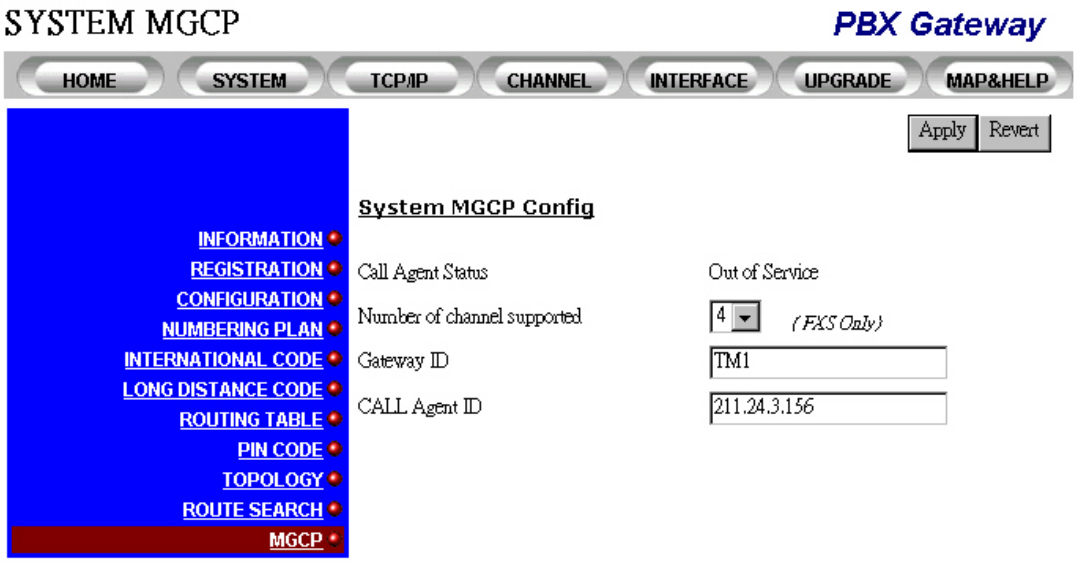
Category	Entry	Description	Data Type	Range
Route Search	IP Address	If the Prefix that is specified in the previous section cannot be found, the IP address of that gateway will be displayed. Otherwise, "Not Found" will be displayed.	RO	
	Route Entry	The Route Entry that will be searched [17]	WO	

4.2.20 Route Search- Console Interface

Note 10 There is no similar function in the Console Interface

[17] This function has the same restrictions as other routing table related functions. For example, you want to find an entry that is specified on a gateway without the FXO interface. However, the gateway is unable to route your calls to the PSTN through the FXO,so you will not get the desired search results even if you have specified the routing entry correctly. The search entry does not allow wild cards, so you must enter the search criteria exactly the same as what you specified in the routing entries.

4.2.21 MGCP Configuration - Web Interface



Category	Entry	Description	Data Type	Range
System MGCP Config	Call Agent Status	The status whether this voice gateway connect to call agent or not	RO	Out of Service, In Service
	Number of channel supported	The number of channels that registered with call agent	RW	0, 4, 8
	Gateway ID	The name of this gateway that register on call agent	RW	String
	Call Agent ID	The IP address or domain name of call agent, used for this gateway to connect with call agent	RW	*String or IP address*

4.2.22 MGCP Configuration - Console Interface

Category	Entry	Console Mode	Console Command	Data Type
MGCP Configuration	gwid	Configuration	**`gwid`** *`<string of name for this gateway registered in Call Agent>`*	WO
	call-agent	Configuration	**`call-agent`** *`<string for call agent or its IP address>`*	WO
	mgcp_chan	Configuration	**`mgcp_chan`** `[0|4|8]`	WO

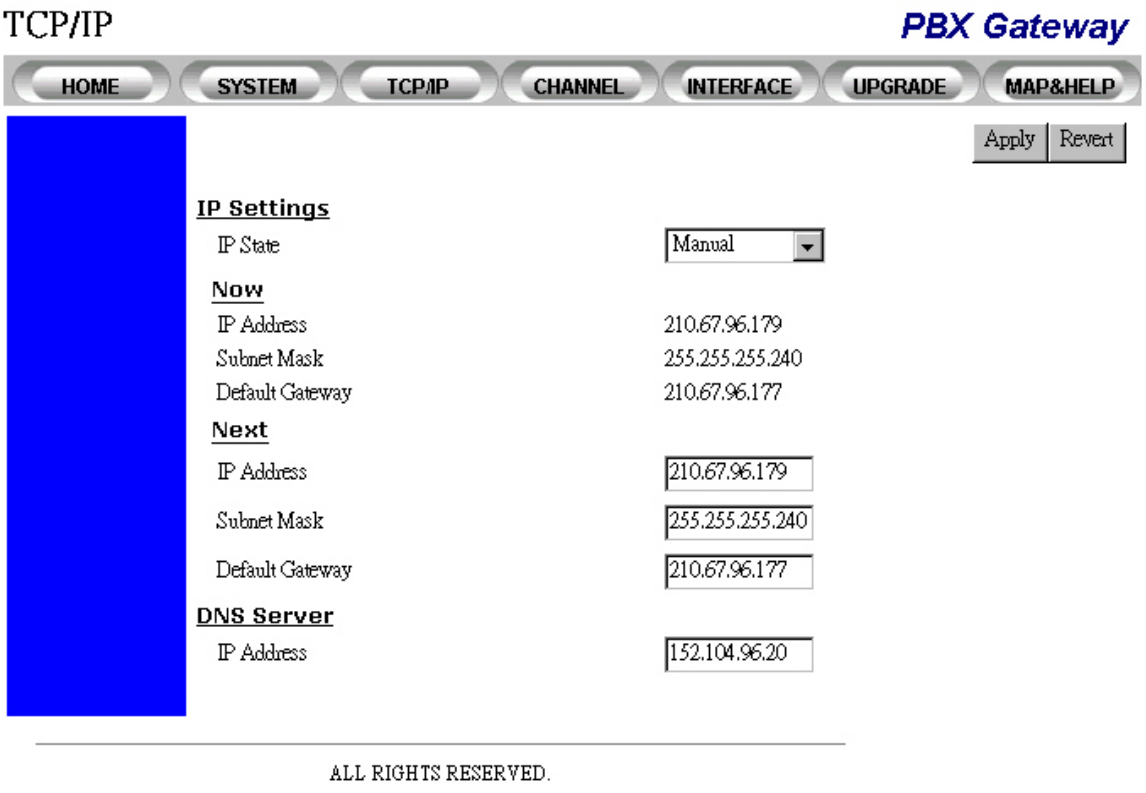
4.3 TCP/IP Configuration

The TCP/IP can be configured through the system console and the Web management interface. There are two ways to obtain the IP address:

1. Manually assigned.
2. DHCP server assigned.

You can select which way you prefer to obtain the IP by setting the IP State mode. If *Manual* is selected, the administrator must assign it manually. If *DHCP* is selected, it will obtain the IP from the DHCP server. You need to set up a DHCP server and configure its IP address so that the gateway is able to locate it. If the gateway is configured using the DHCP mode but cannot find the DHCP server, it will use the IP that was previously configured. After the gateway has successfully acquired the IP address, it will update the newly acquired (manually configured) IP.

Web Management



Category	Entry	Description	Data Type	Range
Information	IP State	Defines the mode used to acquire an IP address: **Manual**: static address mode. The system administrator must assign the IP address directly from the system console or web page. **Auto (DHCP)**: If this mode is selected, the IP will be automatically obtained from the DHCP server.	RW	***Manual*** Auto (DHCP)
	Now	Displays the current IP address, subnet mask and default gateway.	RO	-
	Next	Sets the IP address, subnet mask and default gateway that will be used (after a restart is issued) if the IP state mode is set to manual .	RW	IP address
DNS server	IP Address	The IP address of DNS server, that MGCP protocol can use the domain name instead of IP address.	RW	IP address

Console Commands

Category	Entry	Console Mode	Console Command
Information	IP State	configuration	**ip state** <**user** | **dhcp**>
	IP Address	configuration	**ip address** <*ip address*> <*subnet mask*>
	Default Gateway	configuration	**ip default-gateway** <*ip address*>
DNS	DNS server	configuration	**dns** <*ip address*>

4.4 Channel Management

Channel numbers and naming: There are up to 16 channels that PBX gateway can support and the minimum port density is two. For large port number series, the port naming is given in 4 ports a group. For 7-inches series, the port naming are given as its sequence.

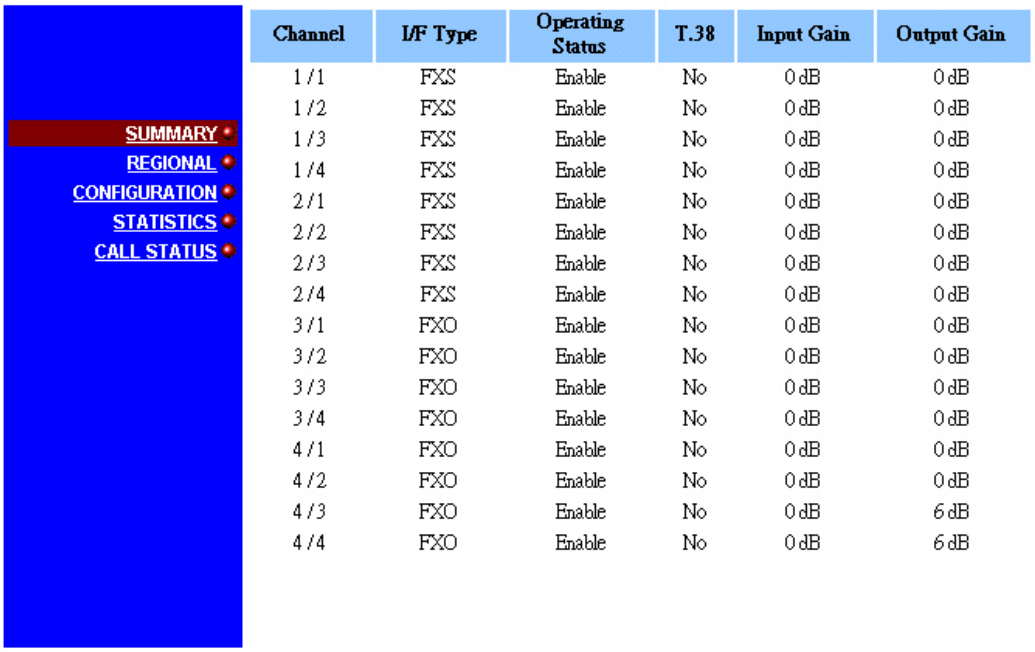
19-inches and 12 inches models			
Sequence	**Name**	**Sequence**	**Name**
port 1	1/1	port 11	3/1
port 2	1/2	port 12	3/2
port 3	1/3	port 13	3/3
port 4	1/4	port 14	3/4
port 5	2/1	port 15	4/1
port 6	2/2	port 16	4/2
port 7	2/3	port 17	4/3
port 8	2/4	port 18	4/4

7-inches model	
Sequence	**Name**
port 1	1
port 2	2
port 3	3
port 4	4

4.4.1 Summary

CHANNEL

PBX Gateway



Channel	I/F Type	Operating Status	T.38	Input Gain	Output Gain
1/1	FXS	Enable	No	0 dB	0 dB
1/2	FXS	Enable	No	0 dB	0 dB
1/3	FXS	Enable	No	0 dB	0 dB
1/4	FXS	Enable	No	0 dB	0 dB
2/1	FXS	Enable	No	0 dB	0 dB
2/2	FXS	Enable	No	0 dB	0 dB
2/3	FXS	Enable	No	0 dB	0 dB
2/4	FXS	Enable	No	0 dB	0 dB
3/1	FXO	Enable	No	0 dB	0 dB
3/2	FXO	Enable	No	0 dB	0 dB
3/3	FXO	Enable	No	0 dB	0 dB
3/4	FXO	Enable	No	0 dB	0 dB
4/1	FXO	Enable	No	0 dB	0 dB
4/2	FXO	Enable	No	0 dB	0 dB
4/3	FXO	Enable	No	0 dB	6 dB
4/4	FXO	Enable	No	0 dB	6 dB

Category	Entry	Description	Data Type	Range
Summary	**Channel**	The channel number. It displays Group/Port format. Port 2 in group 1 will be shown as 1/2	RO	Two groups and 4 ports for each group
	I/F Type	Shows the port interface type.	RO	FXS, FXO
	Operating Status	Shows the operation status of this port. Enable/Disable	RO	Enable Disable
	T.38	Whether or not this port is configured to support the T.38 Fax relay	RO	Enable Disable
	Input Gain	Shows the currently configured input gain	RO	-6 db to 6 db
	Output Gain	Shows the currently configured output gain	RO	-6 db to 6 db

```
PBX Gateway - PBX Gateway#sh channel
  group  port  mode   admin   operation   vad    T.38  input gain output gain
  -----  ----  ----  -------  ---------  ------- ----  ---------- -----------
    1     1    FXS   enable    enable    enable   No         0          0
    1     2    FXS   enable    enable    enable   No         0          0
    1     3    FXS   enable    enable    enable   No         0          0
    1     4    FXS   enable    enable    enable   No         0          0
    2     1    FXS   enable    enable    enable   No         0          0
    2     2    FXS   enable    enable    enable   No         0          0
    2     3    FXS   enable    enable    enable   No         0          0
    2     4    FXS   enable    enable    enable   No         0          0
    3     1    FXO   enable    enable    enable   No         0          0
    3     2    FXO   enable    enable    enable   No         0          0
    3     3    FXO   enable    enable    enable   No         0          0
    3     4    FXO   enable    enable    enable   No         0          0
    4     1    FXO   enable    enable    enable   No         0          0
    4     2    FXO   enable    enable    enable   No         0          0
    4     3    FXO   enable    enable    enable   No         0          0
    4     4    FXO   enable    enable    enable   No         0          0
```

4.4.2 Regional

The configuration shown in this page applies to each channel on the entire device.

Category	Entry	Description	Data Type	Range
Information	Hook Flash Time	Defines the time frame of a break that is to be treated as a Flash signal.	RW	***200ms*** 300ms 400ms 500 ms 600 ms 700 ms 800 ms 900 ms 1000 ms

Category	Entry	Description	Data Type	Range
DTMF Play out	Duration	Defines how long the DTMF will be sent when the gateway receives a DTMF Play Out message from the Call Agent.	RW	***100*** 150 200 250 300 350 400 450 500 550 600 650 700 750 800
	Inter Digit Time	Defines the inter-digit time of the DTMF when the gateway receives a DTMF Play Out message.	RW	***100*** 150 200 250 300 350 400
Guard Time	FXO	The amount of time specified to prevent the FXO interface from terminating the connection while receiving a ring signal that is going to finish a all or a clearing signal that is going to terminate the call session. In this instance, the FXO should not answer the phone.[18]	RW	0.4, 0.6, ***0.8,*** 1.0, 1.2, 1.4, 1.6, 1.8, 2.0, 2.2, 2.2, 2.4, 2.6, 2.8, 3.0
T.38 Fax Relay	Max. Fax Rate	The maximum data rate that is allowed to transmitted for FAX transmission.	RW	2400, 4800, 7200, 9600, 12000, **14400 (**bps)
	Low Speed Redundancy	Number of redundant packets that must be sent out while being transmitted at low speed.	RW	No, 1, 2, 3, 4, 5 (Redundant packets)
	High Speed Redundancy	Number of redundant packets that must be sent out while being transmitted at high speed.	RW	No, 1, 2 (Redundant packets)
Busy Tone Spec	Frequency	*f1, f2*	RW	(300 ~ 3000Hz)
	Cadence	*on, off* The *on* and *off* duration in playing the tone	RW	(100 ~ 5000ms)

Console Commands

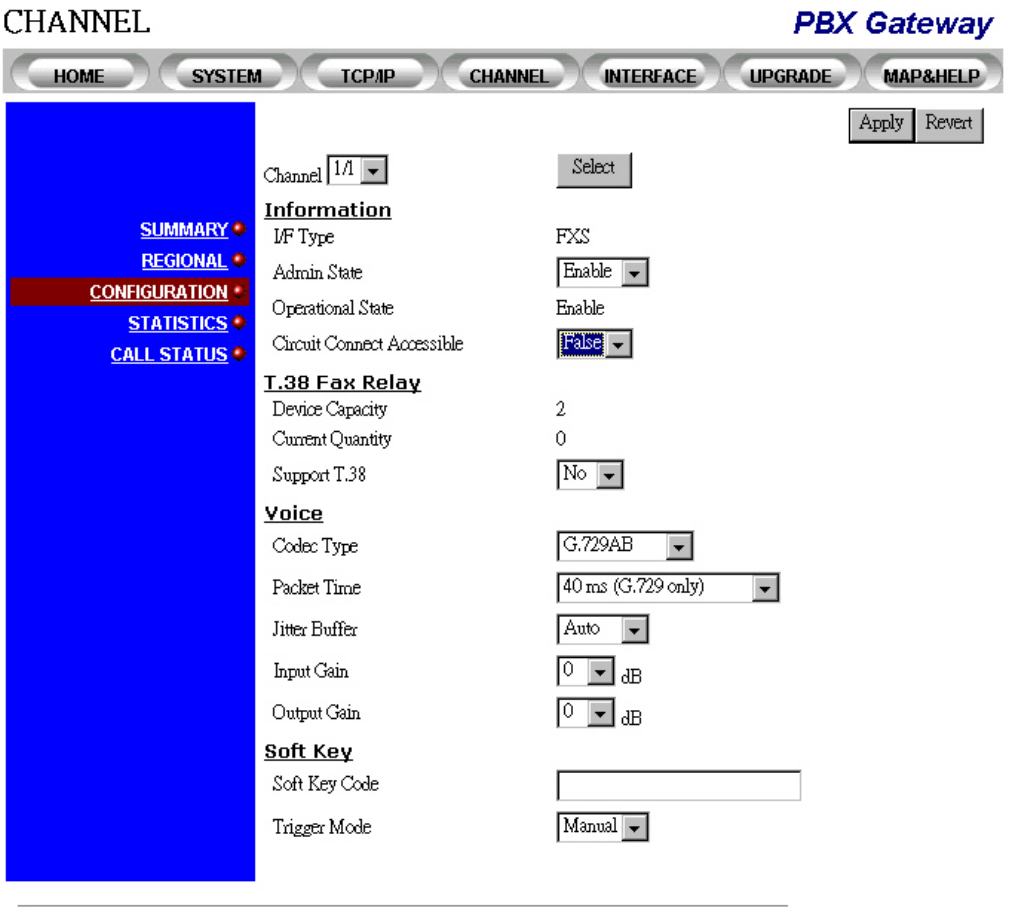
[18] Someone called this clearing signal "ring off" which is a signal that tells the other party that this call is terminated. This ring signal is different from the "ring in" signal that does not have an on and off sequence as cadence, instead, it will be a short ring and will not repeat.

Category	Entry	Console Mode	Console Command
Information	Flash Time	Channel	**Flash** *<200 – 1000>*
DTMF Play out	Duration		Not supported in the console
	Inter Digit Time		Not supported in the console
Busy Tone Spec.	Frequency	There is no such function in the Command Line Interface	
	Cadence		

4.4.3 Channel Configuration

The configuration shown in this web page applies to a single channel. You must select a channel and configure it to your particular specifications.

Web Management



Category	Entry	Description	Data Type	Range
	Channel	Channel number. Displays in Group/Port format. Port 2 in group 1 will be shown as 1/2	RW	One or two groups and 4 ports for each group. Default: ***1/1***
Information	I/F Type	Displays the channel interface type.	RO	FXS or FXO
	Admin State	Enables/disables the channel.	RW	***Enable***, Disable

Category	Entry	Description	Data Type	Range
	Operational State	Displays the current operational states.	RO	Enable, Disable
T.38 Fax Relay	Device Capacity	The maximum number of channels that are permitted to be configured to support the T.38.	RO	**2** (Only two channels are allowed to support T.38)
	Current Quantity	The number of channels that are currently configured to support the T.38.	RO	0, 1, 2
	Support T.38	Enables/disables the T.38 support on this channel.	RW	Enable, ***NO***
Voice	Codec Type	Assigning the preferred port codec type.	RW	G.711 A Law, G. 711 u Law, ***G.729AB***
	Packet Time	Defines how long the gateway will send a voice packet to the destination port. Please refer to the Available Packet time selection table.	RW	10ms – G.711, 20ms – G.711, G.729A, 30ms - G.711, ***40ms - G.729A,*** 60ms - G.729A, 80ms - G.729A
	Input Gain	Input gain selection.	RW	-6, -5, -4, -3, -2, -1, ***0***, 1, 2, 3, 4, 5, 6 db
	Output Gain	Output gain selection.		-6, -5, -4, -3, -2, -1, ***0***, 1, 2, 3, 4, 5, 6 db

Table: Available packet time supported by different coding type

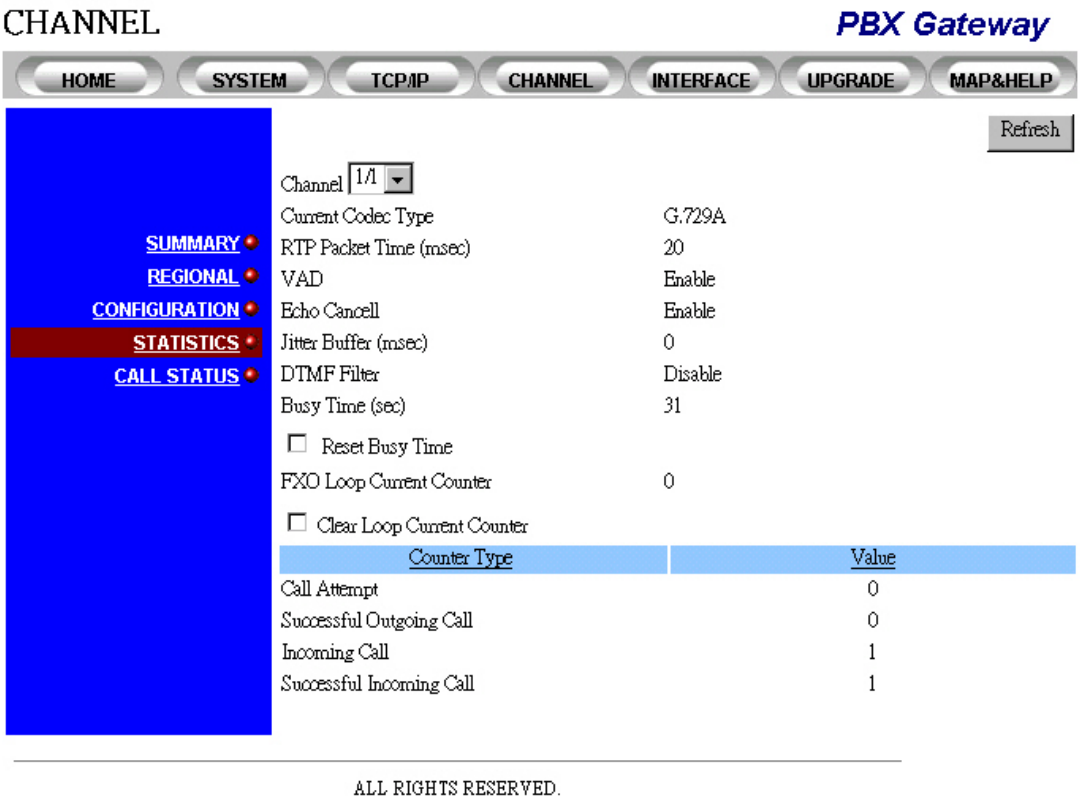
Codec Types	10ms	20ms	30ms	40ms	60ms	80ms
G.711	√	√	√			
G.729A		√		√	√	√

Category	Entry	Console Mode	Console Command
Information	Admin State	Channel	**channel** <*group/port*> <**enable** | disable>
Fax	Enable/Disable	Channel	**t38_fax** <*group/port*> <enable | **disable**>
	Redundancy at high data rate	Configure->Fax	**fax high_redun** <*0-2*> (default=1)
	Redundancy at low data rate	Configure-Fax	**fax low_redun** <*0-5*> (default=3)
	Maximum Transmit Rate	Configure-Fax	**fax rate** *2400 (2400bps)* *4800 (4800bps)* *7200 (7200bps)* *9600 (9600bps)* *12000 (12000bps)* ***14400*** *(14400bps)*
	Show Fax Configuration	Show Fax	**show fax**
Voice	Codec Type	-	Not supported
	Packet Time	-	Not supported
	Input gain	Channel	**gain input** <*group/port*> <**-6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6**>
	Output Gain	Channel	**gain output** <*group/port*> <**-6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6**>

4.4.4 Statistics

This web page shows the configuration and statistical information of each channel. You only have to select a channel number and click the refresh button. The gateway will then return a page showing its current configuration and statistical data.

Web Management



Category	Entry	Description	Data Type	Range
	Channel	The channel number. Shown in the Group/Port format. Port 2 in group 1 will be shown as 1/2	RW	Two groups and 4 ports for each group. ***1/1***
	Current Codec Type	Displays the current codec in use by the channel	RO	
	Packet Time (msec)	Displays the current packet time in use by the channel	RO	
	VAD	Displays VAD administrative status	RO	
	Echo Cancellation	Displays Echo Cancellation administrative status	RO	
	Jitter Buffer (msec)	Displays how long the jitter buffer is used in this channel. If the channel has received no traffic, the last value that was used by the previous call will be displayed. 0 stands for AUTO jitter buffer.	RO	
	DTMF Filter	Displays DTMF Filter administrative status		
	Busy Time (sec)	Displays the length of time this channel has beenbusy . (Includes incoming and outgoing calls.)Busy time will be reset when you switch off the power .	RO	
	Reset Busy Time	Check box. If checked and the refresh button is then clicked, Busy Time will then be reset.	RW	
	FXO Loop Current Lost Counter[19]	Displays the number of counter that FXO interfaces can not detect loop current	RO	
	Clear Loop Current Counter	To reset the FXO Loop Current Counter back to zero	RW	
	Call Attempt	Displays the number of call attempts that have been made.	RO	
	Successful Outgoing Call	Displays the number of successful outgoing calls that have been made.	RO	
	Incoming Call	Displays the total number of incoming calls	RO	
	Successful Incoming Call	Displays the number of successful incoming calls	RO	

[19] If the counter is greater than "0", then the Red alarm LED on the front panel will be lit. After it is cleared, the Red Alarm LED will go off.

4.4.5 Call Status

This web page shows the activities that are currently being performed on each port. Users must refresh the screen manually to check the current port activities. The formats that are displayed here are exactly the same as the CDR that shows from CDR ports (see Chapter 10 The Call Detail Record information)

Web Management

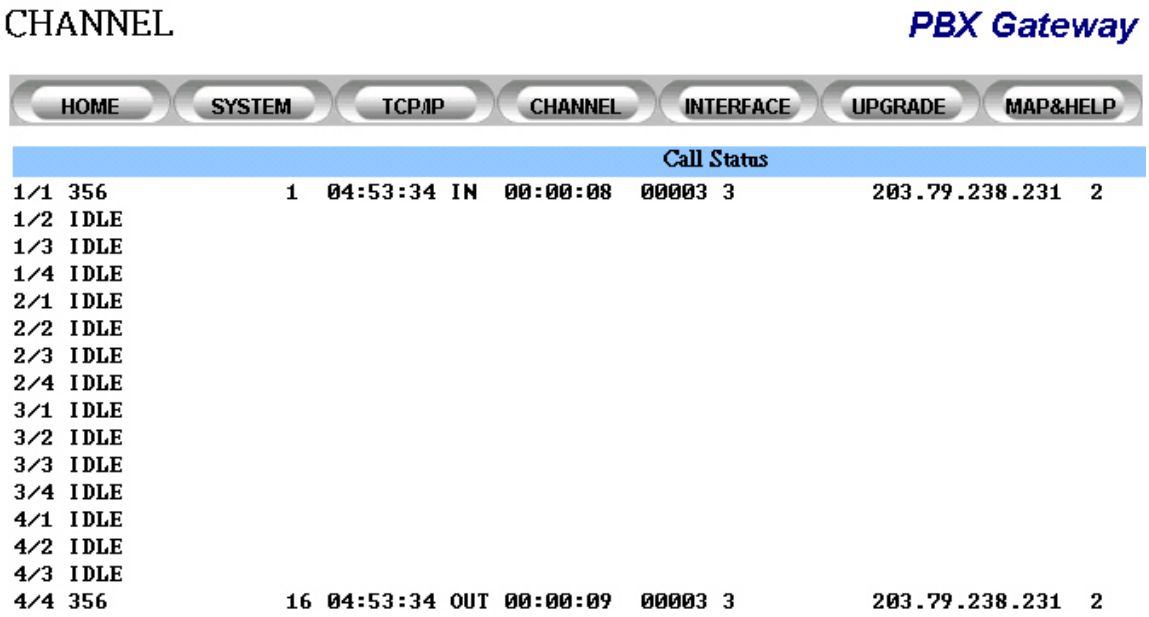


Fig 15 Call Status Screen

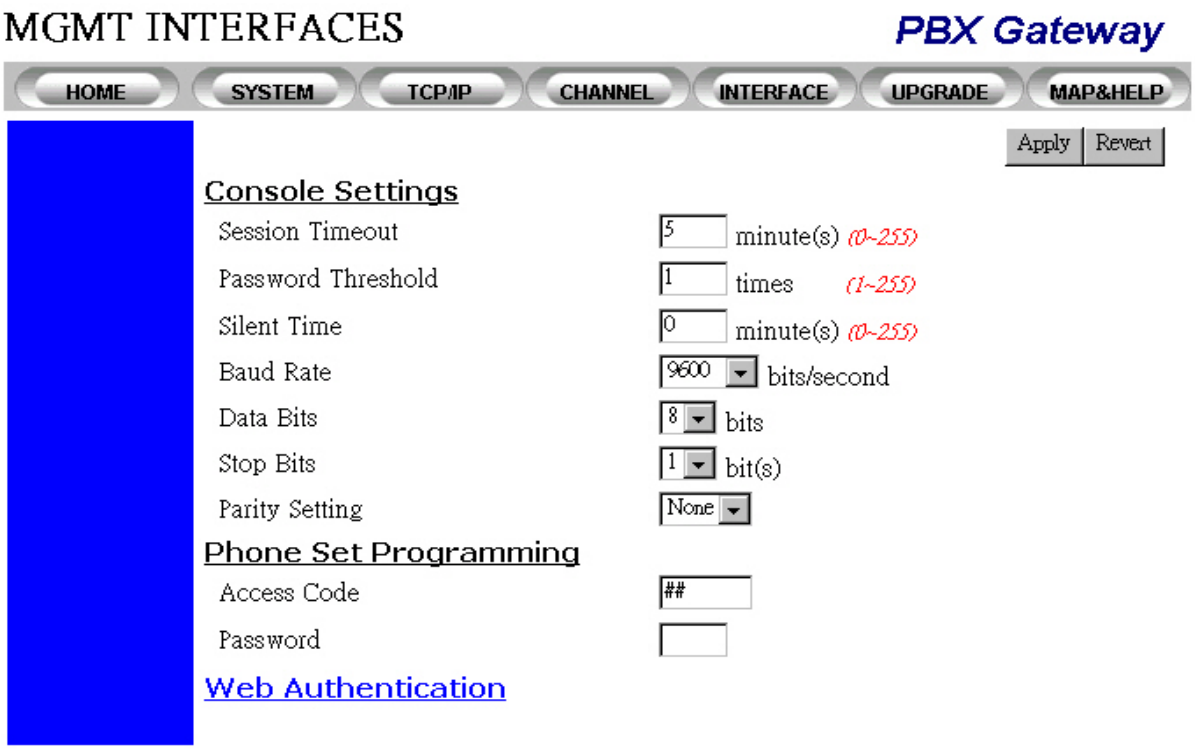
Command Line Interface

This function is not provided through any command line interfaces such as the Console or Telnet.

4.5 Management Interfaces

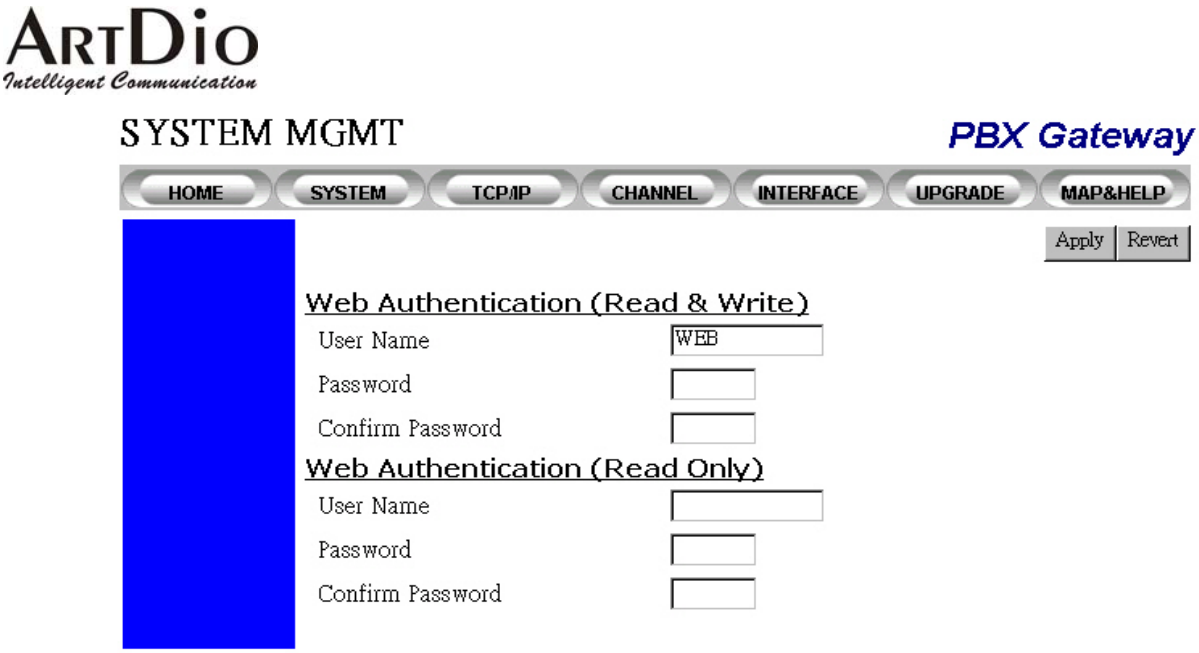
PBX VoIP Gateways are flexible with the Web Management Interface, Console Management Interfaces (through RS-232), Telnet and Phone Set Configuration Interfaces. You can configure the parameters for different management interfaces through the web management interface or through the management interface itself. Following is a demonstration on how it can be configured:

4.5.1 Web Management



Category	Entry	Description	Data Type	Range
Console Setting	Session Timeout	A session (system console or Telnet) will be automatically logged-out if the activity timer has exceeded the maximum timeout value. The value 0 stands for no timeout.	RW	0 – 255 minutes (Default:5)

Category	Entry	Description	Data Type	Range
	Password Threshold	The session will be halted if the number of invalid password tries has reached the threshold. Please note that it applies only to the console and Telnet, it does not apply to the web interface. The value of 0 stands for no password threshold.	RW	0 – 255 (Default:1)
	Silent Time	Determines how long the console will halt when the invalid password tries have reached the threshold.	RW	***0*** – 255 minutes (Default:0)
	Baud Rate	System console baud rate selection. If the baud rate is set to any rate other then 9600 you will see a string of garble in the terminal during system boot up. The console goes back to normal after boot up. This is because the system is set at 9600, 8, 1, N during boot up. Therefore it is highly recommended to configure the system console to 9600 baud.	RW	2400, ***9600***, 19200, 38400
	Data Bits	Data bits selection	RW	7, ***8*** bits
	Stop Bits	Stop bits selection	RW	***1***, 2 bits
Phone Set Programming	Access Code	The Access Code to start the Phone Set Programming Mode (see 5 Phone Set Interface Configuration Procedures for more detailed information)	RW	## as default, 1-6 digits, the first digit can be "#" or "*"
	Password	The password required to enter the Phone Set Programming Mode after entering the Access Code	RW	***0000*** as default, 1-4 digits
Web Authentication	User Name	The Authentication ID to begin the Web Management Interface. The **Read & Write** account can read and write information via a Web browser. The **Read only** account can read information only.	RW	***WEB*** as default for Read and Write, **BLANK** for read only 1-12 characters in string format
	Password	The Password for the Authentication ID to begin the Web Management Interface	WO	Empty password as default, Allow string up to 6 characters
	Confirm Password	Re-enter the Password for the Authentication ID to confirm access into the Web Management Interface	WO	Empty password as default, Allow string up to 6 characters



4.5.2 Console Commands

Category	Entry	Console Mode	Console Command
Line Console	Session Timeout	Console	**time-out** *<0-255>* in minutes
	Data bits	Console	**data bits** <7/8>
	Password Threshold	Console	**password-thresh** *<0-255>*
	Silent Time	Console	**silent-time** *<0-255>* in minutes
	Baud Rate	Console	**speed** <2400 | ***9600*** | 19200 | 38400 >
	Time Out	Console	**time-out** *<0-255>* in minutes
Password	Console Level	Configuration	**password console [read|write]** *<password> in 6 characters for "enable"*
	Phone	Configuration	**password phone** digits *in 4 digits (0~9, default is 0000)*
	Web	Configuration	**password web_read username** *<username> in 6 characters*
		Configuration	**password web_write password** *<password> in 6 characters*

4.6 Software Upgrade

The software upgrade can only be done through a TFTP server, therefore you must have a TFTP server running on the network and the new firmware must be saved on the server. You can issue a command to download it from the web management page or system console. The following steps are a guide to downloading the new firmware from the TFTP server through a web interface.

Step 1. Make sure the TFTP server is running and the newly received firmware is saved on the server.

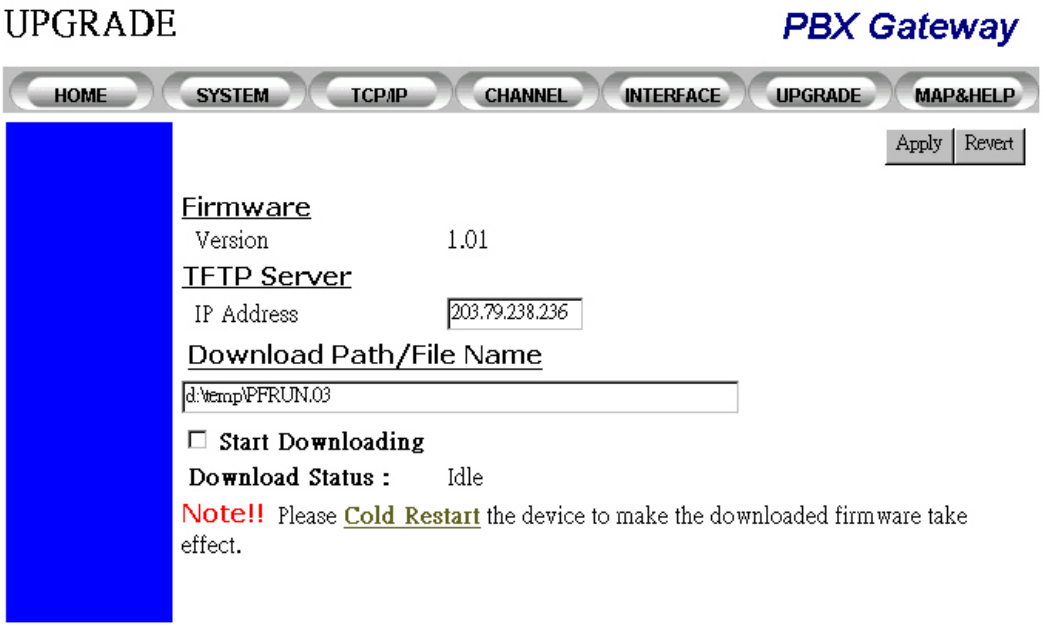
Step 2. Fill in the IP address of the TFTP server and the path/filename information.

Step 3. Check the *Begin Download* box

Step 4. Click the *Apply* button to start downloading the firmware. The gateway will display a page with the download status showing: **in-progress**

Step 5. You can check the download status by manually clicking the *Apply* button repeatedly and holding until the return page shows a successful download. If the gateway cannot find the TFTP server or the filename, the download status in the returned page will show **Time-out** or **Error**.

Step 6. After the code has been successfully downloaded, you have to initiate a cold-start. The new code will not take effect until you issue a cold-start command. You can issue a cold-start command through the system console or through the web management page in the System Management.



Category	Entry	Description	Data Type	Range
Firmware	Version	Displays the firmware version	RO	
TFTP Server	IP Address	Specifies the IP address of the TFTP server. A domain name is also allowed.	RW	IP address and domain name
	Download Path/File Name	Specifies the path of the filename in the TFTP server such as: C:/runtime.tcw	RW	String up to 48 characters
	Start Downloading	A check box to enable the system to begin downloading. When checked and apply is clicked, the system will commence downloading.	RW	

4.6.1 Console Commands

Using the system console to upgrade the firmware is quite similar to using the Web management interface. You must run the TFTP server first. You must also assign the IP address of the TFTP server and filename separately. After they are configured, issue a copy command to initiate the firmware upgrade. You can also combine three commands into one. Following these steps:

Step 1: Configure TFTP server and filename

a) Separate command:

1. PBX Gateway(config)# **tftp server** <*ip-address | domain name*>
2. PBX Gateway(config)# **tftp filename** <*filename*>
3. PBX Gateway(config)# exit
4. PBX Gateway# **copy tftp:///**

b) Combined command

copy tftp://<ip-address>**/**<*filename*>

```
PBX Gateway(config)#copy tftp://192.168.0.201/a:\runtime.tcw
TFTP Server: 192.168.0.201
a:\runtime.tcw
Downloading….
```

Step 2: The Gateway should now be downloading the firmware. Wait for the result.

```
PBX Gateway(config)#copy tftp://192.168.0.201/a:\runtime.tcw
TFTP Server: 192.168.0.201
a:\runtime.tcw
Downloading....
Download success
System must reload
```

Step 3: If the gateway downloaded the firmware successfully, issue a cold-start to launch the new code.

```
PBX Gateway(config)#reload
```

Category	Entry	Console Mode	Console Command
TFTP Server	IP Address	Configuration	**tftp server** <*ip-address	domain name*>
	Download Path/File Name	Configuration	**tftp filename** <*filename*>
	Start Downloading	Privileged	Two commands (If the TFTP server IP address and filename have already been assigned): **copy tftp :///** Or specify the address and file name at the same time: **copy tftp ://**<*ip-address*>/ <*filename*> If the TFTP server IP address and filename have been assigned: If the TFTP servers IP has not been assigned You may specify the address and file name simultaneously:

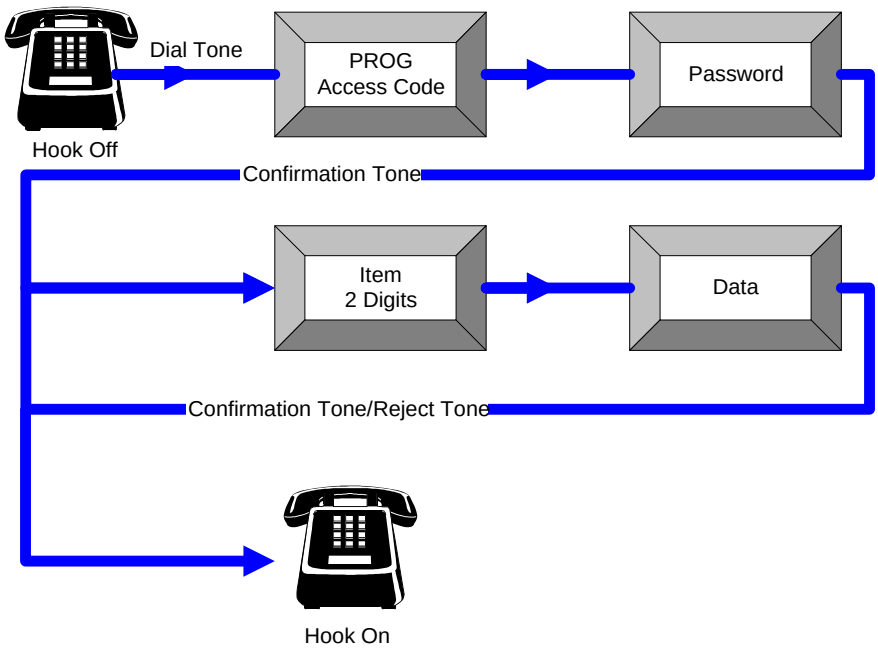
4.7 Additional Console Commands

Comands	Purpose
area	Sets the device's area code
auto_attn	Sets the auto attendant status
call_route	Sets or deletes an entry in the routing table
cdr	Enables or disables the CDR log
code	Enters the access code configuration mode
country	Sets the device's country code
cut_through	Sets the access code to skip the greeting message on this device.
dbflush	Immediately saves the current configuration onto non-volatile memory. It is recommended that you issue this command after entering configuration changes. The system will automatically execute this command if it has detected no input within a certain time frame.
delete nvram	Resets the configuration to the default value. Also known as a Factory Reset. **delete** nvram
dial_code	Sets the access number for out-bound analysis
exit	Exits the current mode and returns to a higher level
end	Returns to Privileged mode
extension_len	Sets the number of digits for the PBX extension
fax	Sets the T.38 Fax relay configuration
gid_tmr	Timer to erase the group id when system shuts down
greet_mode	Sets the device's greeting mode

group_id	Sets the group ID
master_ip	Sets the master's IP address
internal_ac	Sets the internal access code for inter-gateway calls
intn_code	Sets the international access code for in-bound analysis
local_pstn_ac	Sets the local PSTN trunk access code (if it exists)
long_distance	Sets the long distance access code for in-bound analysis
office_excp	Sets the long distance access code for in-bound analysis
oper_code	Sets the code to reach the operator of the PBX system
pend-restart	Perform warm start while system is idle
pin	Sets or deletes a pin code
ping	Checks the IP configuration or network connections
prefix	Sets the device's prefix number
probe-hook	Enable cadence probe state
probe-remove	Disable cadence probe state
prog_ac	Sets the device's phone set program mode access code
region_id	Sets the region/ID information for the proper ringing pattern, cadence and other regional related profiles
rtp_base	Sets the RTP base port number
retransmit	Sets the call retransmit count
service_port	Sets the Service port for Telnet or Web
show ac_summary	Shows a summary of the access code configurations
show call_route	Shows the device's routing table
show channel	Shows the channel summary
show date	Shows the date
show ethernet	Shows Ethernet information
show flash	Shows the flash time settings
show history	Shows the previous commands that were issued
show ip	Shows the IP settings
show line	Shows the console settings
show location	Shows the location information
show pin	Show all pin codes for transit calls
show routing-config	Shows the device's current operating routing mode configuration
show running-config	Shows the current running configuration
show service_port	Shows the service port for Telnet or Web
show slave	Shows the slave device (if the device is set to master)
show tftp	Shows the TFTP server's IP address
show time	Shows the current time
show version	Shows the firmware version
slave	Sets or deletes a slave device
t38_fax	To add/del channels to support the T.38 Fax function
tcwarn_time	Sets the transit call warning time
transit_ac	Sets the transit access code
transit_call	Enables or disables the device's transit call
udp_port	Sets the UDP port number
vad	Enable or disable the voice activity detection

5. Phone Set Interface Configuration Procedures

5.1 Configuration procedures

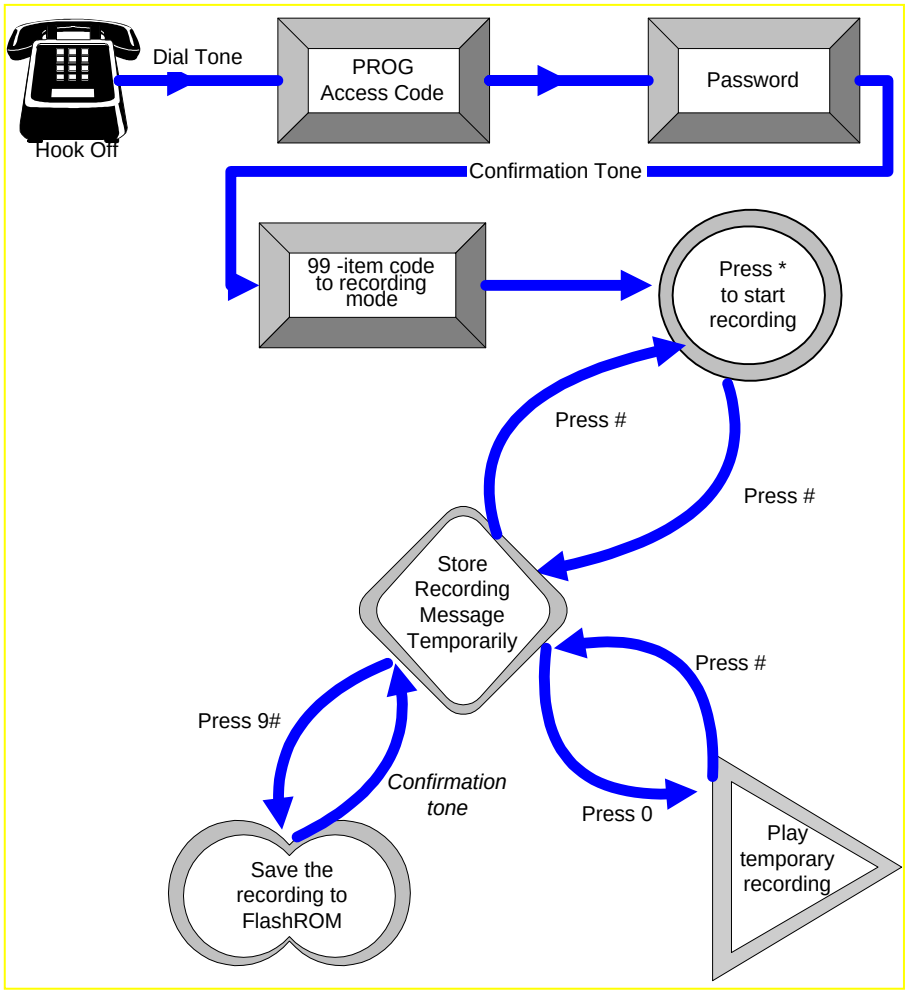


Note 11 Use "#" as the ending prompt for the data entry.

Note 12 The (factory default) value PROG Access Code is "##" and the (default) password is "0000".

Note 13 The default confirmation tone is "doo…doo...doo"

5.2 Greeting Message Recording Procedure



To record the greeting message into the PBX gateway, the user must switch to the recording mode after entering the Phone Set Configuration mode and pressing the item code “99”. If the user has already recorded a greeting message, he or she can use the item code “96” to hear it.
In the recording mode, to prevent accidental use the recorded voice will not be stored automatically. You must press "*" to start recording then "#" to stop recording. You can check your recorded message by pressing "0", if the recording is satisfactory, press "9#" to store it onto none vanished memory (NVRAM), it will take few seconds to
save the greeting message and give you confirmation tone if the action is done.

The recorded message can be uploaded to or downloaded from the PBX gateway by using an FTP client application.

5.3 Configurable Items

5.3.1 Data Range

Syntax for the data descriptions:

In the Phone Set Programming Mode, all data entered is a combination of the 12 keys shown on the keypad on the phone set panel.

1	2	3
4	5	6
7	8	9
*	0	#

x or 0|1|2|3|4|5|6|7|8|9: Digits that range from 0 to 9

''*: Keypad "*"

'#': Keypad "#"

f(0 ~ 9): Digits that range from 0 to 9

*f(0~9, *, #)*: String with digits that range from 0 to 9 or characters * and #.

xf(0~9): x number of digits using digits that range from 0 to 9. For example, *4f(0~9)* means a four digit number like 0000, 1111, 1234, 9999 etc.

$[x_1,x_2]$f(0~9): Number of *x_1* to *x_2* digits and the range of digits is from 0 to 9. Example, *[1,2]f(1~9)* means a number of one or two digits, and the digits used are between 1 to 9, like 12, 22, 34, 1, 2 etc. But does not include 01, 02, 10, 20 etc.

+: Compound operator, which combines more than one definition into a string of digits. Example, *f(0~9, *, #) + [1,5]f(0,9)* means that this is a string that has at least one character with the range *f(0~9, *,#)* and then 1 to 5 digits as the compound result.

5.3.2 Configurable Items

Code	Description	Data after item code
01	DHCP Status	0 : Disable ; 1: Enable
02	IP Address	xxx,'*',xxx,'*',xxx,'*',xxx
03	Subnet Mask	xxx,'*',xxx,'*',xxx,'*',xxx
04	Default Gateway	xxx,'*',xxx,'*',xxx,'*',xxx
05	Group ID	*[1,10]f(0~9),* the number is between 0 to 2147483647.
06	Master IP Address	xxx,'*',xxx,'*',xxx,'*',xxx; 0.0.0.0 if this gateway is the master, and it is the

		default value.
07	Country Code	*[1,3]f(0,9)*
08	Area Code	*[1,3]f(0,9)*
09	Prefix Code	*[1,4]f(0,9)*
10	Add an Inbound International Access Code	*[1,3]f(0,9)*
11	Deletes an Inbound International Access Code	*[1,3]f(0,9)*
12	Outbound International Access Code	*[1,3]f(0,9)*
13	Long Distance Access Code (adds both In-bound and Out-bound)[20]	*[1,3]f(0,9)*
14	Internal Call Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
15	Transit Call Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
16	Program Mode Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
17	Sets the Local PSTN Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
18	Deletes the Local PSTN Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
19	The MGCP Trunk Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
20	Adds a Routing Entry	*[1,6]f(0~9,*,#)+*+[1,2]f(0~9); (as Entry * Cost)*
21	Deletes a Routing Entry	*[1,6]f(0~9,*,#)*
22	Adds a Member	*6f(0~9,*1,*2,*3,*4),* which are the last 6 characters of the MAC address and **1,*2,*3,*4,*5, *6* means A, B, C, D, E, F in hexadecimal
23	Deletes a Member	*6f(0~9,*1,*2,*3,*4),* which are the last 6 characters of the MAC address and **1,*2,*3,*4, *5,*6* means A, B, C, D, E, F in hexadecimal
24	Transit Call Status	0 : Disable ; 1: Enable
25	Adds a PIN Code	*[1,8]f(0~9)*
26	Deletes a PIN Code	*[1,8]f(0~9)*
27	Auto. Attendant Status	0 : Not Provided ; 1: Provided
28	PBX Extension Digit Length	*1f(1~9)*
29	Greeting Status	0 : Default ; 1: Recording
30	Skips Auto Attendant Access Code	*1f(0~9,*,#)+[1,5]f(0~9)*
96	Plays the recorded Greeting Message	# Stop playing
97	Password Change	*4f(0~9)*
98	System Restart	1: Enable
99	Enters the Greeting Message Recording Mode	(see the Greeting Message Recording procedures in section 5.2)

[20] Most of the In-bound/Out-bound Long Distance codes are set to one, as well as the phone set interface. The number, "13", will add both In-Bound and Out-Bound Long Distance Access codes.

6. Firewall Configuration

The PBX voice gateway uses UDP packets to transmit the call control signaling between devices, it also utilizes the normal RTP packets to transmit the voice streams. In order to allow communications to perform even thoughthe PBX gateway is installed behind a firewall, the network administrator must open the required ports and allow related protocols to pass through the firewall. The (factory default) values for the required protocols and port numbers are as follows:

Item	Protocol	Port Numbers	Re-configurable
Signaling	UDP	2000	From WEB, Console
Voice Stream	UDP (RTP, RTCP)	4000~4031	From WEB, Console
T.38	UDP	4064~4079	(Base on Voice Stream)
FTP	TCP	21	Console only
Telnet	TCP	23	From Console[21]
WEB Server	TCP	80	From Console

	UDP Port		
Channel No	**RTP**	**RTCP**	**T.38**
01	4000[22]	4001	4064
02	4002	4003	4065
03	4004	4005	4066
04	4006	4007	4067
05	4008	4009	4068
06	4010	4011	4069
07	4012	4013	4070
08	4014	4015	4071
09	4016	4017	4072
10	4018	4019	4073
11	4020	4021	4074
12	4022	4023	4075
13	4024	4025	4076
14	4026	4027	4077
15	4028	4029	4078
16	4030	4031	4079

Table 6-1 the required port numbers for the PBX voice gateway

Signaling: For out-of-band call control signaling.

Voice Streams: For voice packets.

FTP: For software upgrades and Greeting Message uploads.

Telnet: For remote control.

Web Server: For remote control.

T.38 Fax Relay: For carrying packets of Fax data over IP network

[21] Using the command "service_port" in the Command Line Interface to change well-known port numbers to any number you like.
[22] 4000 is the base RTP port number defined in user's interfaces. If this number changed, all the mapping will changed.

On some firewall systems, you are not permitted to use well-known ports, in order to maintain security. In this case, users may need to change the default port numbers to allow the PBX gateway to function. Such modifications can be done through the Web/Console Management Interfaces (refer to [System]->[Configuration] in Web or [Routing] configurations in the Console). After the modifications, the system must be warm started in order for the new values to take effective. Such modifications need to be done on each device that joins to the same routing group. In other words, they must use the same range of ports in order to communicate with each other.

7. Regulation Compliance Information

7.1 FCC

FCC Class A

This Equipment has been tested and found to comply with the limits for a Class A 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 and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Warning:

- A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to any nearby radio and television reception.
- You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate this equipment.
- The RJ-45 connectors that marked "To LAN" and "To WAN" on the front panel are used for data access only.
- The RJ-11 Connectors on the rear panel are designed to connect to analog phones or analog trunks to a PBAX, they are not intended for connection to the external TNV Communication Network (PSTN).

8. Regional Tone adjustment

For most countries, the tone specifications are not the same. The differences in particular are with the definitions for Dial Tone, Ring Back Tone, Busy Tone and Reorder Tone. In order to make the PBX gateway capable of being installed in different countries, the device administrator can change the regional_id according to which country the device is installed in. If he or she specifies a different regional ID, the ring, cadence and frequency that is sent out or detected by the PBX voice gateway will be adjusted also .
The command to change the regional_id can be imputed under the Console or Telnet by CLI.

PBX Gateway>*enable*
PBX Gateway#*config*
Enter the configuration commands, one per line. End with CTRL/Z
PBX Gateway(config)#*regional_id ?*
<0-99> Set the value for regional id
PBX Gateway(config)#*regional_id 2*
PBX Gateway(config)#*exit*
PBX Gateway#*delete nvram ?*
all Select the function to delete the NVRAM
keep_ip Select the function to delete the NVRAM
<cr>
PBX Gateway#*delete nvram keep_ip*

(The command "delete nvram keep_ip" is functioning as the factory reset but will keep the IP address configuration for this device and the regional_id, after doing this; you should again re-configure the device).

After the system boot-up again, use “show run” to check the new configured regional ID.

The default value is set to "00" for the regional_id, but it may be equivalent to some of the regional_ids listed below. This depends on which regional_id will be entered as the default value.

Regional_id	Country
06	Canada
07	China
12	France
15	Hong Kong
22	Italy
23	Japan

Regional_id	Country
36	Singapore
38	Slovenia
40	Spain
43	Taiwan
46	Great Britain
47	United States

Table 8-1 the table of regional IDs and their corresponding countries

9. FTP for software upgrading, Configuration and Greeting Message uploading/downloading

On the PBX Gateway series PBX gateway, it gives the user the option to upgrade the software using FTP, which is less time consuming then TFTP. By using FTP, users can upgrade the software on the PBX gateway or upload/download the greeting message that is stored in the device.

The (factory default) FTP username is "FTP" (capitals) however the password field is left blank. The administrator can use the Command Line Interface to change the FTP password by changing the write privilege for the Console's login password. But the username ("FTP") cannot be modified.

```
PBX Gateway - PBX Gateway(config)#password console write xxxxx
```

Fig 16 Commands to change the FTP password

After initiating an FTP session, you will see two or three files listed. Do not modify the filenames, since it will make the device incapable of booting up. If you have recorded the greeting message, the file PF35XX.GRT will be displayed. You can upload it from your local disk drive or download it from another location. The file PF35XX.CFG is the configuration file for this device; you can also back it up to your local disk drive. The file PF35XX.RUN is the software for this device, after changing it, you must perform a cold start.

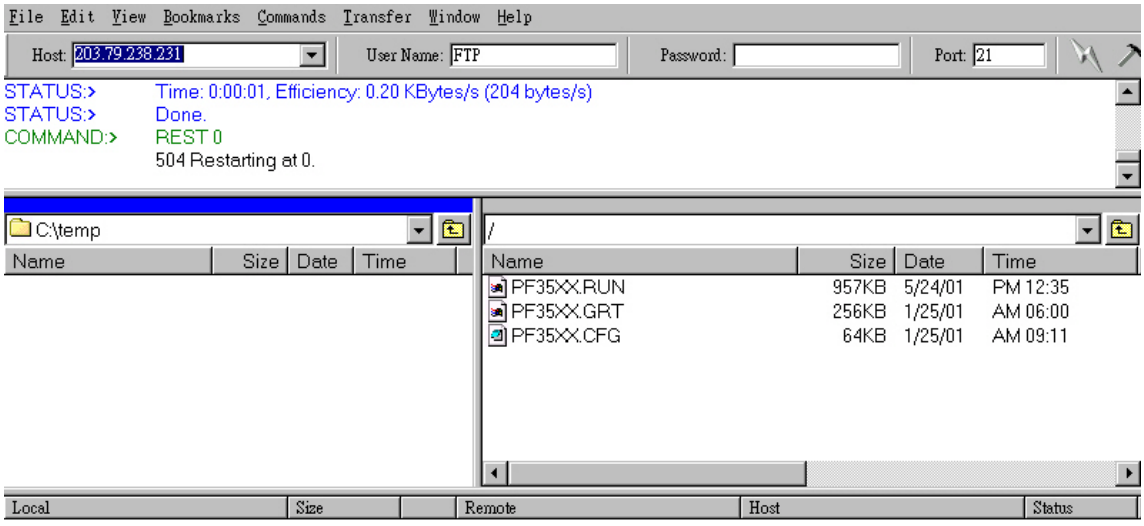


Fig 17 The login screen of an FTP session

10. The Call Detail Record information

The CDR information is very useful for debugging the configuration settings and providing records for billing systems. If users only want to check the routing or numbering plan configurations, they can use the Web-based Call Status screen in the Channel Management. From the Web browser, users must refresh the screen to acquire the updated running status. However, if users need the CDR information for billing purposes, it would be better to connect the RS-232 Null Modem Cable (9600, N, 8, 1) to the CDR port on the front panel. From this port the system will deliver real-time Call Detail Records to the screen or directly to the billing system after a call has ended. The format of the record will be displayed as:

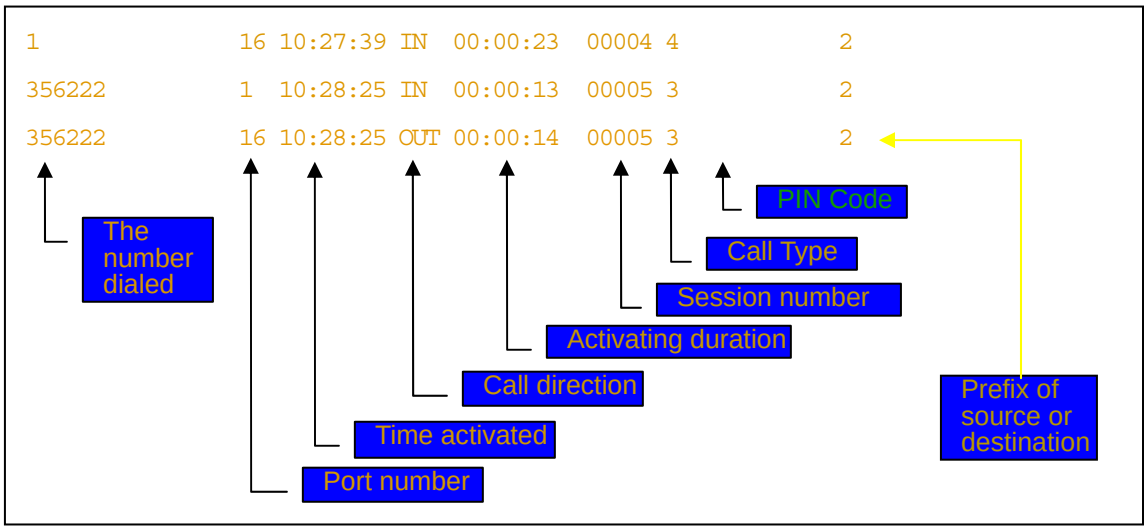


Fig 18 The format of the CDR information

- Call Type: "*" for non-defined calls, "0" for non-defined calls, "1" for International calls, "2" for Long Distance calls, "3" for Local calls and "4" for Internal calls.
- Session Number: The numbers that are generated by the caller and sent to the calling party. A call session will have identical Call Session numbers.
- PIN Code: Partial digits of PIN code, used to trace back to whoever is using the Transit Call Function.