NOTICE

This manual describes the CGW-T/TS Analog GSM/CDMA Cellular Gateway.

ITS reserves the right to modify the hardware and software described in the manual without prior notice. However, changes made to the hardware or software described does not necessarily render this publication invalid.

WARRANTY

In the event that the product proves to be defective in workmanship or materials within a period of one year from date of shipment, ITS shall repair or replace the product at its discretion. Transportation will be the responsibility of the dealer/distributor.

Under no circumstances shall ITS be liable for consequential or special damages, loss of revenue or user/dealer expenses arising out of or in connection with the use or performance of the product, whether based on contract, tort, or any other legal agreement.

The following shall void the above warranty: malfunctions resulting from fire, accident, neglect, abuse, or acts of God; use of improper electrical power; or repair of, tampering with or alteration of the product by anyone other than ITS authorized personnel.

Table of Contents

1 Introduction

Your new CGW-T is an analog GSM/CDMA Cellular Gateway (CGW-TS – GSM only), a cost reduction tool for mobile-to-landline and landline-to-mobile calls. It connects from the trunk interface (analog FXO) of your PBX to a GSM network (via an inserted SIM card) or to a CDMA network (by the built-in CDMA engine), eliminating the excessive interconnection fees and significantly cutting your telephone costs.

The Automatic Route Select table (ARS) in the PBX defines which calls will be automatically routed via the CGW-T to the predefined GSM/CDMA network. In doing so, the CGW-T/TS gateway reduces the company's telephone costs.

Installation of the CGW-T/TS does not require special skills. Simply insert the SIM card (GSM networks only), connect the unit to the PBX trunk interface, attach the antenna and power supply, and your CGW-T/TS can immediately start saving money for you. The unit has an LCD display, which shows the GSM/CDMA operator's name (CGW-T only), the signal strength and other useful call progress information.

A number of additional parameters for the CGW-T/TS, such as Output Audio Volume level setting, Conversation time-out and Restricted Digits, can be programmed via DTMF.

The CGW-T and CGW-TS units are displayed in Figure 1.

CGW-T **CGW-TS**

Figure 1. CGW-T and CGW-TS Devices

NOTE

When the PSTN interface is plugged out, all calls shall be executed via a cellular network, and a corresponding message will appear on the LCD display.

The Toll Restriction feature is implemented in the CGW-T/TS devices by means of 10 restricted prefixes, which cannot be dialed.

1.1 Main Features

The following list details the main features of the CGW-T/TS GSM/CDMA gateway:

Feature	CGW-T	CGW-TS
Integrated dual-band GSM module (900/1800, 850/1900 MHz)	✓	✓
Integrated dual-band CDMA module (800/1900 MHz)	✓	
LED indicators		✓
LCD indicators (signal strength, cellular operator name, operational status)	✓	
DTMF programming: call barring (toll restriction), conversation time-out, reverse polarity signaling support, audio volume control, roaming control (GSM only), CLIR (GSM only)	✓	✓
DTMF dialing	✓	✓
PSTN interface		
Call forwarding		
Line interface, 2-wire (RJ-11 connector)	✓	✓
Plug & Play installation	✓	✓
High voice quality	✓	✓
Maintenance free	✓	✓

1.2 Contents

The contents of your CGW-T/TS package are as follows:

No.	Item	Qty.
1.	CGW-T/TS device	1
2.	Installation and Operation Manual	1
3.	Power Supply (Input: 110VAC, 60Hz or 220VAC, 50Hz) (Output: 9VDC, 800mA)	1
4.	Antenna (with cable)	1
5.	RJ-11 telephone cable	1
6.	Template for wall mounting	1
7.	Screws and plugs for wall mounting	2

2 Physical Description

The physical features of the CGW-T/TS are detailed in Figure 2.

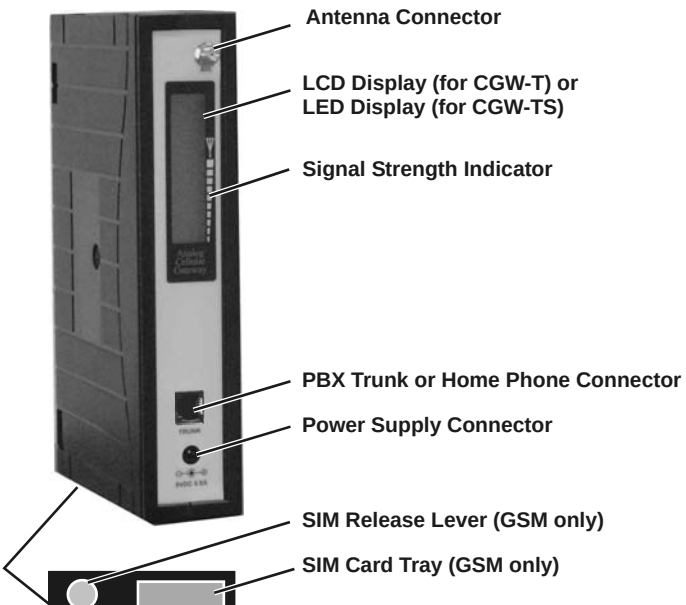


Figure 2. CGW-T/TS Physical Description

3 Pre-Installation

The CGW-T/TS unit contains a GSM engine. It therefore needs a SIM card from the local GSM network provider. Its registration to the GSM operator is similar to that of a mobile GSM phone.

The PIN and PUK code requests must be disabled (see LCD Messages table, below). If, for any reason, you are unable to do so using an analog telephone connected to the CGW-T/TS trunk socket, use any GSM mobile phone to modify the SIM card, or contact your local GSM Service Center.

4 Installation

4.1 SIM Card Insertion into the Unit (GSM only)

CAUTION

To avoid damage to the CGW-T/TS unit, disconnect the 9V adapter from the electric power outlet.

The physical description of the unit can be used as guideline for the following steps:

- Hold the unit in your hands with the display pointed to your left and the SIM insertion slot at the bottom of the unit towards you (so that the text “SIM” is upside-down).
- Using a screwdriver, push the yellow SIM release lever, so that the SIM card tray moves towards you.
- Take out the tray. You will see that the SIM card fits in the tray in one way only.
- Carefully place the tray with the SIM card in the slot and slide it in with the SIM card contacts facing down.

4.2 CGW-T/TS Installation

To install the CGW-T/TS unit, perform the steps as follows:

- Mount the CGW-T/TS unit on the wall as a stand-alone unit or on the 6-fold wall mount bracket, which is a separate accessory.
- Connect the antenna into the Ant. connector on the front panel of the CGW-T/TS unit.
- Connect the analog trunk interface of the PBX to the Phone/PBX connector on the front panel of the CGW-T/TS unit.
- Connect the power supply to the CGW-T/TS unit. The unit will start the initialization and registration. At the end of the process, the LCD will display the signal status (CGW-T only).

NOTE

Adjust the antenna location until an optimal signal level is received.

Figure 3 displays the schematic setup of the CGW-T/TS unit.

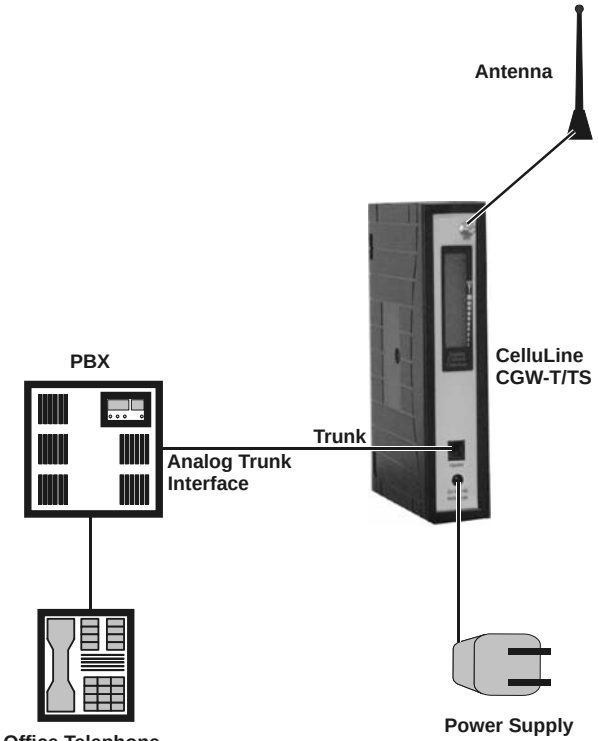


Figure 3. CGW-T/TS Schematic Setup

5 LCD Status Indicators and Diagnostics

5.1 CGW-T LCD Status Indicators and Diagnostics

The CGW-T gateway can be connected to the analog trunk interface of the PBX. At power-up of the CGW-T unit, the information on the LCD will provide the first diagnostics. Usually, further diagnostics are unnecessary. By connecting an analog telephone with the RJ-11 connector to the trunk connector in the unit, you are able to perform further diagnostics.

5.1.1 LCD Status Indicators

The following table shows the messages appearing on the LCD, their description and the action to be taken (if any).

LCD Message	Description	Action
Searching Network…	Searching for the mobile network.	No action needed.
Enter PIN code (T only, GSM only)	PIN code is required to activate the SIM card.	1. Connect an analog telephone to the unit and enter the code (4-8 digits. Add a # to the code when using less than 8 digits) 2. Alternatively, insert the SIM into your mobile phone and disable the security option.
S=X dBm	LCD shows signal level in dBm.	If level is below 85 dBm, move the antenna to another location with a better reception.

LCD Message	Description	Action
Name operator	Name of Operator (read from mobile network).	No action needed.
Calling…	CGW-T dials to destination.	Wait.
Connected	When called party answers.	No action needed.
Disconnected	End of call.	No action needed.
Incoming Call	CGW-T gets a call from network.	No action needed.
Failed	CGW-T receives incorrect operation information from the mobile network.	Try again.
Engine Problem Call FWD to PSTN	GSM/CDMA engine problem.	Power the unit off and turn it on again. If error is repeated, the unit is faulty.
No Signal	No Signal or Signal low (less than 108 dBm).	1. Check your antenna connection. 2. Move your antenna to a location with a better reception. 3. Check with your GSM operator.
Reg. Denied	Registration denied and/or SIM card is not readable.	1. Replace the SIM card. 2. Contact your GSM operator.
Insert SIM Card (GSM only)	No SIM card inserted.	Insert SIM card or check if the existing card is inserted properly.

5.1.2 CGW-T Diagnostics

Perform the diagnostic procedure as follows:

- Connect an analog telephone directly to the trunk connector (RJ-11) on the unit front panel.
- Pick up the receiver and listen to the dial tone:
  - A continuous tone indicates that the unit is working correctly and ready for programming.
  - A busy tone indicates that there is a fault. Check the LCD display for a message.

NOTE

If there is no SIM card in the device, or if the card is not installed properly, there will be no tone on the CGW-T.

5.2 CGW-TS LED Status Indicators and Diagnostics

When you power-up the CGW-TS, the LEDs indicate the first diagnostics. In most cases further diagnostics are not needed. Figure 4 displays the LED layout on the CGW-TS.

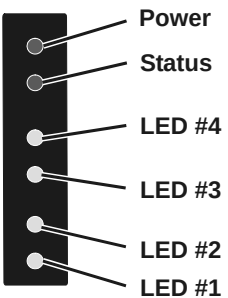


Figure 4. LED Layout on the CGW-TS

To perform further diagnostics, connect an analog telephone with an RJ-11 connector to the trunk connector in the unit. For details on how to perform further diagnostics, see Paragraph 5.2.3.

5.2.1 CGW-TS LED Activity Status Indicators

The LED activity status indicators are detailed in the following table:

LED Status Indicators						
Description	**LED1** *Yellow*	**LED2** *Yellow*	**LED3** *Yellow*	**LED4** *Yellow*	**Power** *Green*	**Status** *Red*
Standby Mode	On	On	On	On	On	On
Conversation	On	On	On	On	On	Flashing fast
Incoming Call	On	On	On	On	On	Flashing
Outgoing Call	On	On	On	On	On	Flashing
Programming Mode	Off	Off	Off	Off	Flashing	Off

5.2.2 CGW-TS LED Error Status Indicators

The LED error status indicators are detailed in the following table:

LED Status Indicators						
Description	**LED1** *Yellow*	**LED2** *Yellow*	**LED3** *Yellow*	**LED4** *Yellow*	**Power** *Green*	**Status** *Red*
GSM Engine Problem	Flashing	Flashing	Flashing	Flashing	Flashing	Flashing
Solution	Refer to your local supplier.					
No Signal or Signal Low (less than 25%)	Flashing	Off	Off	Off	On	Off
Solution	Check your antenna connection or move your antenna to a location with a better reception or enable your Roaming parameter (see Paragraph 5.2.3).					
Registration Denied	Flashing	Off	Off	Flashing	On	Off
Solution	Contact your local GSM operator or enable your roaming parameter (see Paragraph 5.2.3).					

LED Status Indicators						
Description	**LED1** *Yellow*	**LED2** *Yellow*	**LED3** *Yellow*	**LED4** *Yellow*	**Power** *Green*	**Status** *Red*
LED Status Indicators						
Description	**LED1** *Yellow*	**LED2** *Yellow*	**LED3** *Yellow*	**LED4** *Yellow*	**Power** *Green*	**Status** *Red*
PIN Error	Off	Flashing	Off	Off	On	Off
Solution	Dial your SIM card's PIN code using your phone extension. Once entered using the phone, the unit will remember the PIN code. Alternatively, you can remove the SIM card from the CGW-TS and disable the PIN number using your mobile phone, then put it back inside the unit.					
SIM Card is Not Readable	Off	Off	Flashing	Off	On	Off
Solution	Check the SIM position or replace the SIM card or contact your local operator.					
No SIM Card Inserted	Off	Off	Off	Flashing	On	Off
Solution	Insert the SIM card.					

5.2.3 CGW-TS Diagnostics

Perform the diagnostic procedure as follows:

- Connect an analog telephone directly to the trunk connector (RJ-11) on the unit front panel.
- Pick up the receiver and listen to the dial tone:
  - A continuous dial tone indicates that the unit is working correctly and ready for programming.
  - A busy dial tone indicates that there is a fault. Check which LEDs are lit and find the error in the table in Paragraph 5.2.2. You cannot program the unit until you resolve the problem and hear a continuous dial tone.
  - No dial tone indicates that the GSM network signal is too low to complete registration. Remove your SIM card and replace it with a card from a GSM network that provides a higher signal level. Enable the roaming parameter (see command *500 in the programming table), and then replace the SIM card with your original SIM card.

NOTE

All cellular calls you now make from your CGW-TS will be routed through the alternate GSM network that you used to complete your registration.

6 DTMF Programming

The CGW-T/TS gateway can be programmed via DTMF. To program the unit, perform the steps as follows:

a. If the unit is connected to the PBX, remove the cable from the Trunk connector on the unit front panel.
b. Connect an analog telephone directly to the Trunk connector.
c. Dial *900 and enter the password (1234 by default).
d. Use the commands in the following table for programming.

NOTE

- When DTMF programming changes are made, the device will perform an automatic reset for the changes to take effect.
- Exit from the programming mode by *900 or hanging up the telephone.
- If you do not enter digits for 45 seconds, the unit will automatically exit the programming mode.
- When entering an incorrect command, you will hear a beep.
- When entering a correct command, you will hear two beeps.

Operation	Command	Default
Enter the Programming mode	*900 + XXXX where: XXXX = Password (1234 default)	1234
Exit the Programming mode	*900	
Maximum number of digits to be dialed by the CGW-T Note: Number will be dialed after inter-digit time elapsed (3 seconds by default). When exact XX digits are dialed, the number will be dialed directly. When more than XX digits are dialed, the number will be cut off after XX has been reached.	*300 + XX where: XX = 05-20 (digits)	11 (Tip: set the default to country's max. telephone number length)

Operation	Command	Default
Time-out value in seconds. When an insufficient number of digits are dialed, this defines the period of time that the device will wait until timeout (inter-digit).	*310 + X where: X = 2 - 9	3 (sec.)
Reverse Polarity The unit may be set up to send a “reverse polarity” command to the PBX, in case a “call answer” is detected. This parameter is useful if call accounting software is active.	*320 + X where: X = 0 – 2 0 = No reverse polarity 1 = Reverse polarity only on Outgoing calls 2 = Reverse polarity for Incoming and Outgoing Calls	2
Output Volume Control	*330 + X where: X = 0 – 7 (CDMA) X = 0 – 9 (GSM)	5

Operation	Command	Default
CGW-T Telephone Number (CGW-T only) Enter the SIM telephone number to be displayed on the LCD during power-up of the unit. (GSM only)	*350 + Number + # where: Number = SIM Telephone number (up to 15 digits)	None
DTMF support option (CDMA only)	*350 + X, where: X = 1 enabled; X = 0 disabled	
Verification of the Telephone Number (CGW-T only) Display the SIM telephone number on the LCD for 5 seconds when in programming mode. (GSM only)	*360	
Conversation Time-Out An outgoing telephone conversation will be automatically terminated after this time-out.	*390 + XX where: XX = number of minutes 00 = unlimited	00 (unlimited)

Operation	Command	Default
End Dialing Digit Define "#" as the digit that indicates the end of a dialed number, causing the unit to immediately start dialing. (GSM only)	*370 + X where: X = 0 End dialing digit disabled X = 1 End dialing digit enabled ("#" indicates end of number)	1
Pulse drop Activate the pulse drop feature by defining time for loop disconnect for conversation end state signaling to PBX.	*380 + XX where: XX = time in tenth of seconds. For example: X = 10=1000 milliseconds = 1 second X = 01 = 100 milliseconds Legal values: 00-99 Note: If this feature is activated together with reverse polarity (*320) “Pulse drop” occurs after polarity is reversed.	00 (feature disabled)

Operation	Command	Default
Call barring (number of restricted/permitted prefixes – up to 4 digits).	*400 + XX + YYYY + # where: T/TS: XX = 01 to 10 (list of **restricted** prefixes) D: XX = 01 to 20 (list of **permitted** prefixes dialed via cellular network)	None
Delete Call Barring (Toll Restriction).	*400 + XX + # (delete prefix entry) or *400 + # (delete the whole restricted number list)	None
Cellular Engine Reset Interval Define the interval, in hours, between cellular channel resets. Reset is always performed when the unit is in Idle mode. Reset affects the GSM engine only, and does not affect any of the parameters.	*450 + XX where: XX = number of hours between resets (01 to 99; 00 indicates no reset at all)	00 (reset disabled)

Operation	Command	Default
Roaming The unit will be able to register with another GSM operator (GSM only)	*500 + X where: X = 0, off X = 1, on	0
Busy Detect Timer – time interval for busy tone detection. The device disconnects when a busy tone is detected for XX seconds	*520 + XX Where XX – time in seconds (an error rate of ±25% may occur due to busy tone cadence).	6
Tone Detect Timer – time interval for continuous tone detection. The device disconnects when a continuous tone is detected for XX seconds	*530 + XX Where XX – time in seconds (an error rate of ±25% may occur due to tone flexibility).	6

Operation	Command	Default
No Voice Detect Timer – time interval for silence detection. The device disconnects when silence is detected for XX minutes	*540 + XX Where XX – time in minutes.	99
CLIR (Calling Line Interface Restriction) The CGW-T can be restricted to show its SIM telephone number. (GSM only)	*550 + X where: X = 0, off X = 1, on	1 – Basic version. In some types the default is 0 – contact your local distributor.
Change programming password	*600 + new password where: password must be 4 digits (only digits 0-9)	1234
Reset the unit and set to default values	*151	

7 Technical Data

7.1 CGW-T/TS for GSM Network

Model	CGW-T GSM Gateway
GSM Network Type	GSM Phase II
GSM Module	Integrated dual-band (900/1800, 850/1900 MHz)
SIM card	Plug-in, 3V, small
Transmission Power	Max. 2W / 900MHz Max. 2W / 850MHz Max. 1W / 1800MHz Max. 1W / 1900MHz
Receiver sensitivity	-104 dBm
Connectors	▪ RJ-11 (Trunk) – to analog trunk interface to PBX or home phone ▪ Power Supply ▪ SMA female – Antenna
Off-hook AC impedance	600Ω
On-hook line voltage	48VDC
Off-hook line current	Maximum 25mA

Off-hook loop resistance threshold	800Ω
Dial tone frequency	400Hz
Ringing voltage	48Vrms, 25Hz
Supported dialing type	DTMF
Antenna	50Ω Impedance, connected via SMA connector frequency 800 - 2000MHz
Antenna cable length	3m 9.8ft
Power supply	Input: 110VAC, 60Hz 220VAC, 50Hz Output: 9VDC, 800mA
Temperature range	0˚C-45˚C 32˚F-113˚F
Maximum relative humidity	95%
Dimensions (HxWxD)	212x44x121 mm/8.3x1.7x4.8 inch
Weight	550g (1.21 lbs)

7.2 CGW-T for CDMA Network

Model	CGW-T CDMA Gateway
CDMA Network Type	CDMA, CDMA 1X
CDMA Module	Integrated dual-band Tri-Mode (CDMA 1X 800/1900MHz, AMPS 800MHz)
Transmission Power	Max 800MHz = 1/4W
Receiver sensitivity	Digital <-104 dBm Analog <-116 dBm
Connections	▪ To analog trunk interface of PBX – RJ-11 Trunk (operational mode) ▪ To analog telephone – RJ-11 Trunk (programming mode) ▪ Power Supply ▪ Antenna
Off-hook AC impedance	600Ω
On-hook line voltage	48VDC
Off-hook line current	Maximum 25mA
Off-hook loop resistance threshold	800Ω
Dial tone frequency	400Hz

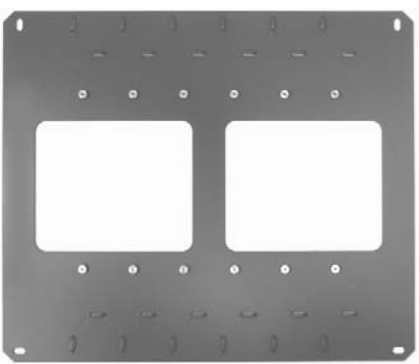
Ringing voltage	48Vrms, 25Hz
Supported dialing type	DTMF
Antenna	50Ω impedance, connected via SMA connector frequency 800/1800/1900MHz
Antenna cable length	3m 9.8ft
Temperature range	0˚C-45˚C 32˚F-113˚F
Maximum relative humidity	95%
Dimensions (HxWxD)	212x44x121 mm/8.3x1.7x4.8 inch
Weight	550g (1.21 lbs)
Power supply	Input: 110VAC, 60Hz 220VAC, 50Hz Output: 9VDC, 800mA

8 CGW-T/TS Accessories

Your CGW-T/TS package contains a multiple-antenna holder that can hold up to six antennas, and wall mount brackets for three or six units (Figure 5).

Multiple-Antenna Holder

Three-Unit Bracket



Six-Unit Bracket

Figure 5. CGW-T/TS Mounting Accessories