Gateway
Instruction Manual

Model: CGW Series

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Table of Contents

1   Introduction

This manual describes how to install, test and service a Gateway. The Gateway is part of the Level Monitoring System, which includes the Gateway, up to 40 Level Monitors (hereafter referred to as Monitors), and a Data Center that provides the user interface.

This manual does not include how to install, test, maintain, or troubleshoot the Monitors. Refer to the individual Monitor Instruction Manuals for this information.

The Outdoor Gateway is to be installed as fixed, permanently connected equipment. This means that the Gateway should be fastened to a support and electrically connected to its supply by a permanent connection.

2   Product Overview

2.1   Description

The Gateway consists of a transceiver that collects Monitor information and either a cellular modem or Ethernet port that relays this information to a centralized data collector.

2.2   Operation

The Gateway can receive Radio Frequency (RF) signals from up to forty Monitors. The Gateway communicates with the Data Center using a cellular or Ethernet connection. The Gateway sends data and can receive commands, setup information, and firmware upgrades from the Data Center.

The Level Monitoring System utilizes 2.4 GHz ISM band communications in accordance with the Federal Communications Commission (FCC) rules.

The Gateway is powered by a DC supply, depending on the model ordered. A terminal block or spade terminal (depending on model) inside the Cellular Gateway housing is provided for connecting to the power source.

2.3   Environmental Specifications

The following environmental specifications should be observed when installing the Gateway:

- Ambient Temperature Range:

    o   Outdoor Models: -30°C to +60°C

    o   Indoor Models: 0°C to +60°C

- CGW-0 Models designed for outdoor use (Raintight) provided that the conduit connections are made in a way that maintains this level of protection.

- CGW-1 Models designed for indoor use only.

2.4   Certifications

This equipment contains a radio module and a cellular modem that comply with Part 15 of the FCC Rules.

3   Installation

3.1   Gateway-Monitor RF Site Guidelines

The Gateway should be mounted in accordance with Section 3.2 and the location should be selected in accordance with the following guidelines:

- Direct line of sight between the Monitor and the Gateway will provide optimum radio reception. Optimal orientation would have the Gateway antenna oriented towards as many of the installed Monitors as possible. The Monitors would ideally be oriented so that the label with the serial number faces the Gateway.

- The Monitor and the Gateway can communicate at distances up to one mile under optimum line-of-sight conditions.

- When obstructions such as walls, buildings, chain link fences, and vehicles exist between the Monitor and the Gateway the distance between these units should be limited to less than 500 feet.

- Multiple obstructions (such as two or more walls or a tank and a wall) should be avoided, if possible.

- Electrically conductive objects, such as metal buildings, concrete reinforcing rods, tanks, silos, and vehicles reflect radio signals. This reflection can be either an advantage or a disadvantage to good radio reception at a particular installation site:

  1   Metal objects between the Monitor and the Gateway may reflect and scatter RF energy and reduce radio signal strength at the Gateway.

  2   Metal objects behind the Monitor or Gateway may increase the radio signal strength at the Gateway by reflecting radio signals toward the Gateway.

- Even small objects such as tank vents or toolboxes between the Monitor and the Gateway can significantly reduce radio signal strength if they are within a few feet of the Monitor or Gateway. These objects can reflect radio signals and cause an RF "shadow" which may prevent radio signals from reaching the Gateway.

- Objects which are not electrically conductive such as wooden or fiberglass buildings, non-reinforced masonry, trees, plastic, and glass have less effect on radio signals than metal objects.

- Windows and wooden doors can provide radio signals access to otherwise closed metal buildings. However, "low-E" window glass may have a thin metallic coating that can reflect radio signals.

- Strong electromagnetic fields such as those found in close proximity to power lines, large electric motors, generators, electric fences and transmitter antennas may interfere with the radio signal received by the Gateway.

- The Gateway should be mounted as high as is reasonably possible to improve its ability to receive radio signals. For example, placing the Gateway high on a wall would be preferable to mounting at a low level. Installing the Gateway in an underground basement should be avoided. Mounting the Gateway so that it has an unobstructed view of the horizon will improve cellular communication.

3.2   Gateway Site Guidelines

Outdoor models of the Gateway are housed in a polymer enclosure designed for mounting on a vertical surface. The enclosure is provided with four (4) small mounting brackets. It is intended that the Gateway be mounted with the wire entrance on the bottom.

Indoor models of the Gateway can be mounted either on a horizontal or vertical surface.

Reference Installation Drawing at the end of this manual.

3.3   Antenna Mounting

The Gateway is supplied with an external mount antenna. Mounting the antenna in the vertical position provides the best RF performance.

With the antenna in the "L" position and already in the vertical position shown below, hand tighten the SMA connector of the antenna onto the gold connector protruding from the enclosure until snug. Do not use a wrench or pliers on the antenna connector or the interior hex head.

Gold Connector   Outdoor Gateway Position   Indoor Gateway Position

3.4   Wiring

> **Warning**: Remove all power to the board before opening the enclosure for service. Electric shock or deathcouldoccur.
>
> **Avertissement**: Enlevez tout le pouvoir de la planche avant d'ouvrir la clôture pour le service. Le décharge électrique ou la mort pourraient se produire.

Access the Gateway wiring connections by opening the cover.

A readily accessible disconnect device shall be incorporated in the supply wiring.

3.4.1   Supply Power

The outdoor models of the Gateway enclosure are supplied with two holes for 3/4" conduit in the bottom of the enclosure. The installer must use the proper fittings to maintain the weatherproof integrity of the enclosure. **The manufacturer does not recommend adding additional holes to the enclosure. However, if additional holes are added, proper Type 4 seals must be used to prevent water from leaking into the enclosure.**

The indoor models of the Gateway are supplied with two bushings installed for the user to connect DC supply and the Ethernet cable (if used for your model).

The Gateway is a Category II device.

The outdoor models of the Gateway require an external SELV source of 12-24V DC.

The indoor models of the Gateway require the use of a 12 – 24V DC supply.

The wiring must be in accordance with any national, state and/or local regulations. This equipment is considered Class 1 which uses a protective earth ground.

Verify that the cables from the cover to the printed circuit board are properly connected. Close the cover and secure the two latches.

Fuses F1 and F2 are permanently soldered on the PCB. They are installed only for catastrophic failure and are not considered serviceable by an end user. The connections for this power are located as follows:
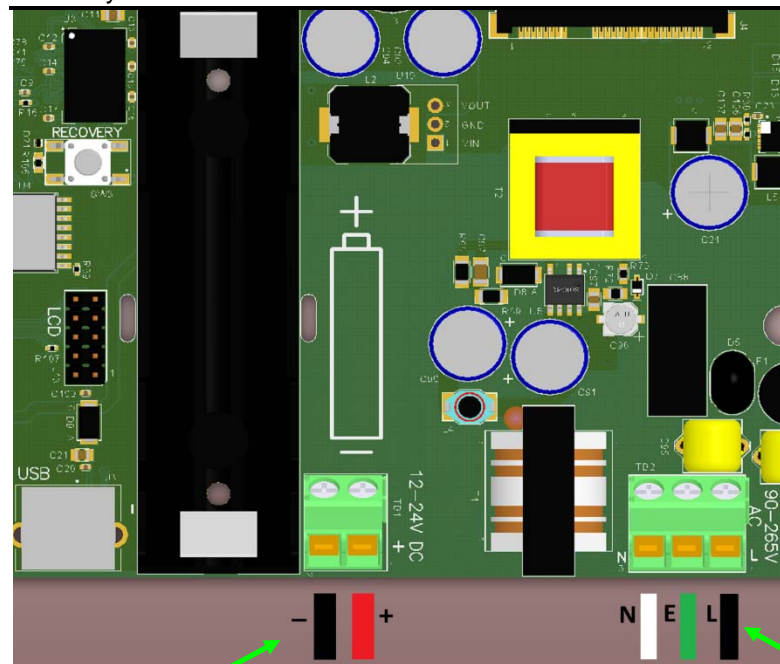
DC power input:
12-24VDC +/- shown

3.4.2   Backup Battery (Optional)

If you purchased a Gateway with a backup battery, the following information applies.

The approved battery for use is an 18650 series rechargeable Li-Ion battery. These are 3.7V cylindrical batteries with 2200mAh capacity.

The procedure for changing the battery in the field is to open the housing and pull out the old battery and insert the new battery. Make sure that it is installed properly (with the "+" terminal to the middle of the board. The "–" terminal is toward the edge of the board at the bottom).

> **Caution**: Risk of Explosion if battery is replaced by an incorrect type.Dispose of used batteries according to the instructions.
>
> **Prudence**: Le Risque d'Explosion si la batterie est remplacée par un type incorrect. Débarrassez-vous des batteries utilisées selon les instructions.

> **Warning**: The cover must be closed, clasped, and screwed/fastened shut with the supplied screws/fastener to prevent access to live circuits.
>
> **Avertissement**: La couverture doit être fermée, fermée et serrée et a vissé/attaché fermé avec les vis/attachefournies pour prévenir l'accès pour vivre des circuits.

3.5   Setup

Prior to applying power, the Gateway must be added to the Data Center (including adding the Gateway and Monitor serial numbers into the database).

3.5.1   Cellular Gateway Setup

There are no extra cables for the Cell Gateway.

If your cellular modem was not factory provisioned or activated on a network then follow the special instructions located in the appendix under Advanced Setup.

3.5.2   Ethernet Gateway Setup

Using an Ethernet cable, connect the Controller to a port on a network switch or hub or any standard RJ-45 network jack where a computer could gain access to the Internet. Longer Ethernet cables may be used, if necessary, but the total cable length includingpermanent wiring inside the building should not exceed 300 feet. The Gateway will connect only to the Data Center and no inbound port forwarding rules should be required on the customer's network firewall.

If the local network requires a static IP address,then follow the special instructions located in the appendix under Advanced Setup.

3.6   Activation

Following wiring and setting up the Gateway, the unit can be activated by turning on the supply power. When power is applied, the Gateway will enter a short test mode and the two lights on the front of the housing will cycle from off to the color Yellow. The Gateway will then enter an initialization phase, which may take several minutes, during which timeData Center light will blink Yellow or Green. Once the Gateway has communicated with the Data Center, it will enter normal operating mode and the **Data Center** light will turn solid Green. The status indicator lights can be interpreted as follows:

The **Data Center** light indicates Data Center communication status. The **Data Center** light blinks approximately once per second any time Gateway is powered.

- Blinking Red – Network connection failure. (No network connection or Loss of connection).
- Blinking Yellow – System is connected to the network, but is waiting for a response from network router or ISP. (Waiting for network)
- Solid Yellow - System is starting up or connecting to the network. (Network not ready)
- Blinking Green – Connected to the network, but the Data Center has not responded. (Waiting for Data Center to reply)
- Solid Green – Connected to the network and talking to the Data Center. (Normal operation)

The **MONITOR** light provides information about radio communication between the Monitor and Gateway. The **MONITOR** light is normally "off". It blinks only when the Gateway is receiving radio transmissions.

- Blinking Green – Data received from a valid Monitor.
- Blinking Yellow – Some data was received from a valid Monitor but the signal was weak or partially corrupt. **Move the Gateway or Monitor and retest until the Monitor light blinks green.**
- Blinking Red – Radio signals were received from an invalid source.

4   Service and Technical Support

If you experience trouble with this equipment, please contact your distributor.

> **CAUTION**: The manufacturer does not support field changes or modifications to any of the Level Monitoring System equipment unless they are specifically covered in this manual. Any other modification to the equipment will void the manufacturer's warranty.
>
> **PRUDENCE**: Le fabricant ne soutient des changements de terrain ou des modifications à aucun des équipements de Système de surveillance de Niveau à moins qu'ils ne soient spécifiquement couverts dans ce manuel. Autre modification à l'équipement va le vide la garantie du fabricant.

> **Warning**: This unit is to be serviced by qualified service personnel only.
>
> **Avertissement**: Cette unité doit être assurée l'entretien par le personnel de service qualifié seulement.

5 Appendix A – Advanced Setup

5.1 Admin Console Setup

In the event that the Gateway needs further setup or is not functioning properly, the system can be accessed through the admin console. The Gateway admin console can be connected through a USB port to any computer running a terminal program, i.e. HyperTerm or PuTTY. A free download of PuTTY is available at www.putty.org. Click on the download button and follow the instructions.

Connect the USB A connector to your computer and the USB B connector to Gateway's J3 USB connection located next to the backup battery. The PC should be a laptop or otherwise electrically isolated from the Gateway power source.

The Linux serial gadget driver must be installed on your computer and a patch is needed for Windows 7 which is available at www.centeron.net/downloads/setup.bat. If your driver installation fails when you connect the USB from the Gateway to your computer, then download and run the setup.bat patch.

When the Linux serial gadget driver is installed, you can open the terminal program using the following communication settings:

Baud 115.2K, 8 Data bits, 1 Stop Bit, No Parity, Handshaking is off
The Port number is depended on the availability of portscurrently on your system.

You will see the following prompt when the Gateway is connected:

OpenWrt login:

If you do not see the above prompt, press <enter> and the log in prompt should appear. If the prompt is still not visible, then re-check your communications settings in the terminal application.

The login is "admin" and the password is "password".

The admin console is a command line driven interface. All commands are typed in and pressing <enter> executes the command.

5.2 Gateway Admin Console Application

To access the administrator console application type the following on the command line:

gwadmin [option] [parameters]
The command line is case-sensitive and spaces separate the option and its parameter(s). The following is the list of available options:

Option [case sensitive]	Parameter(s)	Description
help		Displays this list
getalerts		Get gateway alert enable mask
setalerts	Mask	Enable/Disable gateway alert mask 1 Power up 2 Net Failure 4 Power Outage Turn off alerts: gwadmin setalerts 0 Turn on Power up and power outage: gwadmin setalerts 5
gethosts		Get the list of approved hosts IP addresses
resetconfig		Restore default gateway configuration
reboot		Safely reboot the gateway
getgwinfo		Get information regarding this gateway unit Example: gwadmin getgwinfo Serial Number: 000200002B Manuf. time: 0x0 Hardware version: 0x2 Software version: 2.1.3 Up-time: - Boot: 23981 seconds - Network: 23756 seconds GW MAC: 00:06:96:02:00:00
getnetif		Get the active WAN connection (cell or enet).
getrssi		Return the RSSI of the cell modem (not working)
getstat		Return the System State and Status
getip		Get the stored static IP address
setip	IP Address	Set the stored static IP address Format: xxx.xxx.xxx.xxx
getnetmask		Get the stored netmask
setnetmask	Net Mask	Set the stored netmask Format: xxx.xxx.xxx.xxx
getnetrouter		Get the stored router/gateway IP Address
setnetrouter	IP Address	Store the static IP Gateway/Router address Format: xxx.xxx.xxx.xxx
getnetdns		Get the DNS primary and alternate addresses
setnetdns	Primary DNS IP Addr Alt DNS IP Addr	Set the DNS primary and alternate addresses Format: xxx.xxx.xxx.xxx Alt DNS parameter is optional
getstaticip		Get the enable/Disable the Static IP Address for Ethernet

		1= Enable Static IP Addressing 0=Enable DHCP IP addressing
setstaticip	EnableStaticIP	Enable/Disable the Static IP Address for Ethernet 1= Enable Static IP Addressing 0=Enable DHCP IP addressing

Examples:
Get the current ip address:
gwadmin getip

Set the network gateway/router:
gwadmin setnetrouter 10.2.27.42

Get the gateway information:
gwadmin getgwinfo

Turn on all alerts:
gwadmin setalerts 7

5.3 Setting Up a Static IP Address

Once you have the terminal setup on your computer, you can now change the static IP address of your Gateway. Enter the following admin console commands:
Note[1]: XXX.XXX.XXX.XXX represents your IP address or net mask.
Note[2]: all commands, options, and parameters are case-sensitive.
1. gwadmin setip XXX.XXX.XXX.XXX
2. gwadmin setnetmask XXX.XXX.XXX.XXX
3. gwadmin setnetrouter XXX.XXX.XXX.XXX
4. gwadmin setnetdns XXX.XXX.XXX.XXX XXX.XXX.XXX.XXX
5. gwadmin setstaticip 1

The following is an example and not meant to be used as a real configuration:
gwadmin setip 192.154.27.55
gwadmin setnetmask 255.255.255.0
gwadmin setnetrouter 192.154.27.1
gwadmin setnetdns 8.8.8.8 8.8.8.4.4
gwadmin setstaticip 1

Once the command sequence is entered, the Gateway will restart the network interface with the new parameters. The new static IP connection should be established in less than a minute and can be confirmed byobserving the Data Center light as it transitions from red to yellow and then to flashing green as it waits for communication from the Data Center.

To return to the default setup of using a DHCP server for assigning the IP address,enter the following command:
gwadmin setstaticip 0

The new DHCP connection should be established in less than a minute and can be confirmed by observing the Data Center light as it transitions from red to yellow and then to flashing green as it waits for communication from the Data Center.

5.4 Activating the Cellular Modem

The Gateway cellular modem can be provisioned or activated on Verizon WirelessNetwork with the following steps:

1. Log into admin console as described in section 5.1
2. At the "root@OpenWrt:~#" prompt type otasp and press <enter> to start the over the air activation.
3. Wait about 3 to 4 minutes for the process to complete. Do not remove power during this time as configuration may become corrupted.
4. The Gateway will automatically reboot and the cellular modem is now activated.

Note: Multiple activations should not harm the modem or configuration.