



User Manual

Model: C900 FL-TG

Description: Wireless Monitor

This Document Revision: 2

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1 Revision History

<i>REV</i>	<i>ECN</i>	<i>Description</i>	<i>Date</i>	<i>By</i>
1.0		Initial release	2020/01/20	CM
1.01		Added Channel Frequency Table	2020/01/28	CM
2.0	10585	Added Required FCC information	2020/08/11	DJS

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2 Device Overview

The wireless monitor (also called radio) is a transceiver that monitors the health of a light and wirelessly provide status to a central location. It will also provide the health of a battery backup in light. In an ideal condition, the 915 MHz frequency band (sub 1GHz) signal has a range of up to 4,000 feet.

Device has an interface 4 wire assembly harness to power up with 5 Volt / Ground and TTL serial transmit and receive interface data lines.

Device can also be adapted to connect to a digital addressable lighting interface (DALI) for network based systems that control lighting applications.

A provision application tool is included with the wireless monitor for viewing and setting the device parameters.

3 Applications

- Internet of Things (IoT)
- Metering
- Smart city
- Sensor networks
- Industrial Automation

4 Hardware/ Software Needed

- Computer or Tablet (Windows 10 or Higher), not included with product
- Provision Application, included with product
- 6 Feet Custom Cable (USB B to Mini USB), sold separately

5 Warning

Important device safety and handling information.

Follow and comply with site safety policies. RF Frequency Notice



Figure 1: RF Notice Label

5.1 Electrostatic sensitive device

There is an electrostatic sensitive device (ESD) inside equipment.



Figure 2: ESD Attention Label

Prior to handling equipment, electrically discharge yourself by momentarily touching an unpainted metal ground object.

5.2 Additional Notice

- Terminate device RF port with a 50 Ohm load using antenna.
- Maximum RF input level is 10 dBm at the device RF port.

6 Installation

Power up wireless monitor with 5 Volts and Ground. With a current capability of at least 250 milli-amps.

6.1 Provision Application

6.1.1 Application Files Required

6.1.1.1 8880-027_Application_Provision_Tool_CVL

6.1.1.2 8880-029_AutoFirmwareProgramming

Unzip both files to the C:\ drive root directory.

Connect the Computer / Tablet to the wireless monitor using custom cable, shown in pictures below.

Tablet with cable (Connection End 1)	Custom Cable USB-B to Mini-USB	MGL Light Fixture with cable (Connection End 2)
		

Figure 3: Wireless Radio Connected to Laptop using custom cable

Make sure the wireless monitor amber LED turns “On” located (in underside) next to the mini USB connector. The LED will blink the firmware code revision.

- Run the Application

To open application, click the executable file called “cvprovision.exe” located in the “8880-027_Application_Provision_Tool_CVL”. Create a shortcut to this application exe file on your desktop.

- Screen Layout

The provision application has the 3 tabs.

1. **Provision Tab:** The Provision tab is to provision wireless monitor in which has fields updated by electrician.
2. **Status Tab:** The Status tab is to check the firmware version and to report back problems to engineer.
3. **Advanced Tab:** The Advanced tab is to load firmware upgrade and for a Super User to make changes.

- Provision Tab

On the application provision tab, click the > Refresh button. The COM port that the wireless monitor is connected to will appear on the left field.

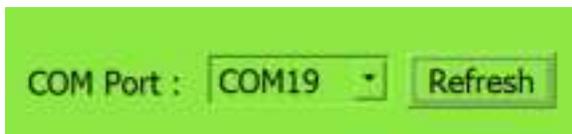


Figure 4: COM Port Field

Click the > Connect button.



Figure 5: Connect Button

Application will connect to the wireless monitor and display the MAC Address. Confirm MAC Address is displayed which is unique identifier for every wireless monitor.



Figure 6: MAC Address View

This is the default view of the application Provision tab, shown in figure below.

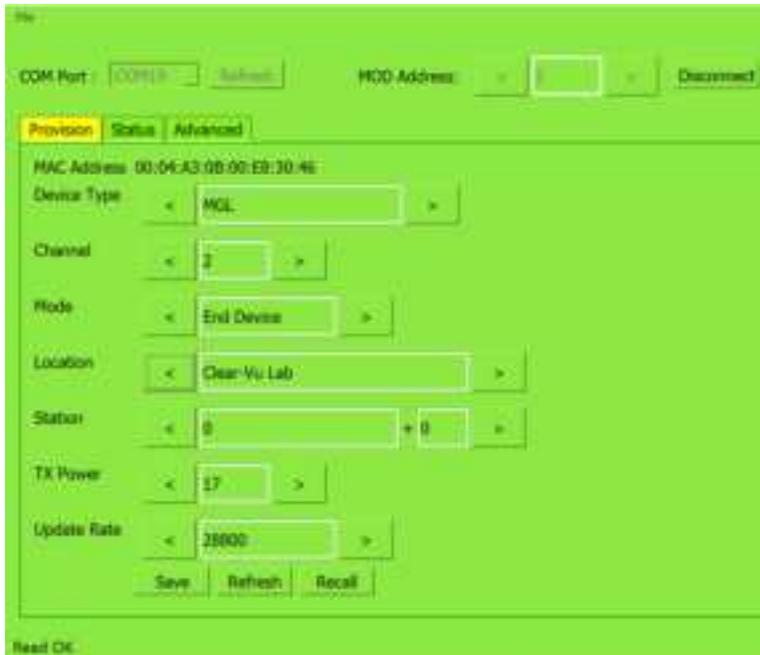


Figure 7: Provision Tab Window (MGL Configuration)

6.2 Factory Defaults

The provision tab has the following factory default settings.

Field	Default Settings	Fields updated at site by Installer	Comment
Device Type	MGL	X	

Channel	2		
Mode	End Device		
Location	Your location name	X	
Station	0 + 0	X	
TX Power	17		
Update Rate	28,800		Unit in seconds 28,800 =8 Hours It can be set as low as 60 seconds.

Table 1: Factory Defaults

6.3 User Updates

User shall update the following fields with information from the device assigned location information:

- Device Type
- Channel
- Station
- Location

After any change click the [Save] Button.

In this example: this is the app for a node set as a Station light with station field designator set to "P" "111".



Figure 8: Provision Tab Window (Station Configuration)

- Status Tab

This is the default view of the application Status tab.



Figure 9: Status Tab Window

Field Name	Definition	Comment
MAC Address	Unique Identifier	Every unit has a unique value
Channel	Radio Frequency Channel	
Network Short Address	Use to ping device	
Battery Voltage	Internal Battery Charge / Discharge Voltage	
Power Source	Which source is powering up light fixture	
LED Status	External Luminaire	
Wireless firmware version	Active wireless monitor firmware installed.	
Temperature	Sensor in underside ambient temperature	Default value in Celsius

Table 2: Status Tab Field Definition

- Advanced Tab

This is the default view of the application Advanced tab. You must be a Super User to use the Advanced tab.

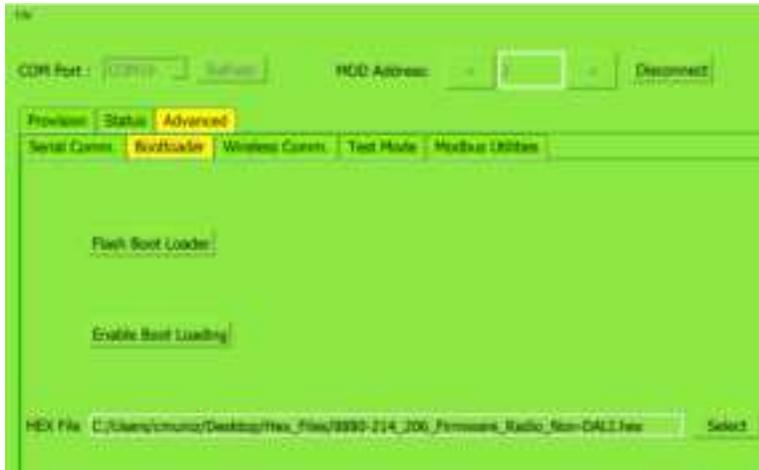


Figure 10: Advanced Tab Window

- Super User

To activate the Super User mode perform the following:

Temporarily click the >Disconnect button. On the window top left corner click >Settings, checkmark the box next to Super User, click the >Save button. Connect back to the wireless monitor by clicking the > Connect button.



Figure 11: Super User Mode Window

For safety reasons, on re-opening app, the Super User box has to be check mark and settings re-saved.

Load Firmware

The next step is generally not require as the wireless monitor comes with the latest firmware code loaded.

How to load firmware in radio. Click the > Advanced tab, a warning window will pop up, click > Yes to proceed.

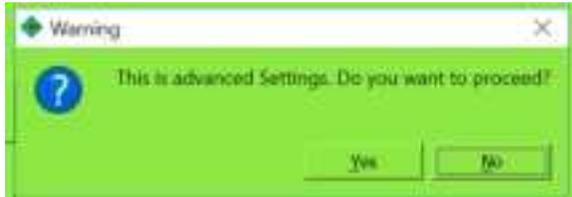


Figure 12: Advanced Tab Warning Window

Click the > Bootloader tab.

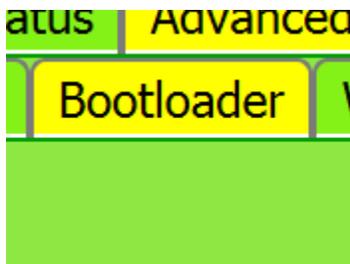


Figure 13: Bootloader Tab Window

Get the latest hex file(firmware). Click the [Select] button. Filename cannot have spaces.



Figure 14: Hex File Field Window

Next, click [Flash Boot Loader] button.

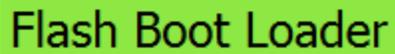
A green rectangular button with the text "Flash Boot Loader" in black, centered within a white-bordered box.

Figure 15: Flash Boot Loader Button Window

Wait while file is uploading. Status bar will pop up.

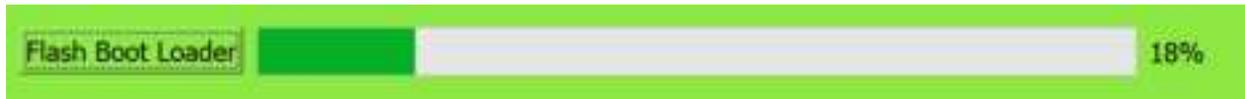


Figure 16: Status Window Bar (shown in progress)

Status bar will reach 100% and on the bottom left corner it will say Flashing Success.

A green rectangular window with the text "Flashing Success" in black, centered within a white-bordered box.

Figure 17: Flashing Success Window (bottom left corner)

Click the Disconnect and then Connect button. Click the [Status] tab and confirm that the correct firmware version is displayed.

A green rectangular field with the text "Wireless Firmware Version" in black on the left and the number "206" in black on the right, enclosed in a white-bordered box.

Figure 18: Wireless Firmware Version Field Result Window

Successful firmware upload has been executed.

The amber LED will blink the firmware version. For example: version 206, will blink twice, then pause, then blink six times, and then stay on.

- Update Settings

- First Time Connection

For first time connection do the following:

On the app window header top left corner Click > File



Figure 19: File Window

Click the > File, Click > Fetch Settings. This step is performed once.

After each use cover the mini-USB port with cap to protect it from damage.

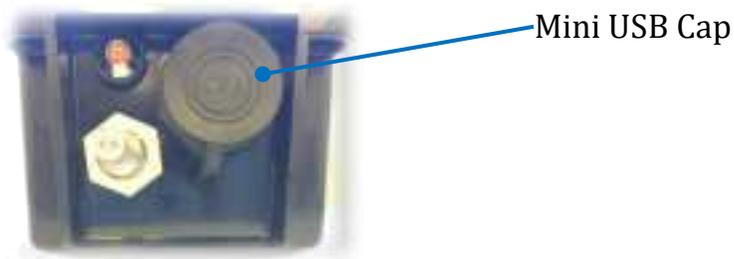


Figure 20: Wireless Monitor Underside View

7 Troubleshooting Guide

- No com port found

The following window will pop up when application is not connected to wireless monitor.

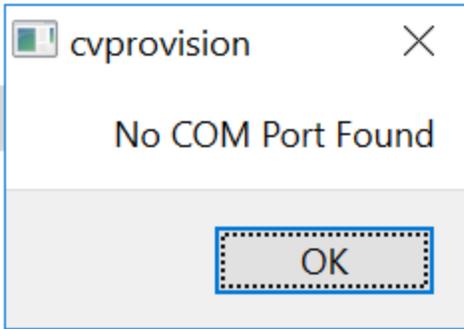


Figure 21: No COM Port Found Window

Application is ghosted when not connected to wireless monitor. The bottom left corner will state "Not Connected".



Figure 22: Provision App Ghost Window

- Wireless monitor does not transmit

The update rate is too long. Speed up the update rate by entering a lower value. Be careful as the system configuration will dictate the update rate field value.

8 Device Details

The wireless monitor consist of the following parts:

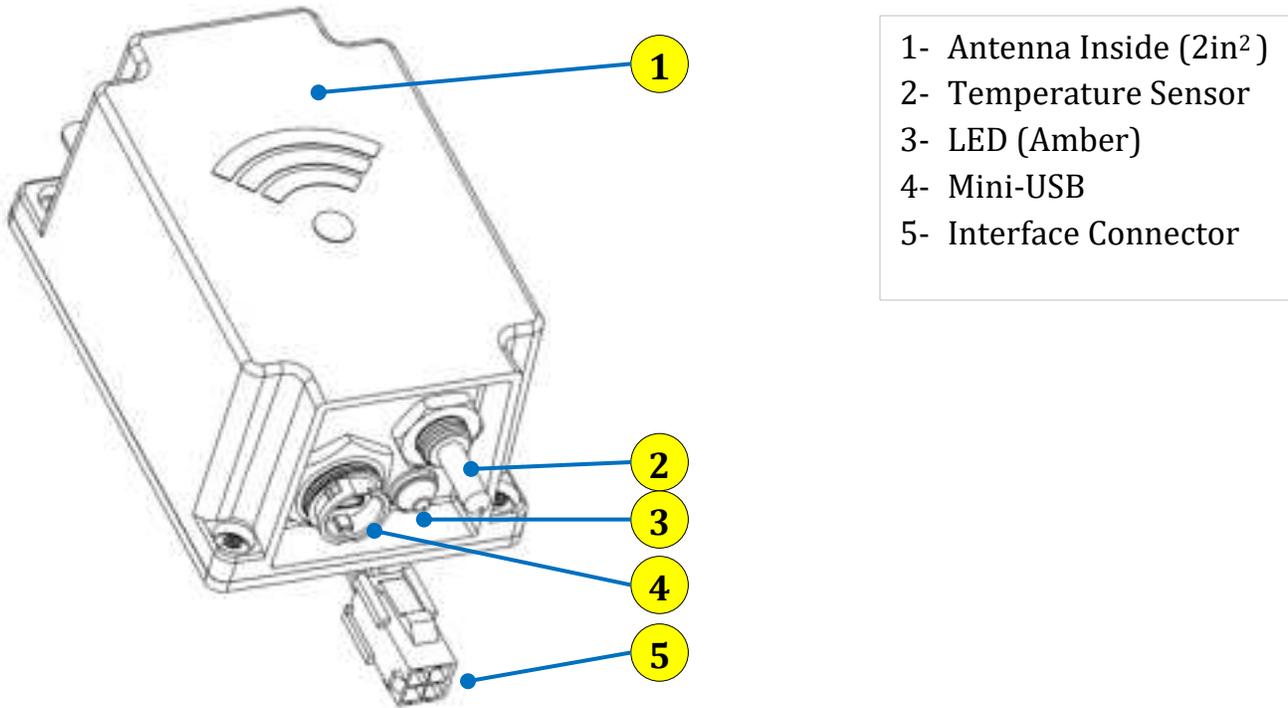


Figure 23: C900 FL-TG Wireless Monitor Details

9 Specification

Operating Voltage: 5 Volts +/- 0.25 Volts (250 milli-amps)

Operating Temperature: -30 °C to 55 °C

9.1 RF Specifications

Frequency band of operation	902 to 928 MHz
Transmit Power	17 dBm Maximum
Frequency RF Channels of operation	See Table 3

Channel	Frequency (MHz)
0	903.08
1	905.24
2	907.4
3	909.56
4	911.72
5	913.88
6	916.04
7	918.2
8	920.36
9	922.52
10	924.68
11	926.84
12	915.00

Table 3: Channel Frequency List

9.2 RF Frequency Channel Setting

To set the wireless monitor frequency (MHz) signal, click the left or right arrow next to the Channel field located on the Provision tab, click the Save button. For channel and frequency cross-reference, see Table 3 above.

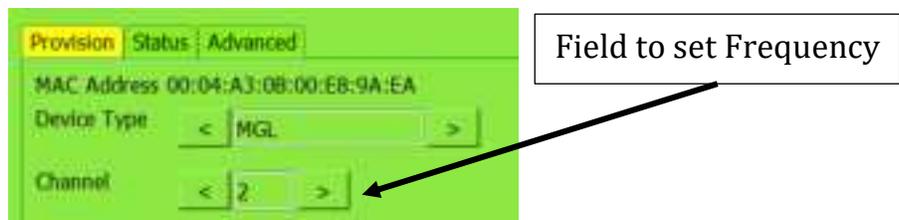


Figure 24: RF Frequency Channel Window

Receive Sensitivity: (-) 146 dBm at the pc board RF port.

9.3 Mechanical

Dimensions	2.55 W x 3.89 H x 1.87 L inches Excludes ground tab
Approximate Weight	8 Oz. (226.8 Grams)
Power / Communication	4 Wires
Interface type	VCC Input (5V), Ground, Transmit, Receive

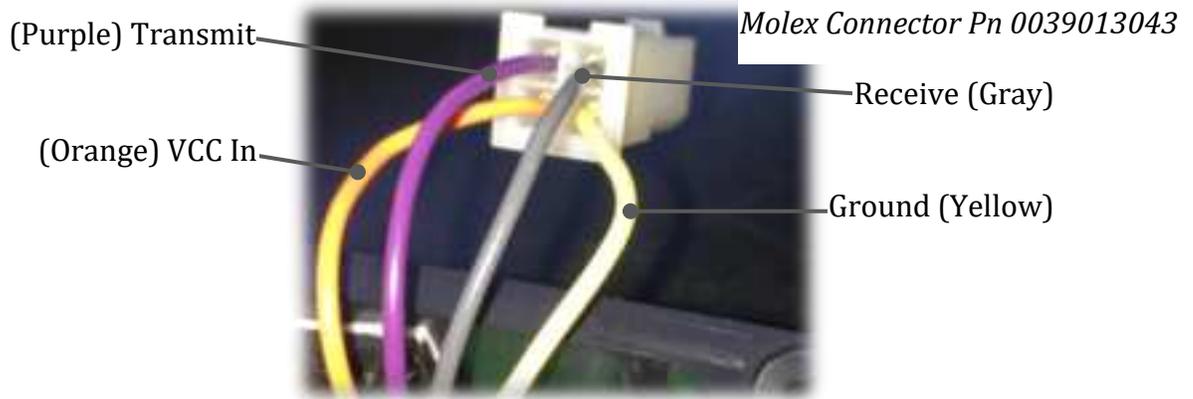
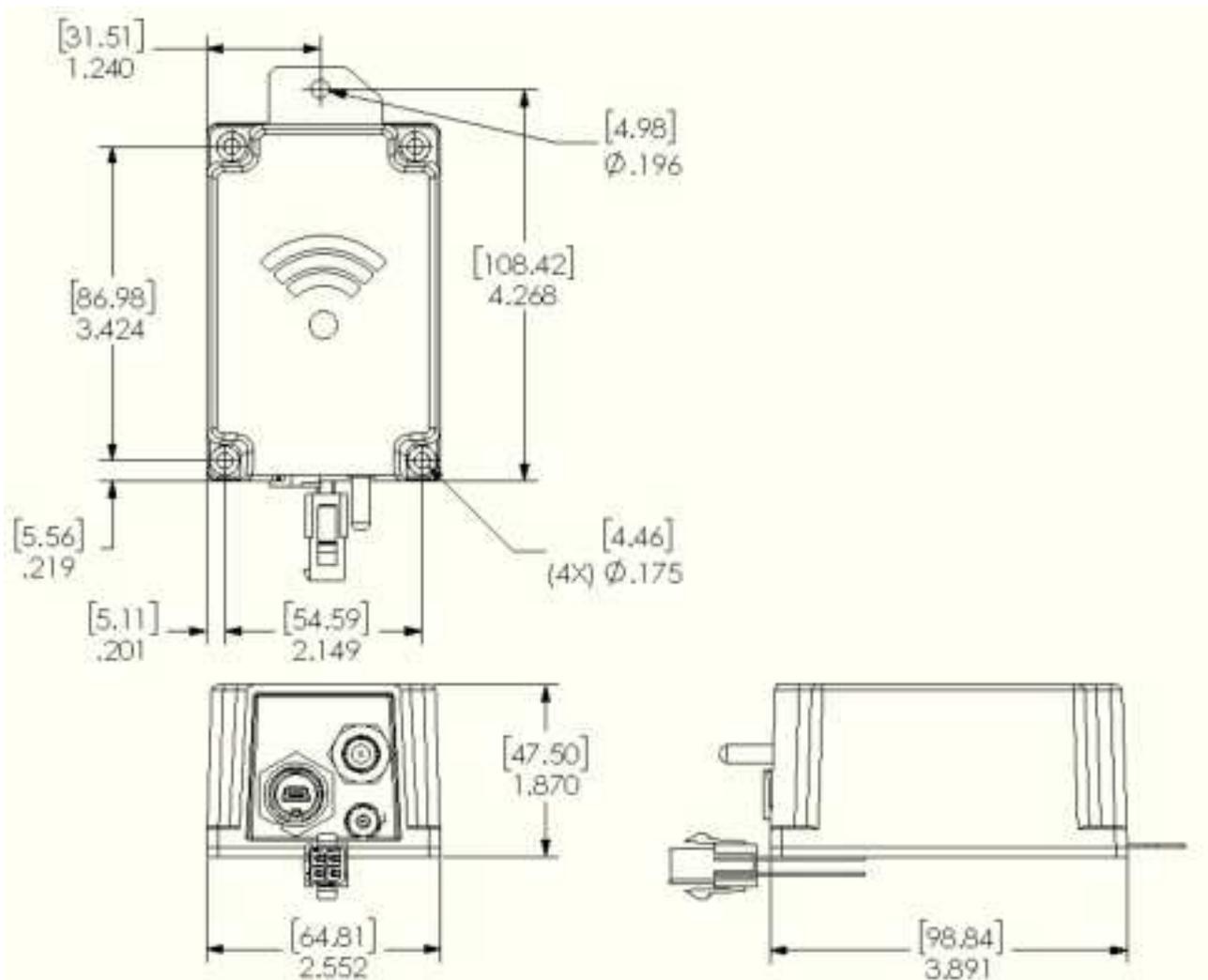


Figure 25: Wireless Monitor Input Interface Connector

Antenna RF Connector type: MMCX

10 Outline Drawing

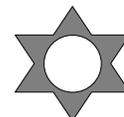


Measurements in inches [mm]

11 Tools

The following tools are used to install device.

- Tamper resistant Torx Key T10



- #1 Phillips Screwdriver For pc board installation in housing.

The device mounting screws can be change to meet your product overall requirements.

12 Block Diagram

12.1 Wireless Monitor

The components that make up a wireless monitor are depicted in Figure 26.

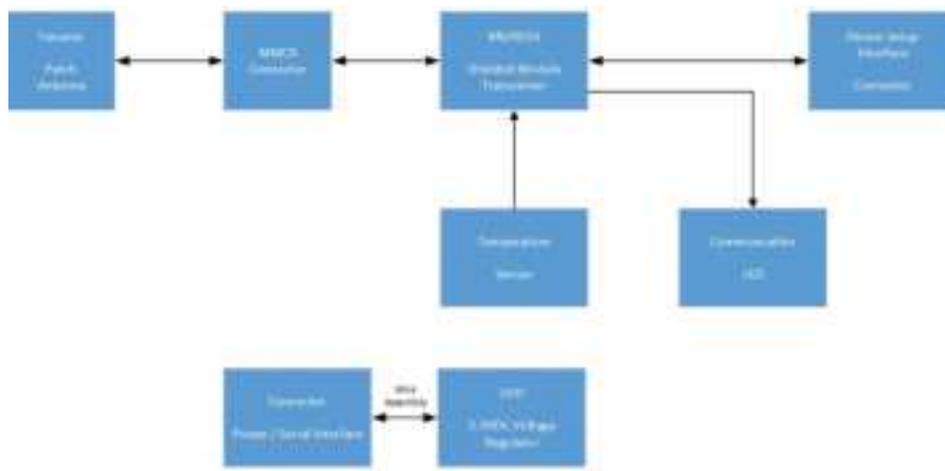


Figure 26: Wireless Monitor Block Diagram

12.2 Architecture Overview

A system can consist of the following major component.

- Wireless Monitor
- Gateway
- Ciqada IoT Platform
- Web Browse
- Mobile App

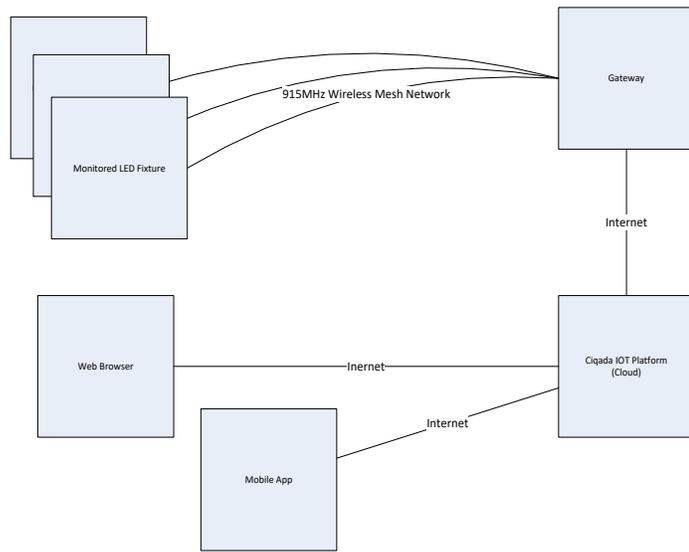


Figure 23: System Block Diagram

13 FCC Notice

This device complies with Part 15 of the FCC Rules Operation that is subject to following conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Note 1: An FCC ID label must be conspicuously visible on the wireless radio exterior surface.

Note 2: FCC Information to user:

Any product changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the C900 FL-TG.

Note 3: Maximum Permissive Exposure Statement:

The C900 FL-TG must be used in a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

14 FCC Statement of Information to User

15 Warranty Information

The wireless monitor has a standard 1 year limited warranty unless otherwise indicated on the shipping package as noted in the purchase agreement.

15.1 Warranty Limitations

The warranty is limited to the repair or replacement of the defective product. Mars Int'l will decide which remedy to provide for the defective components as its own discretion. Mars Int'l shall have a reasonable time after determining that a defective product exists to repair or replace the problem unit. The warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety (90) days from the date of shipment of a repaired or replaced component, whichever is longer.

The Mars Int'l standard warranty does not cover products which have been received improperly packaged, altered, or physically damaged. For example, broken warranty seal, labels exhibiting tampering, physically abused enclosure, broken pins on connectors, any alterations made without Mars Int'l authorization, will void all warranty.

15.2 Limitation of Damage

The liability for any defective product shall in no event exceed the purchase price for the defective product. Mars Int'l has no liability for general, consequential, incident or special damages.

16 Limitation of Liability

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17 Return Material Authorization (RMA)

No product may be returned directly to Mars Int'l without first getting an approval from Mars. If it is determined that the product may be defective, you will be given an RMA number and instructions in how to return the product. An unauthorized return, i.e., one for which an RMA number has not been issue, will be returned to you at your expense. Authorized returns are to be ship to the address on the RMA in an approved shipping container. It is suggested that the original box and packaging

materials should be kept if a defective product needs to be shipped back to Mars. To request an RMA, please call 908.233.0101 and type the extension of the product account manager.

18 Product Identification Scheme

To order wireless monitor or obtain product information use the following table.

Model	Space	System Topology	Hyphen	Antenna Type	Package
C900		FL	-	TG	
		LR	-	TG	

FL= Flood Mesh

LR= LoRa