

User Guide

# FlatMesh 4G Gateway

*FM3G-LTE*  
*FM3G-LTE-T*  
*FM3G-LTE-A*



0.01

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# Warnings



## Warning

Protection provided by the equipment may be impaired if used in a manner contrary to this user manual.



## Warning

Keep a minimum distance of 20cm between the 4G antenna and the human body during normal operation.

The device has been tested to Class A limits and is not intended for home use.



## Warning

Do not attach any unapproved power source. If in doubt, contact the equipment supplier.



This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device must accept any interference, and
2. This device must accept any interference received including interference that may cause undesired operation

Changes or modifications not expressly approved by Senceive Limited could void the user's authority to operate the equipment.

This equipment must be professionally installed. Only the supplied antennas are to be used with the equipment.

FCC ID: 2AMFBFM3G

FCC ID: 2AMBFM3GF



This product must not be disposed of in the normal waste stream. It contains a battery pack and electronic components and so should be recycled appropriately.

In accordance with the WEEE guidelines, customers in the European Union may return the product free of charge for recycling at the end of its life. Contact your supplier for details.

# Chapter 1

## Overview

### 1.1 The FlatMesh System

A FlatMesh network consists of a number of nodes connecting to one gateway device. In some situations multiple networks may be required on a single site, for example a site in which the number of nodes exceeds the number supported by a single Gateway, or a site where there are a set of separate measurement zones.

The FlatMesh 4G Gateway is a fully integrated unit which provides all the functionality required to operate a FlatMesh wireless sensor network in a remote location. This document describes the functionality of the gateway only.

### 1.2 FlatMesh 4G Gateway

The gateway is capable of communicating with nodes over the FlatMesh network, operating on the 2.4GHz ISM band. It will buffer samples collected from sensor-enabled nodes and transmits data over the cellular network. The gateway supports both traditional 2G networks (GPRS), 3G networks (UMTS/HSPA+) and 4G (LTE) networks.

This device has an internal Lithium Ion battery, which will last around 3 weeks on one charge. Your gateway will be provided with either a power supply, solar panel or booster pack to keep the internal battery charged.

## 1.3 Product Specifications

### 1.3.1 Physical Specifications

<b>Dimensions excluding antennas</b>	218 x 68 x 126 mm
<b>Dimensions including antennas</b>	390 x 68 x 126 mm
<b>Total Mass</b>	1.1 kg (approx.)
<b>Housing Material</b>	Die cast aluminium body ASA polymer lid rated to UL94HB Die cast aluminium lid (optional)
<b>International Protection Marking</b>	IP67
<b>Mounting Options</b>	Pole mount integrated with enclosure Wall mount bracket available separately

### 1.3.2 FlatMesh Radio Specifications

<b>Communication Type</b>	Proprietary FlatMesh v3 Mesh Networking Protocols IEEE 802.15.4 compliant
<b>Frequency Band</b>	2400 - 2485 MHz ISM Band
<b>Maximum Transmit Power</b>	6.2dBm (EN 300 328 v2.2.2)
<b>Maximum Antenna Gain</b>	4dBi
<b>Range</b>	Up to 300m depending on the environment Consult with Senceive for your application
<b>Maximum Network Size</b>	Typically up to 100 nodes Consult with Senceive to determine the optimal system configuration
<b>RF Module</b>	Senceive FM3Gateway

### 1.3.3 Cellular Radio Specifications (Standard)

<b>Frequency Bands for GSM/GPRS/EDGE</b>	850/900/1800/1900 MHz
<b>Frequency Bands for UMTS/HSPA+</b>	800/850/900/1900/2100 MHz
<b>Frequency Bands for LTE</b>	700/800/850/900/1700/1800/2100/2600 MHz
<b>Output Power</b>	Class 4 (+33dBm) for EGSM850 / EGSM900 Class 1 (+30dBm) for GSM1800 / GSM1900 Class E2 (+27dBm) for GSM 850/900 8-PSK Class E2 (+26dBm) for GSM 1800/1900 8-PSK Class ? (+26dBm) for LTE Class 3 (+24dBm) for UMTS 800/850/900/1900/2100, WCDMA FDD BdI, BdII, BdVIII, BdV, BdVI
<b>Maximum Cellular Antenna Gain</b>	+3.5dBi
<b>Supported SIM Cards</b>	3V and 1.8V
<b>RF Module</b>	Thales/Gemalto LTE Module PLS62-W

### 1.3.4 Internal Battery (Standard)

<b>Battery Type</b>	Lithium Ion, rechargeable
<b>Nominal Voltage</b>	3.6V
<b>Nominal Capacity</b>	8800mAh
<b>Typical Runtime without charge</b>	21 days
<b>Operating Temperature Range</b>	-20°C to +60°C
<b>Charging Temperature Range</b>	0°C to +40°C



**1.3.5 Internal Battery (-T Version)**

<b>Battery Type</b>	Lithium Ion, rechargeable
<b>Nominal Voltage</b>	3.6V
<b>Nominal Capacity</b>	8000mAh
<b>Typical Runtime without charge</b>	19 days
<b>Operating Temperature Range</b>	-30°C to +75°C
<b>Charging Temperature Range</b>	-30°C to +60°C

**1.3.6 Power Input**

<b>Recommended Solar Panel Type</b>	12V 20W
<b>Target Voltage for MPPT</b>	15.0V
<b>Maximum Input Voltage</b>	32.0V
<b>Input Voltage for Charging</b>	15.0V - 32.0V (recommended 24V)

## Chapter 2

# Installation

The gateway will be delivered to you pre-configured. Simply affix the gateway device to a structure within range of the rest of the network. It is recommended that the gateway be placed in the centre of the network with line of sight to at least two nodes to improve network reliability.

### 2.1 Mounting

There are two mounting options for the gateway - a clamp fixing for a pole, or a bracket which can be fixed to a wall or strapped to a pole.



#### **Warning**

The gateway has a total approximate mass of 1.1kg. Please ensure that the object you are fixing to can handle this load. Ensure that appropriate methods and materials are used when affixing equipment to a wall.

The gateway should be installed with the antennas uppermost. This is key to ensuring the best radio performance for both the FlatMesh network and for the cellular connection.

#### **2.1.1 Wall Bracket**

The tags at the top and bottom of the bracket may be used to affix the gateway to a wall with screws (not supplied.)

The slots in the middle of the bracket may be used in conjunction with hose clamps (sometimes known as Jubilee clips) to secure the gateway to a horizontal or vertical pole.

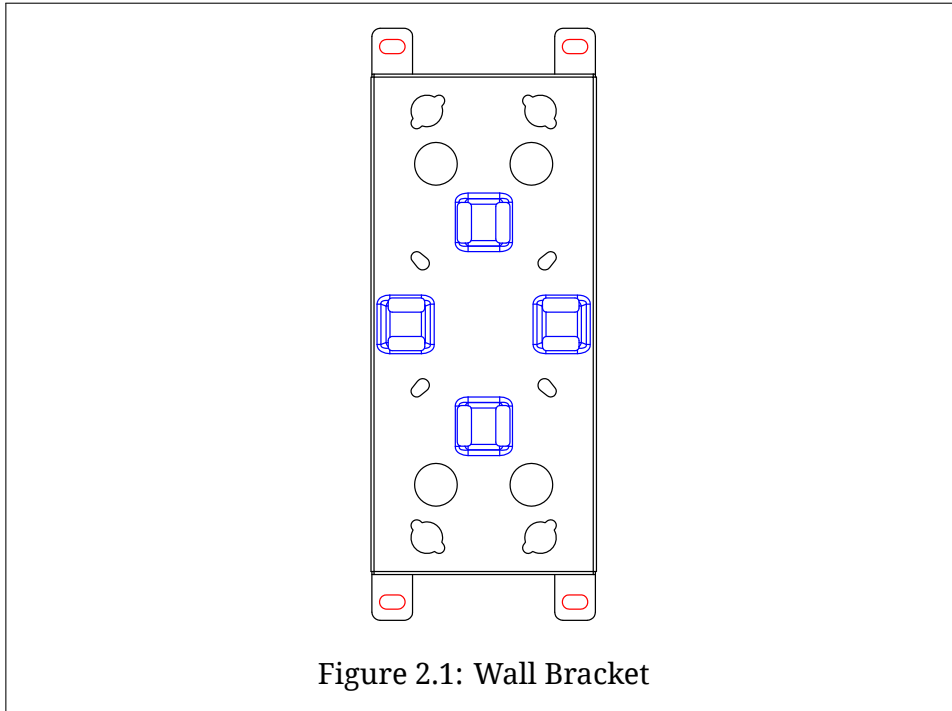


Figure 2.1: Wall Bracket

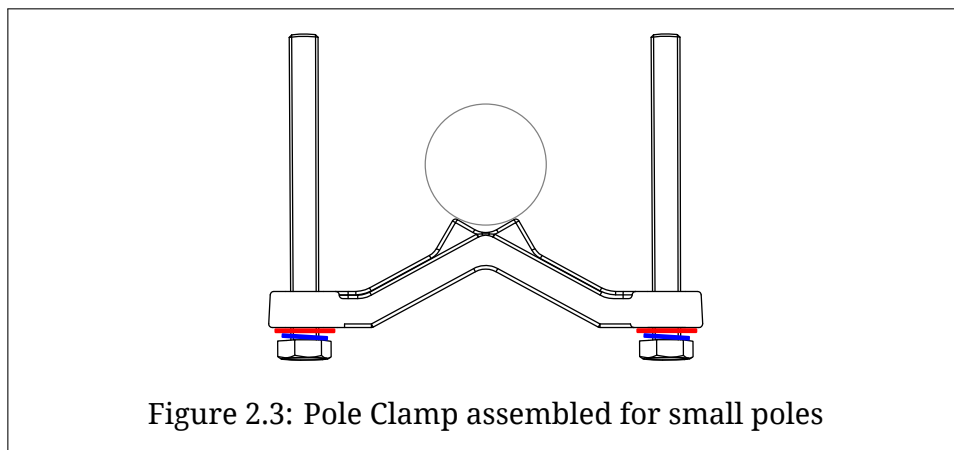
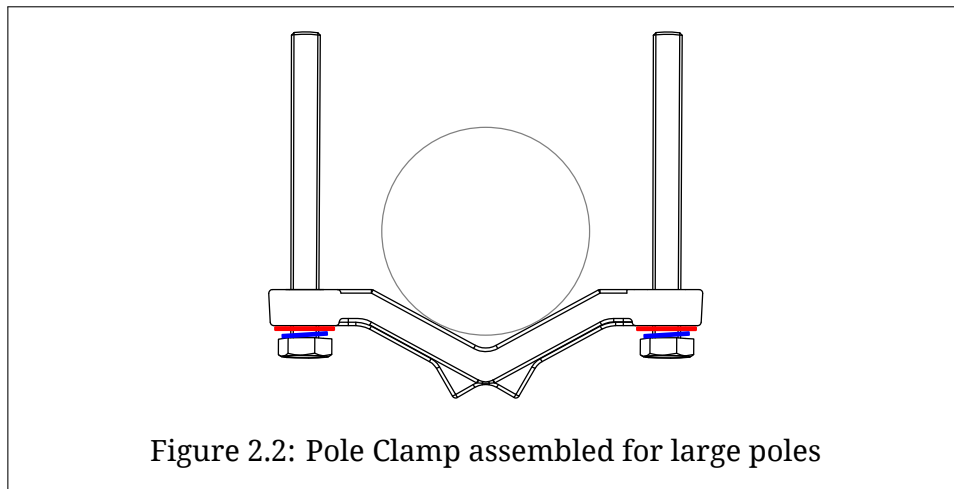
### 2.1.2 Pole Mounting

The pole mount clamp will accommodate a wide range of pole diameters. Invert the pole clamp to accommodate smaller poles.

Assemble the clamp as shown. Note the position of the flat washer (red) and spring washer (blue). Use a 13mm A/F spanner to tighten.

### 2.1.3 Earthing

The enclosure must be earthed if installed outdoors and powered from a mains power supply, or if the solar panel is publicly accessible after installation. Connect the earthing point on the rear of the enclosure to a grounded metal braid using an M4x0.7 screw.

**Note**

When selecting a screw for the earthing point, be aware that the hole on the enclosure is only 6mm deep. Fitting a screw which is too long may damage the device.

## 2.2 Power

The gateway has an internal Lithium-Ion battery which when fully charged will allow the device to operate for 2-3 weeks. For continued operation, you will have been supplied with either a solar panel or mains power supply.

The three-pin power input connector can be found at the bottom side



Figure 2.4: Earthing point

of the unit, to the left of the human interface port.  
Engage the power connector and turn the collar to lock in place.

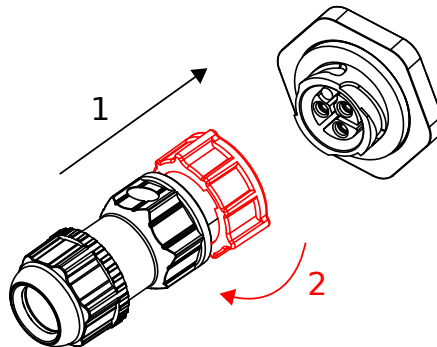


Figure 2.5: Power connector

## 2.3 Antennae

There are two distinct antennae which must be connected to the correct N-type socket on the device. The antenna/socket pairs are labelled *FlatMesh* and *Cellular*.



Figure 2.6: Antennas fitted to gateway (front)

#### Check

It is very easy to accidentally cross-thread the antenna connection. Be sure to align the connectors properly before screwing together.



Figure 2.7: Antennas fitted to gateway (side)

## Chapter 3

# Access Port

The access port is located on the bottom of the gateway next to the power connector. Unscrew the clear plastic cover (by hand if possible to avoid damage.) There is a Micro USB socket, pushbutton and three indicators which can be used to give a basic indication of the function of the network.

When finished with the Access Port, replace the cover:

- Screw the cap into the port until the gasket touches the enclosure
- Tighten the cap an additional 45° (or  $\frac{1}{8}$  of a turn)

### 3.1 Active Node Count

The pushbutton and indicators may be used to show the number of nodes currently active on the network. Press the button briefly, and the blue indicator will illuminate. Then count the number of orange and red flashes. The number of nodes active on the network is given by  $OrangeFlashes \times 10 + RedFlashes \times 1$ .

### 3.2 USB Port

The gateway provides a Micro USB B socket for attachment to a Host device, which can either be a personal computer or a tablet. Contact your supplier for a software package to use with this connection.

## Chapter 4

# Maintenance

The product should not require any maintenance after installation.

If the need to clean the product should arise, use only a damp cloth and mild detergent. Do not use any solvents as this may damage the enclosure.



### **Warning**

Only service personnel authorised by the manufacturer may open the enclosure.

No user serviceable parts are located inside.



## **Chapter 5**

# **Support**

For assistance and support, contact your supplier or the manufacturer:

Senceive Limited

Phone: +44 (0) 207 731 8269

Email: [support@senceive.com](mailto:support@senceive.com)

Web: <http://www.senceive.com>

## **Appendix A**

# **Import / Export Restrictions**

The products described in this user manual contain and use encryption algorithms for data authentication and security. Some countries require registration of these technologies. It is the importer's responsibility to comply with all local regulations. Contact Senceive for more information.

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Senceive Limited

Phone: +44 (0) 207 731 8269

Email: [support@senceive.com](mailto:support@senceive.com)

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## B.3 GCC Runtime Library

GCC RUNTIME LIBRARY EXCEPTION

Version 3.1, 31 March 2009

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