

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

WARNINGS

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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

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

1.3.2 FlatMesh Radio Specifications

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

1.3.3 Cellular Radio Specifications (Standard)

Frequency Bands for GSM/GPRS/EDGE	850/900/1800/1900 MHz
Frequency Bands for UMTS/HSPA+	800/850/900/1900/2100 MHz
Frequency Bands for LTE	700/800/850/900/1700/1800/2100/2600 MHz
Output Power	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
Maximum Cellular Antenna Gain	+3.5dBi
Supported SIM Cards	3V and 1.8V
RF Module	Thales/Gemalto LTE Module PLS62-W

1.3.4 Internal Battery (Standard)

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

1.3.5 Internal Battery (-T Version)

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

1.3.6 Power Input

Recommended Solar Panel Type	12V 20W
Target Voltage for MPPT	15.0V
Maximum Input Voltage	32.0V
Input Voltage for Charging	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.

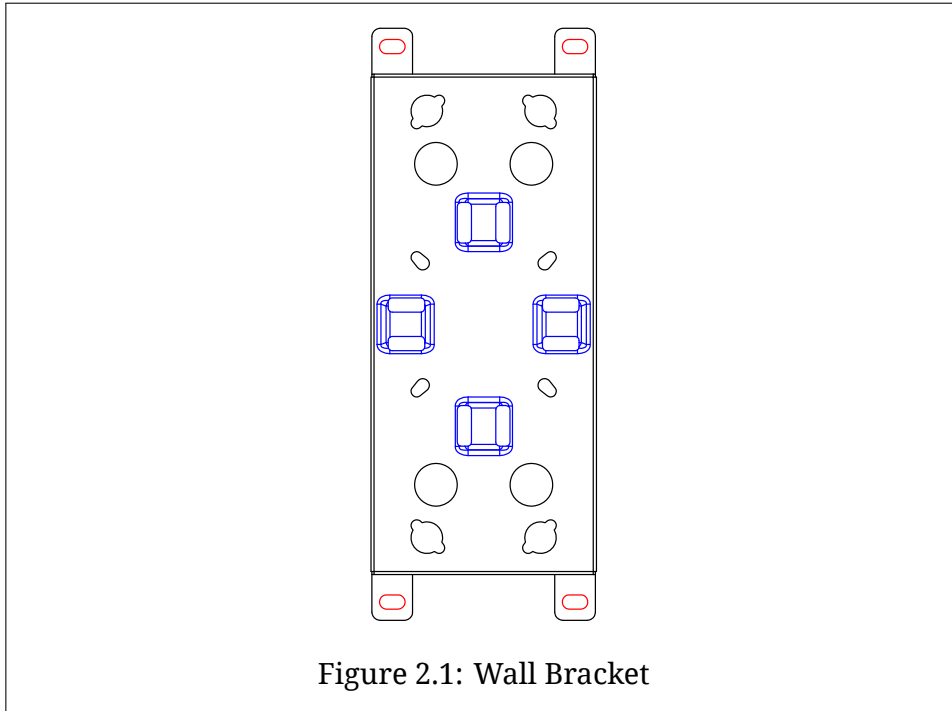


Figure 2.1: Wall Bracket

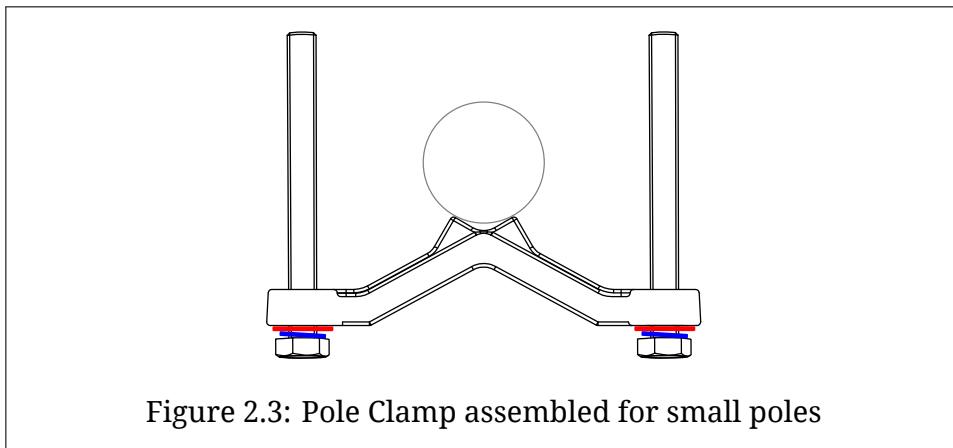
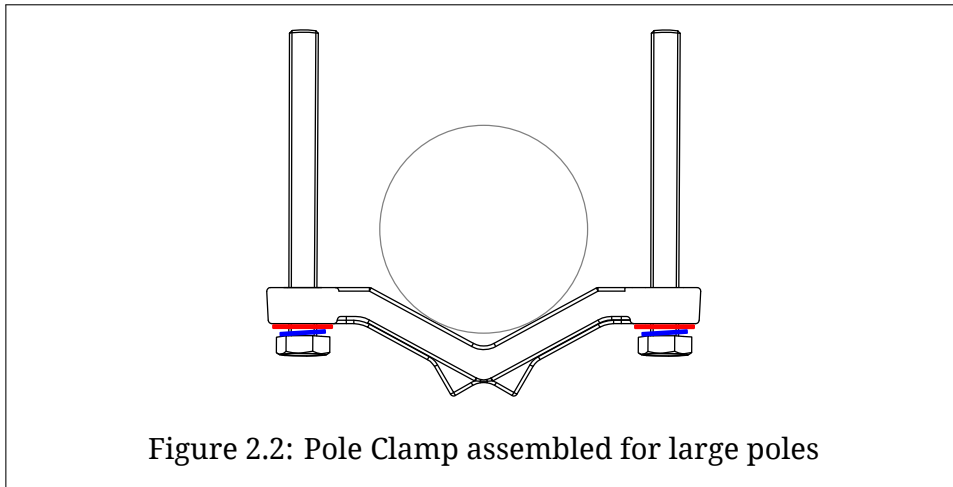
2.1.2 Pole Mounting

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.

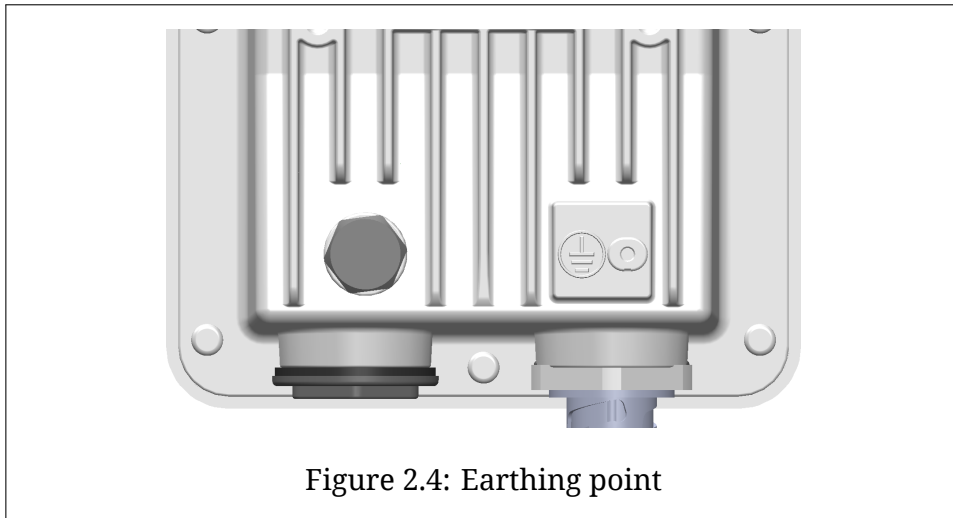
**Note**

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.

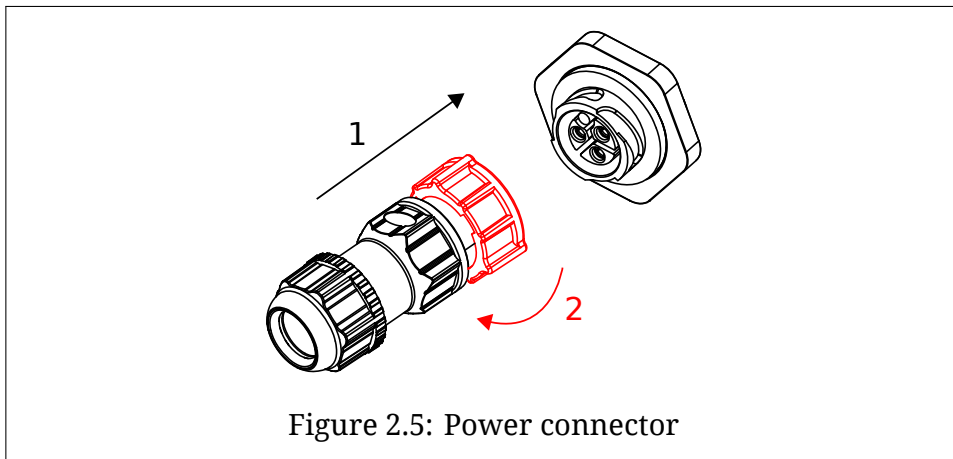
2.2 Power

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

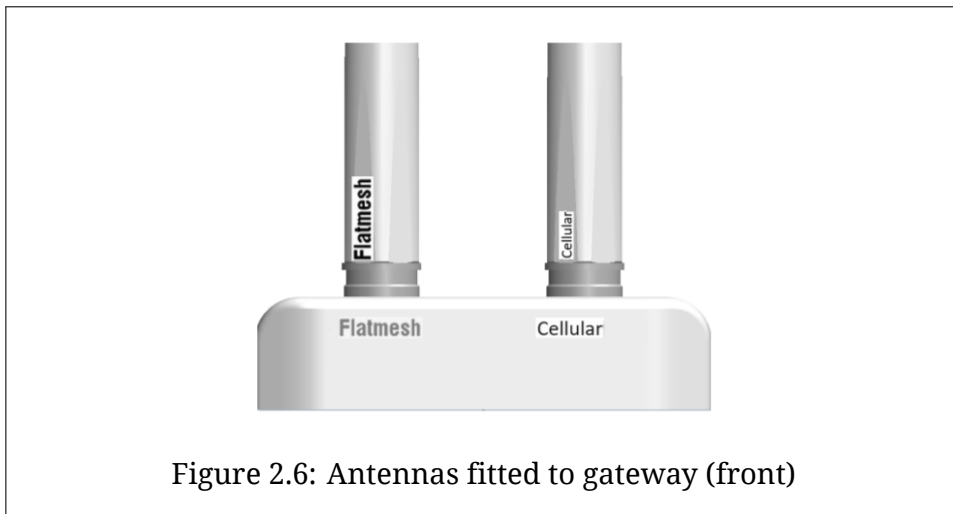


of the unit, to the left of the human interface port.
Engage the power connector and turn the collar to lock in place.

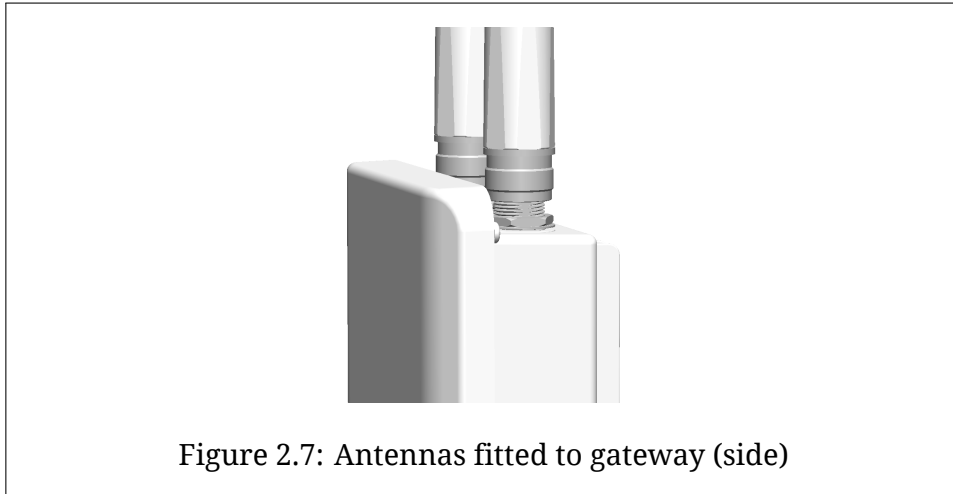


2.3 Antennae

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*.



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



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

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

Appendix A

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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

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

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iconv (Charset Conversion Library) v2.0

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B.3 GCC Runtime Library

GCC RUNTIME LIBRARY EXCEPTION

Version 3.1, 31 March 2009

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If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

<program> Copyright (C) <year> <name of author> This program comes with ABSOLUTELY NO WARRANTY; for details type 'show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

You should also get your employer (if you work as a programmer) or school, if any, to sign a "copyright disclaimer" for the program, if necessary. For more information on this, and how to apply and follow the GNU GPL, see <<http://www.gnu.org/licenses/>>.

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