



User Guide

EdgeHub

FM3H-LTE

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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 external antennae and the human body during normal operation.




WARNING:

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



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 and the UK may return the product free of charge for recycling at the end of its life. Contact your supplier for details.

USA - FCC

	<p>This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:</p> <ol style="list-style-type: none"> 1. This device must accept any interference, and 2. This device must accept any interference received including interference that may cause undesired operation <p>Changes or modifications not expressly approved by Senceive Limited could void the user's authority to operate the equipment.</p> <p>This equipment must be professionally installed.</p> <p>Only the supplied antennae are to be used with the equipment.</p> <p>FCC ID: 2AMFBFM3H</p>
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Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

- The maximum gain of an antenna that is permitted to be used with the device is a 4dBi, 50ohm dipole for the 2.4GHz radio.
- The 2.4GHz FlatMesh radio PCB will be used with the supplied
 - OS-ISMDB-0507-C0 antenna.
- The cellular module shall be used with the supplied
 - OS-LTE-11-C0 antenna.

Chapter 1

Overview

EdgeHub

The Senceive EdgeHub is a multi-functional IP66/IP67 IoT Gateway product.

The EdgeHub contains the following radio products,

- cellular modem (2G/3G/4G), and
- FlatMesh (proprietary, 802.15.4 compliant).

Whilst running a custom flavour of embedded Linux on an agile, yet low powerful processor and platform, the EdgeHub enables operation with various sensors including Senceive FlexiMeasure and FlatMesh 4G Camera.

Complete with a 4G modem, a plethora of communications and power interfaces, and an on-board battery with optional PV panel, the unit connects to the closest 2G/3G/4G network out-of-the-box for off-site configuration during or after installation.

The EdgeHub also supports both traditional 2G networks (GSM) and 3G networks (UMTS).

This device has an internal Lithium-Ion battery, which will operate for 5 days when charged.

Your EdgeHub will be provided with either a power supply or solar panel to keep the internal battery charged.

Product Specifications

FM3H-LTE Physical Specifications

Dimensions excluding antennae	218 x 68 x 126 mm
Dimensions including antennae	390 x 68 x 126 mm
Total Mass	1.2 kg (approx.)
Housing Material	Die cast aluminium body Polycarbonate lid rated to UL94-V-0 (f1)
Operating Temperature	-20°C to 60°C
International Protection Marking	IP66/IP67
Mounting Options	Combined wall or pole mounting bracket included.

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	6.5dBm (EN 300 328 v2.2.2)
Maximum External 2.4GHz Radio Antenna Gain	4dBi
Range	Up to 300m depending on the environment. Consult with Senceive for your application
RF Module	Senceive FlatMesh FM3Node

Cellular Radio Specifications

Frequency Bands for Quad Band GSM	850 / 900 / 1800 / 1900 MHz
Frequency Bands for Seven Bands UMTS (WCDMA/FDD):	800 / 850 / 900 / 1700/2100 (AWS) / 1800 / 1900 and 2100MHz (bands: 1, 2, 4, 5, 8, 9, 19)
Frequency Bands for Twelve Bands FDD-LTE	700 / 800 / 850 / 900 / 1700/2100 (AWS) / 1800 / 1900 / 2100 and 2600MHz (LTE bands 1, 2, 3, 4, 5, 7, 8, 12, 18, 19,20, 28)
Output Power <ul style="list-style-type: none"> • GSM 900MHz • GSM 1800MHz • UMTS 2100MHz: Band I • UMTS 2100MHz: Band VIII • E-UTRA (LTE) - Band 20 • E-UTRA (LTE) - Band 8 • E-UTRA (LTE) - Band 3 • E-UTRA (LTE) - Band 1 • E-UTRA (LTE) - Band 7 	Class 4 (GMSK): +32.9dBm; Class E2 (8PSK): +26.3dBm. Class 4 (GMSK): +29.9dBm; Class E2 (8PSK): +25.7dBm. Class 3 (QPSK), (16QAM) (DL): +23.7dBm. Class 3 (QPSK), (16QAM) (DL): +23.9dBm. Class 3 (QPSK), (16QAM), 64QAM(DL): +22.3dBm. Class 3 (QPSK), (16QAM), 64QAM(DL): +22.3dBm. Class 3 (QPSK), (16QAM), 64QAM(DL): +22.3dBm. Class 3 (QPSK), (16QAM), 64QAM(DL): +22.3dBm. Class 3 (QPSK), (16QAM), 64QAM(DL): +22.6dBm
Maximum Antenna Gain	Primary antenna – external omnidirectional +3.5dBi Diversity antenna – internal microstrip
Supported SIM Cards	µSIM, internally accessible
RF Module	Thales/Gemalto LTE Module PLS62-W FCC identifier QIPPLS62-W

Internal Battery (Standard)

Battery Type	18650-4S1P Lithium Ion, rechargeable
Nominal Voltage	14.4V
Nominal Capacity	2700mAh
Typical Runtime without charge	5 days
Operating Temperature Range	-20°C to +60°C
Charging Temperature Range	-20°C to +45°C

Power Input

Recommended Solar Panel Type	12V 20W or 12V 30W
Target Voltage for MPPT	15V
Maximum Input Voltage	30V
Input Voltage for Charging	13.0V - 30.0V
Maximum Input Current	1.6A
Maximum Input Power	30W


Chapter 2

Installation

The EdgeHub will be delivered to you pre-configured. Simply affix the EdgeHub device to a structure and connect the sensor, (FlatMesh 4G Camera, FlexiMeasure via CAN, , IPI via RS485).

Mounting

The EdgeHub is supplied with a back-plate, fixing bracket which can be fixed to a wall or strapped onto a pole.



WARNING:
The EdgeHub has a total approximate mass of 1.2kg. Please ensure that the object you are fixing to can support this load. Ensure that the appropriate methods and materials are used when affixing equipment to a wall.

The EdgeHub 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.

Wall Bracket

The tags at the top and bottom of the bracket may be used to affix the EdgeHub 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.

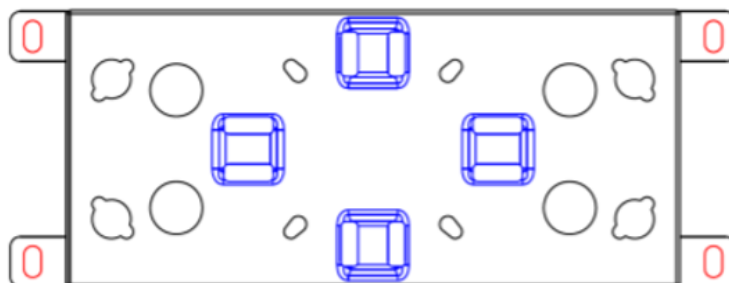


Figure 2.1: Wall Bracket

The EdgeHub bracket wall and pole mounting options are displayed in the following photographs.



Figure 2.2: EdgeHub Bracket for Wall or Pole Mounting

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.



Figure 2.3 Earthing Point

Power

The EdgeHub FM3H-LTE has an internal Lithium-Ion battery which when fully charged will allow the device to operate for 5 days.

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.



Figure 2.4: Three-pin Power input Connector (Black Connector to the left of the Multi-Pin Sensor Interface Port)

Engage the power connector and turn the collar to lock in place.

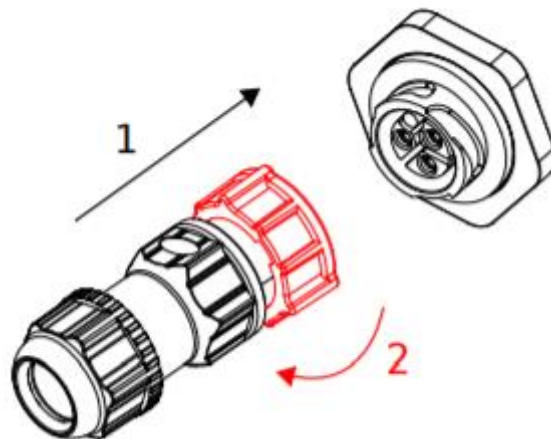


Figure 2.5: Power Connector

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**.

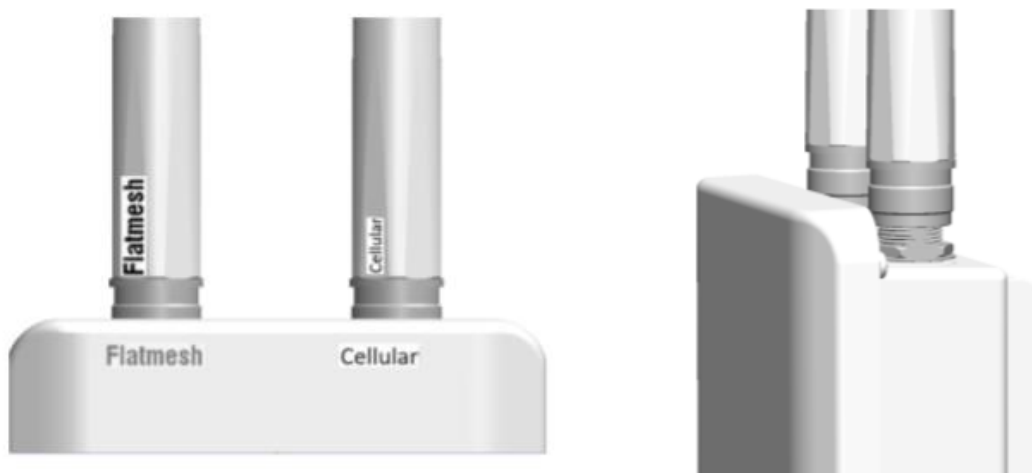


Figure 2.6: Antennae fitted to gateway (front view) and (side view)



Check

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

The Antenna types for use with this device are as described below:

- The maximum gain of an FlatMesh antenna that is permitted to be used with the device is a 4dBi, 50ohm dipole for the 2.4 GHz radio.
- The 2.4GHz FlatMesh radio PCB will be used with the supplied:
 - OS-ISMDB-0507-C0 antenna.
- The cellular module shall be used with the supplied:
 - OS-LTE-11-C0 antenna.

Access Port

The multi-pin sensor interface port is located on the bottom of the gateway next to the power connector

The various sensors connect to the Data Port located on the bottom of the EdgeHub next to the power connector.

The standard to the 18-way EdgeHub connector enables connection of sensors using either a Serial (RS232 or RS485) connection; a CAN connection for Senceive FlexiMeasure, a USB connection for the FlatMesh 4G Camera or an ethernet connection for connecting to an Ethernet network or directly to a Laptop.

Chapter 3

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 4

Help and Support

Contact Information

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

Senceive Ltd

Phone: +44 (0)207 731 8269

Email: customersupport@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.

Senceive Ltd

Phone: +44 (0)207 731 8269

Email: customersupport@senceive.com

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

Appendix B

Software Licenses

The firmware used in this product is partly bound to the following licenses. To obtain the source code for the components which are bound to these licenses, please contact the manufacturer:

Senceive Ltd

Phone: +44 (0)207 731 8269

Email: customersupport@senceive.com

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

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<One line to give the program's name and a brief idea of what it does.> Copyright (C) <year>
<name of author.>

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Yoyodyne, Inc., hereby disclaims all copyright interest in the program `Gnomovision' (which makes passes at compilers) written by James Hacker

<signature of Ty Coon>, 1 April 1989 Ty Coon, President of Vice

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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/>.

The GNU General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library.

If this is what you want to do, use the GNU Lesser General Public License instead of this License.

But first, please read

```
<http://www.gnu.org/philosophy/why-not-lgpl.html>.
```



Harnessing intelligent monitoring
technology to keep people and
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