Outdoor Helium Hotspot Overview

The Nebra Outdoor Helium Hotspot is an ideal solution for providing great Helium LongFi coverage and suitable for use outside in most envrionments.

Specifications

Specification	Nebra Outdoor Hotspot
RRP	£450 ex VAT
Ingress Protection	IP67
Dimensions	300x200x100 mm (Excluding Antenna)
Rated Ambient Temperature	-25-80oC
Weight	1.25 Kg
Power Requirement	802.3AF 48V POE *OR* 9-16V DC @ 15W
Average Power Consumption	~12-15W*
Annual Power Consumption	~105-130kWh
Maximum TX Power	24-27dBm**
Network Connectivity	10/100 Ethernet, 2.4Ghz 802.11N Wi-Fi, Optional 4G Module available separately.
Antenna Connection	N Type Female
Base SOM	Raspberry Pi CM3+

Specification	Nebra Outdoor Hotspot
CPU Specification	Broadcom BCM2837B0, Quad Core Cortex-A53 (ARMv8) 64-bit SoC @ 1.2GHz
High Endurance Storage	32GB
RAM	1GB LPDDR2 SDRAM
Outer dimensions (w/o connectors)	235mm x 155mm x 75mm

* Average Power Consumption Measured At Mains, higher average consumption when the optional 4G Module is used.

** Maximum TX Power may be capped to a lower amount in some regions.

Package Contents

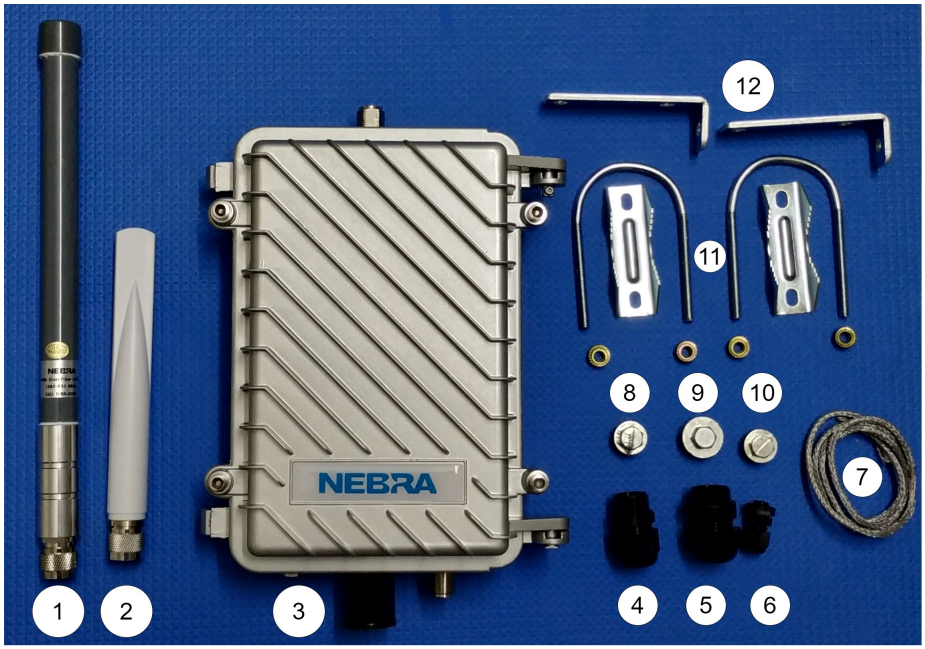

Figure 1: Indoor Hotspot Included

1. **3 dBi N-Type Glass Fiber Antenna**
2. **WiFi Antenna**
3. **Nebra Helium Outdoor Hotspot**
4. **M20 General Cable Gland**
5. **M10 General Cable Gland**

6. **M22 General Cable Gland**
7. **Sealing String**
8. **Spare Blanking Plugs N-type**
9. **Spare Blanking Plugs N-type**
10. **Spare Blanking Plugs M20**
11. **L Shaped Mounting Brackets 2 x L**
12. **Z clamp Brackets x 2** (for pole mounting)
13. **Serial Number QR Code Stickers x 2**
14. **Nebra Stickers x 2**

Block Diagram

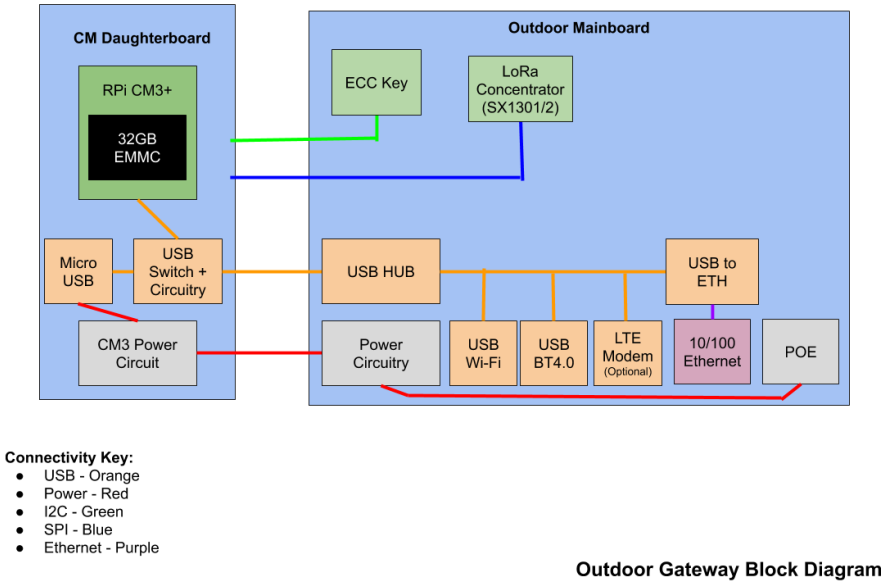

Figure 2: Outdoor Hotspot Block Diagram

Supported Regions

The Nebra Outdoor Hotspot comes in three hardware versions:

Frequency	Supported Regions
433 Mhz	Coming Soon
470 Mhz	CN470
868 Mhz	EU868, IN865, RU864

Frequency	Supported Regions
915 Mhz	US915, AU915, AS923-1/2/3/4, KR920

The frequency is set upon initialisation by the Helium Network.

Antenna Specifications

Specification	470Mhz Model	868 & 915Mhz Models
Frequency Range	420-480	860-930 Mhz
Peak Gain	3 dBi	3 dBi
VSWR	≤1.5	≤1.5
Input Impediance	50 Ohms	50 Ohms
Length	50CM	30CM

Hardware Overview

Mainboard Layout

Layout Contents

1. DC Barrel Jack - 2MM Pin, 6.5MM Barrel centre positive. Recommended PSU 12V @1.5A.
2. LAN Connector - RJ45 Connector wired to the Ethernet & POE Modules.
3. Power Jumper - 3 Pin jumper to select power source, place in position 1-2 for POE, or 2-3 for DC Jack.
4. POE Module - Negotiates 802.11AF compliant connection and outputs 12V DC into the power section.
5. Power Section - Takes the 12V power source and regulates it down to 5V & 3V3 rails.
6. Ethernet Controller - 10/100 Ethernet to USB 2.0 Adaptor, Maxlinear XR22800IL32-F. Connected to USB Hub.
7. USB Hub - 4 Port USB Hub, wired to Ethernet controller, USB port & M-PCIE connector.
8. USB Port - USB 2.0 Type A Connector, recommended max power 250mA.
9. “Raspberry Pi” Header - 40 Pin RPi style header, please note only the first 24 pins are wired. (Refer to 1.1.X)
10. M-PCIE connector - M-PCIE Connector wired up to USB for connectivity, has Micro SIM Card connected to it.
11. Micro Sim Card Slot - For use with 3G/4G Module in M-PCIE slot
12. Lora Module Connector - Designed for use with select M-PCIE LoRa Concentrators, these only have wired up SPI, plus GPS PPS from the GPS Module.

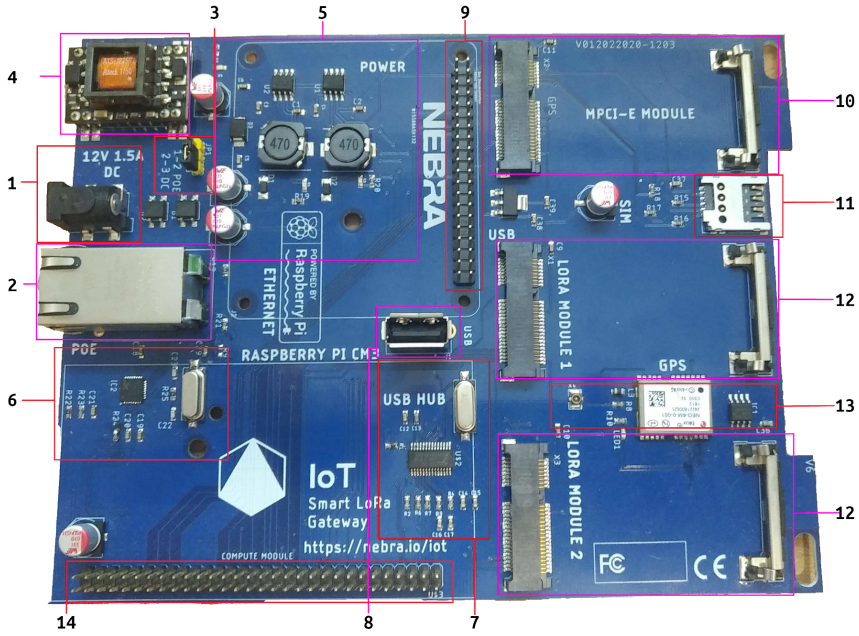

Figure 3: SmartGatewayBreakdown

13. GPS Module - NEO-6M GPS module, connected to UART1 on the compute module. Plus PPS signal to LoRa modules for accurate timings. **PLEASE NOTE: this is not used by the Nebra Helium Hotspots and is only present on the first batch.**
14. Daughterboard Connector - Connects to Compute Module Daughterboard.

Status LEDS The mainboard has 3 Status LEDs which do the following: * 12V LED - Indicates the mainboard has power located near the jumper. * 5V LED - Indicates the 5V regulator is operational located in the power section. * 3V3 LED - Indicates the 3V3 regulator is operational located in the power section.

Daughterboard Overview The standard daughterboard supports both the Compute Module 3 and Compute Module 3+ (including Lite) variants.

While also compatible with the CM1 we recommend using the CM3 / CM3+ / CM3 Lite / CM3+ Lite for the extra power and RAM as well as larger onboard storage options.

Layout Contents

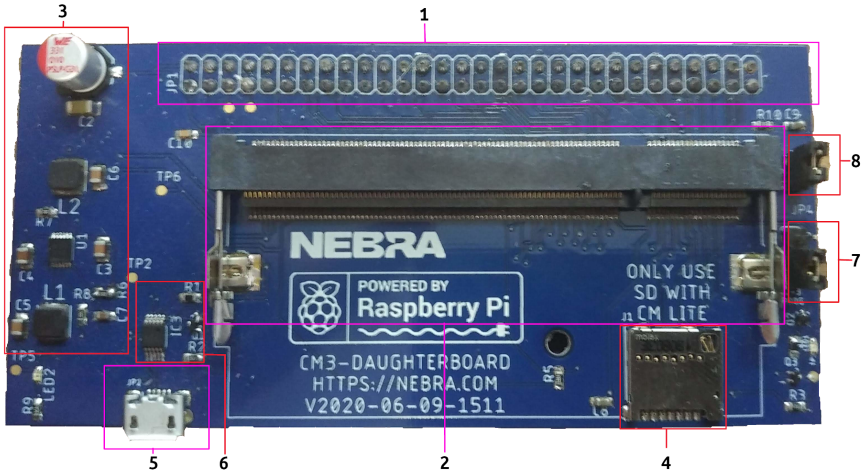

Figure 4: DaughterboardBreakdown

1. Daughterboard Connector - Connects to the Mainboard.
2. SO-DIMM connector - Raspberry Pi Compute Module connects here.
3. Power Regulator - Power Circuitry required for the compute module.
4. SD Card Slot - SD Card Slot for if a CM3/CM3+ Lite is used.
5. Micro USB Connector - Used to re-flash the EMMC on the Compute Module.
6. USB Switch - IC responsible to allow switching between Micro USB and Mainboard.
7. USB Jumper - Used to switch between normal operation and flash mode, ensure it is in position 1-2 for normal operation and 2-3 for programming.
8. Power Jumper - Allows the module to be powered from the Micro USB connector. Only connect when programming from PC and ensure mainboard is not connected.

Status LEDS The board has 2 Status LEDs which do the following:

- Power LED - Indicates the board has power. (Blue)
- ACT LED - Indicates Read / Write operations on the storage. (Green)

Dimensions

The Nebra Outdoor Hotspot is approximately 300x200x100 mm In size when nothing is connected.

You can find the datasheet here

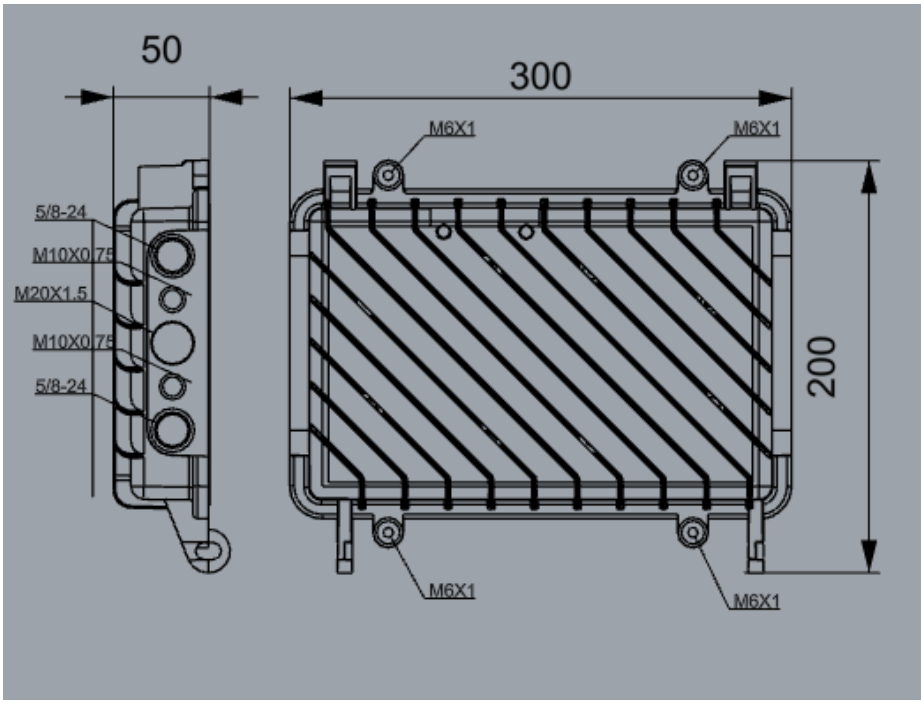

Figure 5: DaughterboardBreakdown

Interfaces

Connectors

From the outside

1. CAT 5e Gland / Passthrough Gland
2. N-Type Female LoRa Antenna Connector

On the inside

1. **9-16V @ 15W DC 6.5MMx2.0MM Barrel Jack**
2. **Ethernet Connector**
3. **LED Indicator**
4. **Interface Button**
5. **4G / LTE Module Connector**
6. **Sim Card Slot**

Status Indicator The Nebra Outdoor Hotspot has a status indicator called LED1 on the Wifi daughterboard in the middle of the hotspot

This indicator is RED and will act accordingly:

- Off - Software has not started yet.
- On - Operating as normal
- Slow Blinking - Bluetooth Pairing is enabled
- Fast Blinking - There is potentially a fault. Please check diagnostics page.

Button The Nebra Outdoor Hotspot has a button on the Wifi daughterboard in the middle of inside teh hotspot. This is labeled S1

This is used to re-enable bluetooth pairing on the hotspot, hold the button in for approximately 15 seconds then release to start pairing. The adjacent status light LED1 should start blinking slowly if successful.

Firmware

The Nebra Hotspots run a customised software to provide high reliability and ensure your units are as up to date as they can be.

Approximately your hotspot will update once a week in an automatic process, we will announce updates via various social media platforms when they happen.

The software is open source at https://github.com/nebraltd/helium-miner-software

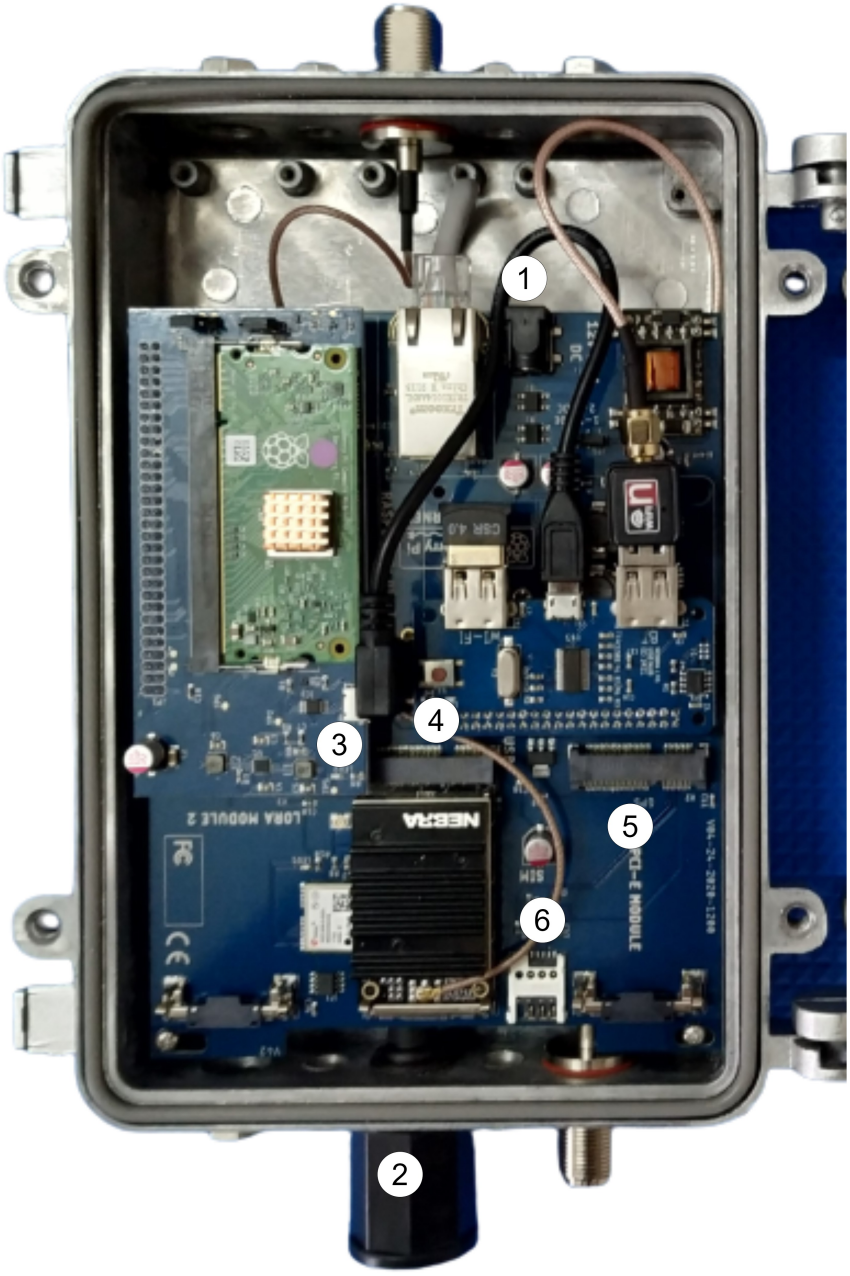

Figure 6: DaughterboardBreakdown

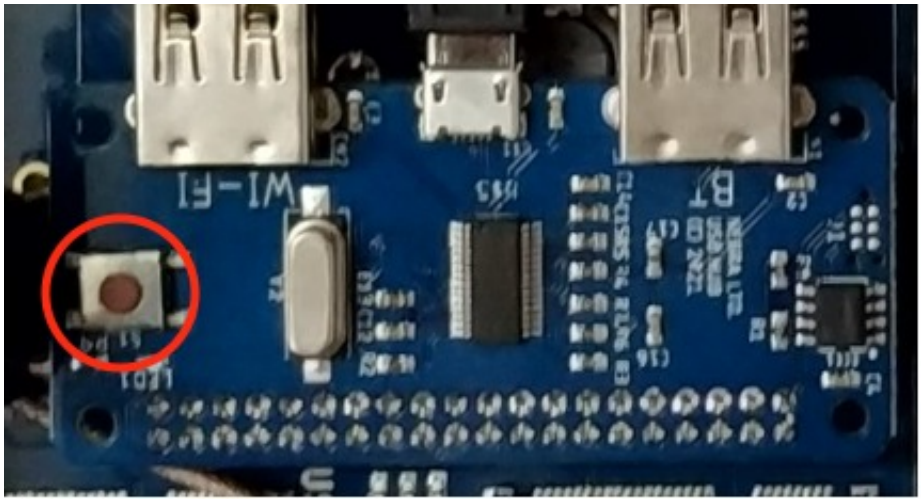

Figure 7: DaughterboardBreakdown

Certifications

We are working on getting the Nebra Outdoor Hotspot certified in multiple regions.

Certification List

Approval	Countries Covered	Hardware Frequency	Status	Frequency Plans
CE	European Economic Area	868 Mhz	Completed	EU 868
UKCA	United Kingdom	868 Mhz	In Progress	EU 868
FCC	United States of America	915 Mhz	Completed	US 915
ISED	Canada	915 Mhz	In Progress	US 915
RCM	Australia & New Zealand	915 Mhz	In Progress	AU 915
MIC	Japan	915 Mhz	In Progress	AS920 (AS1)
SRRC	China	470 Mhz	In Progress	CN 470
EAC	Russia	868 Mhz	In Progress	RU 864
WPC	India	868 Mhz	In Progress	IN 865

All certification related documents can be viewed in the certification folder for our outdoor Raspberry Pi miner.

Certification Codes

Certification	ID Code
FCC	2AZDM-HNTOUT
ISED	27187-HNTOUT

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

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

ever, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: * Reorient or relocate the receiving antenna. * Increase the separation between the equipment and receiver. * Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. * Consult the dealer or an experienced radio/TV technician for help.

Resources You can find 2D and 3D drawings of the outdoor IP67 case here

- Outdoor IP67 Case Diagram
- Outdoor IP67 Case Drawing
- Outdoor IP67 3D Model Top
- Outdoor IP67 3D Model Bottom

Click here to download all the files.