



NEBRA

NEBRA 5G HOTSPOT MINER DATASHEET



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Product Overview

The Nebra 5G gateway is a multi-protocol miner for the Helium network. Primarily it will mine HNT for providing proof of coverage using the LoRaWAN protocol, but will also have the ability to add a 5G small cell antenna, CBRS certified. The 5G miner will have the ability to mine mobile cellular traffic on the Helium network.

In the future, this 5G Nebra miner will also be able to expand to other wireless technologies such as providing Wi-Fi coverage.

The Firmware comes pre-loaded on the gateway and combines the Helium LoRaWAN miner with the mobile cellular network, based on the open-source project Magma.



Features

Open 5G Revolution

Expand your Nebra 5G Gateway over time as the blockchain evolves to support 5G and Wi-Fi by connecting cellular antennas and Wi-Fi access points.

OTA Updates

The Nebra 5G hotspot will feature automatic over-the-air updates (OTA) ensuring that the software on your gateway is always up-to-date with no manual intervention required, giving you peace of mind

Deploy

Indoor or outdoor, the all-aluminium chassis has a rugged design to be deployed in a number of varying scenarios, including outdoor using a compatible IP-rated enclosure

Troubleshooting

All our hotspots feature the Nebra local diagnostic dashboard which makes it easy to troubleshoot and report issues with ease

Mounting Options

The 5G hotspot will come with all the mounting hardware required for standalone or wall mounting horizontally or vertically to suit many application needs. Secure it the way you want to fit your style

Instant Sync

With the Quad Core Intel CPU and 8GB of RAM, the Nebra Gateway is the most powerful on the market, which features the fastest blockchain sync times

Specification

| SPECIFICATION | 5G HOTSPOT |
|-----------------------|--|
| Colour | Black |
| Dimension | 126x134x45.3mm (LxWxH) |
| Construction | Fanless |
| Material | High quality aluminium alloy |
| Processor | On-board Intel ATOM Bay-trail J1900 Quad Core Processor 2.4GHz |
| Graphics | On-board Intel HD graphics |
| Memory | 8GB Single channel DDR3L 1333 |
| LoRa Module | Nebra SX1303 concentrator module (USB) |
| LPWAN Antenna | TBC |
| Storage | 64GB mSATA SSD |
| LED indicator | 1x Power indicator (red), 1x SSD activity (green) |
| Network | 4x Intel I225 Gigabit Ethernet |
| Power interface | DC power supply interface |
| Button | 1x Power switch (with LED), 1x Reset button |
| USB | 1x USB 2.0, 1x USB 3.0 |
| Console | 1x RJ45 RS232/RS485 |
| Wireless | Wi-Fi 4, Bluetooth 4.0 Built-in |
| Power Supply | DC 12V 5A (60W Max) |
| Operating Temperature | -20°C ~ +60°C |
| Storage Temperature | -40°C ~ +85°C |
| Relative humidity | 5%-95%, no condensing |
| Vibration | 0.5g rms/5-500Hz/random/operating |

*Can add Wi-Fi/3G/4G modules etc

**Can support SSD

Interfaces

The 5G miner comes with a number of interfaces for its operations and current status indicator. It is designed to be fully automated with very little physical interaction required.



1. Gigabit Ethernet WAN port for network connectivity
2. Gigabit Ethernet port for LTE/5G Small Cell or Wi-Fi access point connectors
3. Power LED (red)
4. SSD activity LED (green)
5. DC 12V power input 2.1mm



6. Power button
7. USB 3.0 & USB 2.0 ports for external accessories
8. RS232 (RJ45) console port
9. Reset button
10. LoRa antenna connector SMA
11. GPS antenna connector SMA

Dimensions

Dimensions listed below exclude any protruding connectors.



Operating Frequencies

| Frequency | Nebra SKU | Barcode |
|---|-----------|---------|
| 433MHz (EU433) | TBC | |
| 470MHz (CN470) | TBC | |
| 868MHz (EU868, IN865, RU864) | TBC | |
| 915MHz (US915, AU915, KR920, AS923-1/2/3/4) | TBC | |

RF Features

- Mini PCIe form factor with mounted heatsink
- SX1303 base band processor emulates 49 x demodulators, 10 parallel demodulation paths. Supports 8 uplink channels and 1 downlink channel
- Built-in USB interface
- 2x SX1250 Tx/Rx front-ends high/low frequency
- Tx power up to 27 dBm, Rx sensitivity down to -141 dBm @ SF12, BW 125 kHz
- Supports global license-free frequency band (EU433, CN470, IN865, EU868, US915, AU915, KR920, and AS923)

3GPP Feature Specifications

- 3GPP Release: 15 for LTE, 15 for 5G SA
- 4G Core: MME, SGW, PGW, HSS-lite
- 5G Core: AMF, SMF, UPF, UDM-lite
- Stateless: Stateless MME and S-GW allow for hitless service, updates/restarts
- User plane T-put: 1Gbps
- Connected users: >600
- QoS Control: 3GPP standard QoS Class Identifier (QCI)
- CUPS Support: native
- Handover: S1 & X2 handover



Antenna Parameters

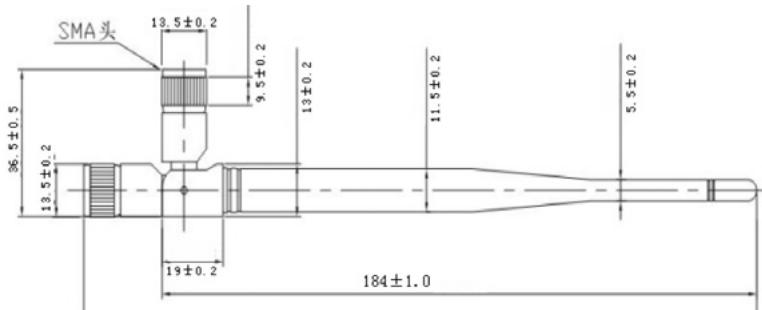
| SPECIFICATION | GPS Antenna |
|---------------------------|----------------|
| Frequency | 1575.42MHz |
| Gain | 25dBi |
| Cable Length | 3m |
| Connector Type | SMA Male |
| Cable Type | RG174 |
| Size | 48.5x37x16.2mm |
| Operating Temperature (C) | -40 - 85 |
| Colour | Black |

LoRa Antenna



Antenna Dimension

The antennas mechanical dimensions is shown below:



Antenna Parameters

| SPECIFICATION | 868MHz Model | 470MHz Model |
|-------------------|--------------|--------------|
| Frequency | 860-930MHz | 420-480MHz |
| Gain | 3 dBi | 3 dBi |
| Length | 210mm | 172mm |
| VSWR | < 1.8 | < 2.3 |
| Connector Type | RPSMA-J | RP-SMA Male |
| Polarization Type | Vertical | Vertical |
| Input Impedance | 50 Ohms | 50 Ohms |
| Colour | Black | Black |

Environmental Requirements

This product should be operated only in a well ventilated environment to ensure there is enough heat dissipation.

The Indoor hotspot should be placed on a flat surface

For ideal hotspot placement please the documentation here - <https://helium.nebra.com/#/handy-guides/hotspot-ideal-location>

Safety Instructions

To avoid malfunction or damage to this product, please observe the following:

Do not expose to water or moisture

Do not expose to any source of extreme heat. The 5G miner is designed for reliable operation and has been tested at normal ambient room temperatures (25°C)

Take care when handling to avoid mechanical, shock, vibration or electrical damage to the connectors or components inside

Do NOT open the case unless specifically requested to do so by a member of our support team. If opening the case please observe anti-static procedures.

Any modification to the 5G miner will void any warranty

Compliance Information

Certification

We are working on getting the Nebra Indoor Hotspot certified in multiple regions. Below is a list of approved regions with links to certification for viewing.

| Approval | Country | Hardware Frequency | Status | Frequency Plan |
|----------|--------------------------|--------------------|--------|----------------|
| CE | European Economic Area | 868MHz | TBC | EU 868 |
| UKCA | United Kingdom | 868MHz | TBC | EU 868 |
| FCC | United States of America | 915MHz | TBC | US 915 |
| RCM | Australia & New Zealand | 915MHz | TBC | AU 915 |
| | | | | |

Certification Codes

| Certification | Code |
|---------------|------|
| FCC | TBC |
| ISED | TBC |

RoHS

All our miners have been tested under the EU RoHS Directive 2011/65/EU and its amendment directive 2015/863/EU.

Software

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 and available on our Helium Miner Software repo on [GitHub](https://github.com/Nebranetwork/helium-miner).

Local Diagnostics

Each 5G miner ships with a local diagnostic tool built-in that you can easily access from another computer or device on the same network or you can alternatively connect the miner through Bluetooth and access through the Helium application. For further information on how to access the local diagnostics page view the documentation listed here - <https://helium.nebra.com/#/handy-guides/local-diagnostics>

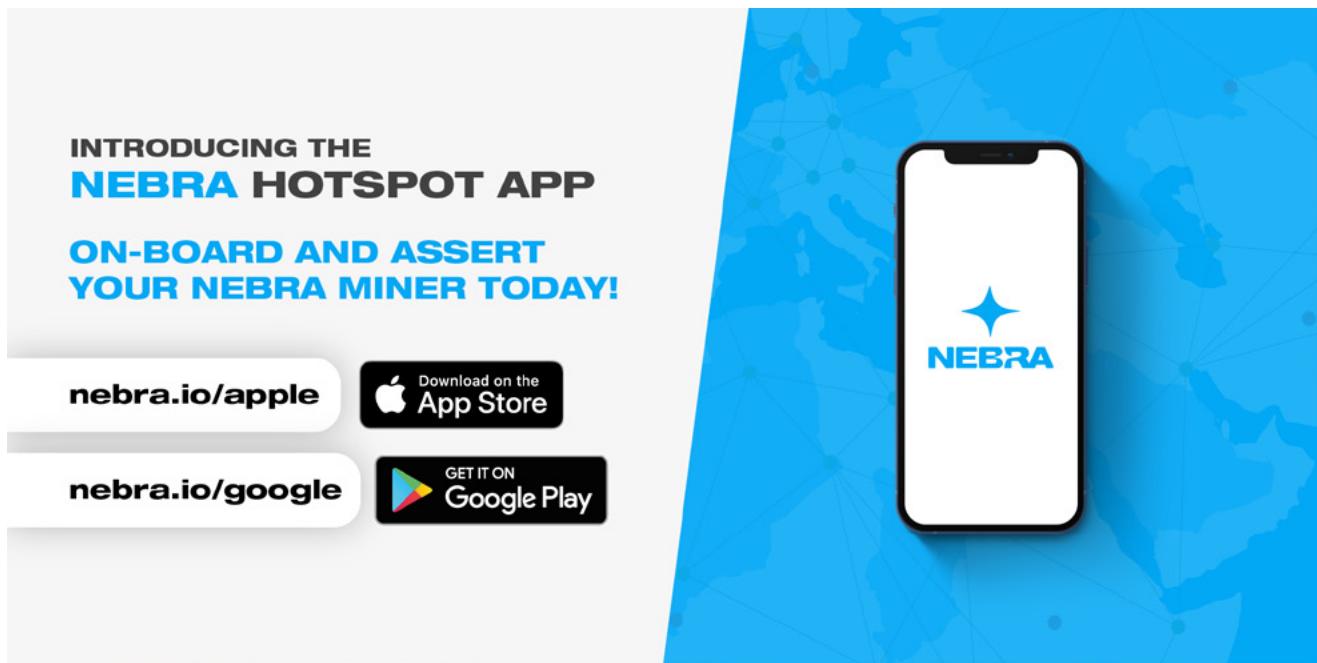
Nebra Dashboard



The Nebra Dashboard allows you to view all of your Nebra hotspot statistics in one place: keep track of rewards, sync status, and device status. You can sign-up to use the dashboard at <https://dashboard.nebra.com/register/>

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Nebra App



Initially, our Nebra Hotspot app simply takes over the core functionalities provided by the Helium Hotspot app - on-boarding and asserting location.

As we further develop the app over the coming months in 2022, we are planning to add a lot more features including integration and single-sign-on with our Nebra dashboard which will bring remote management of your devices to the app as well as a vast array of diagnostics tools. It also will mean that any future dashboard features are also more readily available in the app.

Download the Nebra Application

The Nebra mobile app is available for both Android and iOS devices and can be found in the relevant app store for your device. Click on one of the links below to be redirected to the app store.

[iOS Store](#)

[Android Store](#)



Trademarks

Nebra, the Nebra Logo are all trademarks of Nebra LTD t/a Pi Supply (UK Company Number 06732600)

Warranty Information

All goods supplied by Nebra Ltd are warranted free from defects for 12 months from the date of supply. Warranty will cover hardware only and where possible we will repair or replace if sufficient evidence is provided of a possible defect.

Contact Information

United Kingdom, London

Email: sales@nebra.com

Address: Unit 4 Bells Yew Green Business Court, Bells Yew Green, East Sussex, TN3 9BJ, England

Change Notes

| Version | Date | Change | Initials |
|---------|------------|-----------|----------|
| v1.0 | 27/06/2022 | Draft | CR |
| v1.1 | 28/06/2022 | Published | CR |
| | | | |
| | | | |
| | | | |

FCC Statement

1. 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.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, 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.

This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

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.

IC STATEMENT

This device complies with Industry Canada licence-exempt RSS standard(s)

Operation is subject to the following two conditions:

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

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Ce dispositif est conforme aux normes autoriser-exemptes du Canada RSS d'industrie
L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. Cet équipement est conforme avec l'exposition aux radiations IC définies pour un environnement non contrôlé. L'utilisateur final doit respecter les instructions de fonctionnement spécifiques pour assurer la conformité aux expositions RF. Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec une autre antenne ou transmetteur.

This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.