Panther-X2 Product Manual

www.panther.global

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1. Product description

Since E-Sun Electronics Limited launched the Panther X1 Hotspot, the product has been a big success and welcomed by most users for its exclusive advantages such as abundant storage, full-duplex LoRa mode, multi-hotspot management configuration, high-speed synchronization, and advanced customization. As E-Sun Electronics Limited focuses on building a series of high-quality products in the Internet of Things field in the future, the team has been committed to continuously advancing the research, development, and iteration of Panther X series products. Following the successful launch of Panther X1, we completed the research and development of Panther-X2 Hotspot and launched it to the public.

Panther -X2 has a 4-core high-performance processor, ultra-low power consumption, and ultra-long-distance IoT hotspot gateway. In addition, as an information converter for the LoRa communication protocol, Panther X2 acts as a bridge between network servers and end nodes.

Panther- X2, featuring a signal coverage of around 10-20 km, runs at an ultra-low-power (5W) and can connect to over 2,000 LoRaWAN end nodes within itsrange. It is susceptible, safe, reliable, and easy to interact with and can be used

for environmental monitoring, asset tracking, smart agriculture, and other long-range ultra-low-power IoT applications.

Panther- X2 is compatible with the Helium LongFi network and can be used asa hotspot to obtain Helium digital token, HNT. In addition, the device supportsblock synchronization and remote control. Users can use the official Heliumapplication to complete the Panther- X2 in one minute quickly.

2. Architecture

Panther- X2 sends and receives LoRa data, modulates/demodulates signals,processes LoRa data and higher-level protocol-related tasks, and eventuallytransmits data to the server via Ethernet or Wi-Fi.
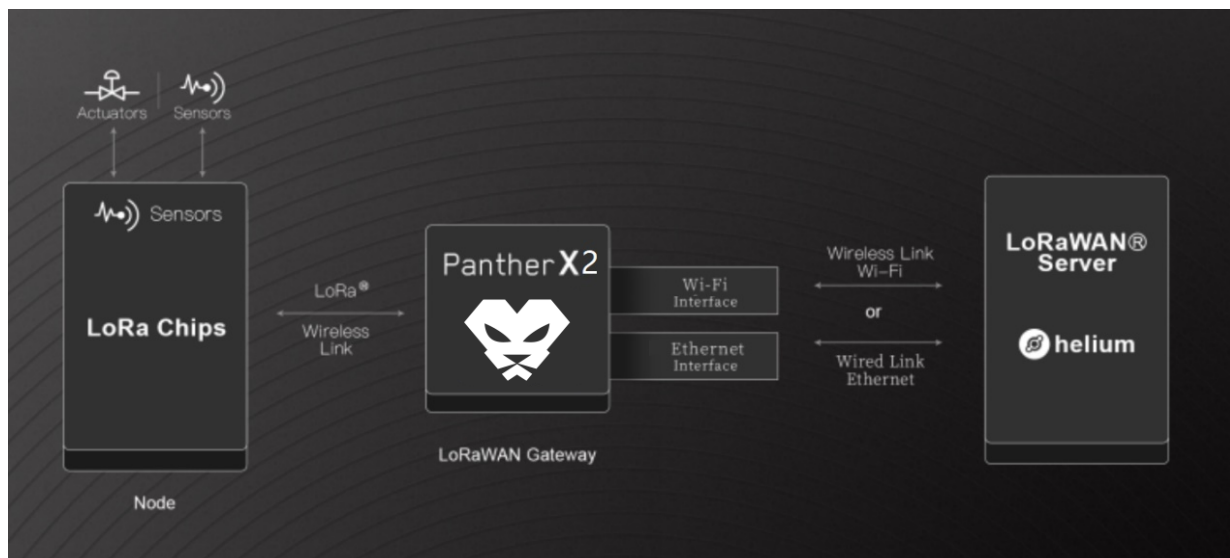
3. Solution

LongFi^{TM} Technology

Helium LongFi is a technical architecture that combines advanced wireless technology LoRaWAN and Helium blockchain. LongFi is optimized for the coverage and battery life of IoT devices.

Proof of Coverage (PoC)

The Panther - X2 Hotspot obtains the digital token HNT when the device isconnected to the Helium mainnet and is used to verify the wireless coverageprovided by the peer. Using a proof of coverage mechanism, Panther - X2 Hotspots can obtain more HNT when Panther - X2 Hotspots are within thecoverage range of other Panther -X2 Hotspots.

The coverage depends on the use environment:

- Open area: 10 kilometers or more.
- Built-up areas: 1~10 kilometers.

A single hotspot obtains fewer HNT because it can only issue challenges through the Internet and not participate in the proof of coverage mechanism.

About LoRa

LoRa is an innovative radio frequency physical layer modulation technology that provides long-range wireless connectivity, excellent power supply efficiency, extremely high receiver sensitivity, full spread spectrum, and secure, encrypted

transmission. It is operated on free industrial, scientific, and medical (ISM) radio bands with 863-870 MHz frequency spectrum and its subsets reserved for Europe, the Middle East, Africa, and India, and 902-928 MHz for the Americas and Asia-Pacific countries/regions. The ISM band primarily used in China is 470-510MHz.

About LoRaWAN

LoRaWAN is a Media Access Control (MAC) layer protocol developed by the LoRa Alliance, serving as a supplement to the physical layer implementation of LoRa. It draws support from an established ecosystem of LoRaWAN-compatible devices, which can be obtained from multiple suppliers and is accredited by the LoRa Alliance for Device Interoperability.

LoRaWAN defines the network's communication protocol and system architecture, while the LoRa physical layer enables the long-range communication link. As a result, the protocol and network architecture have the most influence in determining the battery lifetime of a node, the network capacity, the quality of service, the security, and the variety of applications served by the network.

4. Advantages

High-performance configuration: Powered by the latest quad-core Cortex-A55 1.8GHz processor; Semtech LoRaWAN chip; 4GB DDR4 memory; 32GB eMMC and 64GB TF card;

Secure and trustworthy: With a built-in ECC encryption chip, Panther -X2 promises highly secure authentication and reliable connection;

Comprehensive Coverage: Featuring enhanced 3dBi antennas, Panther -X2 offers broader and more stable network coverage；

More extensive RAM and storage: 4GB DDR4 with faster-running speed and shorter response time, built-in 32GB eMMC and 64GB TF card, Panther -X2 meets the RAM and storage requirements brought by the rapid development ofHelium network;

Easy setup: Easy steps to set up Panther -X2;

Hotspot Placement: Easier management and configuration of multiple hotspots;

5. Connectors

Bluetooth Connect Button   Power   Ethernet   USB2.0   TF Card   LoRa

6. Product specifications

Product name	**Panther - X2**
LoRa Specifications	
LoRa Channel Plan	**AS923/ EU868/US915/**
LoRa Frequency Band	**923MHz/868MHz/915MHz**
Channel capacity	**8 channels**
LoRa output power	**Maximum 30dBm**
Receiving sensitivity	**-141 dBm @SF12 BW 125kHz；** **-127 dBm @SF7 BW 125 kHz；** **-111 dBm @FSK 50 kbps**
Platform	
CPU	**Quad-core Cortex-A55 up to 1.8GHz**
Memory	**DDR4 4GB**
Storage	**eMMC 32GB+ TF Card 64GB**
Wi-Fi radio	**2.4GHz 802.11 b/g/n**
BLE radio	**BLE 5.2**
Input Voltage	**DC 12V 2A**
Connectors	
LoRa Antenna	**RP-SMA-K**
Ethernet	**RJ45 Gigabit**
Power	**5.5*2.1mm, 12V DC**

7. Environment requirements

Environment	
Operating temperature	0°C ~ +40°C
Storage Temperature	-10°C ~ +70°C
Relative Humidity	5%RH ~ 95%RH (non-condensed relative humidity) 20%~90%, non-condensing
Heat Dissipation	Radiator grille

8. Indicators

Power | Status | Network | Bluetooth
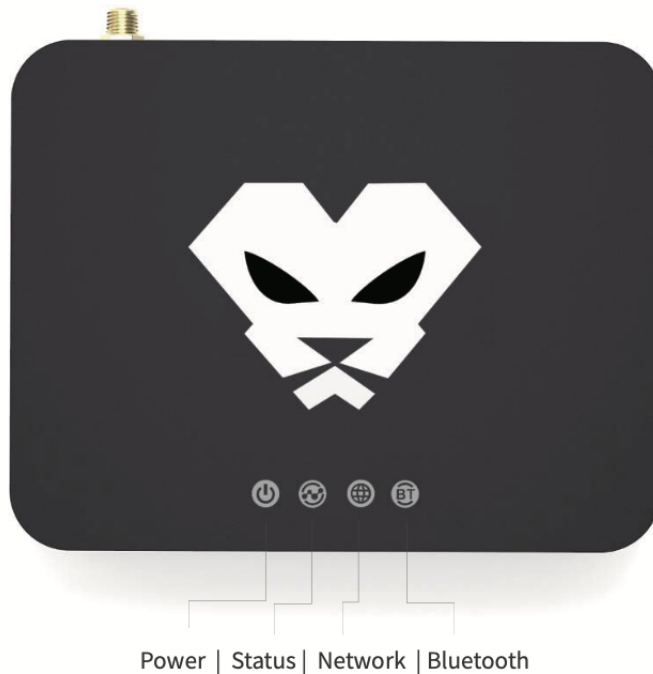
Indicator light	Status
Power	Steady light: Power on No light: Power off
Status	Steady light: The system operates normally Blinking light: System is booting (Bluetooth operations are possible)
Internet	Steady light: Connected to the Helium network No light: Not connected to the Helium network
Bluetooth	Steady light: Bluetooth has been paired successfully No light: Bluetooth pairing is off

9. Dimensions

10 . Box contents

1 Panther -X2 Hotspot Gateway

1 LoRa antenna

1 Power adapter

1 User guide

1 Pin tool

FCC Warnning:
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 againstharmful interference in a residential installation. This equipment generates, uses and can radiateradio frequency energy and, if not installed and used in accordance with the instructions, maycause harmful interference to radio communications. However, there is no guarantee thatinterference will not occur in a particular installation. If this equipment does cause harmfulinterference to radio or television reception, which can be determined by turning the equipmentoff and on, the user is encouraged to try to correct the interference by one or more of thefollowing 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.
Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.
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, and (2) this device must accept any interference received, including interference that may cause undesired operation.
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.