PLANET
Networking & Communication

User's Manual

Universal Network Management AIoT Application Server

► NMS-AIoT

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Revision

User's Manual of Universal Network Management AIoT Application Server
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Table of Contents

Chapter 1. Product Introduction

Thank you for purchasing PLANET Universal Network Management AIoT Application Server. PLANET NMS-AIoT is described below:

NMS-AIoT	Universal Network Management AIoT Application Server with LCD

1.1 Package Contents

Open the box of the **NMS-AIoT** and carefully unpack it. The box should contain the following items:

- **NMS-AIoT Controller x 1**
- **Quick Installation Guide x 1**
- **Power Cord x 1**
- **Console Cable x 1**
- **Installation Kit x 1**

If any of the above items are missing, please contact your dealer immediately.

1.2 Overview

Universal Network Management AIoT Application Server with LCD

PLANET's NMS-AIoT (Universal Network Management AIoT) Application Server can directly monitor over 3,000 sensing devices. In the era of edge computing and AIoT (Artificial Intelligence of Things) applications, enterprises require a high-performance, secure, and flexible management platform to integrate various wired and wireless IoT devices and massive environmental data. The NMS-AIoT Application Server offers a comprehensive solution by integrating energy management, wide-area transmission, and AI edge computing, providing an efficient and secure AI private cloud network for enterprises.

PLANET NMS solution features intuitive dashboard, and map viewing to make network management efficient and effective.

The exclusive product features for PLANET NMS solution include:

- ESG energy management reporting with real-time sensor data analysis and carbon footprint reduction
- Supports integration with versatile IoT devices
- Cybersecurity with IEC 62443 certified
- Supports private and PLANET cloud platforms

Unified Platform Integration

The NMS-AIoT platform integrates multiple communication protocols, including **LoRa**, **Wi-Fi HaLow**, **Modbus**, and **PDU**. This integration allows the management of over 3,000 sensing devices, supporting both wired and wireless connections. It ensures seamless communication and efficient management of various IoT devices across an enterprise's infrastructure.

ESG Energy Management Reporting

One of the standout features of the NMS-AIoT is its ability to support ESG (Environmental, Social, and Governance) energy management reporting. The platform provides real-time sensor data analysis and aids in reducing the carbon footprint by optimizing energy usage. This feature is critical for enterprises aiming to achieve sustainability and energy efficiency goals.

Cybersecurity Compliance

Security is a paramount concern in IoT deployments. The NMS-AIoT platform is certified with IEC 62443, ensuring robust cybersecurity measures. It includes SSL VPN and hybrid VPN support, enhancing secure communications and protecting sensitive data from potential cyberthreats.

AI and Edge Computing Integration

The platform leverages AI edge computing capabilities to process data locally at the edge of the network. This reduces latency and enhances the efficiency of data processing. Real-time monitoring and predictive maintenance are enabled, thus optimizing operations and reducing downtime.

Flexible Deployment Options

The NMS-AIoT supports both private and PLANET cloud platforms, offering flexible deployment options for enterprises. This flexibility ensures that the solution can be tailored to specific organizational needs, be it an on-premise or cloud-based platform.

Centralized Intelligent Management Interface

The NMS-AIoT features a Centralized Intelligent Management Interface designed to be intuitive and user-friendly. This interface provides a comprehensive dashboard that offers real-time monitoring and management of all connected IoT devices. With clear visualizations and easy-to-navigate menus, users can quickly access vital information, analyze data, and make informed decisions. The user-centric design ensures that even those with minimal technical expertise can efficiently operate the system, maximizing productivity and minimizing downtime.

User-friendly Dashboard Design

Complete Data Report

Centralized Management of IoT Devices

1.3 Features

Key Features

- A unified platform integrating LoRa, Wi-Fi, HaLow, Modbus and more
- ESG energy management reporting with real-time sensor data analysis and carbon footprint reduction
- Supports integration with versatile IoT devices
- Intuitive smart dashboard
- Real-time environmental monitoring and analysis
- Precise device location mapping
- 24/7 real-time event notifications
- Early error detection and anomaly resolution
- Embedded hardware controller for easy setup
- Easy installation for non-technical personnel
- Support for future software upgrades
- Support for private and PLANET cloud platforms

Hardware

- **6 x 10/100/1000BASE-T** RJ45 LAN ports
- **2 x** USB 3.0 ports
- **1 x** serial console port
- **1 x** reset button

1.4 Product Specifications

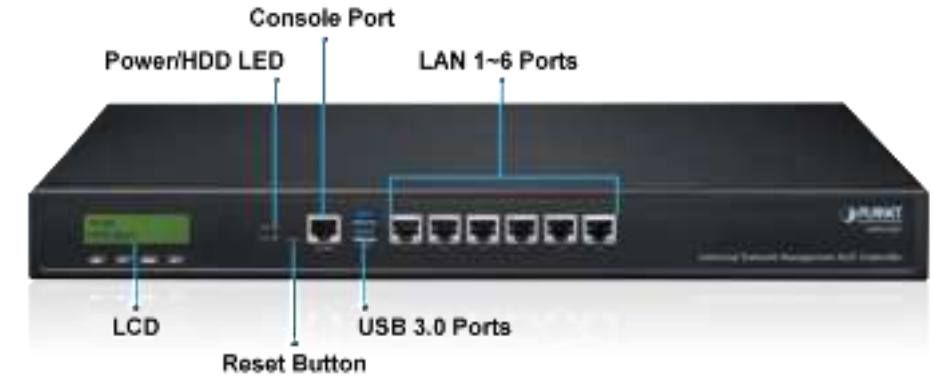
	NMS-AIoT
	Universal Network Management AIoT Application Server with LCD & 6 10/100/1000T LAN Ports
Physical Specifications	
I/O Interface	6 10/100/1000BASE-T Gigabit Ethernet RJ45 ports (LAN 5 and LAN 6 are designed for bypass functionality.)
	2 USB 3.0 ports (They cannot be used at the same time.)
	1 factory default button (GPIO)
	1 RJ45 console port
	2 DB-9 COM,COM2 (reserved)
Storage	2.5" 64G SATA HDD
LED	2 LED (Power / HDD)
LCM Size (Active Area)	49.45 (W) x 9.58 mm (H)
LCM Button	4 touch buttons for enter, exit, up and down
Dimensions (W x D x H)	438 (W) x 180 (D) x 44 mm (H) 17.24” (W) x 7.09” (D) x 1.73” (H)
Weight	3 kg (6.62 lbs)
Form Factor	1U 19-inch rack-mount
Enclosure	Metal
Power Requirements	3-pin AC power input socket AC 100~240V , 65W
Environment & Certification	
Temperature	Operating: 0 ~ 50 degrees C Storage: -20 ~ 70 degrees C
Humidity	5 ~ 90% relative humidity (non-condensing)
MTBF (Hours)	100,000
Network Management	
Dashboard	Providing the at-a-glance view of center system, events summary, monitored record of each sensor and real-time alarm status
Device List	Manages all sensors and devices in the NMS-AIoT
Detail Information	Displays monitoring and history records, the latest 10 events, and current sensor information
User Management	Privilege level configuration
Event Reports	The alarm event of each sensor can be reported based on customized rules or system updates/changes.
Alarm System	Email alerts for the administrator via the SMTP server
Automatic Rules	Create one or more customized automatic rules for each sensor

Maximum Scalability	3,000 nodes
Standards Conformance	
Regulatory Compliance	CE, FCC
Standards Compliance	IEEE 802.3 10BASE-T IEEE 802.3u 100BASE-TX IEEE 802.3ab Gigabit 1000BASE-T

Chapter 2. Hardware Introduction

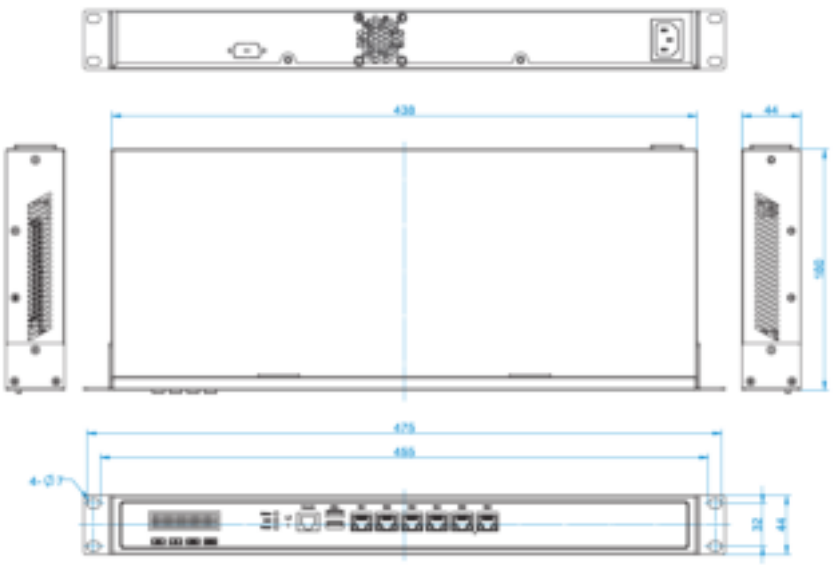
2.1 Physical Descriptions

Physical Interface



Mechanical Drawing

NMS-AIoT



Hardware Interface Definition

Interface	Description
AC IN	100~240V~, 0.59A max.
LCM	Easy system operation by pressing the button
USB Port	Connect the USB HDD to enable USB backup/restoration function
LAN Ports (1-6)	10/100/1000BASE-T RJ45 auto-MDI/MDI-X ports
PWR LED	Indicates that the device is powered on (Green)
HDD LED	Indicates that the HDD is working (Green)

2.2 Hardware Installation

Refer to the illustration and follow the simple steps below to quickly install your NMS-AIoT.

Set up the NMS-AIOT Controller with Ethernet connection for the first-time configuration by following the steps below.

Default IP Address: 192.168.1.100
Default Management Port: 8888
Default Username: admin
Default Password: admin

Launch the Web browser (Google Chrome is recommended.) and enter the default IP address "**https://192.168.1.100:8888**". Then, enter the default username and password shown above to log on to the system.

The secure login with SSL (HTTPS) prefix is required.

After logging on, connect the NMS-AIoT Controller to the network to centrally control PLANET managed devices.

Chapter 3. Preparation

Before getting into the device's web UI, user has to check the network setting and configure PC's IP address.

3.1 Requirements

User is able to confirm the following items before configuration:

1. Please confirm the network is working properly; it is strongly suggested to test your network connection by connecting your computer directly to ISP.
2. Suggested operating systems: Windows 7/8/10/11, macOS 10.12 or later, Linux Kernel 2.6.18 or later, and other modern operating systems are compatible with TCP/IP protocols.
3. Recommended web browsers: Google Chrome, Microsoft Edge or Mozilla Firefox.

3.2 Setting TCP/IP on your PC

The default IP address of the NMS-AIoT is 192.168.1.100. To successfully connect to NMS-AIoT, users need to configure their computer with a static IP address or ensure that a DHCP server is available on their network. Below are the detailed steps.

3.2.1 Method 1: Setting a Static IP Address

1. Open Network and Sharing Center

On Windows, right-click the network icon in the taskbar and select "Open Network and Sharing Center."

On macOS, open "System Preferences" and click on "Network."

2. Select the Active Network Connection

On Windows, click on the name of the current network connection (e.g., Ethernet or Wi-Fi).

On macOS, select the active network interface from the list on the left (e.g., Wi-Fi or Ethernet).

3. Configure IP Address

On Windows, click "Properties," then select "Internet Protocol Version 4 (TCP/IPv4)" and click "Properties."

On macOS, click "Advanced," then select the "TCP/IP" tab.

4. Set a Static IP Address

Set the "IP Address" to: 192.168.1.x, where x is any number between 2 and 254 that is not the same as NMS-AIoT's IP address (192.168.1.100).

Set the Subnet Mask to: 255.255.255.0

Set the Default Gateway to: 192.168.1.1 (If the known gateway address is different, set it accordingly.)

The DNS server addresses can be left blank or set to a public DNS server (e.g., 8.8.8.8).

5. Save Settings and Close the Window

Click "OK" to save the settings and close all windows.

6. Test the Connection

Open a web browser and enter https://192.168.1.100 in the address bar to verify that you can connect to the management interface of Device A.

3.2.2 Method 2: Using a DHCP Server

1. Ensure a DHCP Server is Available

Make sure that a DHCP server or use PLANET Gateway is running in the current network environment. Typically, home routers have built-in DHCP functionality.

2. Set the Computer to Obtain an IP Address Automatically

On Windows, follow the steps above to access the "Internet Protocol Version 4 (TCP/IPv4)" settings.

Select "Obtain an IP address automatically" and "Obtain DNS server address automatically".

On macOS, go to the "TCP/IP" settings and set "Configure IPv4" to "Using DHCP".

3. Save Settings and Close the Window

Click "OK" or "Apply" to save the settings and close all windows.

4. Test the Connection

Similarly, enter https://192.168.1.100 in a web browser to verify that you can connect to NMS-AIoT.

Chapter 4. Web-based Management

This chapter provides setup details of the device's Web-based Interface.

4.1 Introduction

The device can be configured with your Web browser. Before configuring, please make sure your PC is under the same IP segment with the device.

4.2 Logging in to the NMS-AIoT

Refer to the steps below to configure the NMS-AIoT:

Step 1. Connect the IT administrator's PC and NMS-AIoT's LAN port (port 1) to the same hub / switch, and then launch a browser to link the management interface address which is set to **https://192.168.1.100** by default.

Step 2. The browser prompts you for the login credentials. (Both are **"admin**" by default.)

Default IP address: **192.168.1.100**
Default user name: **admin**
Default password: **admin**

Administrators are strongly suggested to change the default admin and password to ensure system security.

4.3 Dashboard Page

Upon successful login, the main web page will load, displaying the web dashboard with summary information, a sensor history chart, and real-time event alarms.

Figure 4-3-1: Dashboard Page

■ Summary Information

The Event Summary displays the daily count of event records, allowing review of data from the past seven days, as shown in Figure 4-3-2.

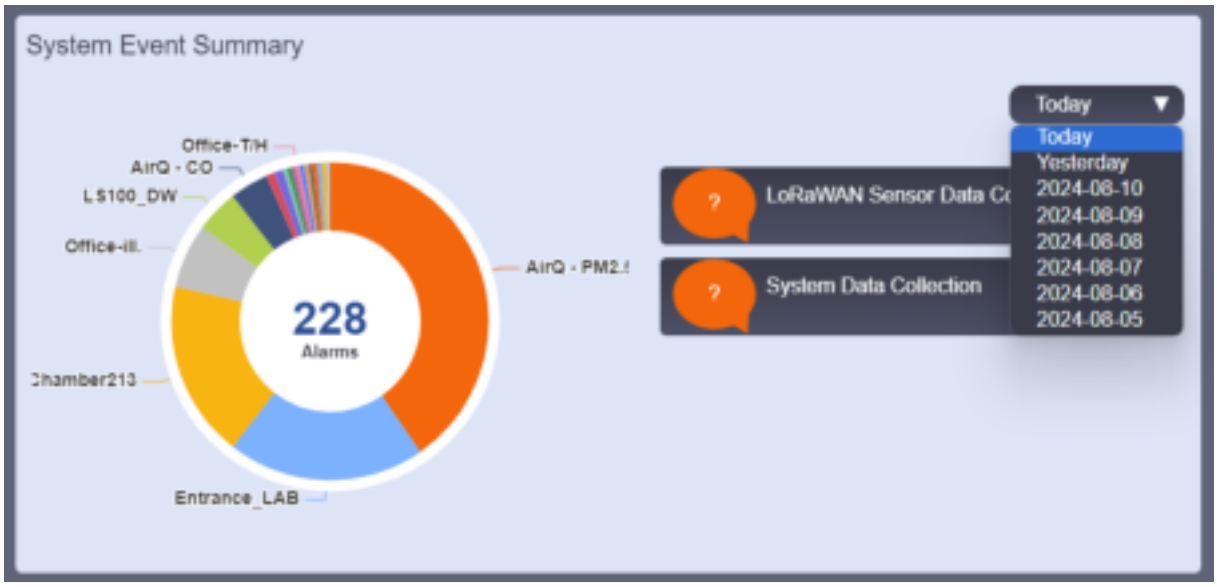


Figure 4-3-2: Event Summary

■ Sensor History Chart

The sensor history chart displays alias-based sensor data over daily, weekly, and monthly intervals. Users can also switch to viewing sensors located in different locations, as shown in Figure 4-3-3

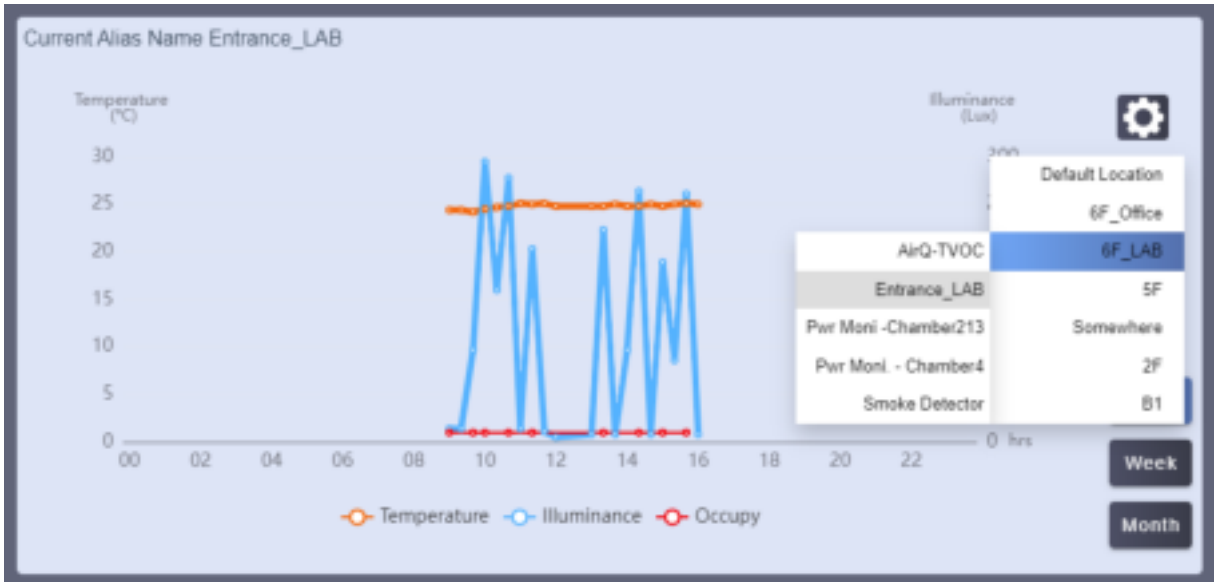


Figure 4-3-3: Sensor History Chart

■ Real-time Event Alarm

The Real-time Event Alarm chart provides an up-to-the-minute display of event alerts as they occur. This chart helps users monitor and respond to critical events in real time, ensuring prompt action and increased situational awareness, as shown in Figure 4-3-4

Figure 4-3-4: Real-time Event Alarm

■ Menu and Shortcut

■ Shortcut

In the top right corner of the screen, you'll find several shortcut buttons for quick access to preset screens, along with a menu that consolidates various functions.

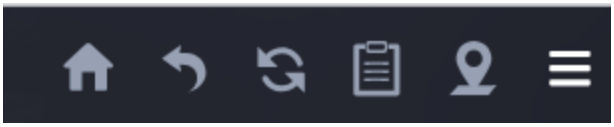


Figure 4-3-5: Shortcut and Menu

Object	Description
	Click the **'Home'** button to navigate to the dashboard page.
	Click the **'Back'** button to return to the previous page.
	Click the **'Refresh'** button to refresh the current web page.
	Click the '**Refresh'** button to navigate to the overview page.
	Click the **'Map'** to navigate to the default map page.
	Click the '**Menu'** button to display the list of functions.

■ Menu

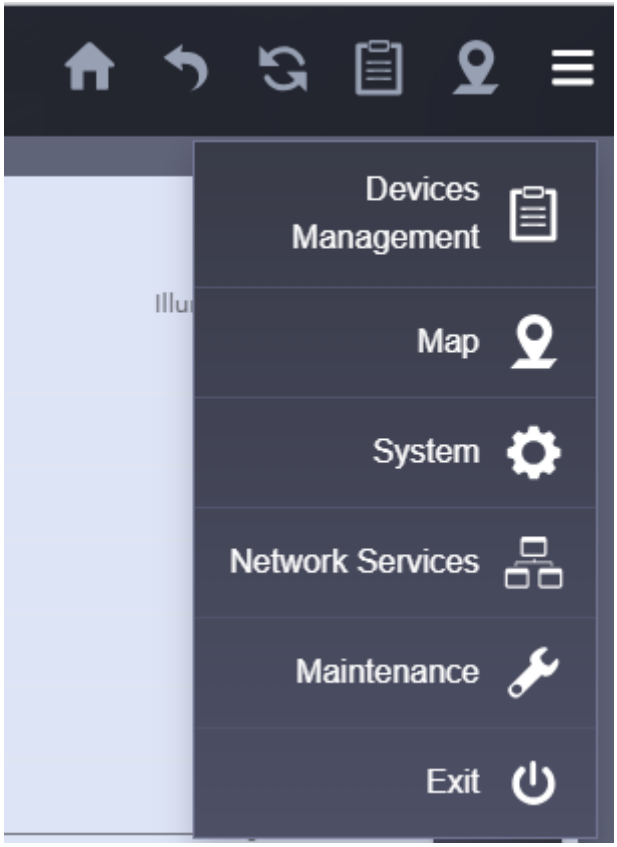


Figure 4-3-6: Menu List

Object	Description
Device Management	The Device Management feature allows you to manage, monitor, and configure all devices linked to NMS-AIoT. It includes both graphical and text-based views, as well as all automated management options.
Map	The Map feature allows you to assign a location to each device and place them on various customized maps.
System	The System feature provides settings pages for configuring NMS-AIoT devices, as well as management pages for NMS-AIoT accounts and groups.
Network Services	The Network Services feature offers configuration pages for various network services.
Maintenance	The Maintenance feature includes configuration pages for NMS-AIoT devices, as well as management of system updates, upgrades, data backups, system logs, and event logs.
Exit	The Exit feature provides options for logging out, rebooting, and shutting down the system.

4.4 Device Management

4.4.1 Overview page

The graphical interface provides a fast and intuitive way to visualize device status, monitored values, and supervisory conditions. This allows users to easily interpret data, assess system performance, and quickly identify any issues that require attention, all through a visually engaging and informative display.

Figure 4-4-1: Overview Page

Filter Feature

You can quickly display a selected list of sensors by using the location menu, filtering by sensor category, or applying text-based filters. This allows for efficient navigation and easy access to the specific sensors you need.

Figure 4-4-2: Filter Item

Clicking on an image allows you to access the device or sensor's monitoring data, view historical records, check event logs, and review the current configuration settings for the device or sensor.

The following diagram uses the Example LS200-CM3 sensor as a reference.

Figure 4-4-3: Overview Page

Figure 4-4-4: Device Info Page

LS200-CM3	The LoRaWAN 3-phase Current Meter, designed for robust industrial power monitoring, excels with a maximum current measurement of 75A.

The left side of the screen displays sensor device record charts, which can be viewed and marked by day, week, or month in the historical records. Threshold indicators and on-click value displays provide clearer insights into alert monitoring status and associated values.

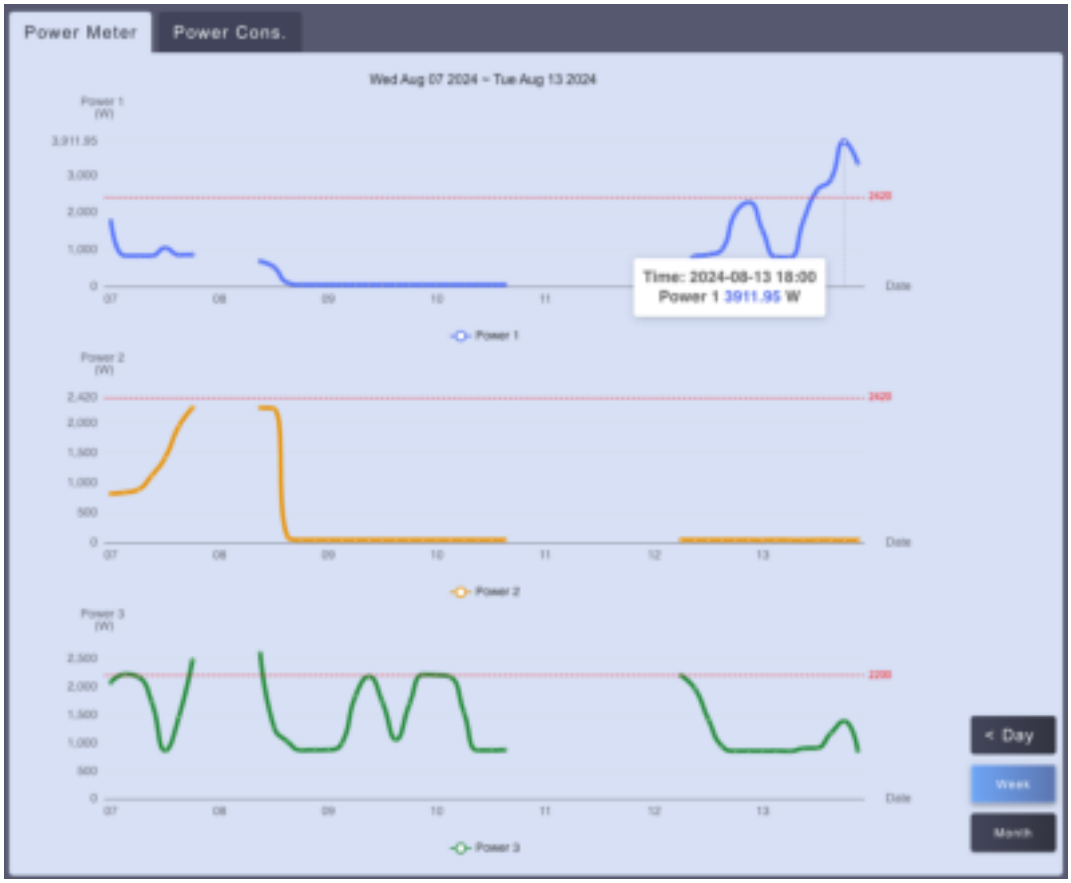


Figure 4-4-5: Power Meter Sensor Chart

Displays and statistics for annual, quarterly, and daily data, as well as budget charts for the entire month.

Figure 4-4-6: Power Meter Sensor Chart

The top right corner displays the current status and information of the selected sensor.

Figure 4-4-7: Device Information View

The bottom right corner displays the 10 most recent event records for the selected sensor.

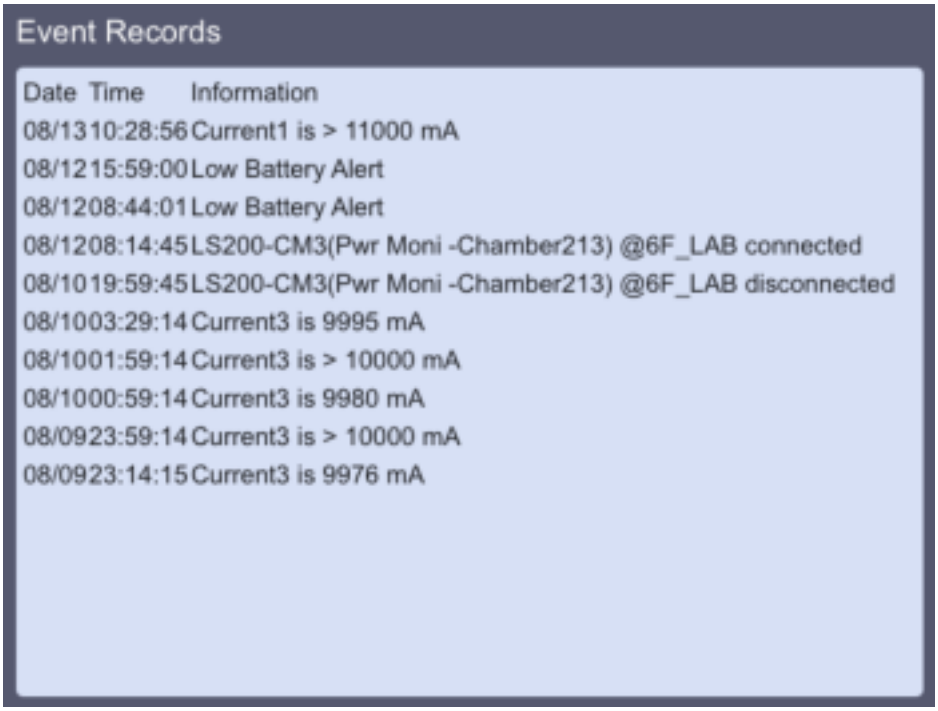


Figure 4-4-8: Event Records View

On the sensor information page, there are shortcut keys for editing device settings, configuring automation rules, and resetting the current session.

Figure 4-4-9: Shortcut of Device Settings

Device Edit

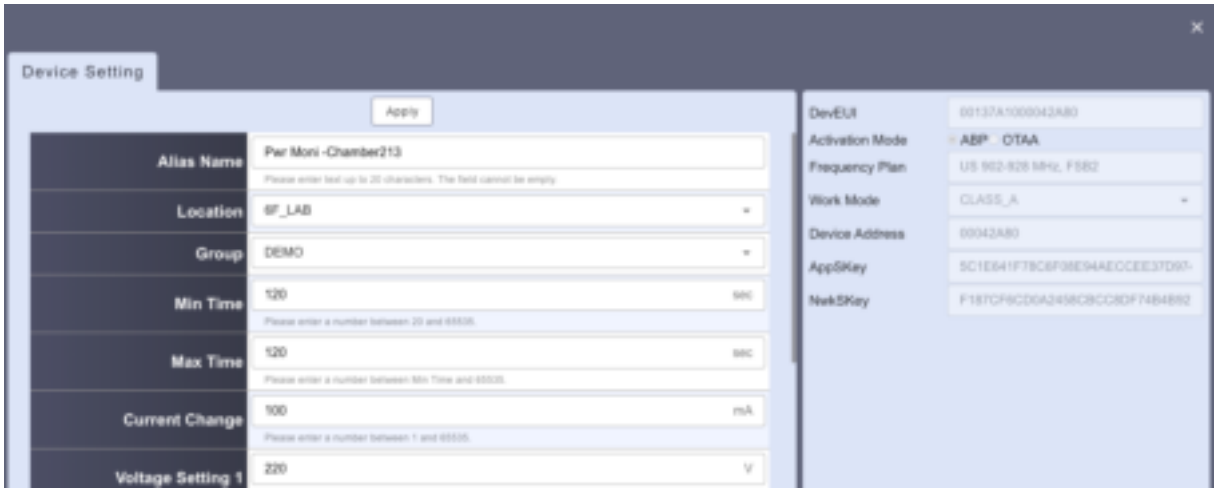


Figure 4-4-10: Device Setting Page

Edit Rule

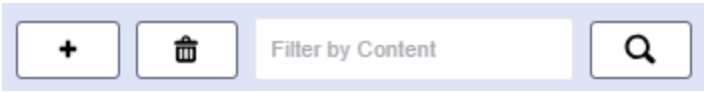
Figure 4-4-11: Automation Rule Setting View

4.4.2 Device List

The text-based tabular list offers a comprehensive and easily navigable overview of the status of all devices and sensors, allowing you to quickly assess their condition at a glance. The table is designed for efficiency, with multiple shortcut keys that provide instant access to the relevant settings and configurations of any selected device, streamlining your management and ensuring that adjustments can be made swiftly and accurately as shown in Figure 4-4-12.

Figure 4-4-12: Text-based Tabular List

Object	Description
Status	The online or offline status of the device
Group	The group settings for the device
Device Type	The device type of the device
Model Number	The model number or model name of the device
Alias Name	The alias name of the device
DevEUI	The unique device identifier of the LoRaWAN sensor
Device Description	The device description of the device
Location	The location setting of the device
Action	Device Info: to navigate to the Device Info page Device Setting: to navigate to the Device Setting page Automation Rule: to navigate to the Automation Rule page Remove: to remove the device from NMS-AIoT



Object	Description
	Add device
	Remove device
	Filter device list by content

■ Add Device

To add a LoRaWAN Gateway

Figure 4-4-13: Add LoRaWAN Gateway View

Object	Description
Category	To select the bindable device category.
Device Type	To select the bindable device type.
Location	To assign a location for the new device (default is **'Default Location'**).
Module Number	To select the bindable module number.
Frequency Plan	To select a frequency plan for the LoRaWAN gateway.
Gateway EUI	To enter the DevEUI of LoRaWAN gateway. * Required field
Gateway Name	To enter a clear and meaningful gateway name for this LoRaWAN gateway.
Gateway ID	The ID will be automatically generated by the Gateway EUI.

Add New LoRaWAN Sensor

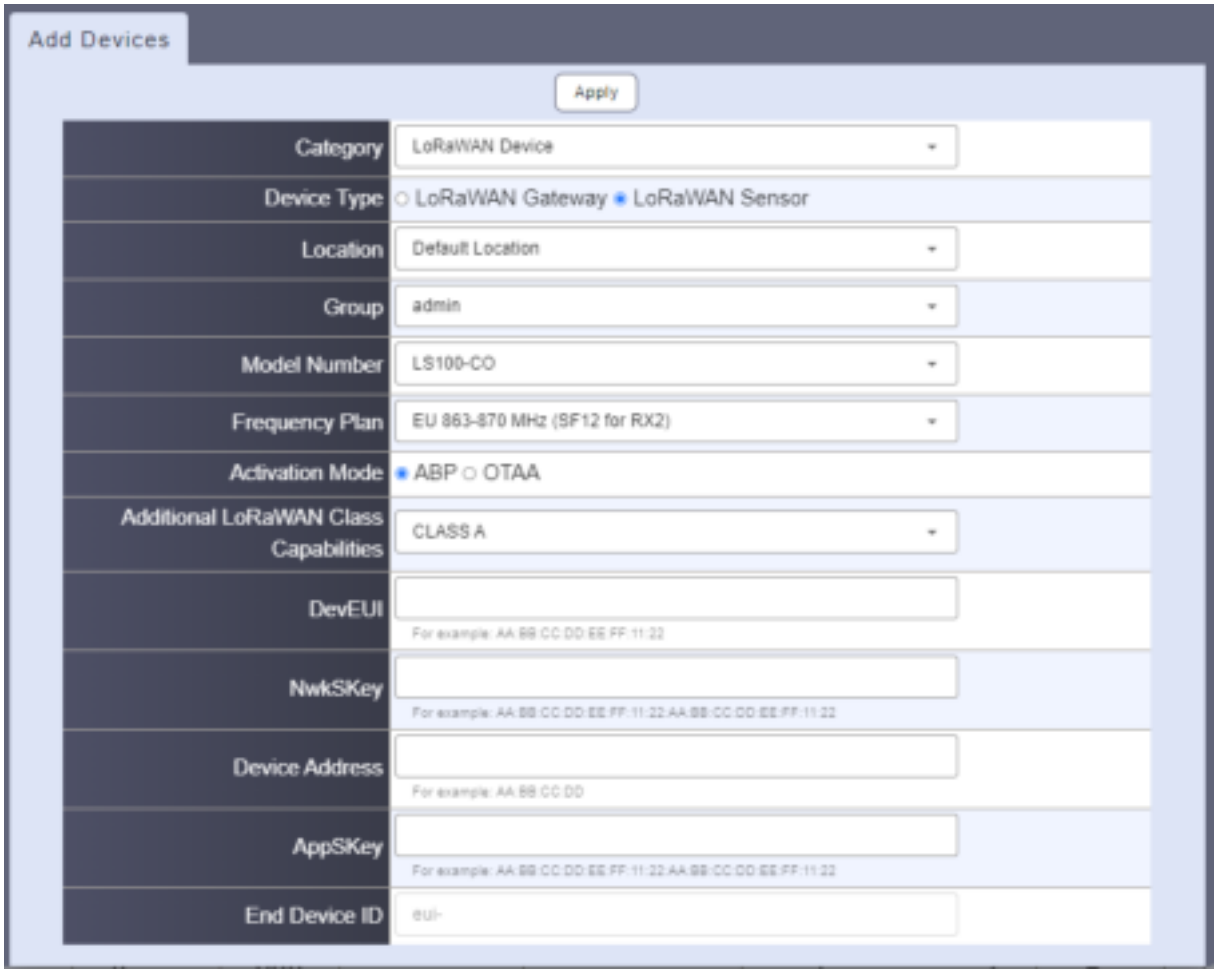


Figure 4-4-14: Add LoRaWAN Sensor View

Object	Description
Category	To select the bindable device category.
Device Type	To select the bindable device type.
Location	To assign a location for the new device (default is **'Default Location'**).
Group	To assign a group for the new device.
Module Number	To select the bindable module number.
Frequency Plan	To select a frequency plan for the LoRaWAN sensor.
Activation Mode	Activation by Personalization (ABP) Over-The-Air-Activation (OTAA)
Additional LoRaWAN Class Capabilities	Three device types: Class A, Class B, and Class C
DevEUI	The **DevEUI** uniquely identifies the end-device. * Required field
NwkSKey	The **Network Session Key** (NwkSKey) is used for interaction between the Node and the Network Server. * Required field
Device Address	The end device within the current network. * Required field
AppSKey	The **Application Session Key** (AppSKey) is used for encryption and decryption of the payload. * Required field
JoinEUI (AppEUI)	The **AppEUI** uniquely identifies the entity able to process the Join-req frame. * Required field
AppKey	The **Application Key** (AppKey) is the encryption key used for messages during each over the air activation. * Required field
End Device ID	The ID will be automatically generated by the **DevEUI**.

Note: The values for **DevEUI, NwkSKey, Device Address, AppSKey, AppEUI,** or **AppKey** can be found on **the label of the sensor** or its packaging, or you can contact the provider.

■ Automation Rule

Automation rules help streamline operations, improve efficiency, and ensure that important actions are taken promptly based on real-time data or system events.

Figure 4-4-15: Automation Rule Page

Object	Description
+	Add a new automation rule for a sensor
Filter by Content	Filter device list by content
Rule Name	The name of Automation Rule
Device for Event	Refers to a specific device within a system that is responsible for initiating or triggering certain events based on predefined conditions.
Condition for Event	Refers to the specific criteria or circumstances that must be met for an event to be triggered within a system or application.
Device for Action	Refers to a specific device within a system that is responsible for executing or performing a predefined action when certain conditions are met or when an event is triggered.
Action	When a device is set to execute or operate a specific action, the system sends a command or signal to the "Device for Action" to perform its designated task.
Edit	Automation Rule: to navigate to the Automation Rule page. Remove: to remove the device from NMS-AIoT

4.4.3 Map

This page allows you to mark sensor devices on the uploaded floor plan, enabling quick identification of device status through the map. By visualizing the placement of each device on the floor plan, you can easily monitor and manage your sensor network. The map feature provides a comprehensive view of your setup, making it easier to detect issues, track performance, and optimize the placement of your devices for better coverage and efficiency as shown in Figure 4-4-16.

Figure 4-4-16: Map Page

This page displays Map settings page as shown in Figure 4-4-17.

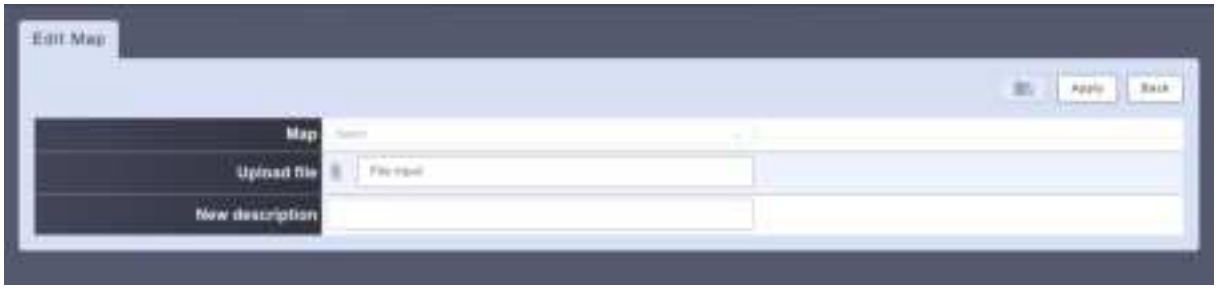


Figure 4-4-17: Edit Map Page

This page displays Location settings page as shown in Figure 4-4-18.

Figure 4-4-18: Edit Location Page

4.4.4 System

- Date and Time

Time settings and NTP functionality allow you to configure the system clock and synchronize it with a Network Time Protocol (NTP) server. Accurate time synchronization is essential for ensuring that all system logs, event timestamps, and scheduled tasks are consistent and reliable. By using NTP, you can automatically keep the system time accurate, reducing the risk of time-related errors and improving the overall system performance.

This page displays Date and Time settings page as shown in Figure 4-4-19.

Figure 4-4-19: Date and Time Settings Page

- IP Settings

Device IP configuration allows you to set the IP address for the device, ensuring it can communicate effectively within the network. Proper IP address configuration is essential for network connectivity, enabling the device to interact with other devices, access servers, and perform its designated functions. You can configure the device with a static IP address for consistent network performance, or use DHCP to automatically assign an IP address, depending on your network requirements.

This page displays IP settings page as shown in Figure 4-4-20.

Figure 4-4-20: IP Settings Page

- Account Settings

Login account settings allow you to change the account password, with requirements that the password meets high-security standards. This includes criteria such as a minimum length, the use of uppercase and lowercase letters, numerals, and special characters to ensure strong protection against unauthorized access. Regularly updating passwords and adhering to these strong password policies help safeguard your account and maintain system security.

This page displays account setting page as shown in Figure 4-4-21.

Figure 4-4-21: Account Setting Page

- User Management

The User Account Management and Group Settings functions can only be edited and managed by users with the highest level of permissions (admin). This ensures that critical account and group configurations are securely controlled, minimizing the risk of unauthorized changes and maintaining the integrity of the system.

This page displays user settings page as shown in Figure 4-4-22.

Figure 4-4-22: Users Setting Page

This page displays group setting page as shown in Figure 4-4-23.

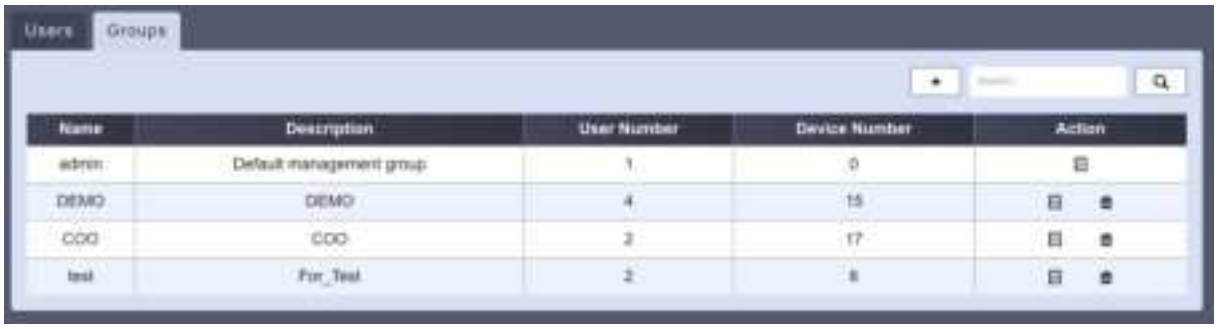


Figure 4-4-23: Group Setting Page

4.4.5 Network Services

Mail configuration supports email services such as SMTP and Microsoft Exchange Web Server, allowing events to be sent to specified email addresses. This feature ensures that you receive timely notifications about critical events directly in your inbox, enabling swift responses to system alerts. By configuring multiple recipients, you can ensure that the right team members are informed immediately, enhancing the overall reliability and responsiveness of your monitoring system. The Mail Configuration is shown in Figure 4-4-24.

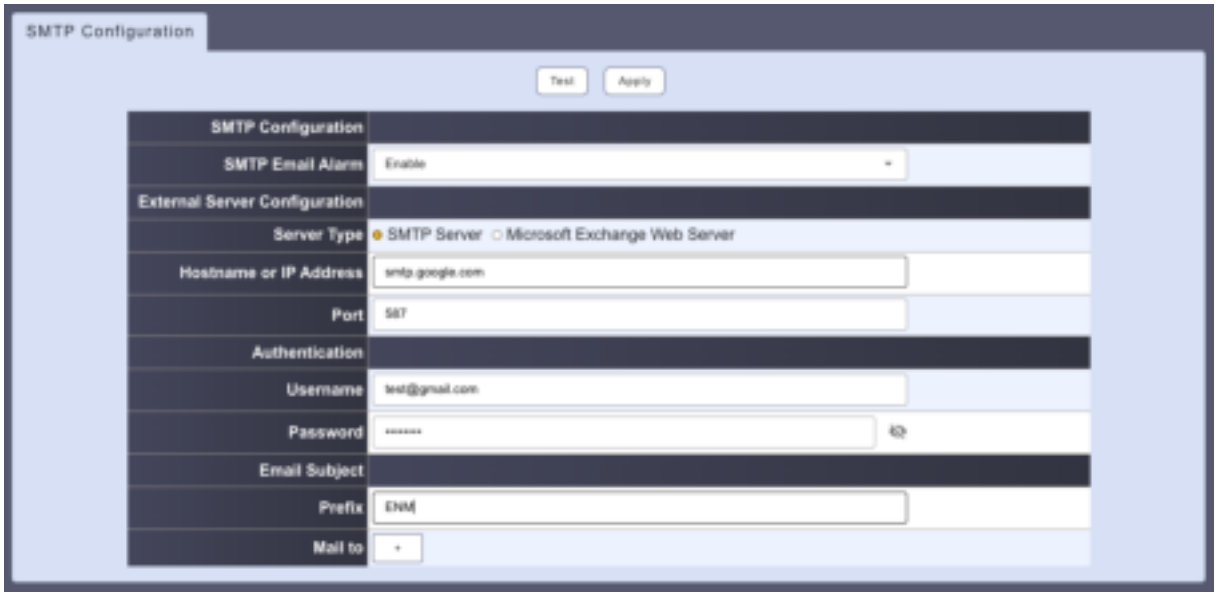


Figure 4-4-24: Mail Configuration Page

Object	Description
SMTP Email Alarm	Disable or enable the mail function. The default configuration is disabled.
Server Type	Supports SMTP and Microsoft Exchange Web Server mail service.
Hostname or IP Address	To enter the mail server hostname or IP address.
Port	The mail server port.
Username	Username for mail service.
Password	Password for mail service.
Prefix	Add a custom string to the subject line of outgoing emails.

4.4.6 Maintenance

- Backup and Restore

The Backup and Restore feature allows you to save and recover device configurations, including network settings, mail configurations, account and group settings, and more. This functionality is crucial for ensuring that your system can be quickly restored to a known good state in the event of a system failure, configuration error, or other issues. Regular backups provide peace of mind, knowing that all critical settings are securely stored and can be easily retrieved to maintain system continuity and integrity.

This page displays Backup and Restore function as shown in Figure 4-4-25.

Figure 4-4-25: System Settings Backup & Restore Page

- Event and Log

Monitoring events and logs allows administrators to review system activity, diagnose issues, and ensure the proper functioning of the system by maintaining a comprehensive history of operations. 'Events' typically represent significant actions or changes, such as alarms, notifications, or system status updates, while 'Logs' provide a detailed record of these events, including timestamps and other relevant data.

This page displays Events List as shown in Figure 4-4-26.

Figure 4-4-26: Events List Page

- Factory Default

This page displays Factory Default setting as shown in Figure 4-4-27.

Figure 4-4-27: Factory Default Setting Page

- System Information

System Information provides details about the device's current status, including CPU usage, hard drive capacity, memory utilization, and the display of the firmware (FW) version. This information is crucial for monitoring the overall health and performance of the system, helping administrators to identify potential issues, manage resources effectively, and ensure that the system is operating with the correct firmware.

This page displays system information as shown in Figure 4-4-28.

Figure 4-4-28: System Information Page

This page displays system upgrade as shown in Figure 4-4-29.

Figure 4-4-29: System Upgrade Page