Milesight

AIoT Indoor Parking Management Suite

User Manual

V1.1

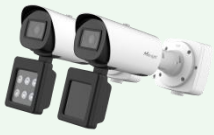
Content

Chapter I Introduction

1.1 Overview

Milesight AIoT Indoor Parking Management Suite is designed for indoor parking management. Ultrasonic sensors are used to detect the occupancy of parking spaces, and the information is reported to the parking management system through the gateway, so as to guide users to quickly find free parking spaces and reduce congestion and additional emissions caused by searching for parking spaces. Besides, based on AI algorithm, the professional Supplement Light AI LPR Camera generates reliable traffic insights to improve safety and mobility. Make parking easy and smart with AIoT!

1.2 Related Products

Product	Name	Key Features
	Supplement Light AI LPR Motorized Pro Bullet Plus Network Camera **Note:** You can also choose other models from the Milesight AI LPR Series.	➢ AI-powered LPR Algorithm ➢ Integrated Supplement Light ➢ Clear Capture of Dynamic License Plates ➢ Superior Image Quality for 24/7 Traffic Monitoring ➢ Wiegand Protocol Supported ➢ Versatile Interfaces
	Semi-Industrial LoRaWAN® Gateway UG65	➢ IP65 Rating ➢ Outstanding Performance ➢ New Generation of LoRa Chip ➢ Low Power Consumption ➢ Deep Penetration ➢ High Capacity ➢ Multiple Backhaul Connectivities

		➢ Compatible with Multiple Network Servers ➢ Flexible Installation
	Mini LoRaWAN® Gateway UG63	➢ Eye-Catching Design ➢ Massive Connectivity ➢ Blind Spot Coverage ➢ Gateway Fleet ➢ Listen Before Talk ➢ Low Power Consumption ➢ High Compatibility
	LoRaWAN® Ultrasonic Distance/Level Sensor	➢ Dual Ultrasonic Sensor ➢ IP67 Waterproof ➢ LoRaWAN® Based ➢ Easy Configuration (via NFC) ➢ 3-Axis Accelerometer

1.3 How it Works

- **Sensor EM310-UDL:** Detect the occupancy status of a single parking space
- **UG65/UG63 LoRaWAN® Gateway:** Receive the parking space occupation information detected by the sensor and transfer it to the parking management system.
- **Supplement Light AI LPR Camera:** Detect vehicle information and linkage with gate and the parking management system.

1.4 Benefits of the Solution

✓ **Intelligent AI-powered LPR Algorithm**

Superior image quality with the highest performance sensor and cutting-edge image processing technologies ensure the best performance of embedded AI analytics. Precise recognition results of number plate, vehicle type, vehicle color and plate color

are all set to boost intelligent parking traffic solution right away.

✓ **LoRa Outstanding Performance**

LoRa technology is a new wireless protocol designed for remote connectivity and low-power communication, eliminating the cumbersome wiring process for parking systems. With the latest Semtech LoRa Chip and a 64-bit quad-core CPU, the LoRaWAN® Gateway supports receiving data from up to 8 end-devices at the same time, handles more traffic with less power consumption, and has a line of sight of around 15km in open area, making it ideal for a variety of applications.

✓ **Low Power Consumption**

The low power consumption of sensors and gateways greatly saves the users system maintenance costs and provides a cost-effective option for parking management.

✓ **Dual Ultrasonic Sensor**

The advanced sensor EM310-UDL uses a dual ultrasonic beam with a measurement range from 3 cm to 450 cm, resulting in an ultra-short blind spot, which provides high-precision parking space occupancy information for parking management systems.

✓ **Flexible Compatibility**

To maximize the usability and compatibility, the Supplement Light AI LPR Camera supports CGI/APIs and Wiegand Protocol, which allows the easy open integration with third-party VMS or platforms, realizing the access control solution. And the MQTT protocols offers a wide range of options for data processing.

✓ **Easy Configuration**

The low power consumption and integrated design and cellular support save a lot of tedious wiring process, making the product environment more adaptable and the overall deployment more simple and convenient.

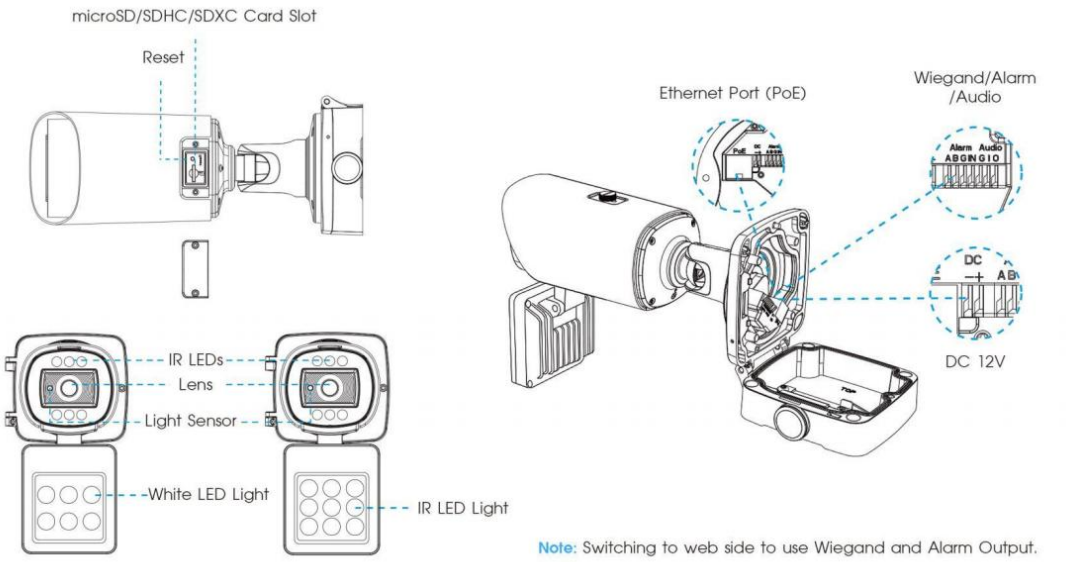
1.5 Related Documents

Document Type	Link
Supplement Light AI LPR Camera	
Datasheet	http://www.milesight.com/static/file/en/download/datasheet/ipc/Milesight-Supplement-Light-AI-LPR-Motorized-Pro-Bullet-Plus-Network-Camera-Datasheet-en.pdf
Quick Start Guide	http://www.milesight.com/static/file/en/download/user-manual/ipc/Milesight-Network-Camera-Quick-Start-Guide.pdf
Sensor EM310-UDL	
Datasheet	https://resource.milesight-iot.com/milesight/document/em310-udl-datasheet-en.pdf
User Manual	https://resource.milesight-iot.com/milesight/document/em310-udl-user-guide-en.pdf
UG65 LoRaWAN® Gateway	
Datasheet	https://resource.milesight-iot.com/milesight/document/ug65-datasheet-en.pdf
Quick Start Guide	https://resource.milesight-iot.com/milesight/document/ug65-quick-guide-en.pdf
User Manual	https://resource.milesight-iot.com/milesight/document/ug65-user-guide-en.pdf
UG63 Mini LoRaWAN® Gateway	
Datasheet	https://resource.milesight-iot.com/milesight/document/ug63-datasheet-en.pdf
Quick Start Guide	https://resource.milesight-iot.com/milesight/document/ug63-quick-guide-en.pdf
User Manual	https://resource.milesight-iot.com/milesight/document/ug63-user-guide-en.pdf

Chapter II Settings

2.1 Camera Settings

2.1.1 Hardware Overview



2.1.2 Hardware Installation

Please deploy the cameras at the entrance and exit of the parking lot to detect vehicle information and linkage with gate and the parking management system. To increase the accuracy of license plate recognition, be sure to install the LPR cameras properly to capture the license plates with the correct image size, lighting conditions and camera angle. The following highlights are the precautions of installa tion angle：

A. Installing the camera in front of the vehicle (Recommended):

The captured image should be filled with a full width of the vehicle.

B. Installing the camera slightly to the side:

To avoid capturing unnecessary contents in the image, the camera should be install ed in a higher position(Vertical angle is less than 30°; Horizontal angle is no more th an 30°; Tile angle is less than 5°) to capture the front part of the vehicle.

Notes

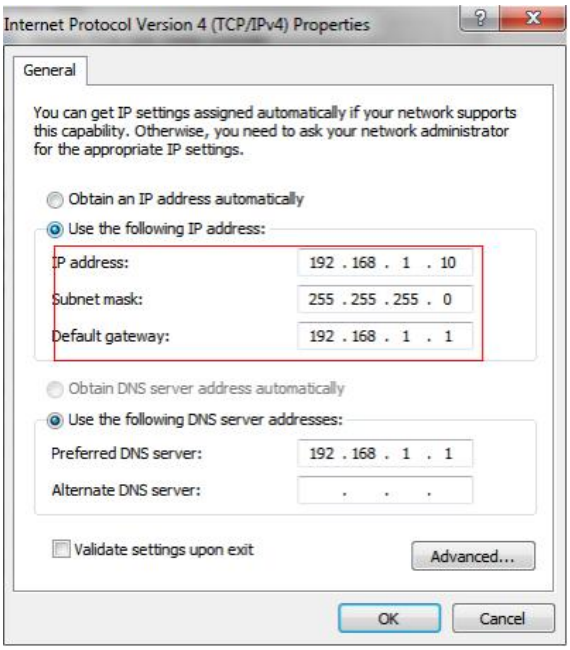
Here only introduce the installation location, for detailed installation steps, please refer to Milesight Network Camera Quick Start Guide.

2.1.3 Access to Web GUI

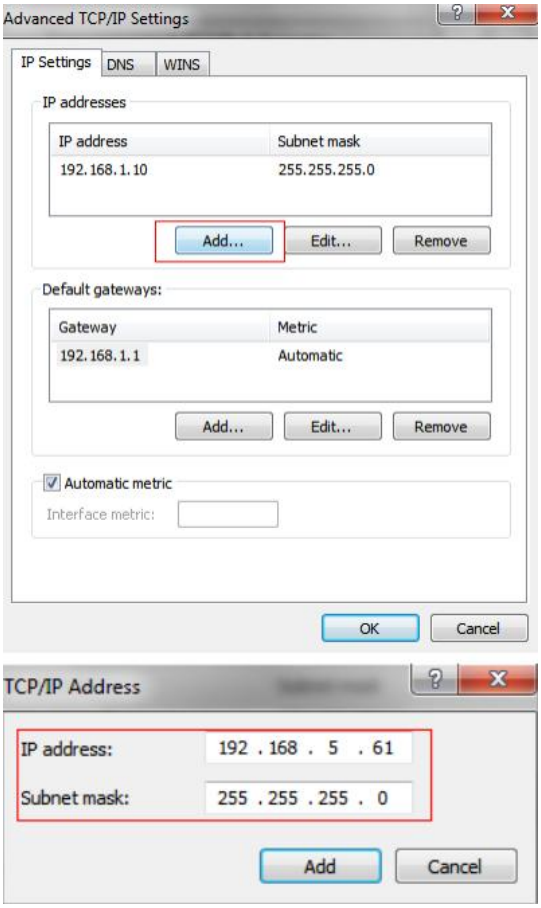
If the network segment of the computer and that of the camera are different, please follow the steps to change the IP address:

Step1: Change the IP address of computer to 192.168.5.0 segment, here are two ways as below:

a. Start→Control Panel→Network and Internet Connection→Network Connection→Local Area Connection, and double click it;



b. Click “Advanced”, and then click “IP settings”--> “IP address”--> “Add”. In the pop-up window, enter an IP address that in the same segment with Milesight network camera (e.g. 192.168.5.61, but please note that this IP address shall not conflict with the IP address on the existing network);



Step2: Start the browser. In the address bar, enter the default IP address of the camera: http://192.168.5.190;

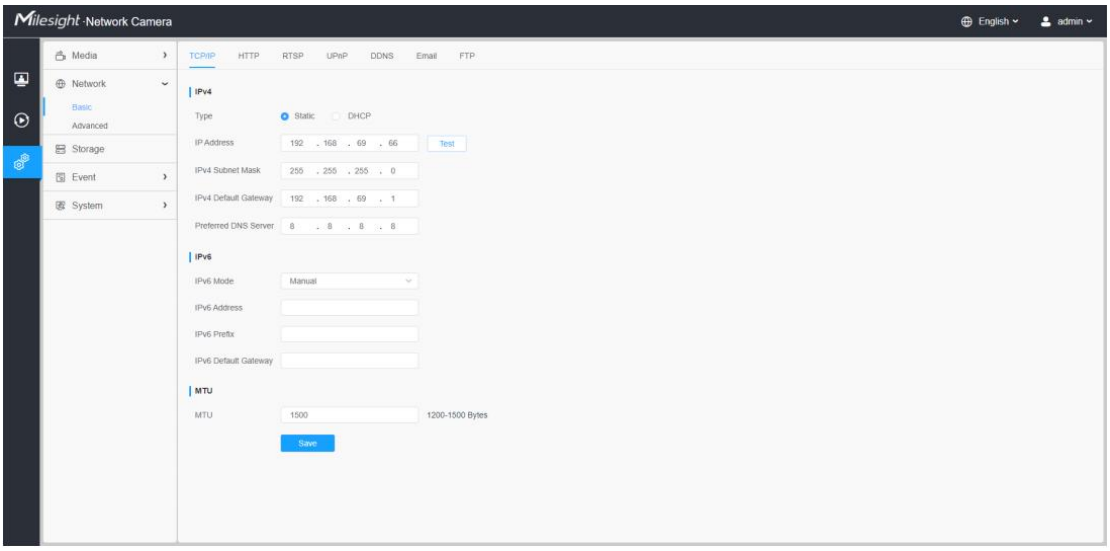
Step3: You need to set the password first when using it for the first time. And you can also set three security questions for your device after activation. Then you can log in to the camera with the user name (admin) and a custom password.

Notes

① Password must be 8 to 32 characters long, contain at least one number and one letter.

② You can click the “forget password” in login page to reset the password by answering three security questions when you forget the password, if you set the security questions in advance.

Step4: After login, please select "Settings" → "Network" → "Basic" → "TCP/IP". The Network Settings page appears (Shown as below Figure);



Step5: Change the IP address or other network values. Then click "Save" button;

Step6: The change of default IP address is completed.

2.1.4 LPR Settings

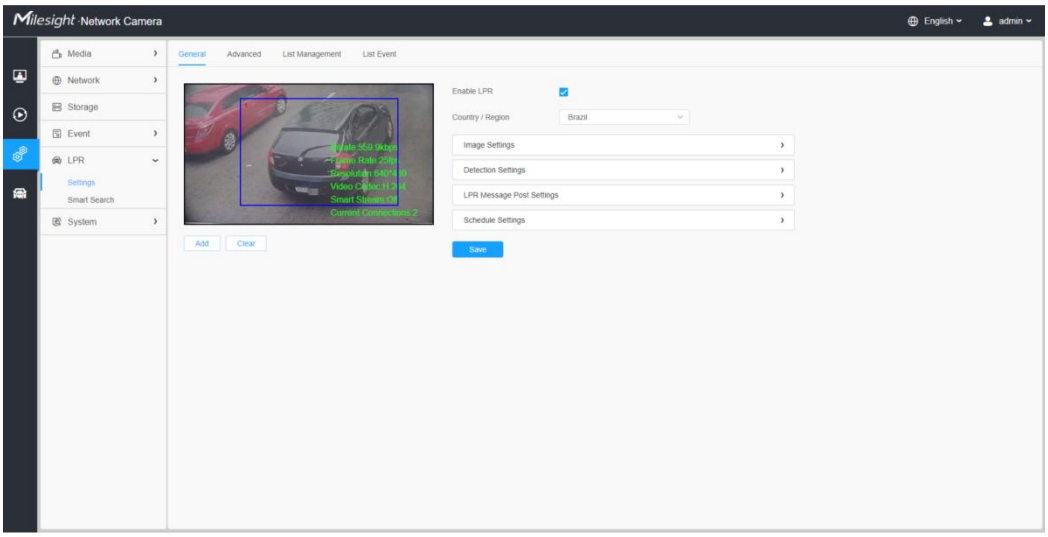
Notes

Here only introduce the configuration related to this solution, for more camera configuration, please refer to Milesight Network Camera User Manual.

(1) General

Step1: After log in the web, go to **"LPR "→ "Settings"→ "General".**

Check the checkbox **"Enable LPR"**, you can draw the screen to select area interested.

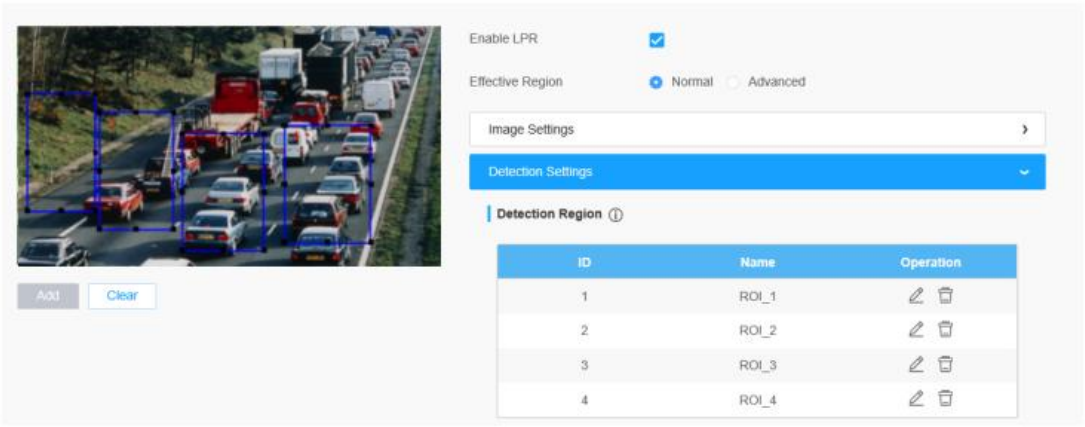


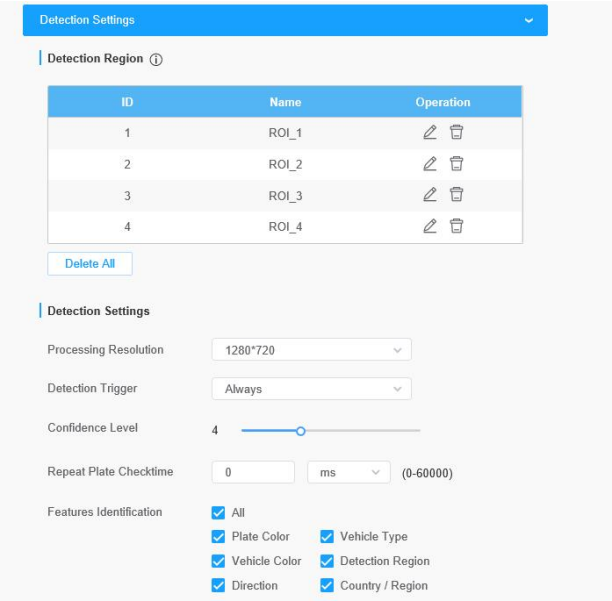
[Enable LPR]: Automatic license plate recognition after it is enabled.

[Country/Region]: You can select the country/region to use the LPR function.

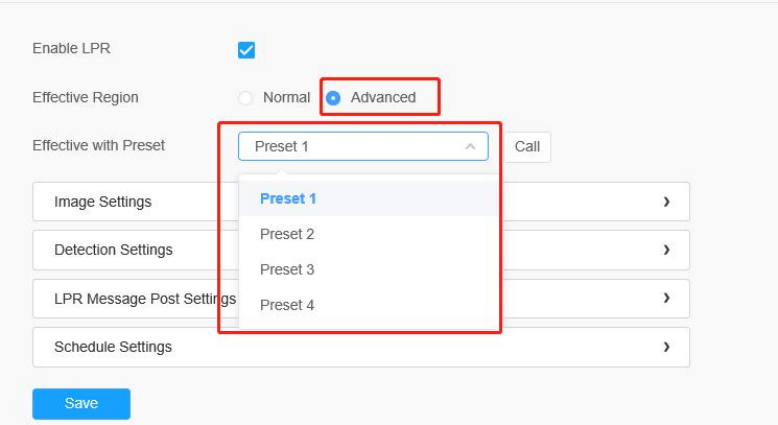
Step 2: Detection Settings.

You can draw the screen to select four areas interested. The area as shown in the blue box below, it will also display pixels above each area.

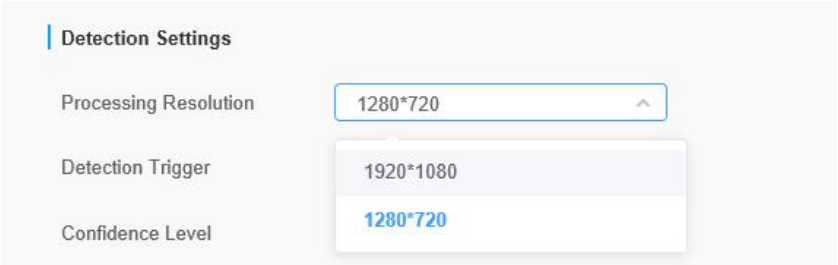




[Detection Region]: You can set up to 4 ROI areas by drawing the screen. If you choose **Normal,** it supports configuring the LPR detection regions for the current area. If you choose **Advanced** (Only for PTZ series), it supports configuring different LPR detection regions for different PTZ presets(Only support Preset 1~4 so far).



[Processing Resolution]: Default selected resolution is 1280*720. Users can choose different resolution according to the network environment.



[Detection Trigger]: If you choose "**Always**", camera will always detect the license plate. If you choose "**Alarm input**", camera will only detect the license plate when Alarm Input is triggered.

[Confidence Level]: You can set the confidence level from 1 to 10. When the confidence level of the license plate is higher than the set confidence level, it will push the license plate image to the logs interface.

[Repeat Plate Checktime]: Set the time interval for repeatedly reading license plates to effectively avoid duplicate identification of parking vehicles.

[Feature Identification]: Check **Plate Color, Vehicle Type, Vehicle Color, Detection Region, Direction, Country / Region** or **All** to enable Features Identification, it will display the corresponding information on the logs interface.

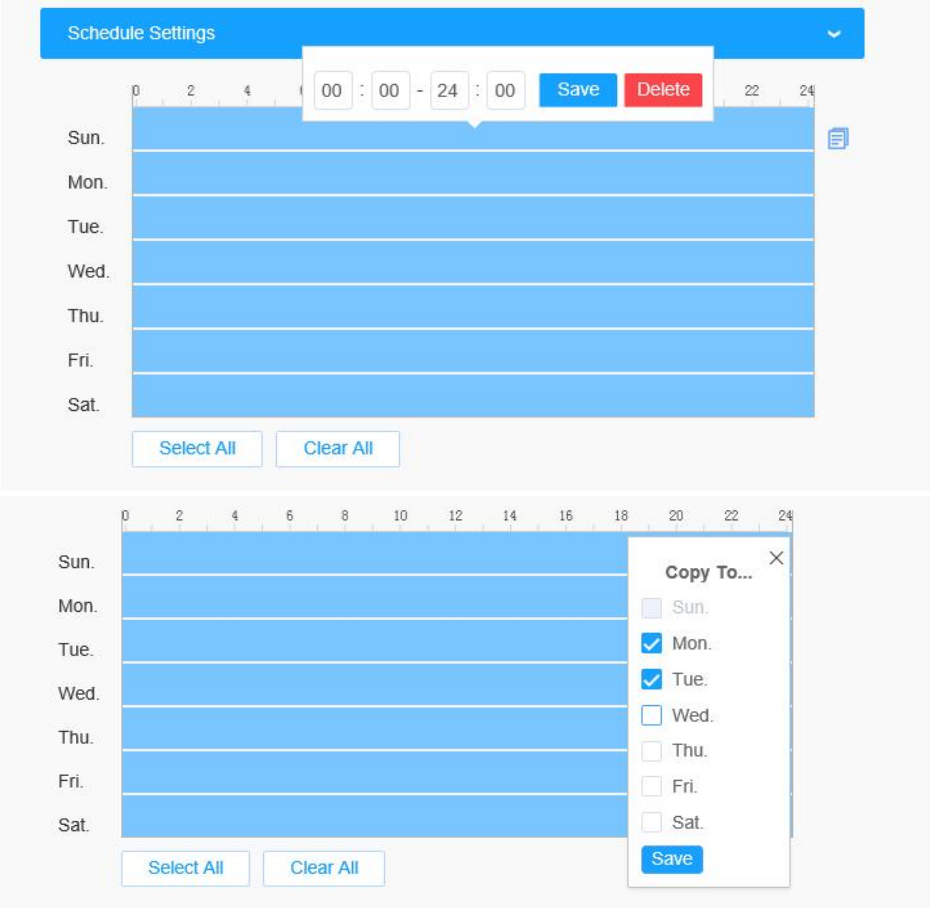
Notes

① The optimal recognize license plates interval of Milesight LPR cameras is within 90-150 PX.

② For better performance, please choose the appropriate resolution in advance.

Step 3: Schedule Settings. You can draw the schedule by clicking. And then click

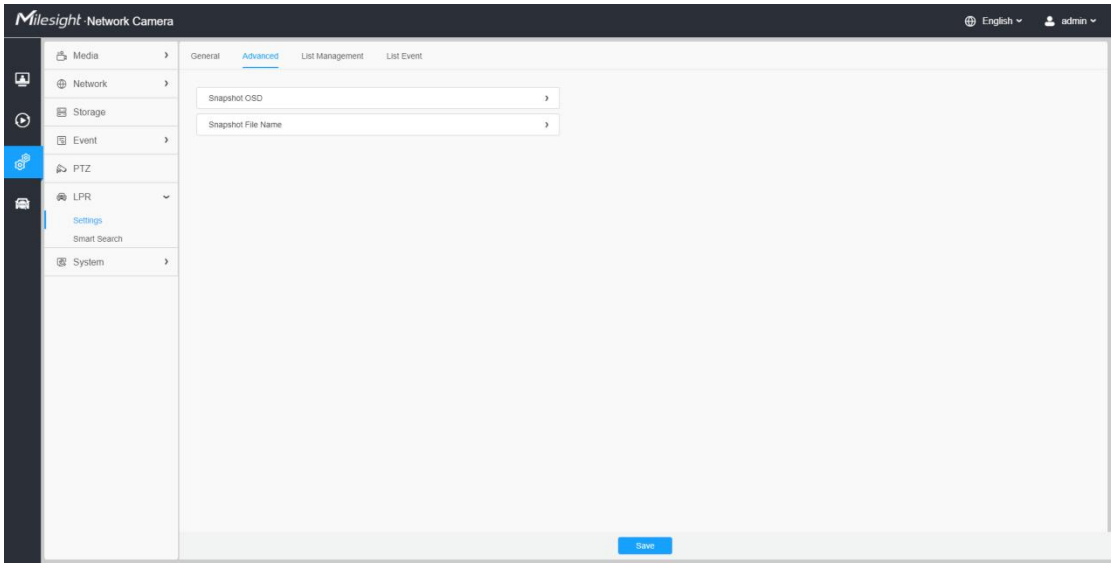
[Save] or **[Delete]** after setting. You also can copy the settings to other channels.



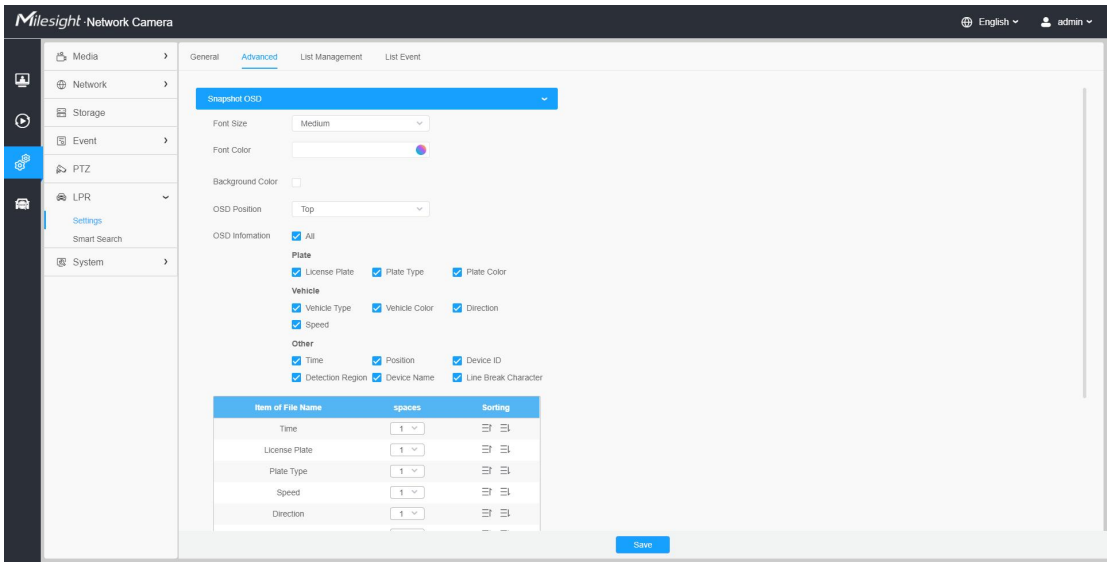
Step 4: Don't forget to click "**Save**" after finishing all settings.

(2) Advanced

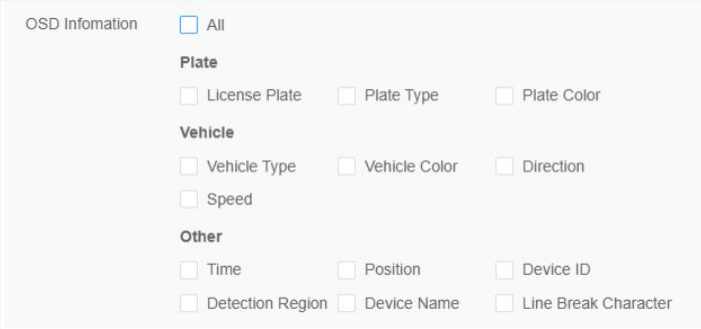
In the interface, you can set display information on snapshot of license plate recognition, and also customize the file name of snapshots which are uploaded via FTP or Email or stored on local LPR Picture File Path.



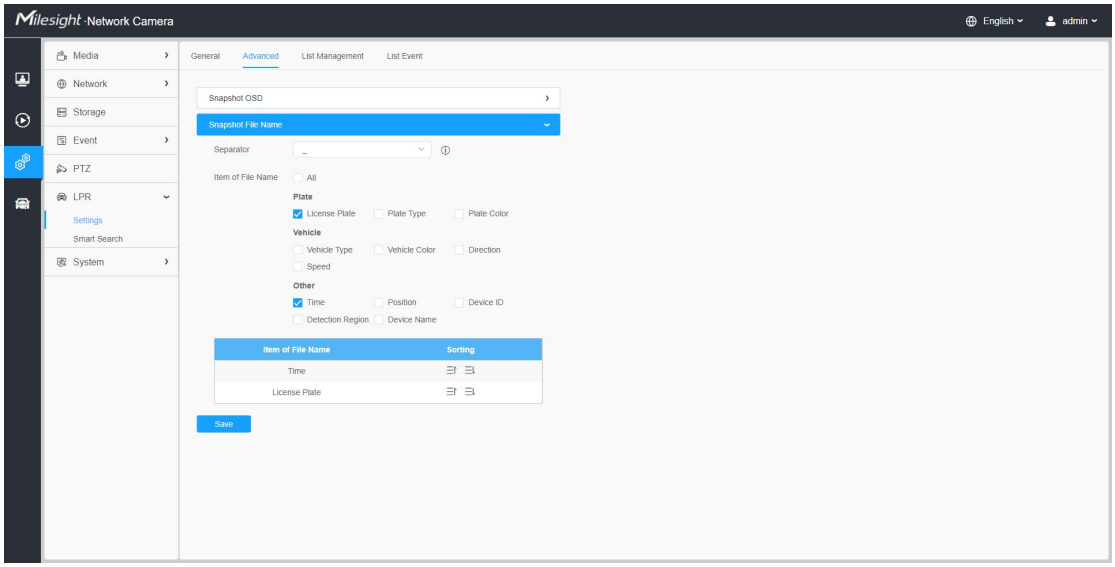
[Snapshot OSD]

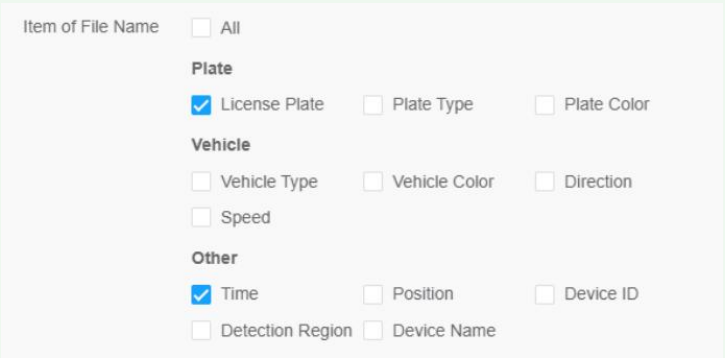


Item	Function Introduction
Font Size	Small/Medium/Large are available for OSD information. **Note:** Snapshot OSD font size and Image OSD font size are corresponded.
Font Color	Enable to set different colors for OSD information. **Note:** Snapshot OSD font color and Image OSD font color are

	corresponded.
Background Color	Check the checkbox to select background color of snapshot OSD information. **Note:** Background color cannot be the same with font color.
OSD Position	Check the checkbox to show OSD information position.
OSD Information	Customize the OSD content. You can set OSD Information as shown below:  When license plate is recognized and the alarm is triggered, the snapshot of license plate recognition will show as below: 

[Snapshot File Name]



Item	Function Introduction
Separator	"-", "_" and Space are available for File Name Separator format. The default separator is "-".
Item of File Name	You can customize the snapshot file name according to items chosen. 

Each time an item is checked, the list will add the item row, including the item name and sorting operation. You can click and button to sort these items, and choose separator to connect these items name. Also, the content of Position and Device ID items can be customized. When you check all items, the function interface will show as below:

Notes

You need to check at least one item.

Once license plate is recognized, the snapshot will be uploaded via FTP or Email or stored on your local LPR Picture File Path. Then, You can see the snapshot file name which you customize as shown below:

Full-snapshot Recognized successfully

Full-snapshot Recognized failed

License plate snapshot Recognized successfully

License plate snapshot Recognized failed

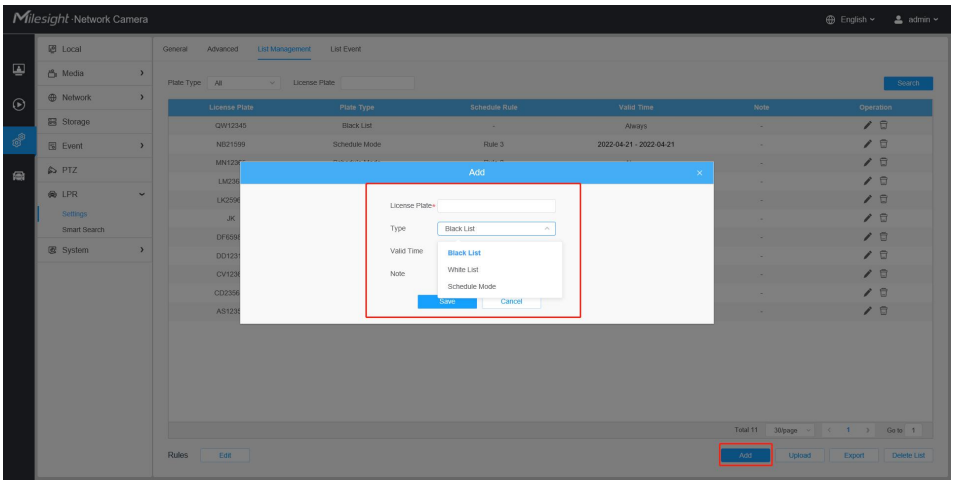
Notes

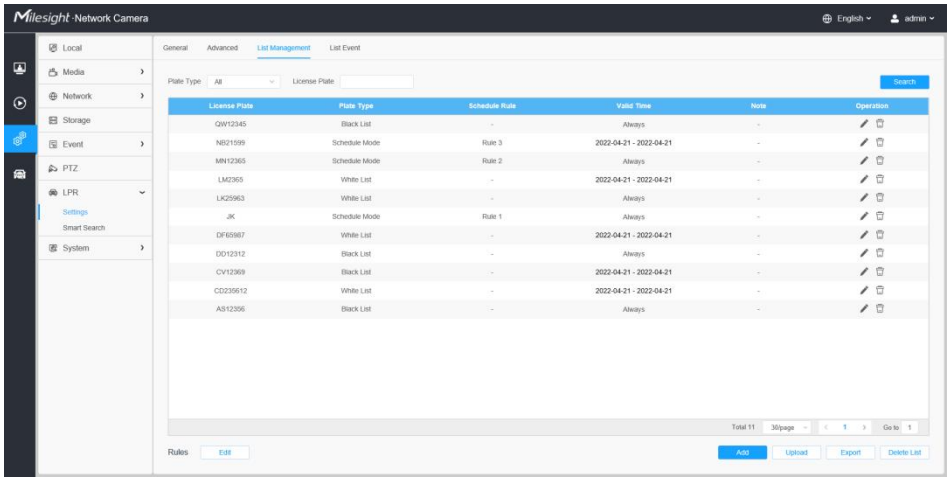
① If the item checked is not recognized successfully, then the item will be displayed with the specific symbol “#”.

② The file name of full-snapshot will be preceded by a number of 4.

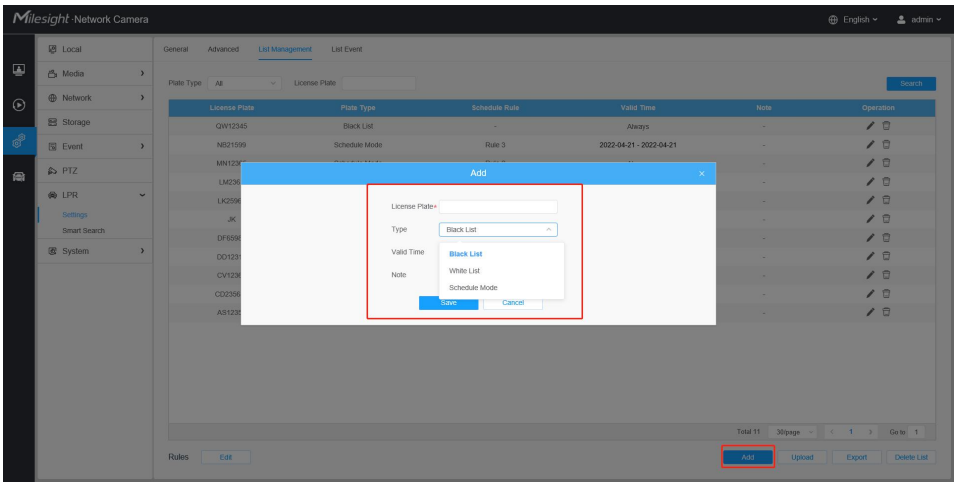
(3) List Management

Add the license plates to this interface as Black, White type (Black/White List) , and then you can set the alarm action for these license plates in the corresponding black list mode, white list mode or Visitor mode interface. When these license plates are detected, the camera will respond accordingly to your settings.

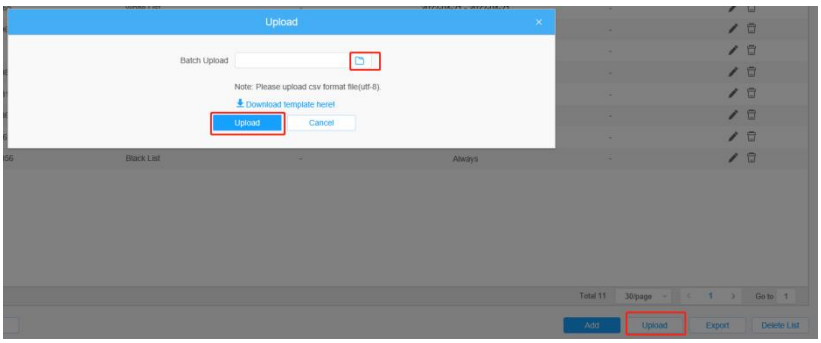




Step1: Click the "**Add**" button, select the **Type** as black or white, enter the license plate, the license plate will be added successfully.



Step2: You can add a csv form with the license plate you want to add, click the "**Browse**" button to import the form to this interface, click the "**Upload**" button, the license plates will be added successfully.



Notes

① You can first download the template as a reference in this interface.
② It allows to add 1000 license plates to the List.

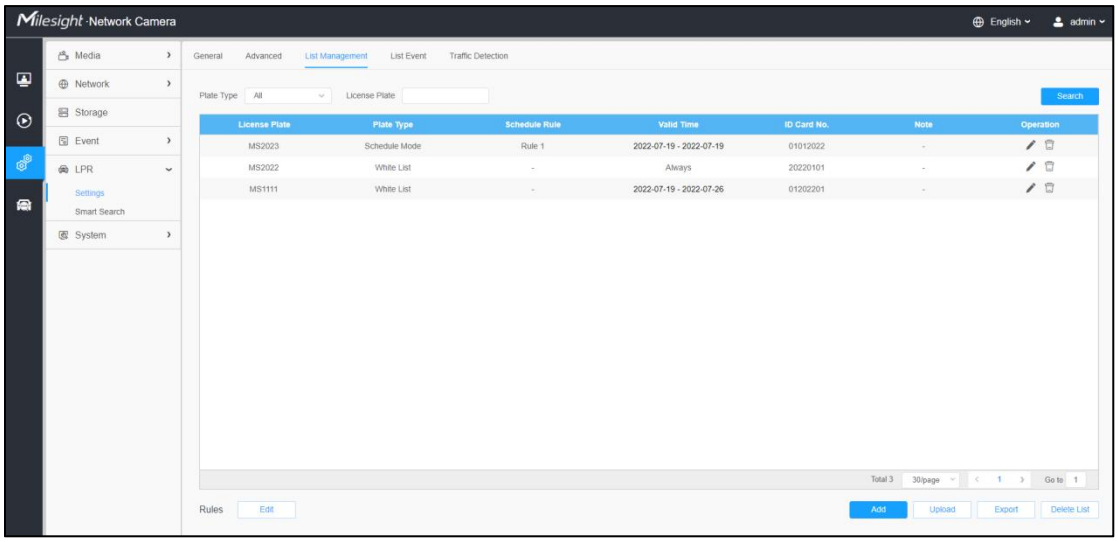
Step3: Select Plate Type or directly enter the license plate number, click the "**Search**" button, the corresponding license plate will be displayed in the list.

Step4: Click the "**Export List**" button to export the license plates in the current list to a csv form locally.

Step5: Click the "**Delete List**" button to delete all the license plates in the current list.

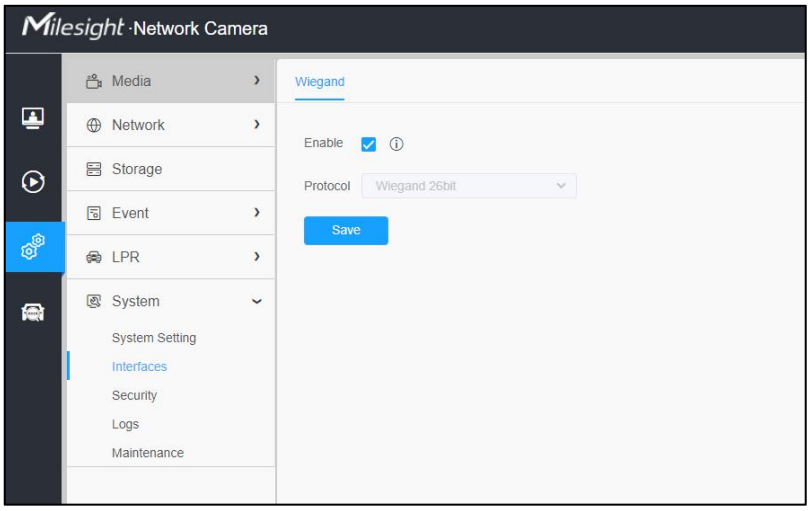
(4) Wiegand Configuration

When adding the license plates, you can define the ID card number for the license plate, when the camera identify these license plates and recognize the attached ID card number, it will send the ID card number to your parking system through the **Wiegand protocol**, and then your system can respond based on the received information, such as access control.

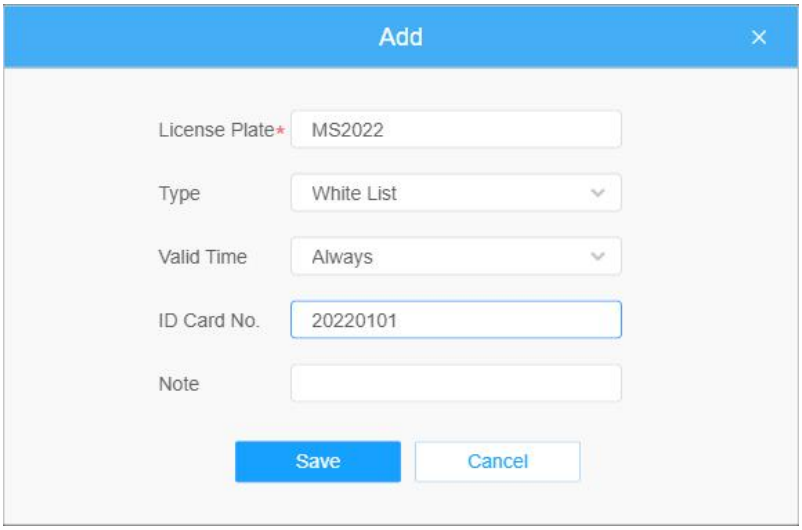


Step1: Go to **"System"→ "Interfaces"→ "Wiegand"**, then enable the Wiegand

interface.



Step2: Back to **"List management"** interface, click the "**Add**" button, select the corresponding license plate type, enter the ID Card number and license plate, the license plate will be added successfully.



Notes

Please make sure the camera has been correctly connected to your parking system through the Wiegand interface as shown below.

① GND and A (Wet contact for External Output).

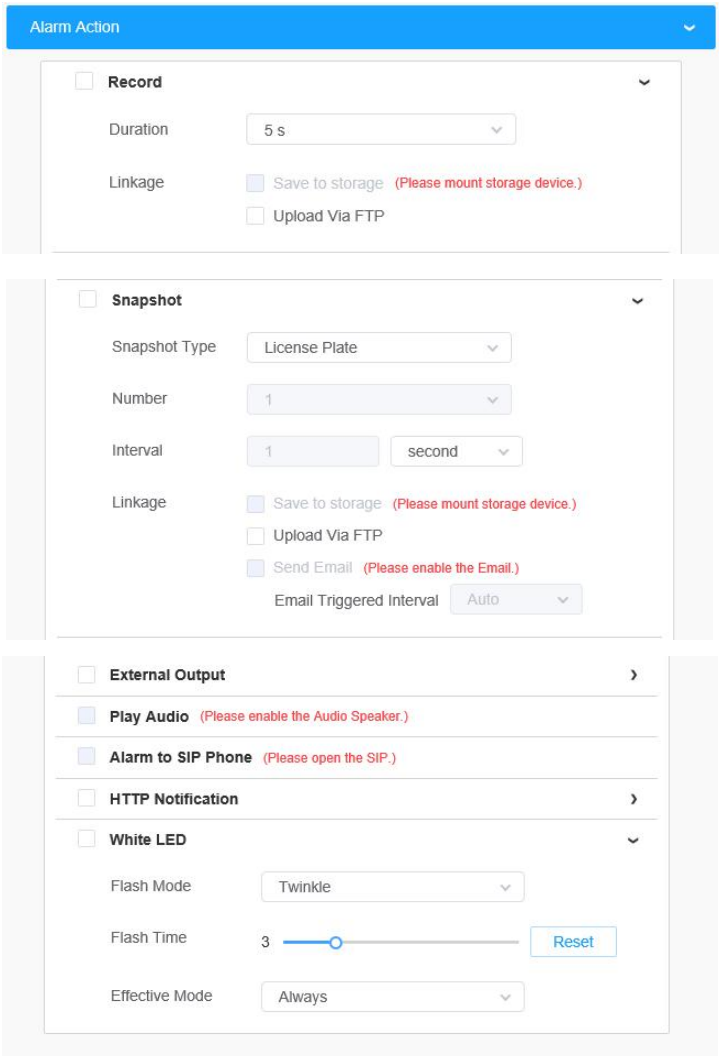
② A, B and GND (DATA0, DATA1 and GND for Wiegand).

(5) List Event

Step1: Select the List Type, Black list, White list or Visitor.

Step2: Schedule Settings. You can draw the schedule by clicking it.

Step3: Set alarm action.



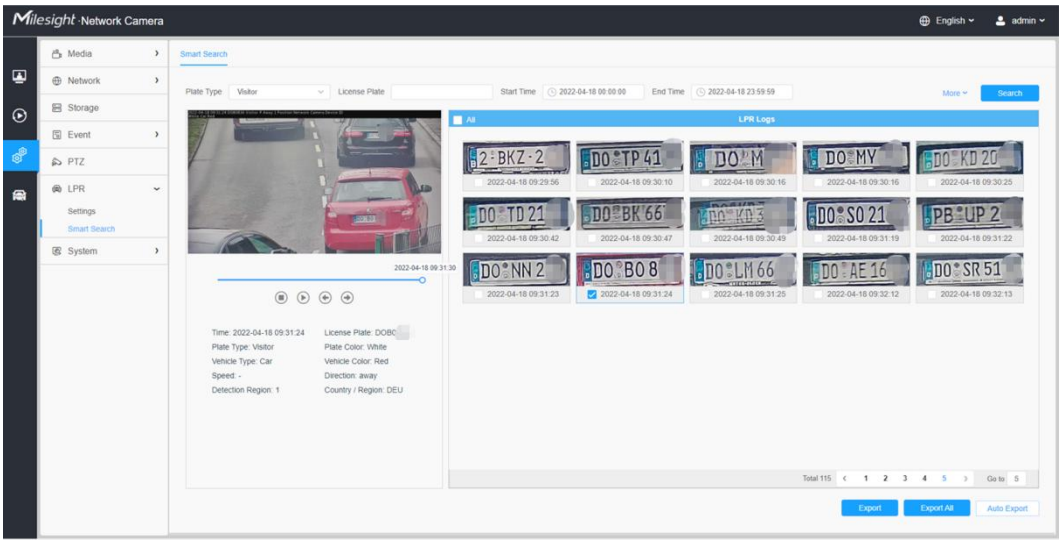
After that, when **a license plate marked as "Black" is detected**, the camera will respond accordingly to your settings if you select the Black List in List type;

when **a license plate marked as "White" is detected**, the camera will respond accordingly to your settings if you select the White List in List type;

when **a license plate that is not marked as "Black" or "White" is detected**, the camera

will respond accordingly to your settings if you select the Visitor in List type.

(6) Smart Search



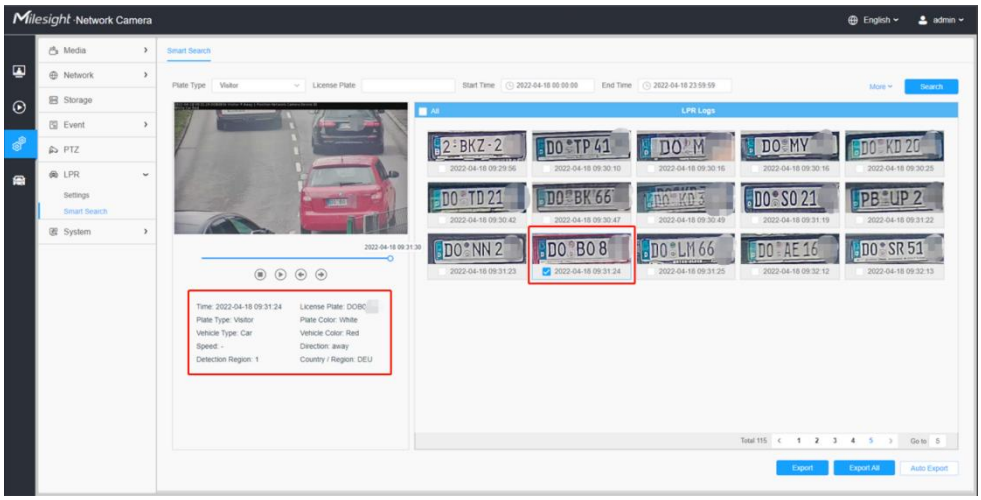
Step1: The detect results in real time will be displayed on the right side of Logs page, including detected time, live screenshot, and license plate.

Step2: Select Plate Type or directly enter the license plate number, select Start Time and End Time, click the "**Search**" button, the corresponding license plate will be displayed in the list below.

Notes

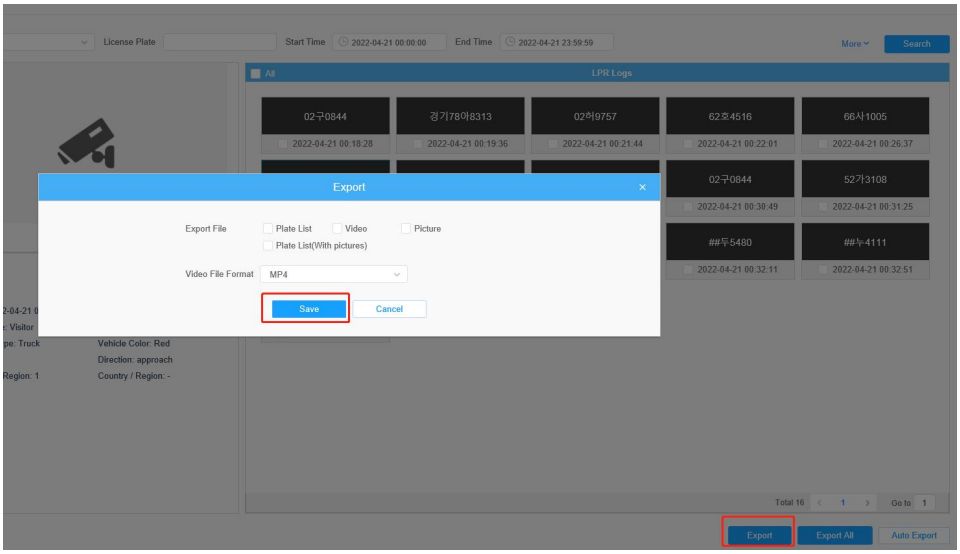
① It supports displaying 4000 logs.
② Only when there is a SD Card or NAS has been set on the storage management , then the logs can be stored and showed on Smart Search page.
③ For Plate Color/Vehicle Color Recognition and Vehicle Type Classification, please make sure your model is MS-xxxx-xPC.

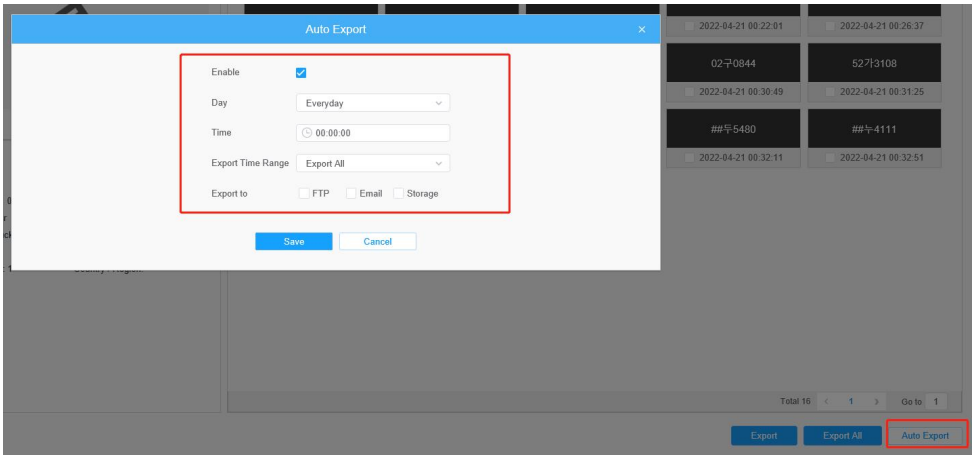
Step3: Click the license plate on the right of each log to display license plate details as shown below.



Step4: Click the "**Export**" button to export the license plate you selected to a csv form locally.

You can also click the "**Auto Export**" button to automatically export the log to FTP, SMTP or Storage.





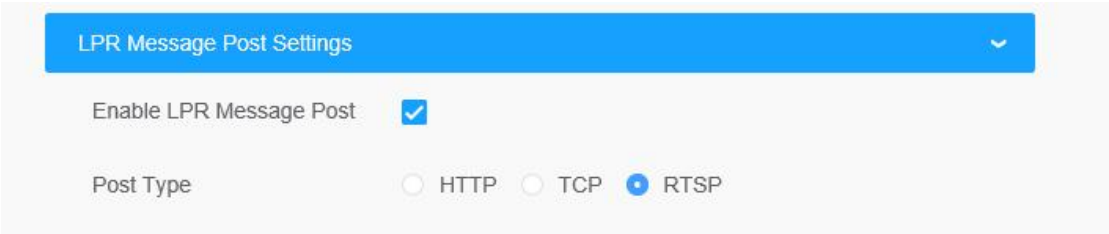
(7) Data Transmission

The data can be sent to your parking system through **RTSP**, **TCP** or **HTTP** protocol.

Step1: Go to **"LPR "→ "Settings"→ "General"**, then go to LPR Message Post Settings.

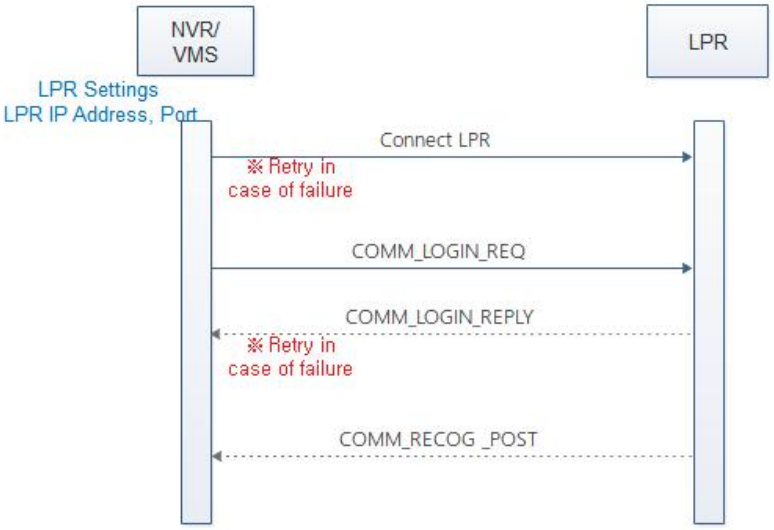
Step 2: Check the checkbox to enable LPR Message Post. It will push information to some

third-party devices or software that are compatible with ours. Information can be pushed by **RTSP**, **TCP** or **HTTP**.



- **TCP Type:**

➢ **System Structure**



Enter the LPR IP address and LPR port on the NVR/VMS to register the LPR camera. Then LPR Camera will transmit the data of recognition result to the NVR/VMS when the license plate is recognized. The data includes the time that was recognized, the license plate, the license plate snapshot, and the full-screen snapshot.

- **List of messages**

	Command Name	Explanation
0x0001	COMM_LOGIN_REQ	Request login to LPR.
0x8001	COMM_LOGIN_REPLY	Response to COMM_LOGIN_REQ.

- **Basic Packet Composition**

1. SIG CC FF : Packet Start
2. SIG END FF DD : Packet End
3. COMMAND
4. DATA_SIZE
5. DATA

➢ **Basic Packet Composition**

SIG	COMMAND	DATA_SIZE	DATA	SIG END
2 byte	2 byte	4 byte	Variable	2 byte

➢ **COMM_LOGIN_REQ**

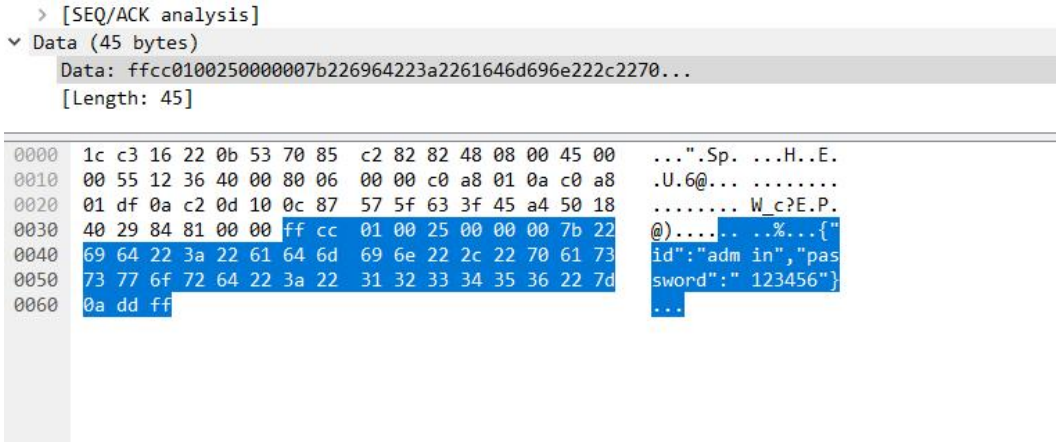
1. Data Type: JSON-charset=utf-8
2. Data Content: ID and Password
3. Example

```
{
    “id”: “admin”,
    “password”: “1234”
}
```

SIG	COMMAND	DATA_SIZE	DATA	SIG END
2 byte	2 byte	4 byte	Variable	2 byte
CC FF	0x0001	Variable	JSON DATA	FF DD

※ DATA_SIZE = DATA length + 2 bytes(SIG END)

※ Use Little-Endian



- **COMM_LOGIN_REPLY**

1. Data Type : JSON-charset=utf-8
2. Data Content : result - Required Items

HTTP Status code

a. 200 : OK

b. 401 : No Privileges

c. Etc...

3. Example

{

"result": "200"

}

SIG	COMMAND	DATA_SIZE	DATA	SIG END
2 byte	2 byte	4 byte	Variable	2 byte
CC FF	0x8001	Variable	JSON DATA	FF DD

- **COMM_RECOG_POST**

1. Recognition Result Message

- ❖ The LPR camera sends the recognition results on its own initiative without requiring a request from the NVR/VMS.
- ❖ Data Type : Binary
- ❖ Data Content

a. **metadata**

① Device ID : 16 byte – GUID byte array : 04 f9 12 bb ce 94 65 40 89 af e8 3c d8 8f 70 be

② recognition time : 8 byte – Posix Time : 1525867890000

~~③ Car Number : 16 byte – utf-8 string : "부산 02 가 1234"<< NULL Exclude Fixed Size~~

④ Color of the Car : 1 byte – refer to the color table（stand by）

⑤ Color of the licence plate : 1 byte – refer to the color table（stand by）

⑥ Speed : 2 byte – unsigned short integer, Km/h Unit

⑦ Number of resulting images : 1 byte

⑧ Direction : 1 byte – 0: Unknown 1: In 2: Out

⑨ Region:32 byte

⑩ ROI ID : 1 byte 1~4 0:unknown

⑪ plate's length

⑫ license plate

⑬ Vehicle Type: 0:unknown 1:car 2:motor bike 3:bus 4:truck 5:minibus

⑭ Confidence:4 byte(float)

⑮ Plate Type: 1:black 2:white 3:visitor

⑯ Distance: (int)need to enable radar

⑰ Azimuth: (float) need to enable radar

⑱ Vehicle Count:need to enable radar

⑲ Width: resolution width

⑳ Height: resolution height

㉑ coordinate_x1: The left coordinates of license plate.

㉒ coordinate_y1: The top coordinates of license plate.

㉓ coordinate_x2: The right coordinates of license plate.

㉔ coordinate_y2: The bottom coordinates of license plate.

b. Image data : variable size

c. Data Chunk

① Chunk ID : 4 byte

Meta : 11 ff 00 00

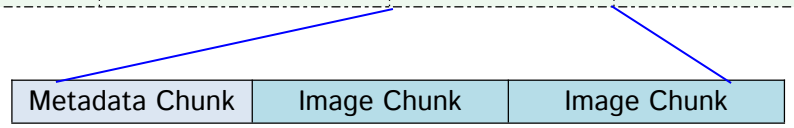
Image : 22 ff 00

② Chunk Size : 4 byte

Data size excluding Chunk Header 8 byte.

2. Packet Example

SIG	COMMAND	DATA_SIZE	DATA	SIG END
2 byte	2 byte	4 byte	Variable	2 byte
CC FF	0x8801	Variable	…	FF DD



Chunk Header		Metadata Chunk							
Chunk ID	Chunk Size 4 byte	GUID 16 byte	Time 8 byte	~~Number~~(Obsolescent) 16 byte	V-color 1 byte	P-color 1 byte	Speed 2 byte	I-count 1 byte	Direction 1byte
11 FF 00 00	110+Number length（GUID+...+Number）	04 f9 12 …	0x16344D04550	~~"부산01가1234"~~	0x01	0x01	100	2	0
		Region 32byte	ROI ID 1byte	Plate Len 1byte	Number Variable	Vehicle Type 1 byte	Confidence 4 byte	Plate type 1 byte	Distance 4 byte
		WOB/ZK	1	6	"AB1234"	1		3	30
		Azimuth 4 byte	Vehicle Count 4 byte	Width 2 byte	Height 2 byte	coordinate_x1 2 byte	coordinate_y1 2 byte	coordinate_x2 2 byte	coordinate_y2 2 byte
		3.5	50	1280	720				

Chunk Header		Image Chunk
Chunk ID 4 byte	Chunk Size 4 byte	JPEG image data
22 FF 00 00	Variable	FF D8 FF E0 …

Chunk Header		Image Chunk
Chunk ID 4 byte	Chunk Size 4 byte	JPEG image data
22 FF 00 00	Variable	FF D8 FF E0 ...

➢ **Color Table**

```
enum LprColor{
    LPR_COLOR_UNKNOWN = 0,
    LPR_COLOR_BLACK,
    LPR_COLOR_BLUE,
    LPR_COLOR_CYAN,
    LPR_COLOR_GRAY,
    LPR_COLOR_GREEN,
    LPR_COLOR_RED,
    LPR_COLOR_WHITE,
    LPR_COLOR_YELLOW,
    LPR_COLOR_VIOLET,
    LPR_COLOR_ORANGE
};
```

Revision	Date	Description
1.0	2018/10/18	
1.1	2019/5/13	Metadata Chunk Add Direction
1.2	2019/9/17	Metadata Chunk Add Region,ROI-ID

1.3	2020/7/29	Remove “Number”. Add new fileds “Plate Len” and “Number”.
1.4	2021/7/5	Add “Vehicle Type” and modify “Color Table”
1.5	2021/8/13	Add “Confidence, Plate Type, Distance, Azimuth, Vehicle Count”
1.6	2022/4/12	Add Width and Height of Resolution, Coordinate of license plate

- **HTTP Type**

➢ **Integrate Method**

For the HTTP Type, currently our LPR camera supports HTTP Post and Get request method. VMS or NVR needs to develop matched API to receive the LPR information from the camera. The matched API URL may be like below:

URL of Post Method: http://IP:Port/xxxx

URL of Get Method: http://IP:Port/xxxx?

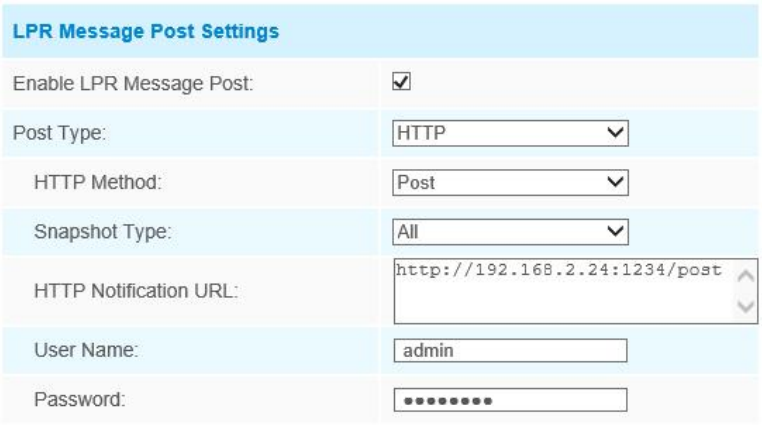
After VMS or NVR has completed the API, our LPR camera could use the API URL to send LPR information to the VMS or NVR when the car plate is recognized.

➢ **LPR Information transfer**

✓ **Post Method**

Take an example, the API URL from a VMS is like “http://192.168.2.24:1234/post”

Fill in the specified URL in camera’s web UI (if the VMS requires the authentication, please also fill in) :



Camera will post the LPR information data in json format to the VMS or NVR in real time when it is recognized.

The content will be sent is as follows:

```
POST /post HTTP/1.1
User-Agent: httpclient
Host: 192.168.2.24:1234
Content-Type: application/json
Content-Length: 46107

{
        "device": "Network Camera",
        "time":   "2020-11-16 00:18:08",
        "plate":  "S8pK",
        "type":   "Visitor",
        "speed":  "-",
        "direction":        "-",
        "detection_region": "-",
        "region": "",
        "direction":        "-",
        "resolution_width": "1280",
        "resolution_height":        "720",
        "coordinate_x1":    "473",
        "coordinate_y1":    "93",
        "coordinate_x2":    "676",
        "coordinate_y2":    "135",
        "confidence":       "0.70",
        "plate_image":      "/9j/4AAQSkZJRgABAQAAAQABAAD/
2wBDAAUDBAQEAwUEBAQFBQUGBwwIBwcHBw8LCwkMEQ8SEhEPERETFhwXExQaFRERGCEYGh0dHx8fExciJCIeJBweHx7/2wBDAQUFBQcGBw4ICA4eFBEUHh4eHh4eHh4eHh4eHh4eHh4eHh4eH
h4eHh4eHh4eHh4eHh4eHh4eHh7/wAARCAAqAMwDASIAAhEBAxEB/8QAHwAAAQUBAQEBAQEAAAAAAAAAAAECAwQFBgcICQoL/
8QAtRAAAgEDAwIEAwUFBAQAAAF9AQIDAAQRBRIhMUEGE1FhByJxFDKBkaEII0KxwRVS0fAkM2JyggkKFhcYGRolJicoKSo0NTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqDhIWGh4
iJipKT1JWW15iZmqKjpKWmp6ipqrKztLW2t7i5usLDxMXGx8jJytLT1NXW19jZ2uHi4+T15ufo6erx8vP09fb3+Pn6/8QAHwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/
8QAtREAAgECBAQDBAcFBAQAAQJ3AAECAxEEBSExBhJBUQdhcRMiMoEIFEKRobHBCSMzUvAVYnLRChYkNOEl8RcYGRomJygpKjU2Nzg5OkNERUZHSElKU1RVVldYWVpjZGVmZ2hpanN0dXZ3eHl6goOEhY
aHiImKkpOU1ZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4uPk5ebn6Onq8vP09fb3+Pn6/9oADAMBAAIRAxEAPwBAccjOQOD6UZYtgnA6/
wD16ZnGTnn6VDdzpbwNI3OB0Ipkk272z+H6VJGTg8/rXm+r+JdXvr5rTSUJZThmPCg56UW+keN5E8z7btBPTpTswR6SpIfIFPcKyYYcEV5nHJ43sp1VlEwJA68132hz3c1mHuhh+
+eue9OzQF1QB0LfiKcRwOvSs/U9Qh0+EySsCcEgE4FcZdeJ9Y1WUxaVEdgOC7HCfgO9TcR6Cmf7pPrTyM8815wNO8Zsol+1ds4C1HB4g1/RnK61G8iFs+YMsD9fShXHY9LBJ+g/
ShsFR9R1NZ+h6pDqNsroVyRk46Grk8qwQmRiCqj86BE305Hbigk42t/OvP8AWfFWozXT2e1xNJJnnbwFHbNVFs/
G0wM3n7M9guQOaaTGkemE45IyaaMdOR24rzm18Q67pMyx6smI8gbxyB9RXd6PfRX8PmJgcdPWmIuNkrgs3I6jinRjYMZJOecmob6ZLaB5G4ABrG0XVnv7wohG0Mdx/pQgOiyv+TSjIHr7VBI/
loS5AwOe3euK8T+M3t3a3tBluo5/
U0Ad3vH3QcfzpdzZ9PUVxXgm71O+xNd19rNkADHFdZd3MNpDvkb2FGwFndkdu3NIJFUjMiDPqa828QeM7h5WgtGHGcnsP8aoeH77ULnVE8291cHOQCAMUJgeuAqeeMdqAR26fWoLAj7LED128/
WrGzPKg4oEZJOGPPfvVbUbf7XatEuMtVgjPUHkYz61S1TUGsoC6oXb0B6VI7Hnd/
puuaJqM1zYw+ejMWKHqOT0rStvHurRAi70uXI4J2E4q3YfEHTZpniu1MYBxh1INbSeIPDMybjPH05+UEninp1H6mRY+P7OaURX1sYmPGHBArsLG9gu7dZICCp5xmvN/
GWqaFcjy7OJXduFVRk56ZrpvAVtOmnr5mV+Xn29qLaXFYwviPdTFzEWbYXwcNjgdqq6J4lk063Xy9LeTptOzIB+vrXSeNdGmu4GlhALjlTjv/hWDoPiK206VrXU7ZY26HeOD7g/
hT6DWxeHxBvRkf2TMf8AgBrN1rxVJqMJjk0qQEgg5j611sfiTw55eQ8X+7gH/PSsm98XWMkv2fT9PW6yeioCMe/
akkg06FL4ezXCTlSkiIHAG5SAAevWus8Vuy6exUkfKelTaCZZofNktEhJGSAOPp71V8ZACwPTgHpQBgfDuKOSQu4yzMSSe9egDphen6Vwfw2A2L1PzHp3613ozxycgU3uHU5jxvbRyWrs6KQVOcj8fSs7
4bSN5Srzj1cZ71s+M8f2ex6Ha2eKxPhwQ0akDruwcULYDb8ZztHp7YJAwSPf2rD+GrF1DEnLMxP+fxrpPE1mbrT3Vcg8j86wPh/bT2kpglyTGWwTj/P/AOui2gWN/
wAUzyJYErx1z+FeW6W7X2rL5vO98nP4167rNqbyzd81xx9K8g1S1u9E1PzNh2biVbt9DREEj2LRIooLJNgAJUHOOcVy/wARLto7ZkVwp6D8aveDdcF/
arHt5XgUvjTSzfWMmBkkcY7EdKQjyhIS7nnBPTk16d4I0a1itvNKZYcHsT/9avLblZ7S5aKVWV1POe9dp4J8TzxyrayKSCOTnjj2/Kq1BnpijaMDgDpThI2PvY/GoreUTwLIGK7hnp7/
AP1qlUHaO5xyc0gM9A2CCcnJ98DNR+UskZWSLcP9rmppOJFx/wA8gf1pYOXweaQ7GFqPhbRr5szWq59ccis//hX+j7QEWQA9OTXWLyjE9QR/OrC9PxFUh3Oa0/
wfo1m5MVqjH+LIyTW7DGkEflogVfSpZONpHc802TqwpNiAYYFWUEEY5GRWXq3h3S79T58C+uf/ANdaZ61LL/F+FIDkYvh/oisTtc8/3j/KtnTfD212AIht0H0AH/
661gBs6f55pGJCLg46fyp8zC7AKAMAADHGKr3tjbXcey4TcPc9KtfxH6H+dNP8f+9ikmIoado9hp3zW8Spz24rSTv3GcZqKT1CD60+BQrBQABjoBRuPYhvdPtb2MxygMPwNQaVo1hpy4toyoHpWhHz155
pq/ex2qhCuudwOPQ1WgsoIpd0a4Zeh71aX79Ko4/GkAhxjj15rP1LSbPUEKXEQJI5OOorQxmRs/54pi9R/vUbAY2j+H4tLfNo2F3ZILcY57HpW0djIVfBBwD7009vqB+tOj/
1Zp7gYmt+FdO1JSWRQex9Poe1Yen+BJLG/E8d0XUZGG5rux3+q0ScPgdM01K2g0yK0iENuqEr8o5x0qcMQMAEj6VGQA3A/wA5p68qM88UhH//2Q==",
```


"plate_image": "/9j/4AAQSkZJRgABAQAAAQABAAD/
"full_image": "/9j/4AAQSkZJRgABAQAAAQABAAD/

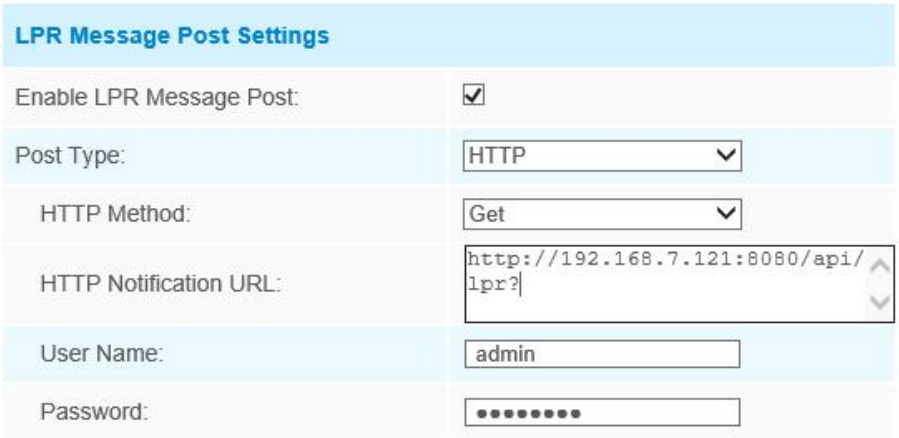
Key	Sample of Value	Description
device	Network Camera	The Device Name which can be configured on the System Info of camera. The default is Network Camera.
time	2020-11-03 20:29:48	The time when license plate is recognized.
plate	AMW212	The recognized license plate number.
type	Visitor	The plate list type of recognized license plate, Black or White or Visitor.
speed	-	The running speed of detected vehicle.
direction	Away	The driving direction of detected vehicle, Approach or Away.
detection_region	1	The ID of detection region where the vehicle is being tested, 1 or 2 or 3 or 4.
region	BEL	The registration country/region of the recognized license plate.
resolution_width	1280	The width of LPR processing resolution.
resolution_height	720	The height of LPR processing resolution.
coordinate_x1, coordinate_y1	473, 93	The top left coordinates of license plate.

coordinate_x2, coordinate_y2	676, 135	The bottom right coordinates of license plate.
confidence	0.70	The confidence value of recognized license plate.
plate_color	White	The color of recognized license plate.
vehicle_type	Bus	The type of recognized vehicle.
vehicle_color	White	The color of recognized vehicle.
plate_image		The snapshot of license Plate, depends on whether it is configured to send together. As shown below, it will be sent together if select License Plate or All. 
full_image		The full snapshot, depends on whether it is configured to send together. As shown below, it will be sent together if select Full Snapshot or All. 

✓ **Get Method**

Take an example, the API URL from a VMS is like "http://192.168.7.121:8080/api/lpr?"

Fill in the specified URL in camera's web UI (if the VMS requires the authentication, please also fill in) :



For sending the license plate information, the LPR camera will automatically add

the license plate parameters to the URL.

For example, the car plate is “MS12345”. Once it’s detected, the LPR camera will send below URL to VMS:

http://192.168.7.121:8080/api/lpr?Caption = LPR&description = MS12345

If the license plate information is to be displayed in VMS, the VMS side needs to extract it from the URL.

- **RTSP Type**

➢ **Prerequisites**

This part is implemented in onvif metadata. There are three streams in rtsp: video stream, audio stream, and alarm stream. Metadata alarm is performed through the onvif alarm stream in the rtsp. So if the VMS or NVR supports and can receive the onvif alarm stream in the rtsp, it can work with rtsp.

➢ **Integrate Method**

We have defined the format of the XML. Knowing the XML format, VMS or NVR can be developed to be integrated, and LPR information can be displayed in VMS or NVR.

ex.) The contents of the xml include the date, time, license plate, and license plate snapshot paths as shown below.

<tt:MetaDataStream>
<tt:Event>
<wsnt:NotificationMessage>
<wsnt:Topic Dialect="http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet">tns1:RuleEngine/LicensePlateDetector/LicensePlate</wsnt:Topic>
<wsnt:Message>
<tt:Message UtcTime="2018-05-15T06:19:34Z" PropertyOperation="Changed">

<tt:Source>
<tt:SimpleItem Name="VideoSourceConfigurationToken" Value="VideoSourceToken"/>
<tt:SimpleItem Name="VideoAnalyticsConfigurationToken" Value="VideoAnalyticsToken"/>
<tt:SimpleItem Name="Rule" Value="MyLicensePlateDetectorRule"/>
</tt:Source>
<tt:Key>
<tt:SimpleItem Name="LicensePlateResult" Value="43 거 6510"/>
</tt:Key>
<tt:Data>
<tt:SimpleItem Name="LicensePlatePicturePath" Value="/LPR/2018051506193401.jpg"/>
<tt:SimpleItem Name="LicenseCarSpeed" Value="25km/h"/>
<tt:SimpleItem Name="LicenseCarDirection" Value="1"/>
</tt:Data>
</tt:Message>
</wsnt:Message>
</wsnt:NotificationMessage>
</tt:Event>
</tt:MetaDataStream>

Description: You can receive the recognized license plate image through the snapshot path and the command named get (ex. http://IP:PORT/LPR/2018051506193401.jpg). Only 10 latest images are available for download. (If you can't see image in the NVR or VMS, type url (ex.http://IP:PORT/LPR/2018051506193401.jpg) in the web browser address box to see if the image is visible.)

- **LPR information transfer**

When the integration is complete, the LPR camera sends an xml containing LPR information to the VMS or NVR in real time when it is recognized.

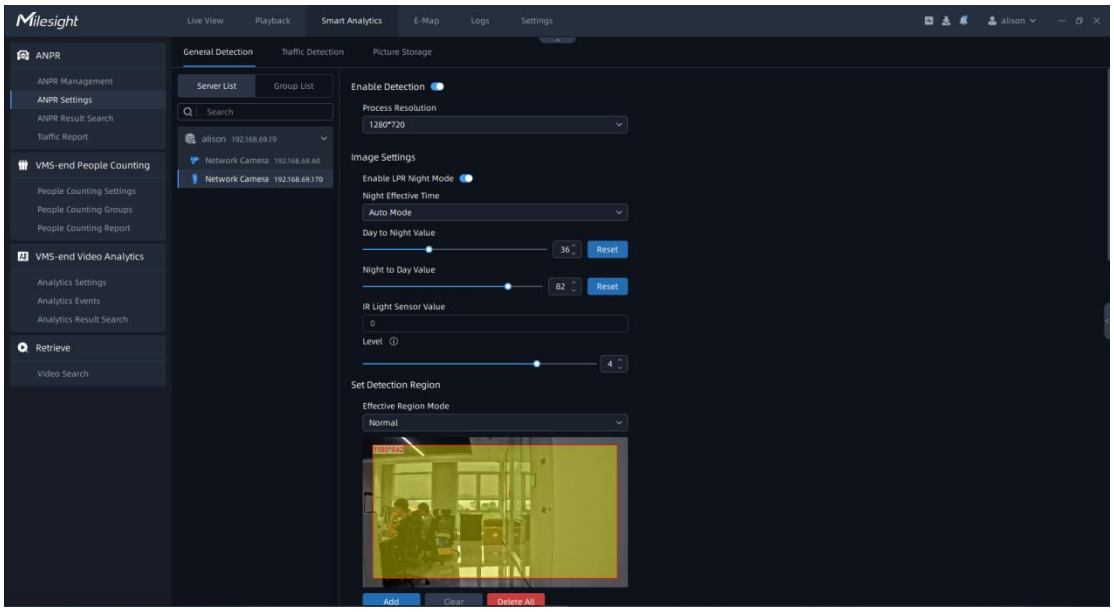
2.1.5 Application Example

Taking Milesight VMS Enterprise as an example, the LPR camera can be added to VMS Enterprise, and then the recognized information can be sent to the VMS for management.

Notes
For more information, please refer to the Milesight VMS Enterprise User Manual.

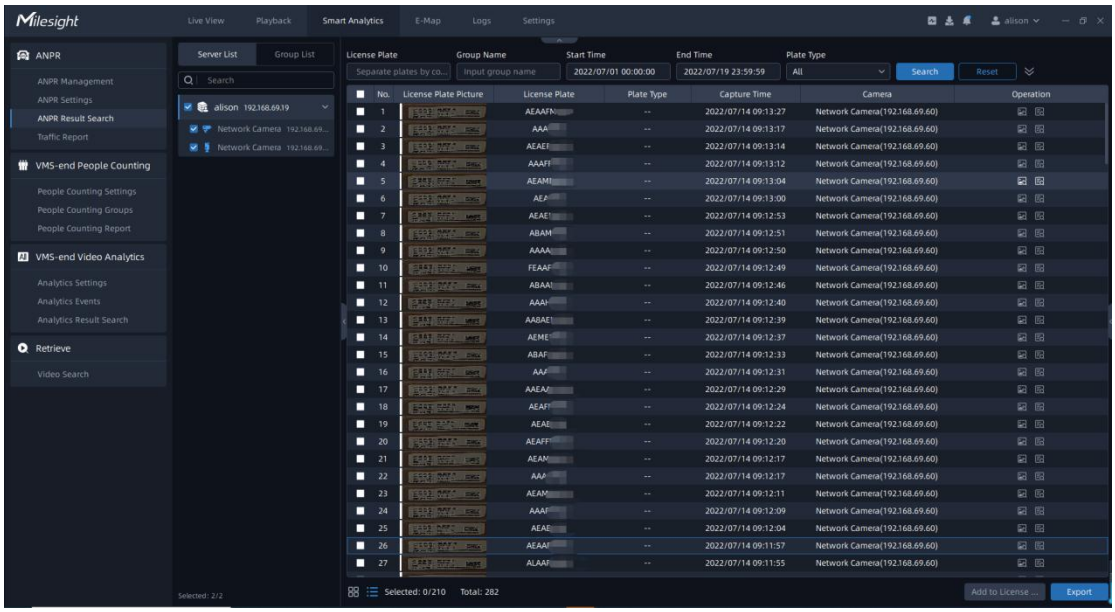
(1) ANPR Settings

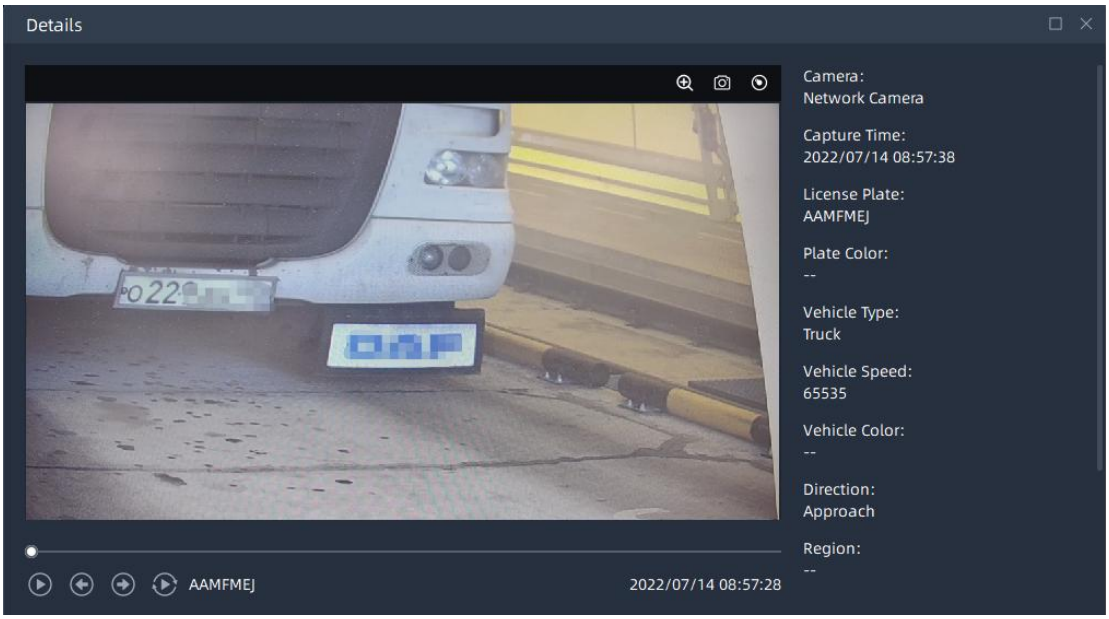
Here you can directly configure the LPR settings on the VMS side, the configuration is the same as on the camera side, you can refer to 2.3.4 LPR Settings.



(2) ANPR Search

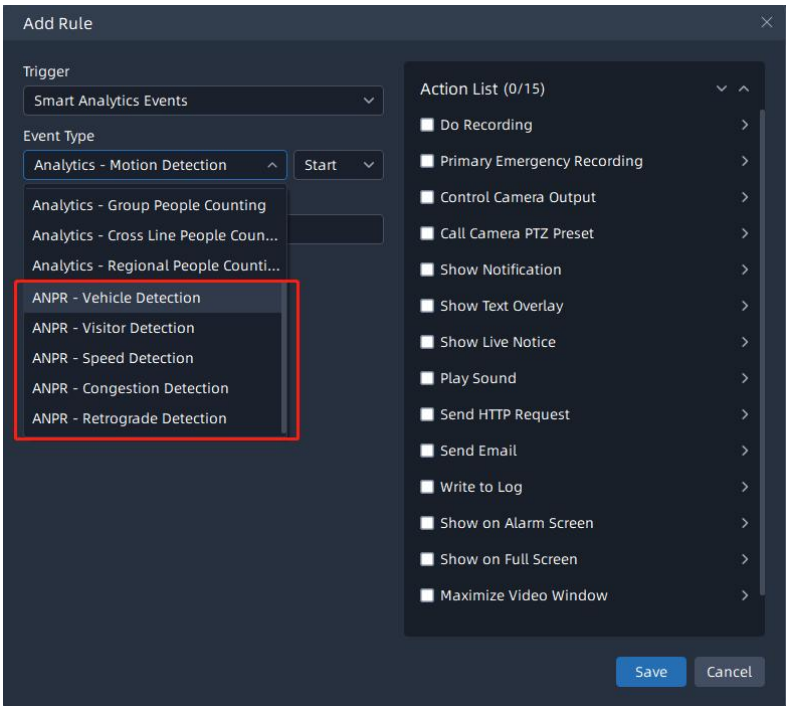
The real-time detection results will be displayed on the center of Smart Search page, including License Plate, Plate Type, Capture Time, live screenshot, camera name and IP.





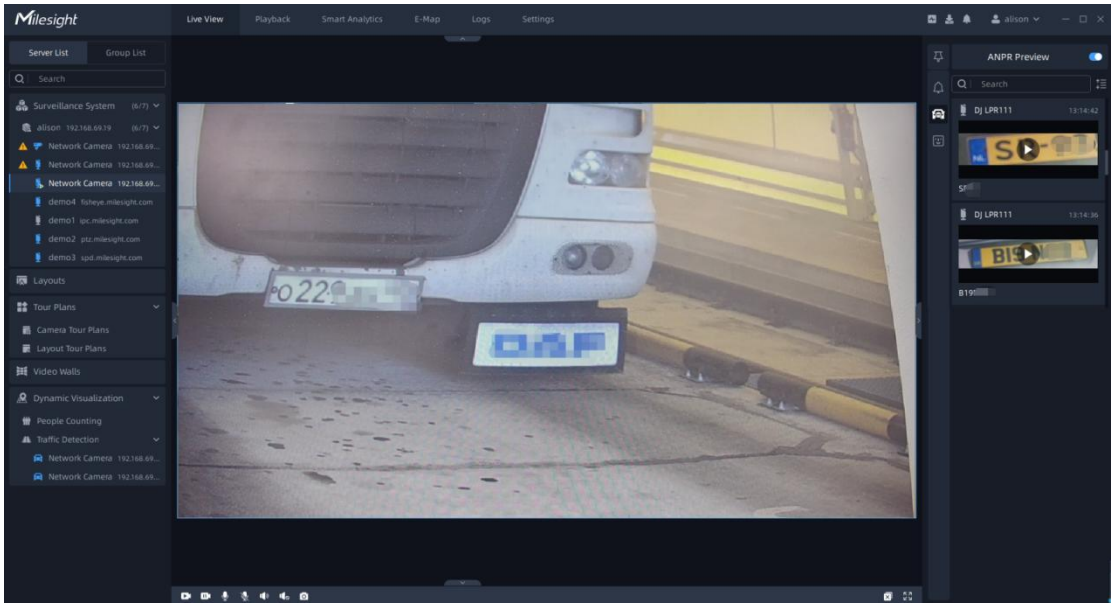
(3) ANPR Event

Here you can set ANPR Event Types as Vehicle Detection, Visitor Detection, Speed Detection, Congestion Detection and Retrograde Detection, and then set the corresponding alarm actions.



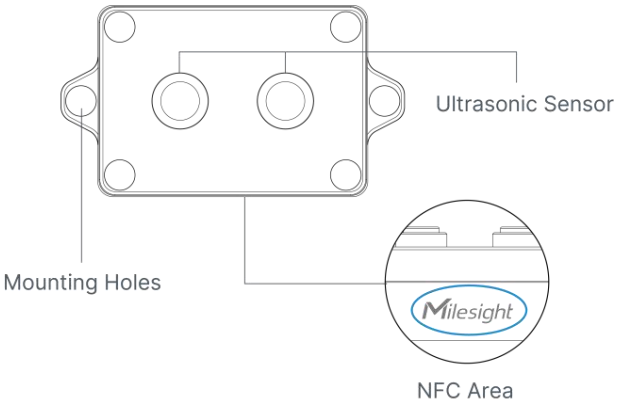
(4) ANPR Preview

Here you can preview the license plate recognition results which are pushed by front-end device, the preview page is as below:



2.2 Sensor Settings

2.2.1 Hardware Overview



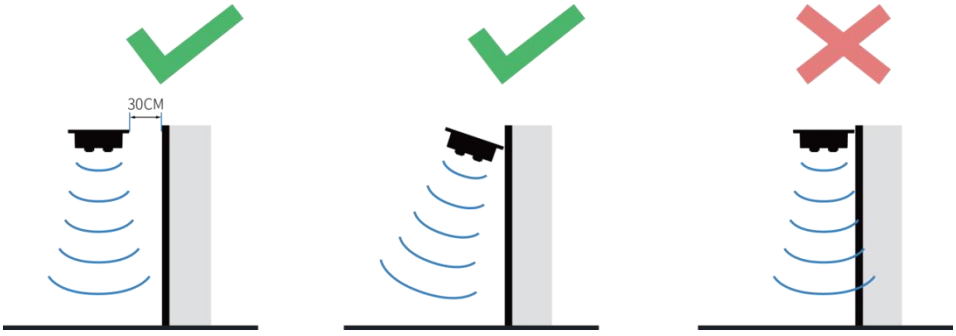
2.2.2 Hardware Installation

Please deploy the sensors above each parking space.

1. Ensure the location of device is within the communication range of LoRaWAN® gateway and keep it away from metal objects.

2. Device must be sat in a horizontal position on top of the object so that it has a clear path to the object. And the detection distance of the sensor is **up to 450cm** from the object, so please install the sensor within this range.

3. Place device in where it is far away from the side-wall more than **30 cm** and without internal obstructions that block the ultrasonic signal. If the device has to install on the side wall, please ensure the ultrasonic sensor direction point away from the wall.



Notes

Here only introduce the installation location, for detailed installation steps, please refer to Chapter 4 in EM310-UDL User Guide.

2.2.3 Sensor Configuration

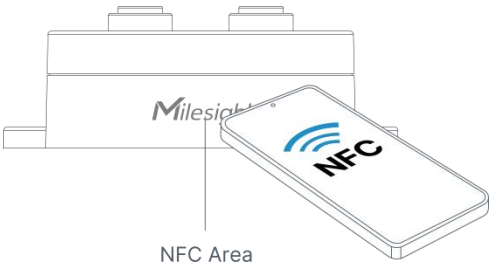
(1) NFC Configuration

EM310-UDL can be configured via NFC.

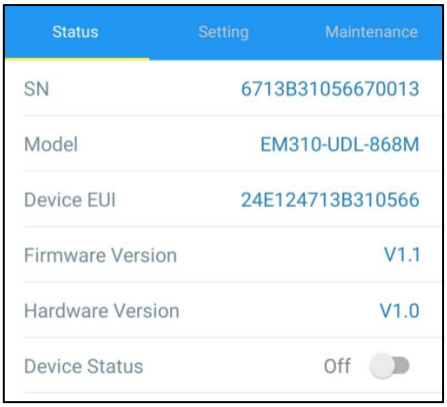
Step1: Download and install "Milesight ToolBox" App from Google Play or App Store.

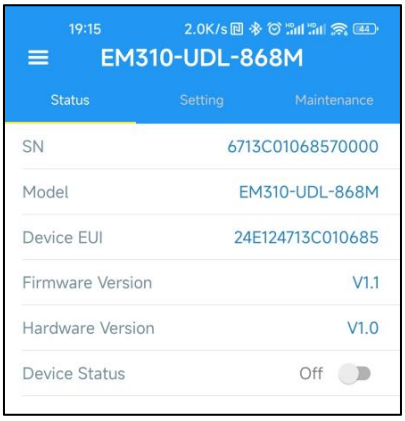
Step2: Enable NFC on the smartphone and open"Milesight ToolBox" App.

Step3: Attach the smartphone with NFC area to the device to read the basic information.



Step4: Basic information and settings of devices will be shown on ToolBox if it's recognized successfully. You can switch on/off the device by tapping the button on the Device Status.





Step5: Tap "Read" button to check current status and sensor data of device.

Step6: Tap "Write" button to write all your settings to the device.

Notes

① Ensure the location of smartphone NFC area and it's recommended to take off phone case.

② If the smartphone fails to read/write configurations via NFC, keep the phone away and back to try again.

③ EM310-UDL can also be configured by dedicated NFC reader provided by Milesigh t IoT or you can configure it via TTL interface inside the device.

④ Please make sure the sensor's firmware version is V1.1 or above, and the Toolbox version is V1.5.0 or above.

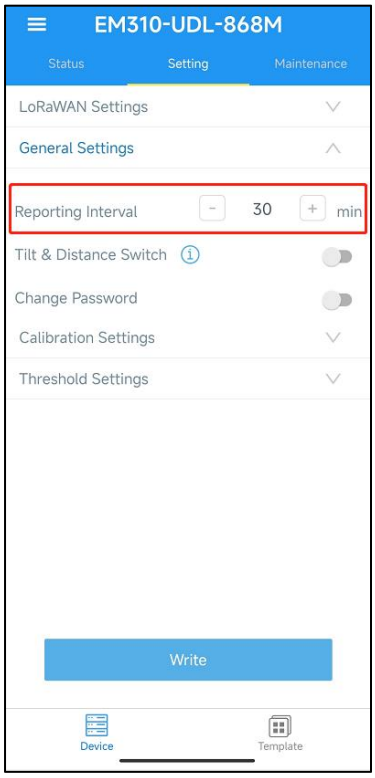
(2) Basic Settings

Notes

Before you start, please be aware that the following configuration is the key to this solution. For more configuration, please refer to EM310-UDL User Manual.

Step1: Reporting Interval Setting.

Go to "**Device -> Setting -> General Settings"** of ToolBox App to change the reporting interval.



Item	Function Introduction
Reporting Interval	Periodic reporting interval of transmitting data to network server. Default: 10 mins Range: 1-1080 mins. We recommend that you set the reporting interval to 30 minutes for power saving, it can be used as the heartbeat packet of the sensor at the same time.

Step2: Threshold Settings.

Here you can set the detection threshold of the sensor, then the sensor will detect whether the distance reaches the threshold according to the collecting interval. When the threshold is reached or is dismissed, it uploads the current data once instantly.

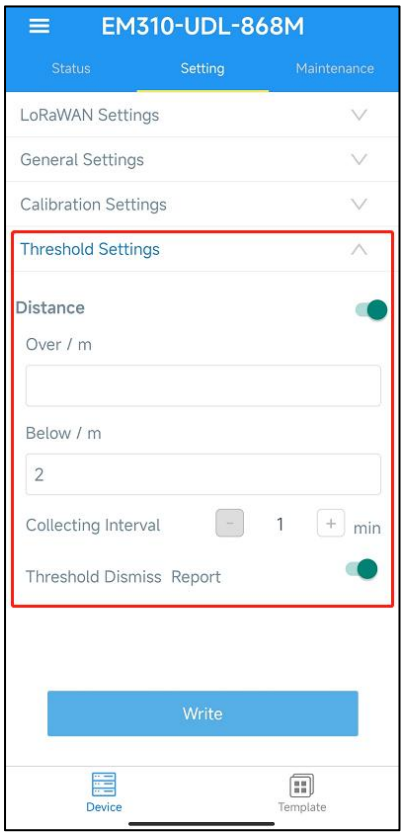
1. Go to "**Device -> Setting -> Threshold Settings"** of ToolBox App to enable the "Distance" option.
2. Input the distance threshold. You can choose either "Over" **or** "Below" as the

threshold.

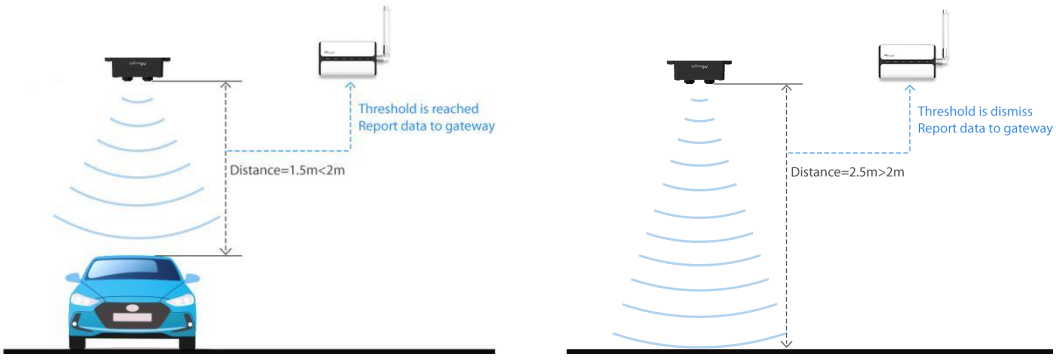
- **Over:** Upload the current data when it exceeds the set threshold, it means the current parking space is available.
- **Below:** Upload the current data when it is less than the set threshold, it means the current parking space is occupied.

3. Set the collecting interval of the sensor. We recommend that you set the collecting interval to 1 minute to detect the real-time status of the parking spaces.

4. Enable the "Threshold Dismiss Report" option to report the data when the threshold is dismissed.



Take the configuration in the above figure as an example, here I set the "Below" option to 2 meters and then enable the "Threshold Dismiss Report" option, when a vehicle enters the corresponding parking space and the sensor detects that the distance to the object (vehicle) is less than 2 meters, the data will be reported. And when the vehicle leaves the corresponding parking space and the sensor detects that the distance exceeds 2 meters, the data will also be reported.



Notes

① Of course, you can also set the “Over” option and enable the “Threshold Dismiss Report” option, then when the distance is greater than the set threshold or released, the data will be reported

② If the “Over” option and the “Below” option are configured at the same time, the data will not be reported when the vehicle enters or leaves the parking space.

(3) LoRaWAN Settings

LoRaWAN settings is used for configuring the transmission parameters in LoRaWAN® network.

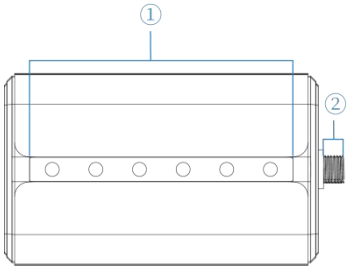
Notes

For detailed configuration steps, please refer to Chapter 3.2 in EM310-UDL User Manual.

2.3 Gateway Settings

2.3.1 Hardware Overview

A. UG65



① LED Area

POWER: Power Indicator

STATUS: System Indicator

LoRa: LoRa Indicator

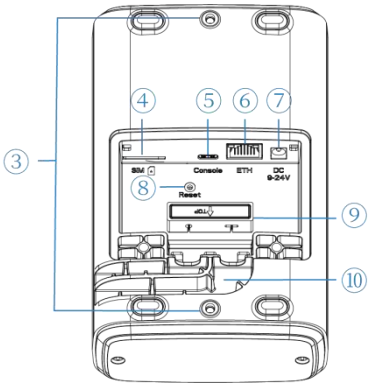
Wi-Fi: Wi-Fi Indicator

LTE: Cellular Indicator

ETH: Ethernet Port Indicator

② LoRa Antenna Connector

(only for external antenna version)



③ Bracket Mounting Screws

④ SIM Slot

⑤ Type-C Port

⑥ Ethernet Port (PoE)

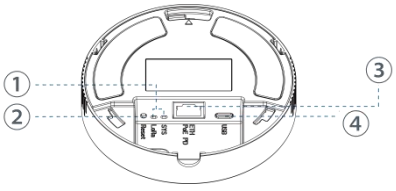
⑦ Power Connector

⑧ Reset Button

⑨ Waterproof Silicone

⑩ Cable Groove

B. UG63



① LED Area

SYS: System Indicator

LoRa: LoRa Indicator

② Reset Button

③ Ethernet Port (PoE PD) & Indicator

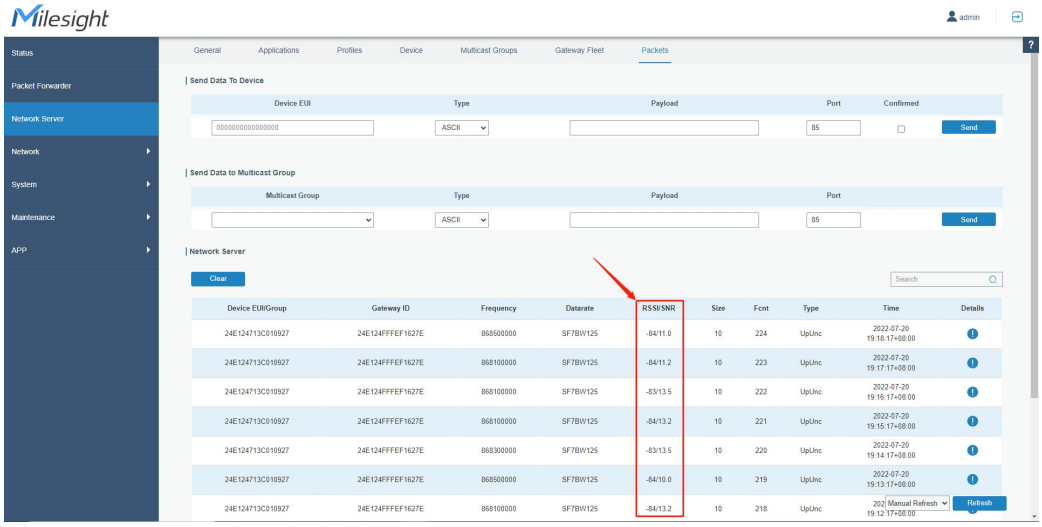
④ Type-C Console Port

2.3.2 Hardware Installation

Please deploy several gateways in the parking lot to receive the parking space occupancy information detected by the sensor and transmit it to the parking management system.

1. For the parking lots separated by walls, the recommended gateway deployment interval is 7 to 50 meters for better signal coverage.

2. The signal strength is related to the actual scene. Therefore, it is recommended that customers deploy the gateway according to the actual signal coverage. It is better to deploy the gateway in the middle of the environment that needs to be covered. Users can check the signal strength between the gateway and the sensor on the webpage as shown below:



3. For some areas where the signal is not available, we recommend deploying UG63 as a supplement.

Notes

① Usually in an open environment, the recommended gateway deployment interval is 7 to 100 meters.

② It is recommended to deploy gateways at each layer.

③ Here only introduce the installation location, for detailed installation steps, please refer to UG65 Quick Guide and UG63 Quick Guide.

2.3.3 Gateway Configuration

(1) Access to Web GUI

This chapter explains how to access to Web GUI of the gateway.

Username: **admin**

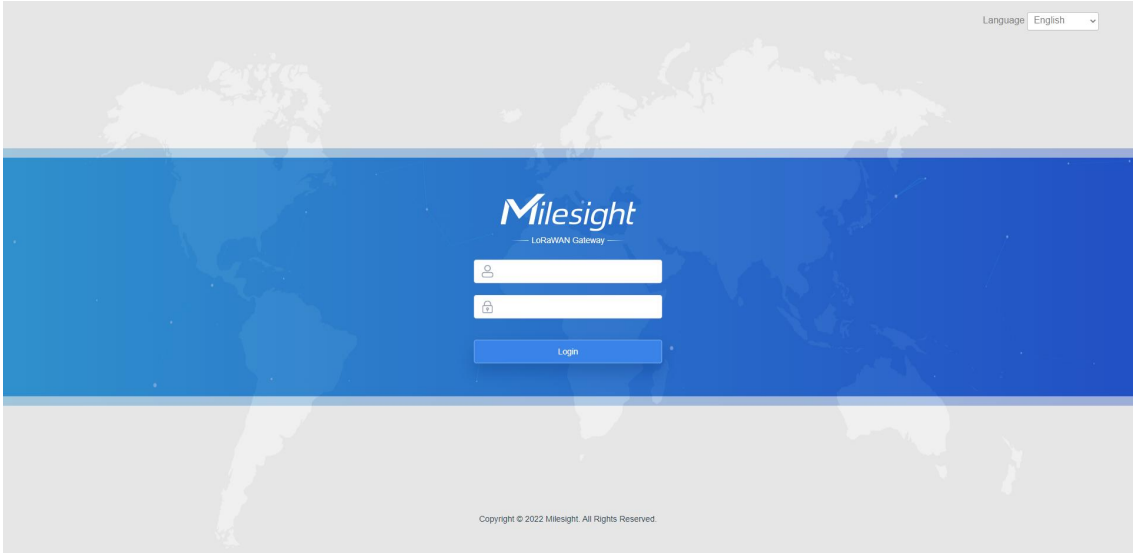
Password: **password**

Method 1: Wireless Access

Step1: Enable Wireless Network Connection on your computer and search for access point "**Gateway_******" to connect it.

Step2: Open a Web browser on your PC (Chrome is recommended) and type in the IP address **192.168.1.1** to access the web GUI.

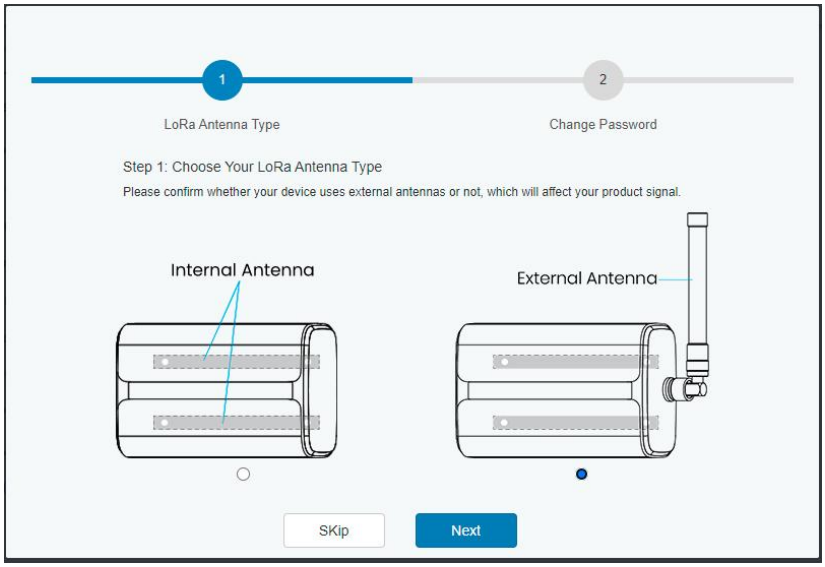
Step3: Enter the username and password, click "Login".



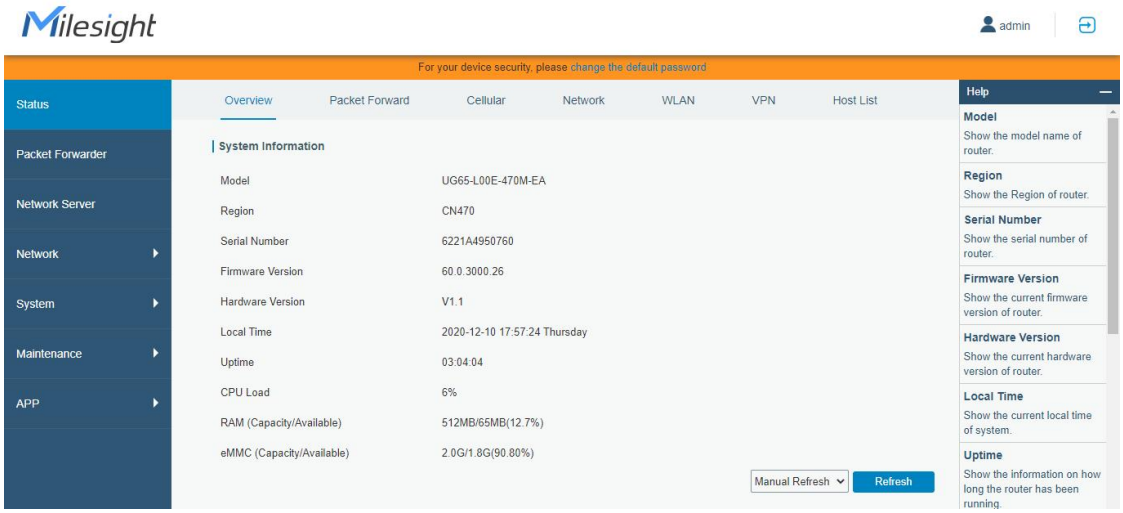
Notes

If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.

Step4: After logging in the web GUI, follow the guide to complete the basic configurations. It's suggested that you change the password for the sake of security.



Step5: You can view system information and perform configuration of the gateway.

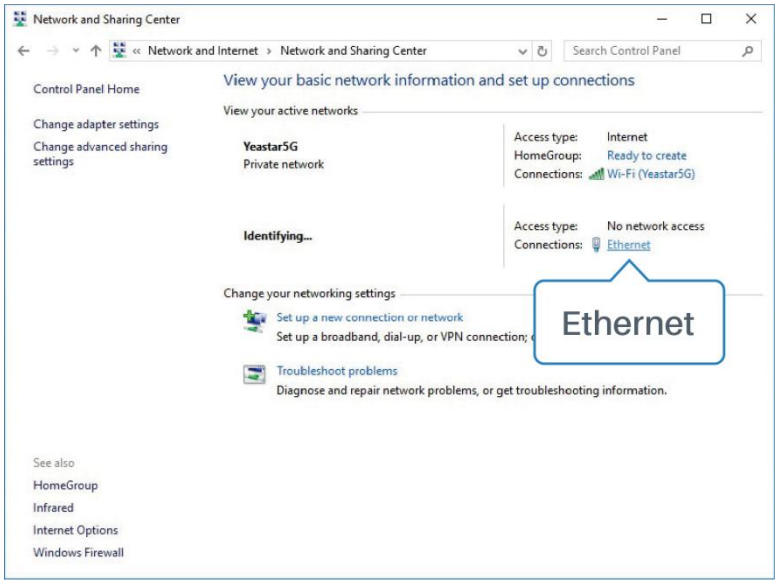


Method 2: Wired Access

Step1: Connect PC to the ETH port directly or through PoE injector to access the web GUI of gateway. The following steps are based on Windows 10 system for your reference.

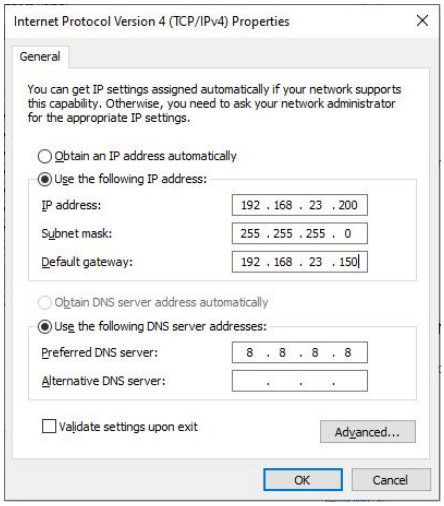
Step2:

Go to “Control Panel” → “Network and Internet” → “Network and Sharing Center”, then click “Ethernet” (May have different names).



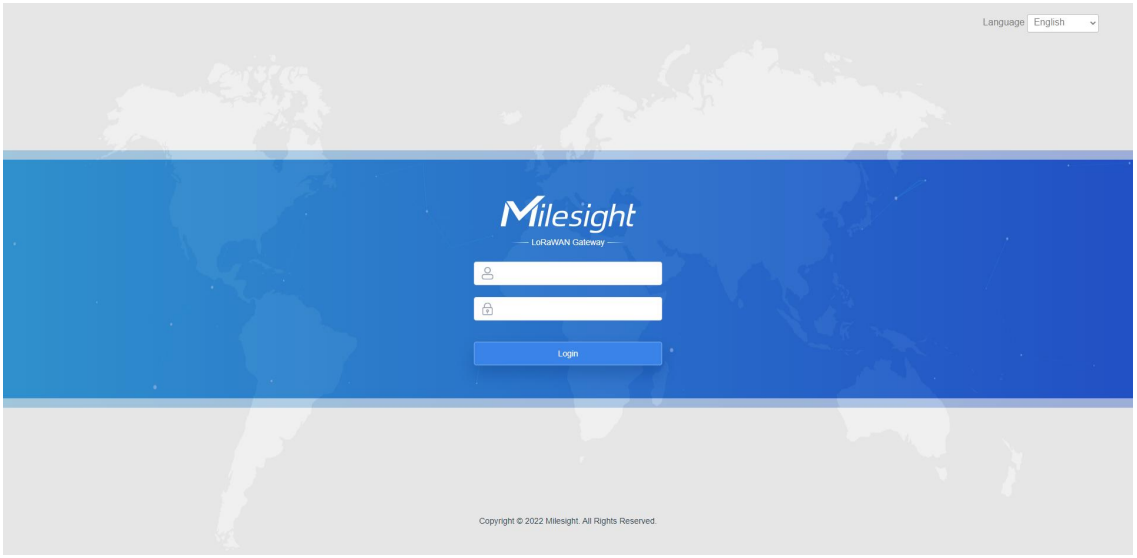
Step3: Go to “Properties” → “Internet Protocol Version 4(TCP/IPv4) ”and select “Use the following IP address”, then assign a static IP manually within the same subnet of

the gateway.



Step4: Open a Web browser on your PC (Chrome is recommended) and type in the IP address **192.168.23.150** to access the web GUI.

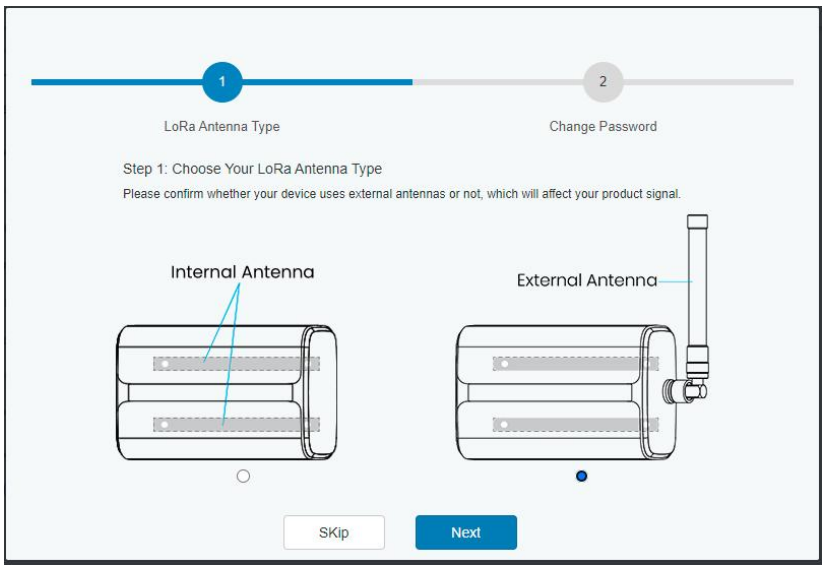
Step5: Enter the username and password, click "Login".



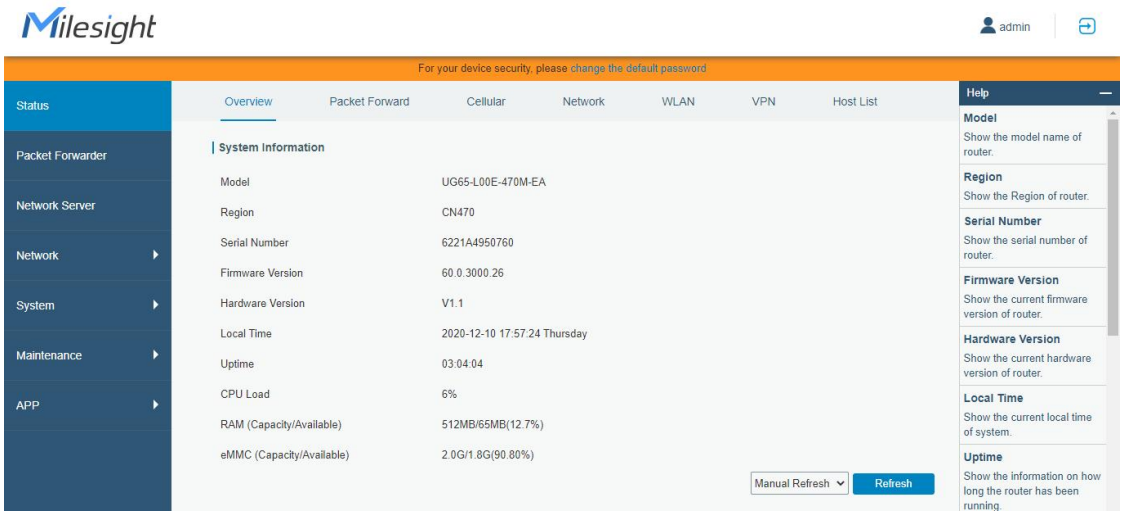
Notes

If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.

Step6: After logging in the web GUI, follow the guide to complete the basic configurations. It's suggested that you change the password for the sake of security.

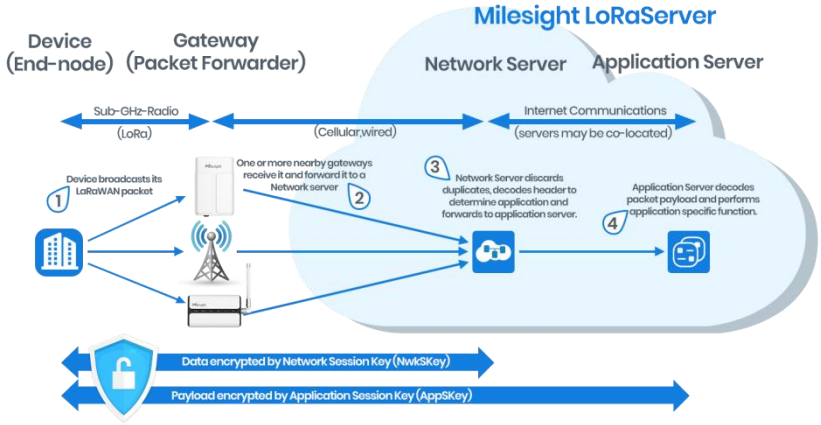


Step7: You can view system information and perform configuration of the gateway.



(2) LoRaWAN Settings

LoRaWAN settings is used for configuring the transmission parameters in LoRaWAN® network.

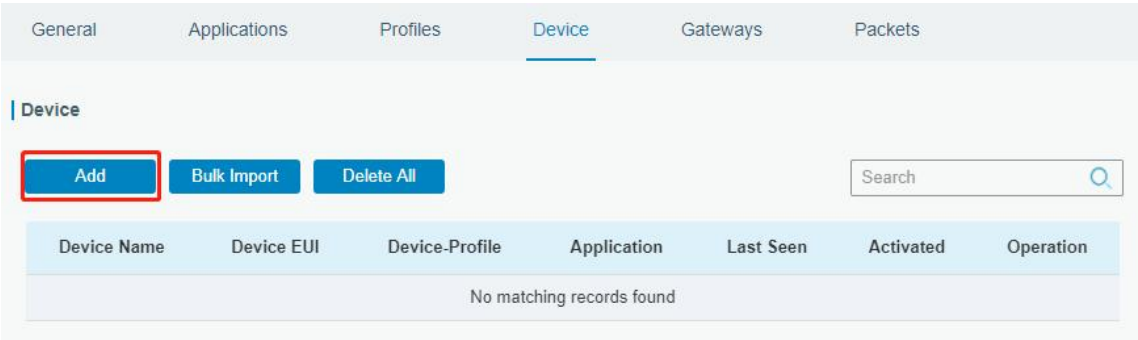


Notes

For detailed configuration steps, please refer to Chapter 3.2 in UG65 Quick Guide.

(3) Adding Sensors

Step1: Go to the "Device" page and click "Add" to add the sensors.

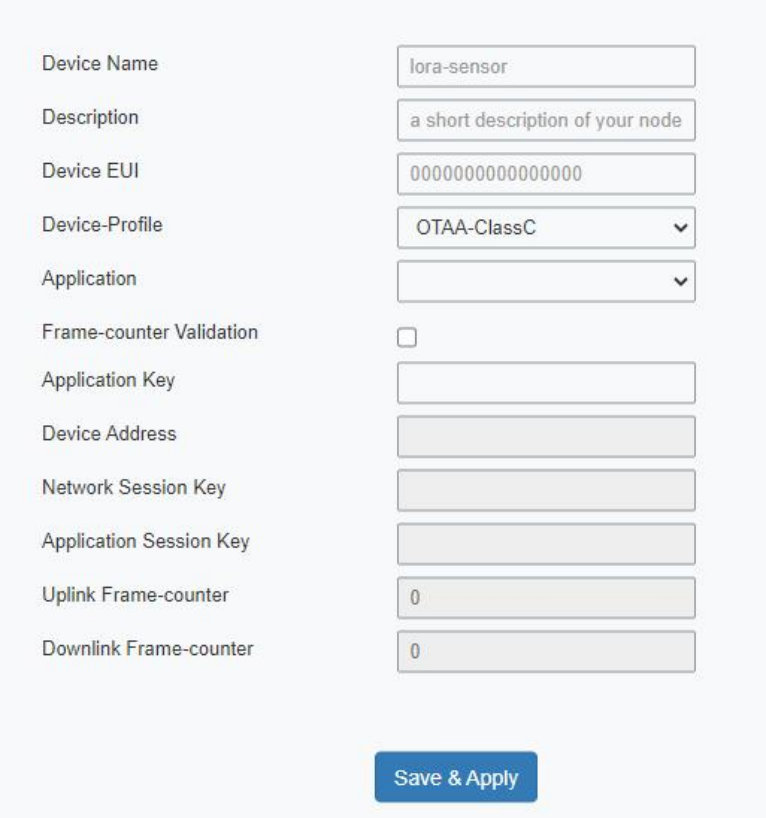


The meanings of the options on the interface are as follows:

Item	Function Introduction
Add	Add a device.
Bulk Import	Download template and import multiple devices.
Delete All	Delete all devices in the list.
Device Name	Show the name of the device.

Device EUI	Show the EUI of the device.
Device-Profile	Show the name of the device's device profile.
Application	Show the name of the device's application.
Last Seen	Show the time of last packet received.
Activated	Show the status of the device . ✓ means that the device has been activated.
Operation	Edit or delete the device.

Step2: After clicking the "Add" button, it will pop up a device adding window, you need to fill in the corresponding device information, please select the correct device profile according to device type. And then click the "Save&Apply" button after filling in the information.



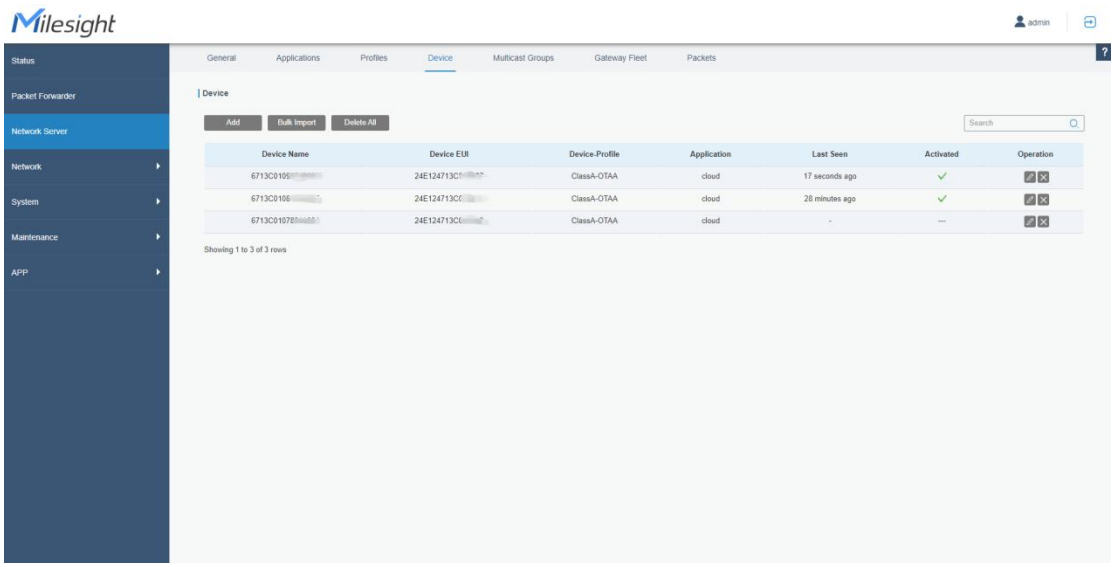
The meanings of the options on the interface are as follows:

Item	Function Introduction
Device Name	Enter the name of this device.
Description	Enter the description of this device.
Device EUI	Enter the EUI of this device.
Device-Profile	Choose the device profile.
Application	Choose the application profile.
Modbus RTU Data Transmission	Choose from: "Disable", "Modbus RTU to TCP", "Modbus RTU over TCP". This feature is only applicable to Milesight **class C** type LoRaWAN® controllers.(UC501/UC300, etc.) -Modbus RTU to TCP: TCP client can send Modbus TCP commands to ask for controller Modbus data. -Modbus RTU over TCP: TCP client can send Modbus RTU commands to ask for controller Modbus data.
Fport	Enter the LoRaWAN® frame port for transparent transmission between Milesight LoRaWAN® controllers and UG65. Range: 2-84, 86-223. Note: this value must be the same as the Milesight LoRaWAN® controller's Fport.
TCP Port	Enter the TCP port for data transmission between the TCP Client and UG65 (as TCP Server). Range: 1-65535.

Frame-Counter Validation	If disable the frame-counter validation, it will compromise security as it enables people to perform replay-attacks.
Application Key	Whenever an end-device joins a network via over-the-air activation, the application key is used for derive the Application Session key.
Device Address	The device address identifies the end-device within the current network.
Network Session Key	The network session key specific for the end-device. It is used by the end-device to calculate the MIC or part of the MIC (message integrity code) of all uplink data messages to ensure data integrity.
Application Session Key	The AppSKey is an application session key specific for the end-device. It is used by both the application server and the end-device to encrypt and decrypt the payload field of application-specific data messages.
Uplink Frame-counter	The number of data frames which sent uplink to the network server. It will be incremented by the end-device and received by the end-device. Users can reset the a personalized end-device manually, then the frame counters on the end-device and the frame counters on the network server for that end-device will be reset to 0.
Downlink	The number of data frames which received by the end-device

Frame-counter	downlink from the network server. It will be incremented by the network server. Users can reset the a personalized end-device manually, then the frame counters on the end-device and the frame counters on the network server for that end-device will be reset to 0.

Step3: After saving the configuration, the sensor is added successfully. It will list all the devices that have been added, as shown in the device list below, you can check the connection status and basic information of the device.



Step4: You can also click “Bulk Import” if you want to add many sensors all at once.

Click “Template Download” to download template file and add device information to this file. Application and device profile should be the same as you created on web page.

	A	B	C	D	E	F	G	H	I
1	name	description	deveui	application	deviceprofile	appkey	devaddr	appskey	nwkskey
2	24e1242191323266		24e1242191323266	cloud	ClassC-OTAA	112233445566778899aa112233445566			
3									
4									
5									

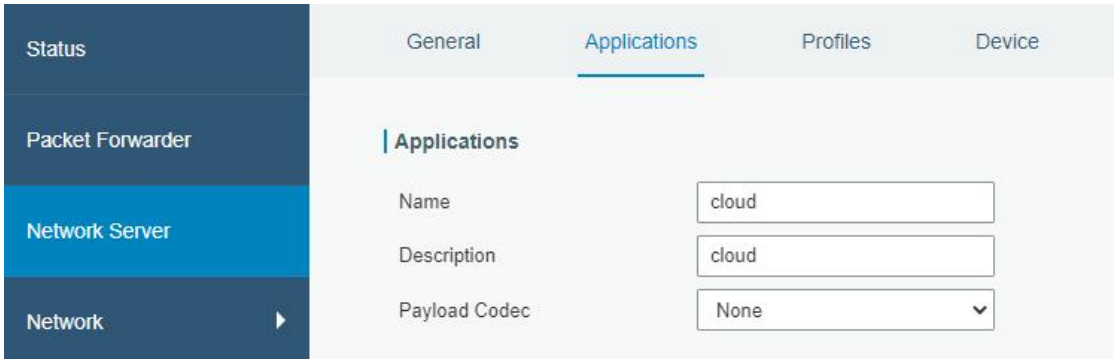
And then import this file to add bulks of devices.

(4) Data Transmission

You can create a new application on this page, which is mainly used to define the method of decoding the data sent from end-device and choosing the data transport protocol to send data to another server address. The data will be sent to your custom server address using **MQTT, HTTP or HTTPS** protocol.

Step1: Go to "Network Server" > "Application".

Step2: Click  to enter the configuration page, displayed as the following picture:



Step3: Click "Save" to create this application.

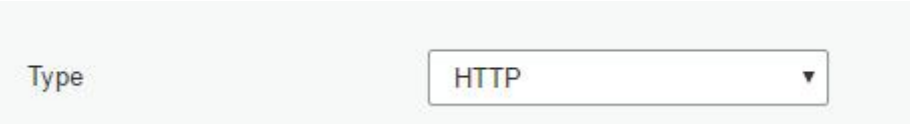
The meanings of the options on the interface are as follows:

Item	Function Introduction
Name	Enter the name of the application profile. E.g Smoker-sensor-app.

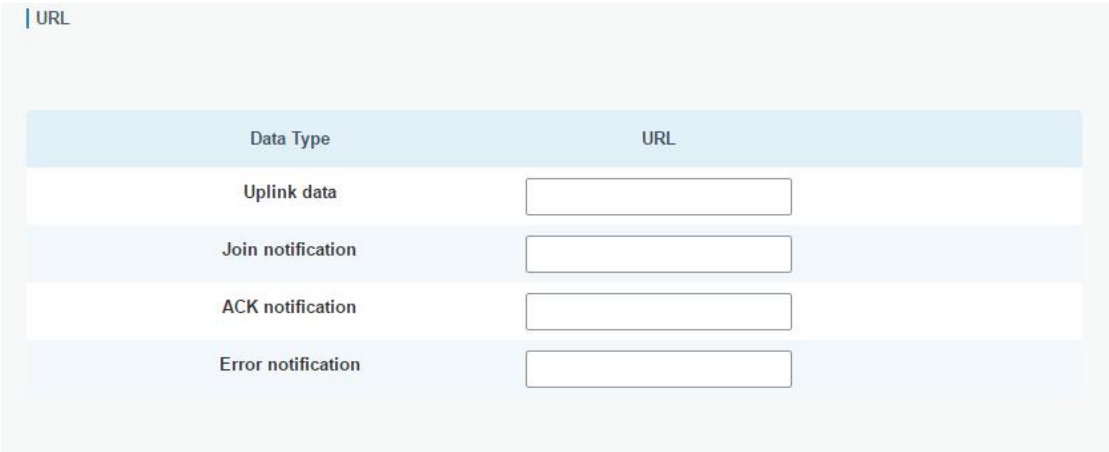
Description	Enter the description of this application. E.g a application for smoker sensor.
Payload Codec	Select from: “None”, “Cayenne LPP”, “Custom”. None: This mode enables devices not to encode data. Cayenne LPP: This mode enables devices to encode data with the Cayenne Low Power Payload (LPP). Custom: This mode enables devices to encode data with the decoder function and the encoder function which you have entered the code.
Data Transmission	Data will be sent to your custom server using the MQTT,HTTP or HTTPS protocol.

HTTP or HTTPS:

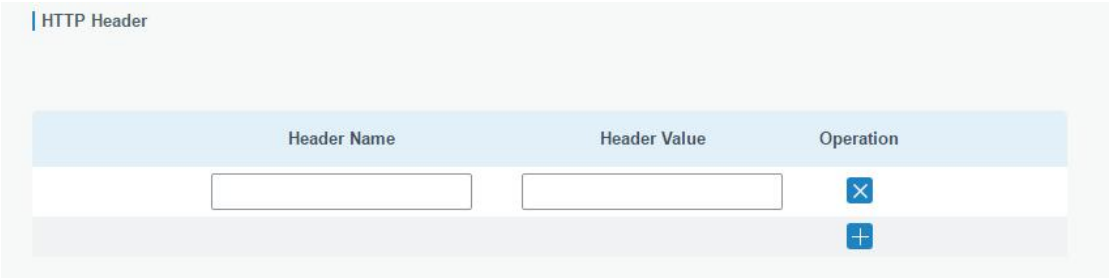
Step 1: select HTTP or HTTPS as transmission protocol.



Step 2: Enter the destination URL. Different types of data can be sent to different URLs.



Enter the header name and header value if there is user credentials when accessing the HTTP(s) server.

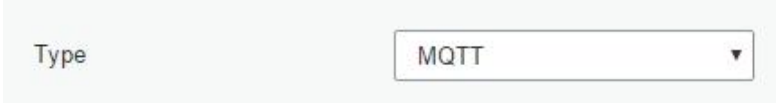


The meanings of the options on the interface are as follows:

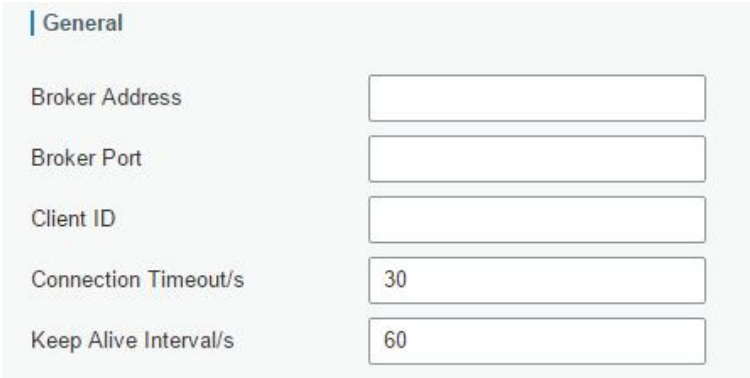
Item		Description
HTTP Header	Header Name	A core set of fields in HTTP header.
	Header Value	Value of the HTTP header.
URL	Data Type	Data type sent to HTTP/HTTPS server.
	Topic	Topic name of the data type using for publish.
	URL	HTTP/HTTPS server URL to receive data.

MQTT:

Step 1: Select the transmission protocol as MQTT.



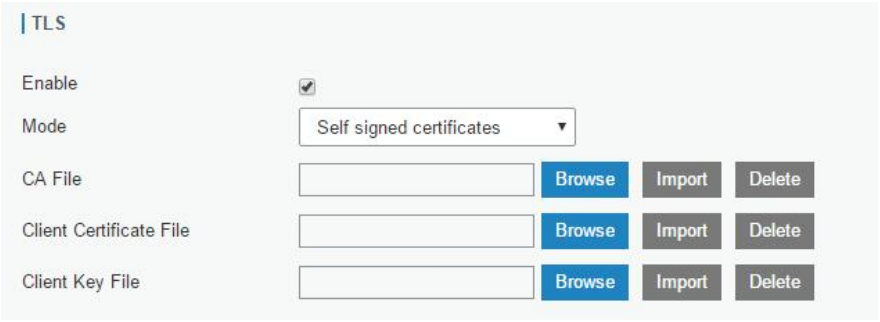
Step 2: Fill in MQTT broker general settings.



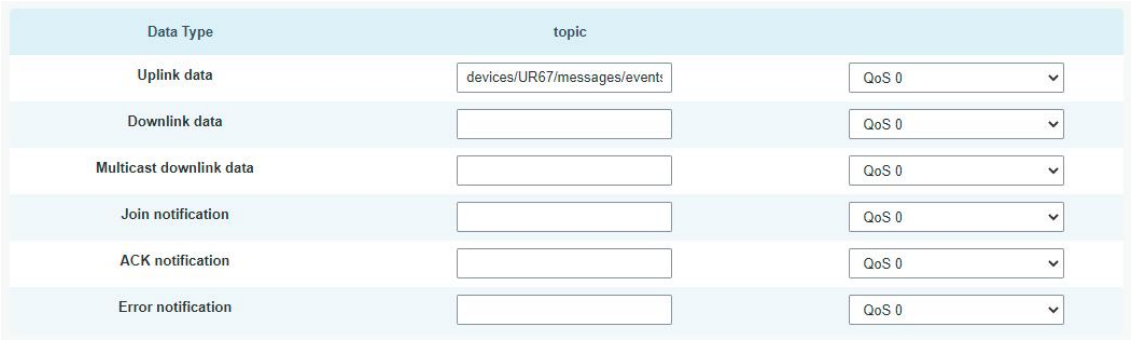
Step 3: Select the authentication method required by the server.

If you select user credentials for authentication, you need to enter the username and password for authentication.

If certificate is necessary for verification, please select mode and import CA certificate, client certificate and client key file for authentication.



Step 4: Enter the topic to receive data and choose the QoS.



The meanings of the options on the interface are as follows:

Item		Description
General	Broker Address	MQTT broker address to receive data.
	Broker Port	MQTT broker port to receive data.
	Client ID	Client ID is the unique identity of the client to the server. It must be unique when all clients are connected to the same server, and it is the key to handle message at QoS 1 and 2.
	Connection Timeout/s	If the client does not get a response after the connection timeout, the connection will be considered as broken. Range: 1-65535 Default: 30
	Keep Alive Interval/s	After the client is connected with the server, the client will send heartbeat packet to the server regularly to keep alive. Range: 1-65535 Default: 60
User Credentials	Enable	Enable user credentials.
	Username	The username used for connecting to MQTT broker.
	Password	The password used for connecting to MQTT broker.
TLS	Enable	Enable the TLS encryption in MQTT communication.
	Mode	Select from “Self signed certificates”, “CA signed server certificate”. CA signed server certificate:verify with the certificate issued by Certificate Authority (CA) that pre-loaded on device. Self signed certificates: upload the custom CA certificates, client certificates and secret key for verification.
Topic	Data Type	Data type sent to MQTT broker.
	Topic	Topic name of the data type using for publish.
	QoS	QoS 0 – Only Once This is the fastest method and requires only 1 message. It is also the

		most unreliable transfer mode. QoS 1 – At Least Once This level guarantees that the message will be delivered at least once, but may be delivered more than once. QoS 2 – Exactly Once QoS 2 is the highest level of service in MQTT. This level guarantees that each message is received only once by the intended recipients. QoS 2 is the safest and slowest quality of service level.

(5) Device Payload

EM310-UDL reports basic information of sensor whenever it joins the network.

Channel	Type	Description
ff	01(Protocol Version)	01=>V1
	09 (Hardware Version)	01 40 => V1.4
	0a (Software Version)	01 14 => V1.14
	0b (Power On)	Device is on
	0f (Device Type)	00: Class A, 01: Class B, 02: Class C
	16 (Device SN)	16 digits

Example:

ff0bff ff0101 ff166713b31056670013 ff090100 ff0a0100 ff0f00

Channel	Type	Value	Channel	Type	Value
ff	0b (Power On)	ff (Reserved)	ff	01 (Protocol Version)	01 (V1)
ff	16 (Device SN)	6713b3105667 0013	ff	09 (Hardware version)	0100 (V1.0)
ff	0a (Software version)	0100 (V1.0)	ff	0f (Device Type)	00 (Class A)

EM310-UDL reports sensor data according to reporting interval (10 mins by default).

Channel	Type	Description
01	75(Battery Level)	UINT8, Unit: %
03	82 (Distance)	UINT16, Unit: mm
04	00 (Device Position)	00: Normal (horizontal offset angle < 20°) 01: Tilt (horizontal offset angle ≥ 20°)

Example:

01 75 62 03 82 44 08 04 00 00					
Channel	**Type**	**Value**	**Channel**	**Type**	**Value**
01	75 (Battery)	62 => 98%	03	82 (Distance)	44 08 => 08 44 = 2116 mm = 2.116 m
04	00 (Device Position)	00=Normal			

EM310-UDL supports downlink commands to configure the device. Application port is 85 by default.

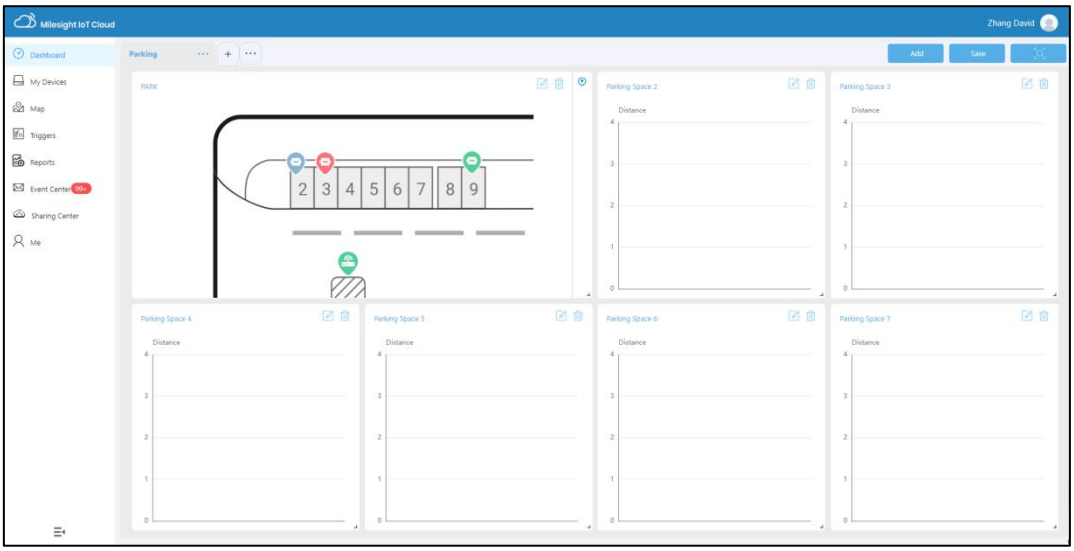
Channel	Type	Description
ff	03 (Set Reporting Interval)	2 Bytes, unit: s

Example: Set reporting interval as 20 minutes.

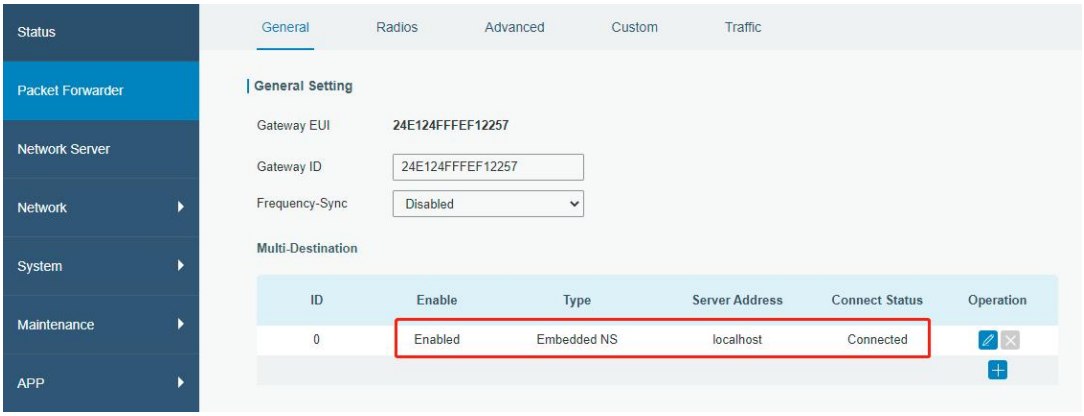
ff03b004		
Channel	**Type**	**Value**
ff	03 (Set Reporting Interval)	b0 04 => 04 b0 = 1200s = 20 minutes

2.3.4 Application Example

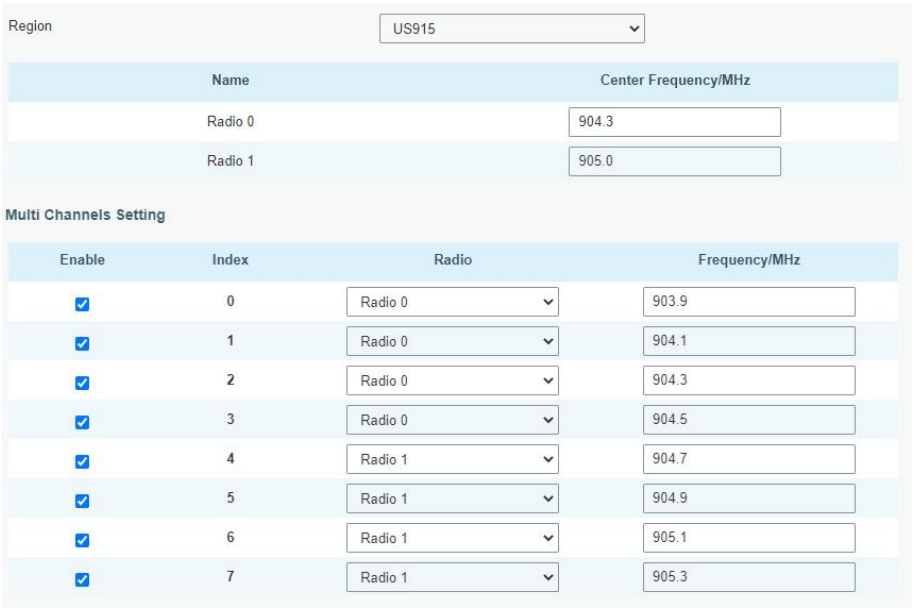
Taking Milesight IoT Cloud as an example, the gateways can be added to IoT Cloud, and then data can be sent to the Cloud for management as shown below.



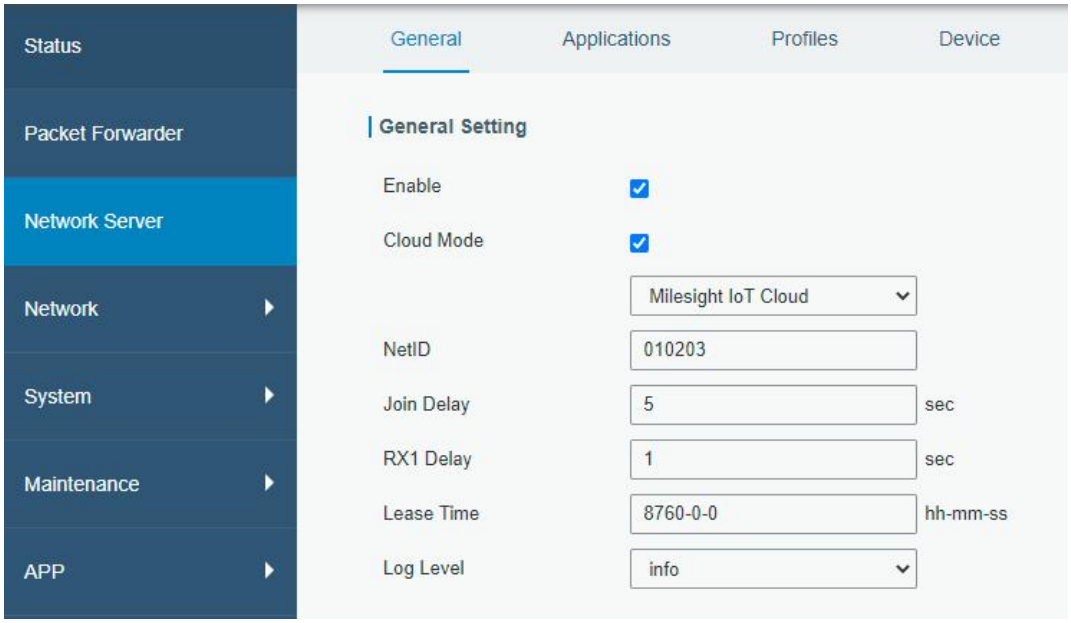
Step1: Go to "Packet Forwarder->General" page to enable the embedded network server.



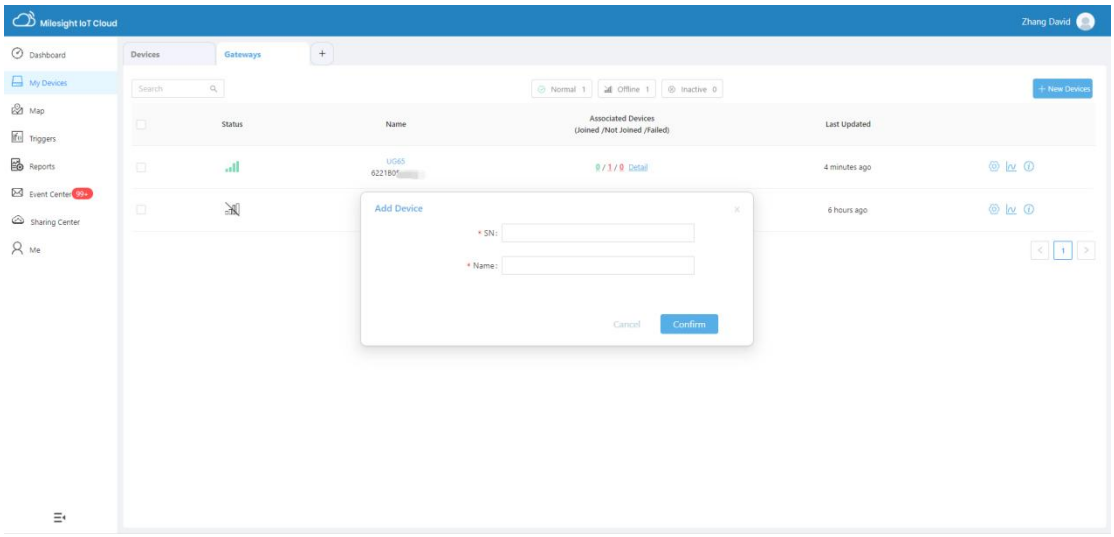
Step2: Go to "Packet Forwarder-> Radio" page to select the antenna type, center frequency and channels. The channels of the gateway and nodes need to be the same.



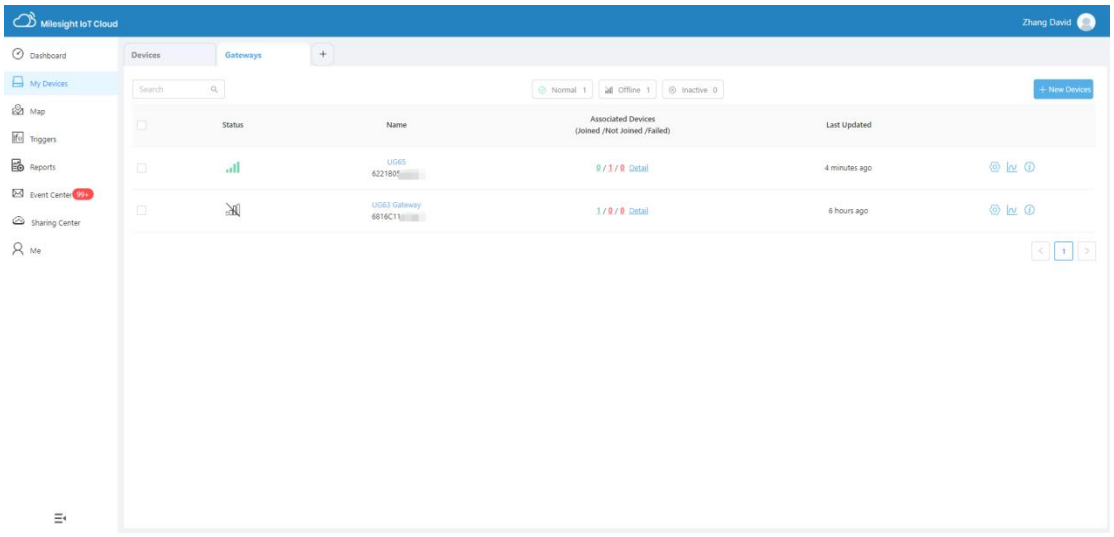
Step3: Go to "Network Server" → "General" page to enable the network server and "Cloud mode", then select "Milesight IoT Cloud".



Step4: Log in the Milesight IoT Cloud. Then go to "My Devices" page and click "+New Devices" to add gateway to Milesight IoT Cloud via SN. Gateway will be added under "Gateways" menu.



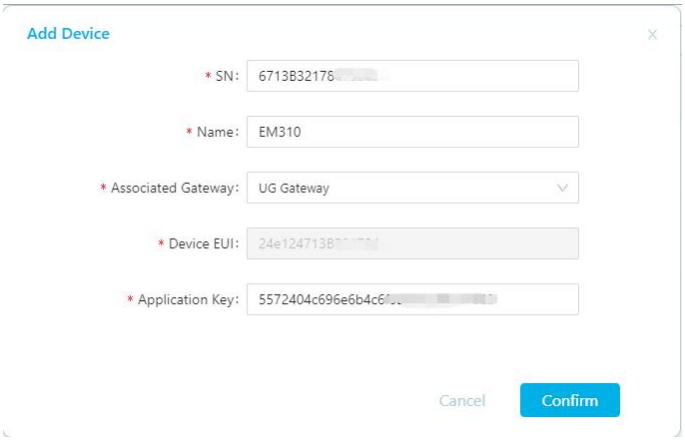
Step5: The gateway is online on Milesight IoT Cloud.



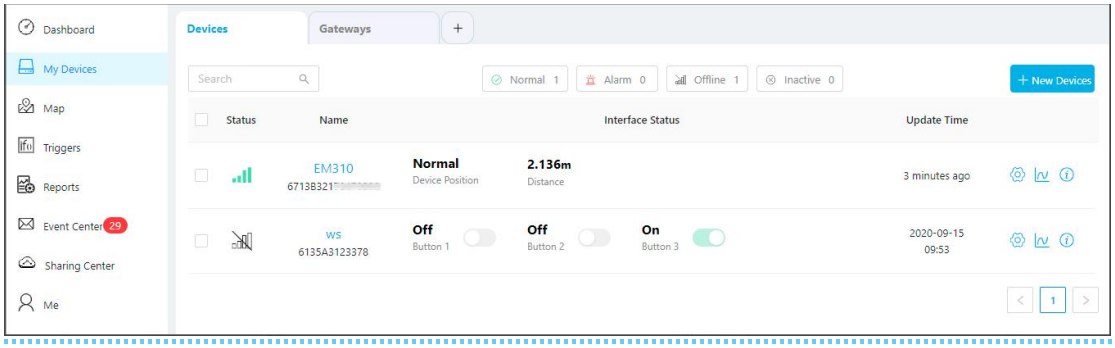
Notes

You can also add sensors to the gateway on IoT Cloud, the steps are as follows:

Step1: Go to "My Devices" page and click "+New Devices". Fill in the SN of the device and select an associated gateway.



Step2: After the device is online in Milesight IoT Cloud, you can check the data via web page or mobile App and create dashboard for it.



Chapter III Services

Milesight provides customers with timely and comprehensive technical support services. End-users can contact your local dealer to obtain technical support. Distributors and resellers can contact with Milesight directly for technical support.

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