Milesight-Troubleshooting

5G AIoT Camera

Version	1.0	Update	2021.12.6

1. Introduction

(1) Introduction of 5G AIoT camera

Milesight 5G AIoT 4X/12X Pro Bullet Plus Network Camera is our newest member of the 5G series. Featuring cutting-edge 5G technology, the 5G AIoT Pro Bullet Plus Network Camera provides a fresh experience of UHD image quality, low latency and fast transmission speed to some scenarios where network wiring is inconvenient. Offering IoT technology, AI deep learning, compact structure and more, Milesight 5G AIoT Pro Bullet Plus Network Camera builds a whole new world by combining high-tech with high-performance. IoT is an advanced function which allows to get information of any things need to be monitored, connected and interacted in real-time via various technologies and devices, like sensor and RFID to smartly realize perceiving, recognizing and managing things.

This article will introduce the basic configuration of 5G AIoT camera, so that you can quickly learn to use our 5G AIoT camera.

(2) Model

- Milesight 5G AIoT 4X/12X Pro Bullet Plus Network Camera

- Milesight 5G AI 4X/12X Pro Bullet Plus Network Camera

- Milesight AIoT 4X/12X Pro Bullet Plus Network Camera

- Milesight AIoT Motorized Pro Bullet Plus Network Camera

2. How to set IoT

(1) Device Setting

Step 1: After logging into the web, go to **"Advanced Settings"**→ **"IoT"**. Check the checkbox **"Enable IoT"** and IoT function will be enabled automatically without clicking the save button.
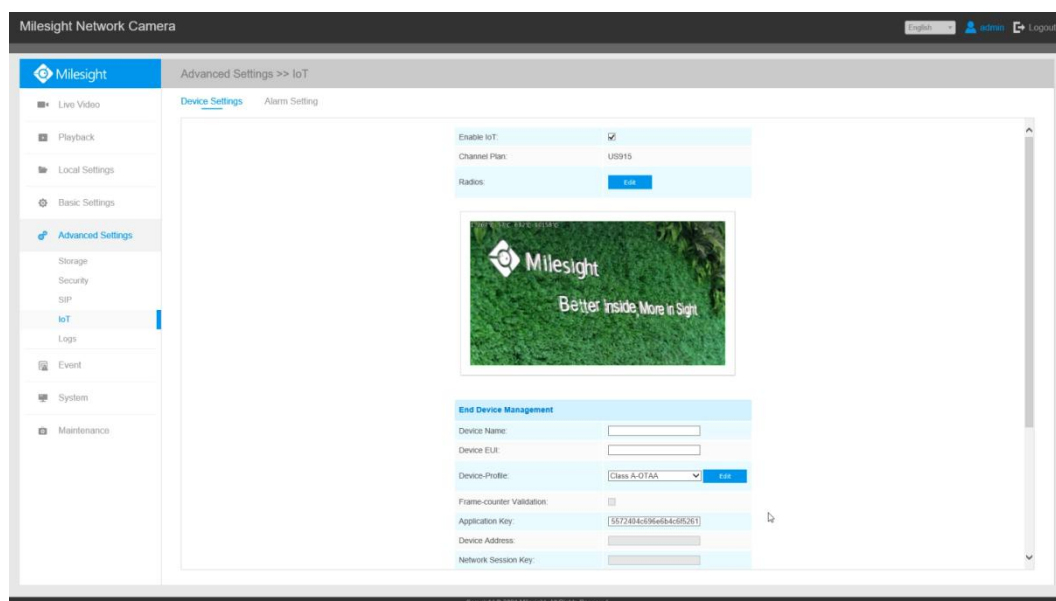
Step 2: Configure Radios Settings.

Currently our IoT camera supports three IoT frequency bands of 915M (The corresponding channel plan is **US915/AU915/KR920/AS923/AS923-2**), **868M** (The corresponding channel plan is **IN865/EU868/ RU864**) and **470M** (The corresponding channel plan is **CN470**). Before buying the camera, you need to contact our sales to choose the frequency band that is supported in your country.

For example, here I choose the IoT camera with the frequency bands of 915M or reference document regional parameters for LoRaWAN, and it will show that the current channel plan is US915 on the camera's web.

Note: Usually you can directly use the default settings without configuring Radio Settings. If you need to customize some radio settings, you can click the Edit button to make further settings as shown below.

Please refer to the meaning of the options as follows:

Parameters		Function Introduction
Radio Channel Settings	Channel Plan	The required Channel Plan can be selected according to the country region. For example, here I choose the IoT camera with the IoT frequency band of 915M, then it will list all the channel plans supported by this frequency band, including US915, AU915, AS923, AS923-2 and KR920, then I need to select the corresponding channel plan.
	Channel Mask	Enabled frequencies are controlled using channel mask. Leave it blank means using all the default standard usable channels specified in the LoRaWAN® regional parameters document. A bit in the ChMask field set to 1 means that the corresponding channel can be used for uplink transmissions if this channel allows the data rate currently used by the end-device. A bit set to 0 means the corresponding channels should be avoided. This option is optional for CN470, US915 and AU915.
	Center Frequency of Radio 0	Supports transmitting and receiving packet; Note: For details of default value and configuration ranges in different regions, please refer to Appendix 1 at the end of this document.
	Center Frequency of Radio 1	Only supports receiving packet from nodes; Note: For details of default value and configuration ranges in different regions, please refer to Appendix 2 at the end of this document.

	Multi-channel list	The radio and frequency corresponding to all channels will be listed here. All channels are enabled by default. You can also check the box to enable the corresponding channel.
LoRa Channel Settings	**Radio**	Choose Radio 0 or Radio 1 as center frequency.
	Frequency	Enter the frequency of this channel. For example： 1. The frequency range formula of US915 and AU915: Center frequency ±0.55； 2. The frequency range formula of other regions (except US915 and AU915): Center frequency ±0.4625； For example, the center frequency is configured with 867.5, then the frequency range corresponding to each channel: 867.5-0.4625~867.5+0.4625.
	Bandwidth	Enter the bandwidth of this channel. 125KHz, 250KHz and 500KHz are available. The default option is 250KHz； **Note:** The default option is 500KHz for AU915 and US915.
	Data Rate	From SF7 to SF12, the transmission rate decreases and the transmission distance increases. In general, the range of Data Rate is SF7 ~ SF12, the default value would be SF7. Only the default value of the Channel Plan AU915 and US915 is SF8.
FSK Channel Settings	**Radio**	Choose Radio 0 or Radio 1 as center frequency.
	Frequency	Enter the frequency of this channel.
	Bandwidth	Enter the bandwidth of this channel. 125KHz, 250KHz and 500KHz are available. The default option is 125KHz. **Note:** The default option is 250KHz for AU915 and US915.
	Data Rate	Enter the data rate. The Date Rate must be between 500~250000.
Additional Channels		For some regional variants, if allowed by your LoRaWAN® region, you can use Additional Plan to configure additional channels undefined by the LoRaWAN® Regional Parameters, like EU868 and KR920; **Note:** If you choose the channel plan as CN470, AU915 and US915, additional channels are not supported.

Note:

The configurations here should be the same with those in End Device.

Step 3: Add and manage End Devices.

Please refer to the meaning of the options as follows：

Parameters	Function Introduction
Device Name	Customize the device name.
Device EUI	Fill in Device EUI which can be obtained from the device label. You can also get Device EUI from Milesight Tool Box if you use Milesight Lora Sensor.
Device-profile	Usually you can use the default settings without configuring Profiles Settings. If you need to customize some profiles settings, you can click the Edit button to make further settings and click save button, it will list the Device-profiles you created.

	Please refer to the meaning of the options as follows： **[Name]**: Customize the profile name. **[Max TXPower]**: Enter the maximum transmit power. The TXPower indicates power levels relative to the Max EIRP level of the end-device. 0 means using the max EIRP. EIRP refers to the Equivalent Isotropically Radiated Power. The Max TXPower must be between 0~16. **[Join Type]**: OTAA and ABP are optional, the default option is OTAA. ➢ **OTAA:** Over-the-Air Activation. For over-the-air activation, end-devices must follow a join procedure prior to participating in data exchanges with the network server. An end-device has to go through a new join procedure every time as it has lost the session context information. ➢ **ABP:** Activation by Personalization. Under certain circumstances, end-devices can be activated by personalization. Activation by personalization directly ties an end-device to a specific network bypassing the join request - join accept procedure. **[Class Type]**: Device type is Class A by default. Users can check the box of Class B or Class C to add the class type. **[MAC Version]**: Choose the version of the LoRaWAN® supported by the end-device. 1.0.0/1.0.1/1.0.2/1.1.0 are optional, the default option is 1.0.2. **[Regional Parameters Revision]**: Revision of the Regional Parameters document is supported by the end-device.A and B are optional, the default option is B. **[RX1 Data Rate Offset]**: The offset used for calculating the RX1 data-rate is based on the uplink data-rate. **[RX2 Data Rate]**: Enter the RX2 datarate which is used for the RX2 receive-window. **[RX2 Channel Frequency]**: RX2 channel frequency is used for the RX2 Frequency receive-window. **[Frequency List]**: List of factory-preset frequencies. The range is based on what is specified in the LoRaWAN® regional parameters document.
Frame-counter Validation	If disable the frame-counter validation, it will compromise security as it enables people to perform replay-attacks. This function can be used to judge whether the package loss occurs.
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. It is mainly used to generate corresponding Device Address/Network Session Key/Application Session Key. **Note:** 1. The default key can be obtained from the end-device； 2. Milesight Sensors' default key is 5572404c696e6b4c6f52613230313823.
Device Address/Network Session Key/Application	Information needed to access the network. If you choose ABP network access mode, you need to fill in these items. And you can obtain them from End Device. For example, you can get such information from Milesight Tool Box when you use Milesight Lora Sensor.

Session Key	**Device Address:** The device address identifies the end-device within the current network.
	Network Session Key: The network session key is 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.
	The default key of Milesight Sensor is 5572404c696e6b4c6f52613230313823.
	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.
	The default key of Milesight Sensor is 5572404c696e6b4c6f52613230313823.
Uplink Frame-counter	Calculate the number of uplink frames sent from End Device to network server. This count is increased and received by the End Device. The default value is 0.
Downlink 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 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. The default value is 0.
Device Type	Select the device type according to the actual situation. Lora Sensor and Lora Sensor Node are optional. Lora Sensor is a kind of sensor that supports LoraWAN protocol, while Lora Sensor Node is a kind of device which receives data from interfaces of RS485, AI and GPIO.
Font Color	Configure the OSD font color.
Font Size	Configure the OSD font size.

Note:
① Device Name and Device EUI cannot be repeated.
② Device EUI, Application Key, Device Address, Network Session Key and Application Session Key should be consistent with the configuration of End Device.
③ Uplink Frame-counter and Downlink Frame-counter can be reset only in ABP mode.

Step 4: Sensor Settings. You can enter sensor configuration page by clicking [Sensor]. After the configuration is finished, you can click [Save] to save your configuration or click [Cancel] to cancel your configuration.

Lora Sensor

Milesight Network Camera

Sensor ID:	1
Sensor Type:	Temperature Sensor
Sign:	☑
Decimal Place:	1
Unit:	°C
Show OSD:	☑

Save   Cancel

Milesight Network Camera

LoRa Node
RS485

Port Type:	RS485
Channel ID:	5
Sensor Type:	Temperature Sensor
Sign:	☐
Decimal Place:	
Unit:	°C
Show OSD:	☐

Save   Cancel

No	Port Type	Channel ID	Sensor Type	Edit	Delete
1	RS485	1	Temperature Sensor	🔧	✖
2	RS485	2	Humidity Sensor	🔧	✖
3	RS485	3	CO2	🔧	✖

Milesight Network Camera

LoRa Node
GPIO

Port Type:	GPIO
Channel ID:	GPIO 2
Sensor Type:	Temperature Sensor
Show OSD:	☐
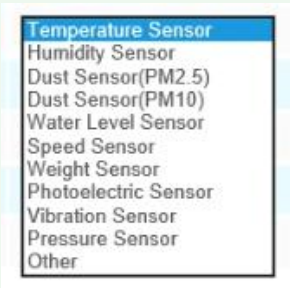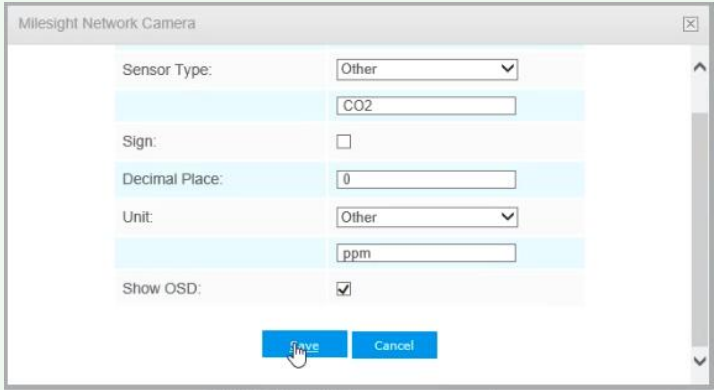
Save   Cancel

No	Port Type	Channel ID	Sensor Type	Edit	Delete
1	RS485	1	Temperature Sensor	🔧	✖
2	RS485	2	Humidity Sensor	🔧	✖
3	RS485	3	CO2	🔧	✖
4	RS485	4	Pressure Sensor	🔧	✖
5	GPIO	GPIO 1	Gate	🔧	✖

Please refer to the meaning of the options as follows：

Parameters	Function Introduction
Sensor ID	Select the Sensor ID that you want to configure. The number of sensor IDs depends on how many kinds of data the sensor has and there is a one-to-one relationship between ID and data.
Port Type	Select the correct port type according to the actual situation. RS485, GPIO and AI are available. **Note:** Only for LoRa Node;
Channel ID	Select the Channel ID that you want to configure. There are eight Channel IDs for each kind of interface.
Osh	The high value of the device range. **Note:** Only AI of LoRa Node;
Osl	The low value of the device range. **Note:** Only AI of LoRa Node;
Sensor Type	Sensor Type configuration. We have several common used sensor types as shown below: Or you can also customize it:

Sign	The tick indicates that the value has a plus or minus sign.
Decimal Place	Decimal configuration. For example, when you fill in 1, you are moving the decimal point one to left, and you get a decimal.
Unit	Data unit configuration. We have some common units here and users can also customize it.
Show OSD	As the picture shown below, once you enable this function, you can see the detected data on the screen.

Note:
①The channel ID and Sign should be consistent with those in End Device.
②Decimal Place is set according to the properties of the sensor. For example, you need to set this value to 1 to get the correct temperature when using the Milesight temperature sensor.

Step 5: You can click to modify the configuration in End Device Management.

Step 6: You can click to delete the device you added.

(2) Alarm Setting

Step 1: Select the alarm rule that you want to set and you can configure four kinds of rules.

Step 2: Check the checkbox to enable Alarm Rules.

Step 3: Click to select the sensor to alarm.

Device Settings   Alarm Setting

Alarm Rules:	Alarm Rule 1
Enable:	☑
Effective to Sensor:	Edit

Milesight Network Camera   ☒

☐ Select All

☐ EM500-CO2-915M-1-Temper...

☐ EM500-CO2-915M-2-Humidit...

☐ EM500-CO2-915M-3-CO2

☐ EM500-CO2-915M-4-Barome...

Save   Cancel

Step 4: Set threshold for the selected sensor.

When the data reaches the critical value, the alarms will be triggered. Both upper and lower thresholds are configurable. You can also only configure upper or lower threshold.
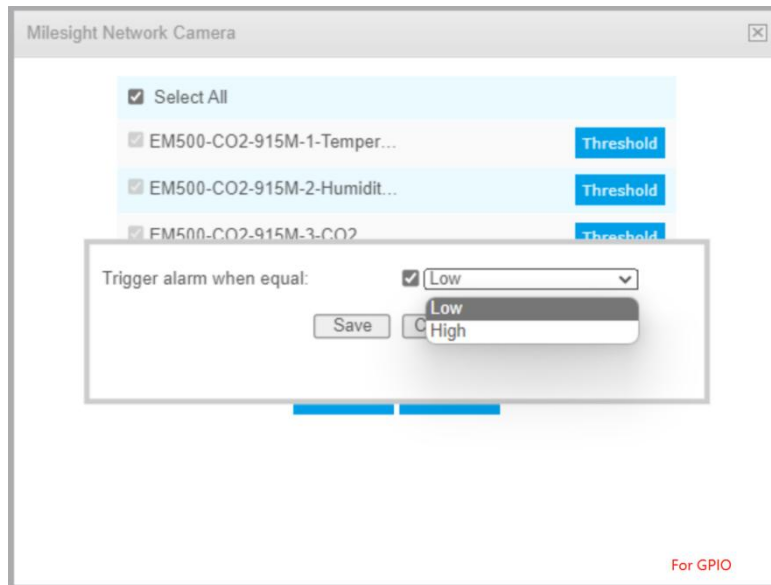
Milesight Network Camera   ☒

☐ Select All

☑ EM500-CO2-915M-1-Temper...   Threshold

☐ EM500-CO2-915M-2-Humidit...

Trigger alarm when more than: ☑ 25   ✕ ℃
Trigger alarm when less than: ☐ 0.00   ℃

Save   Cancel

Step 5: Click [Edit] to set the alarm schedule for IoT.

Step 6: Set Alarm Action.

Please refer to the meaning of the options as follows：

Parameters	Function Introduction
Save Into Storage	Save alarm recording files into SD Card or NAS.
Upload Via FTP	Upload the recording files via FTP.
Upload Via Email	Upload the files via Email.
External Output	If the camera equips with External Output, you can enable the action after configuring the trigger duration.
Alarm to SIP Phone	Support to call the SIP phone after enabling the SIP function.
HTTP Notification	Support to pop up the alarm news to specified HTTP URL.
OSD Blink	If the Show OSD in the page of sensor configuration is checked, the OSD will blink when alarm is triggered.

Step7: Set alarm settings.

Please refer to the meaning of the options as follows:

Parameters	Function Introduction
Record Video Sections	Six different periods are available (5s, 10s, 15s, 20s, 25s, 30s).
Snapshot	The number of snapshot, 1~5.
Snapshot Interval	This cannot be edited unless you choose more than 1 Snapshot.

Email Triggered Interval	Auto / 10 seconds / 20 seconds / 40 seconds / 60 seconds / 100 seconds / 5 minutes / 15 minutes / 30 minutes / 1 hour / 8 hours / 12 hours / 24 hours are available.
External Output Action Time	Length of time that an alarm lasts, this cannot be edited unless you enable the External Output on the Alarm Action firstly.
Audio Action Settings	Set the audio schedule to trigger different audio files and action times in different times, which is corresponded to alarm action.
Play Audio Interval	Auto/ 10 seconds/ 30 seconds/ 1 minute/ 5 minutes/ 10 minutes are available.
OSD Blink Time	Support to set the blinking duration of the OSD, 1~10 are Available.

For example, here I set the alarm action as OSD blink with an interval of 3 seconds, when the data reaches the critical value, the alarms will be triggered, we will see the OSD blinking on the live view interface.
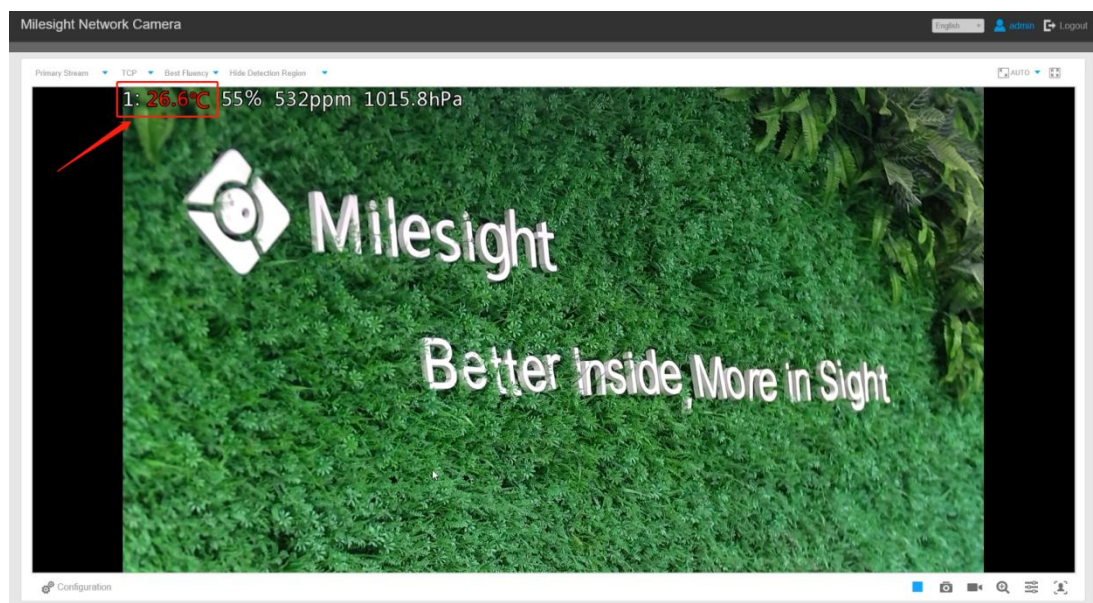
3. How to configure 5G Camera

Step 1: Insert the SIM card into the SIM card slot at the bottom of the camera, as shown below:
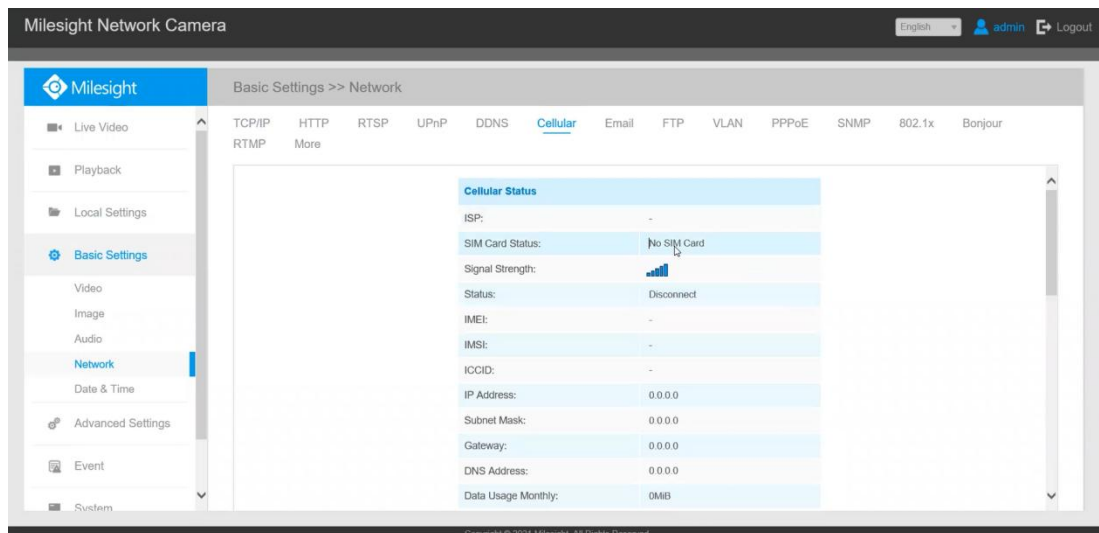

Note:
① It supports Nano SIM for SIM card slot.
② For 5G camera, the SD card slot is inside the camera, as shown below:

Step 2: After logging into the web, go to **"Basic Settings"→ "Network"→ "Cellular"**, you can check the

cellular status and set the cellular settings here, as shown below.

Note: If you use the 5G camera for the first time, it is necessary to connect the camera through the network port to access the webpage of the camera for basic configuration.

Step3: Fill in the information provided by your Internet Service Provider (ISP) to Cellular Settings interface,

then click Save to access the network successfully.
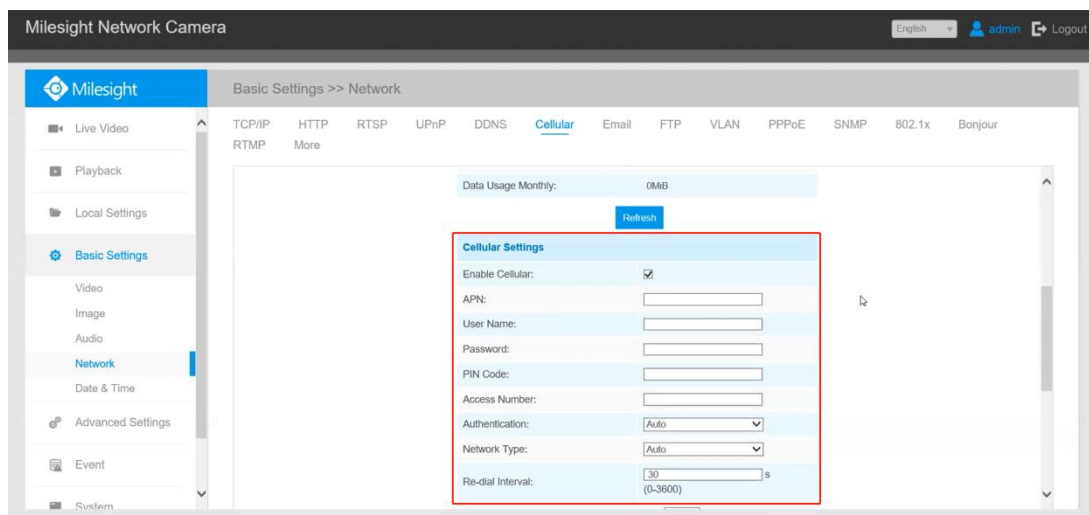
Please refer to the meaning of the options as follows:

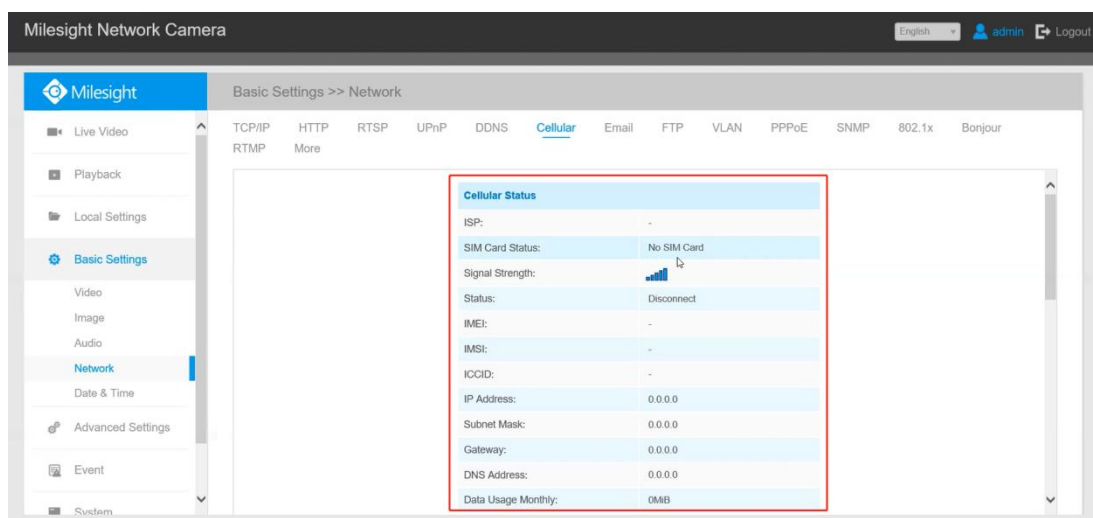| Parameters	Function Introduction
Enable Cellular	Check this option to enable 5G network.
APN	Enter the Access Point Name for cellular dial-up connection provided by local ISP.
Username	Enter the username for cellular dial-up connection provided by local ISP.
Password	Enter the password for cellular dial-up connection provided by local ISP.
PIN Code	Enter a 4-8 characters PIN code to unlock the SIM.
Access Number	Enter the dial-up center NO. For cellular dial-up connection provided by local ISP.

Authentication Type	Select the Authentication Type. There are five options including **Auto, PAP, CHAP, MS-CHAP, MS-CHAPv2** to match different Internet Service Providers. The default option is **Auto**, which can automatically match Internet Service Provider.
Network Type	Select the network type of cellular network. There are five options including Auto, 5G, 4G, 3G and 2G. **Auto:** connect to the network with the strongest signal automatically.
Re-dial Interval	Fill in the re-dial interval time. When the 5G network is offline, it will re-dial according to the interval you set. The Re-dial Interval must be between 0-3600s.
Billing Day	Select the date for clearing the data each month. Users can choose from 1st to 31st, and the system will clear the data on the date you set each month.

Note:

①For some Internet Service Provider, users only need to insert the SIM card directly to access the 5G network without additional configuration.

②As long as the SIM card is inserted and cellular is enabled, it will consume the data of the SIM card. If there is live video streaming, it will consume more data.

Step4: After connecting to the network successfully, you can check the cellular status information on Cellular Status interface, as shown below.


Please refer to the meaning of the options as follows:

Parameters	Function Introduction
ISP	Show the network provider which the SIM card registers on. **Note:** It will display "-" when the SIM card is not inserted or not recognized.
SIM Card Status	Display the connection status of SIM card. **No SIM Card:** The SIM card is not inserted. **Invalid:** The SIM card has been inserted but failed to connect to the network. **Valid:** The SIM card has been inserted and successfully connected to the network.

Signal Strength	Display the current signal strength of the network.
Status	Display the connection status of the network, including "connect" and "disconnect".
IMEI	Show the IMEI of the module.
IMSI	Show IMSI of the SIM card.
ICCID	Show ICCID of the SIM card.
IP Address	Display the IP Address, Subnet Mask, Gateway and DNS Address of the current network. If the SIM card is not inserted or not recognized, it will display 0.0.0.0.
Subnet Mask	
Gateway	
DNS Address	
Data Usage Monthly	Display current monthly used data.
Refresh	Click this button to manually refresh the above status.

Step 5: Set the schedule, the 5G network will take effect according to the schedule you set.
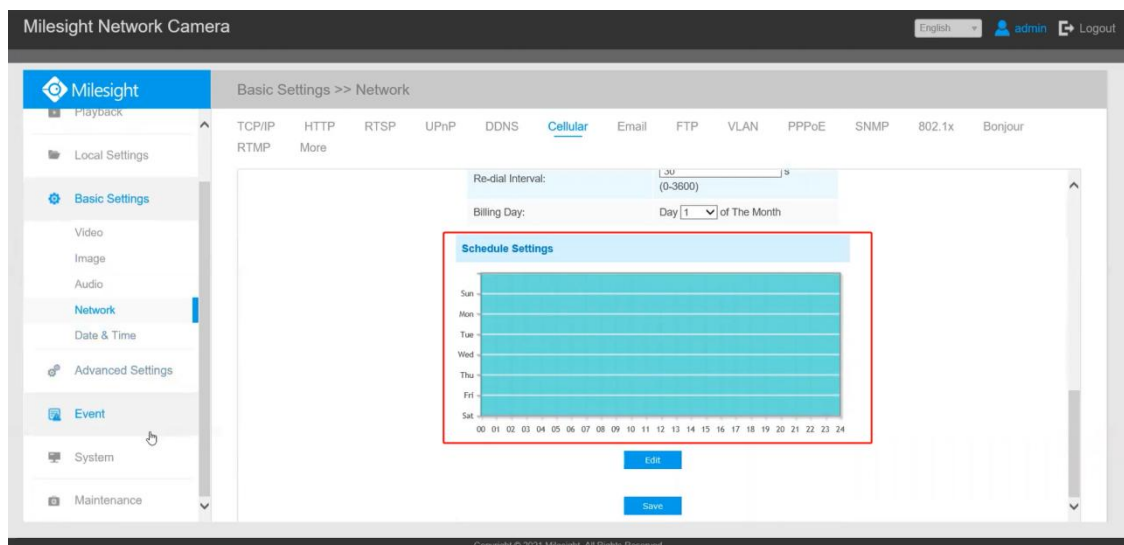
Step 6: After configuring the cellular settings, you also need to complete other basic configurations of the camera if needed, such as events, recordings, etc.

Step 7: After completing the basic settings of the camera, you can access the camera using 5G network without connecting the network cable.

4. Compatibility between 5G AIoT Camera and Milesight back-end

After completing the basic settings of 5G AIoT camera, you can access the camera through the Milesight back-end using 5G network without connecting the network cable.

- For Milesight CMS, it supports adding 5G camera <u>via P2P</u> using 5G network, and then <u>the parameter of 5G and IoT can be configured.</u>
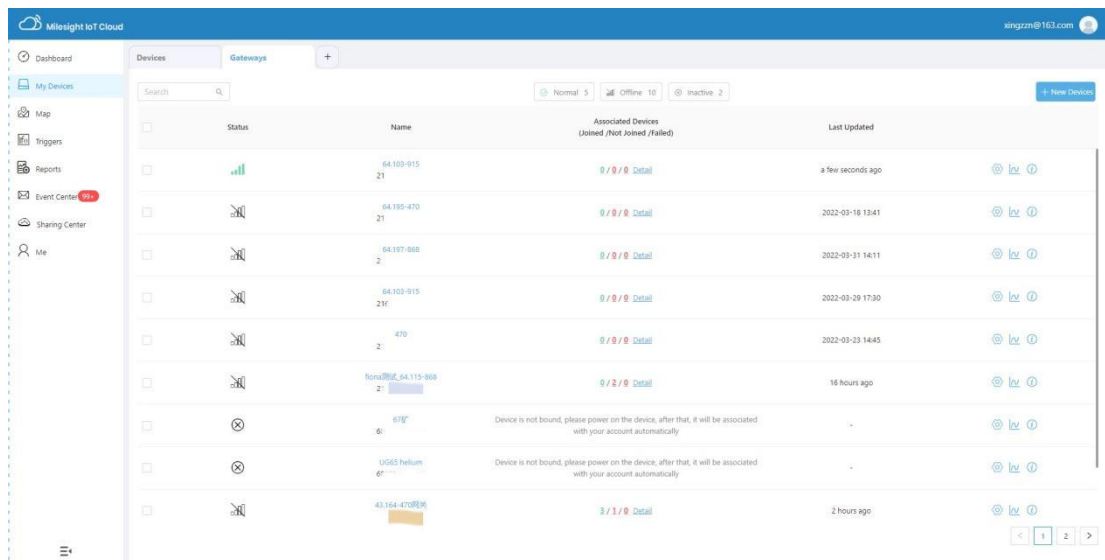

5G Settings

IoT Settings

- For Milesight VMS Enterprise, it supports adding 5G camera <u>via P2P</u> using 5G network.

- For M-sight Pro APP, it supports adding 5G camera <u>via P2P</u> using 5G network.

- For Milesight IoT Cloud, it supports <u>adding IoT Camera</u> to Milesight IoT Cloud <u>as a gateway</u>, and

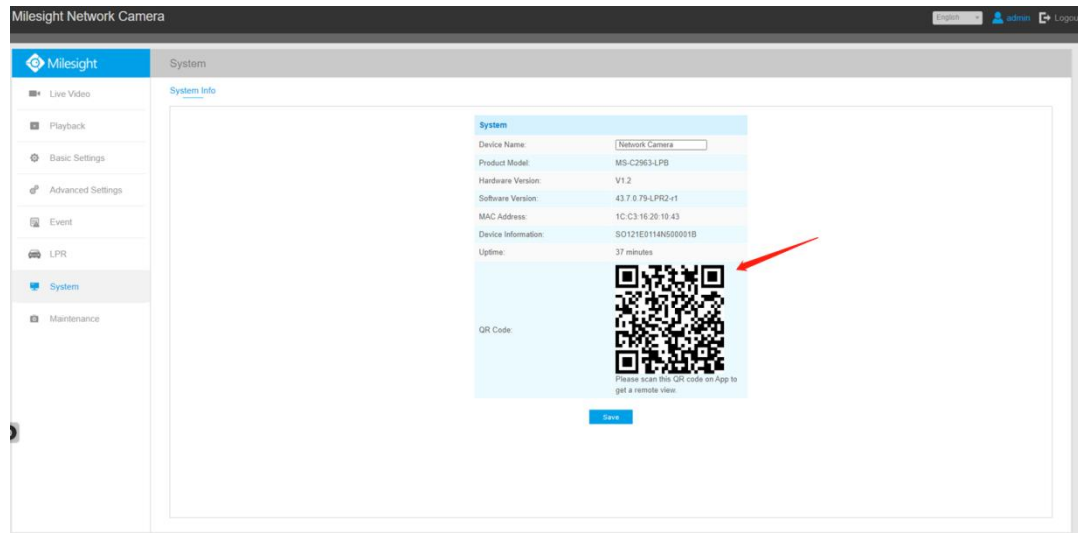then <u>manages the sensor data</u> on the cloud centrally.
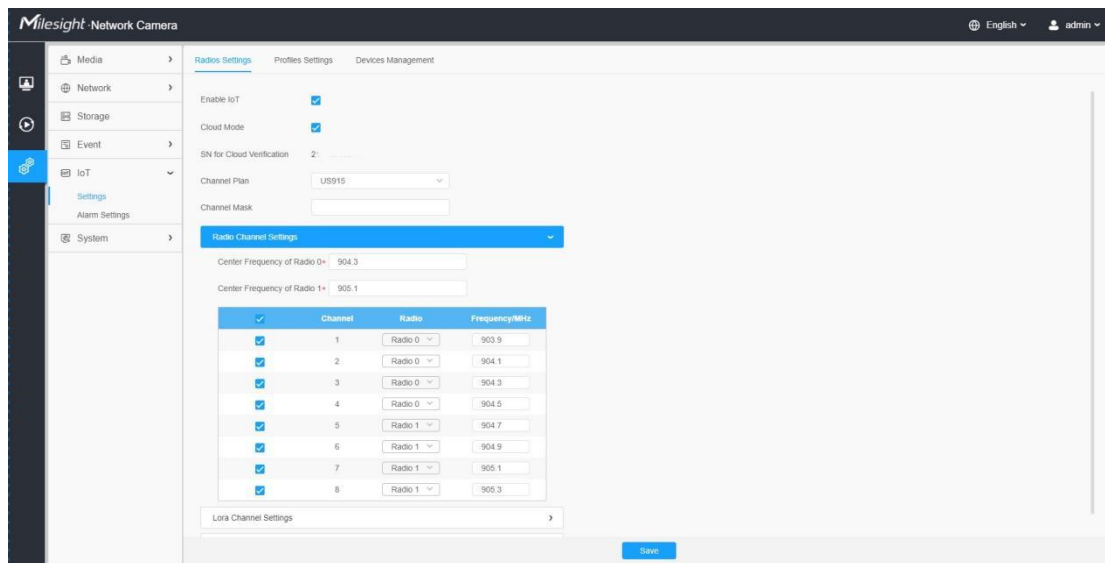
Interface of IoT Camera

Interface of Milesight IoT Cloud

Note:

①For 5G camera, the P2P function will be activated by default as shown below.

②If you don't need to use the 5G network, you can connect to the camera through a network cable to use it.

—— **END** ——

Appendix 1

According to different regions, the default value and configurable range of the **Center Frequency of Radio 0** are different, as follows：

Channel Plan	Default Value	Configurable Range
EU868	867.5	863-870
IN865	865.3	865~867
RU864	868.9	864~870
US915	904.3	902~928
AU915	917	915~928
AS923	923	915~928
AS923-2	921.5	915~928
KR920	922.3	920.9~923.3
CN470	472.3	470~510

Appendix 2

According to different regions, the default value and configurable range of the **Center Frequency of Radio 1** are different, as follows：

Channel Plan	Default Value	Configurable Range
EU868	868.5	863~870
IN865	866.385	865~867
RU864	867.7	864~870
US915	905.1	902~928
AU915	917.8	915~928
AS923	922.2	915~928
AS923-2	922.3	915~928
KR920	923.1	920.9~923.3
CN470	472.9	470~510