Milesight



VS121-P

AI Workplace Occupancy Sensor

User Guide

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Chapter 1. Preface

Copyright Statement

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Safety Instruction

Milesight will not shoulder responsibility for any loss or damage resulting from not following the instructions of this operating guide.

Warning:
Serious injury or death may be caused if any of these warnings is neglected.

- This installation must be conducted by a qualified service person and should strictly comply with the electrical safety regulations of the local region.
- To avoid risk of fire and electric shock, do keep the product away from rain and moisture before installation.
- Do not touch components which may be hot.
- Make sure the plug is firmly inserted into the power socket.
- Make sure the device is firmly fixed when installing.
- The device must not be disassembled or remodeled in any way.

CAUTION:
Injury or equipment damage may be caused if any of these cautions are neglected.

- The device must not be disassembled or remodeled in any way.
- Do not place the device where the temperature is below/above the operating range.
- The device must never be subjected to shocks or impacts.
- Do not expose the device to where a laser beam equipment is used.
- To prevent heat accumulation, do not block air circulation around the device.

- Use a soft, dry cloth to clean the lens of the device. Stubborn stains can be removed using a cloth dampened with a small quantity of detergent solution, then wipe them dry.
- Do not use volatile solvents such as alcohol, benzene or thinners as they may damage the surface finishes.

Revision History

Date	Doc Version	Description
March 15, 2023	V 1.0	Initial version
April 20, 2023	V 1.1	Add installation height of high ceiling mount version
July 15, 2023	V 1.2	1. Add people flow analysis feature; 2. Support MQTT/MQTTS transmission; 3. Add DO overcrowding alarm feature; 4. Add DI filer staff/deliverer feature; 5. Reporting interval range is extended to 5~86400s; 6. Adjust illuminance of region people counting.
April 2, 2024	V 1.3	1. Support region dwell time detection; 2. Support the cumulative number periodic report and trigger report of line cross counting; 3. Support to reset cumulative count on schedule; 4. Support to report the data on the dot; 5. Compatible with Milesight Development Platform; 6. Support data retransmission; 7. Support realtime location pushment.
July 30, 2025	V1.4	1. Add BACnet/IP protocol. 2. Remote login is compatible with Devicehub 2.0. 3. Add configuration of passwords at login, user passwords are required to contain 4 styles. 4. Add Log Management. 5. Support for importing HTTPS certificates. 6. Add Detection Persistence Time Setting.

Date	Doc Version	Description
		7. Privacy mode switching is available on the web page. 8. Customized Region Name for Region People Counting. 9. Add High-Sensitivity Mode to improve the trigger reporting speed. 10. Add 5 timestamps to reset cumulative data.
February 10, 2026	V2.0	1. Add LED Indicator switch. 2. Delete High Ceiling Mount Version.

Chapter 2. Product Introduction

Overview

Milesight VS121 is an AI workplace sensor designed to monitor occupancy and utilization in modern workspace, which can reach up to 98% recognition rata based on AI algorithm. Besides, the precise data collection and multiple privacy-friendly modes make it more user-friendly.

With PoE transmission, VS121 is available for more applications. And it equips rich serial interfaces such as DI, DO and RS485 for various scenarios. VS121 supports data push via HTTP(s)/MQTT(s) for easily integration and allows for remote management via Milesight DeviceHub.

Key Features

- Recognition rate of up to 98% based on the advanced AI identification and analysis technology and wide detection range
- Support people counting, occupancy detection and dwell time detection
- Support up to 16 mapped regions for detection
- Allow for bi-direction line crossing people counting
- Support U-turn detection for effective data and precise detection
- Support people flow analysis to calculate the traffic from different directions
- Support both normal mode, blur mode, and privacy mask for up to 8 regions
- Support schedule detection and schedule cumulative counting reset
- Support Milesight DeviceHub and Milesight Development Platform management
- Adapt to more applications with rich industrial interfaces
- High compatibility of data transmission via Ethernet port (HTTP/MQTT/HTTP API)

Chapter 3. Hardware Introduction

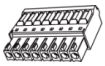
Packing List



1 × VS121 Device



4 × Wall Mounting Kits



1 × Terminal Block



1 × Mounting Sticker



1 × Warranty Card

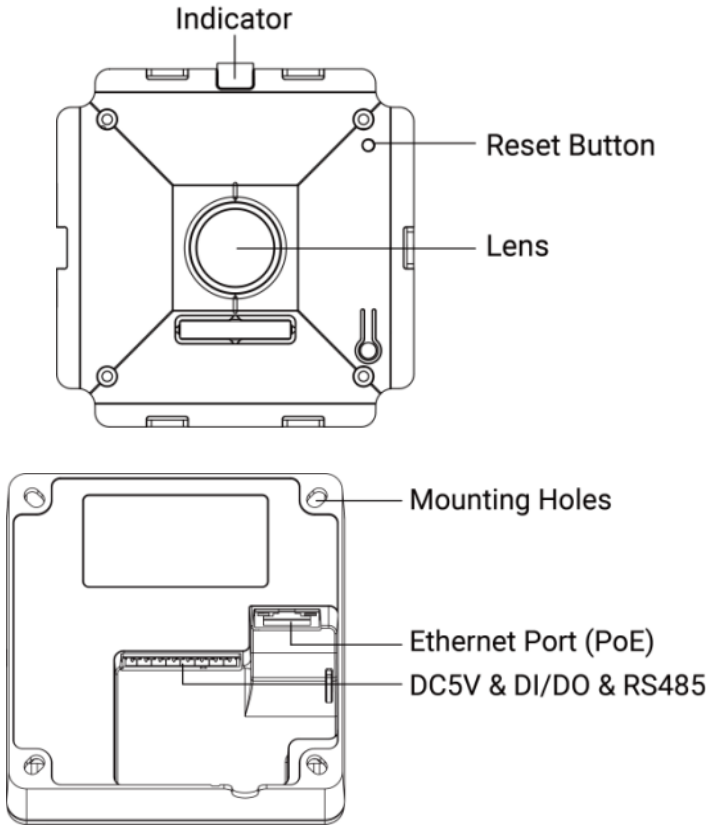


1 × Quick Start Guide

Note:

If any of the above items is missing or damaged, please contact your sales representative.

Hardware Overview

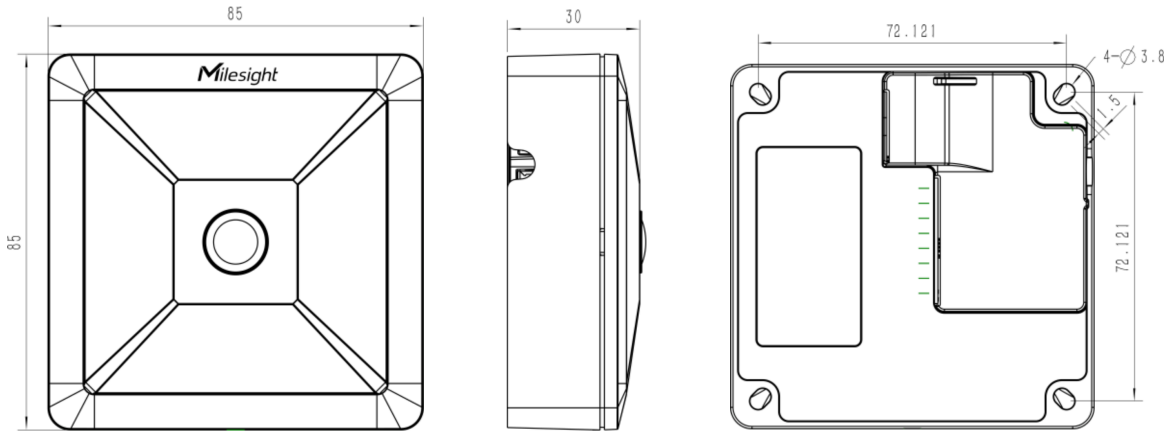


PIN	RS485	DO	DI	Power	Description
1	---	---	---	DC 5V	Positive
2	---	---	---	GND	Negative
3	---	---	DI	---	Wet contact, low level: ≤0.5V, high level: 3-5V
4	---	---	G	---	Ground
5	---	DO	---	---	Wet contact, support devices: 3.3V~12V, ≤500mA
6	---	COM	---	---	Common Ground
7	B	---	---	---	Receive Data
8	A	---	---	---	Transmit Data

Buttons and LED Indicators

Function	Action	LED Indication
On/Off Status	Power on or off the device.	Green Light On: Device is on
		Off: Device is off
Device Abnormal	/	Red Light On
Reset to Factory Default	Press and hold the reset button for more than 10 seconds.	Blinks 6 times.

Dimensions (mm)



Chapter 4. Installation

Preparation before Installation

To better utilize the advantages of AI algorithm, there are some important steps to follow:

Recommended Height for Certain Object

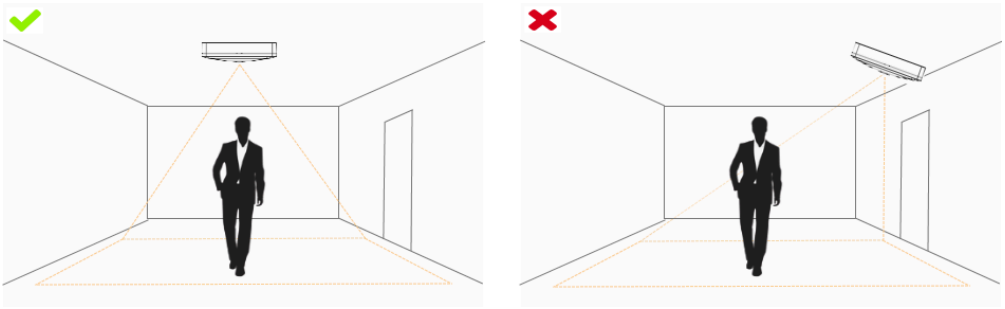
Object	Installation Height	Note
Sedentary object	> 2.5m (8.2ft)	Commonly used for Region People Counting
Standing object	> 3m (9.8ft) (the optimum height is 3m)	Commonly used for Line Crossing Counting and People Flow Analysis

Covered detection area for region people counting and people flow analysis at different heights:

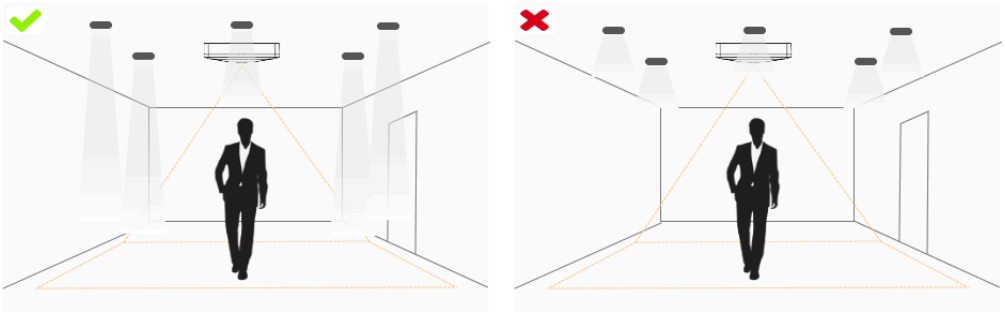
Recommended Installation Height	Covered Detection Area
2.3m	2.6m × 8.6m
2.5m	3.2m × 9.8m
2.7m	4.2m × 13.6m
3m	4.8m × 14m
3.2m	5.2m × 15.4m
3.5m	6m × 17m
4m	6.8m × 18.8m

Recommended Installation for Line Crossing Counting

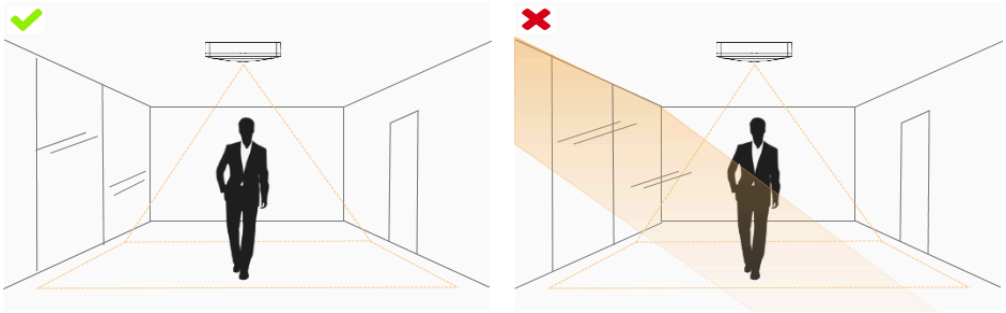
- Make sure the sensor is facing straight down, in line with the ceiling.



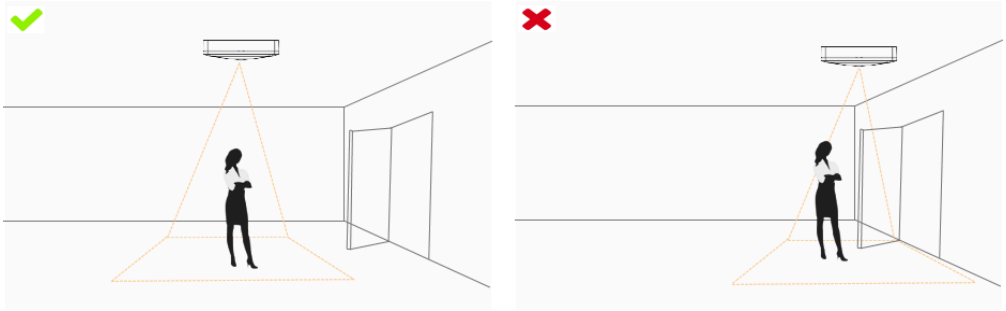
• Make sure there is sufficient white light on site.



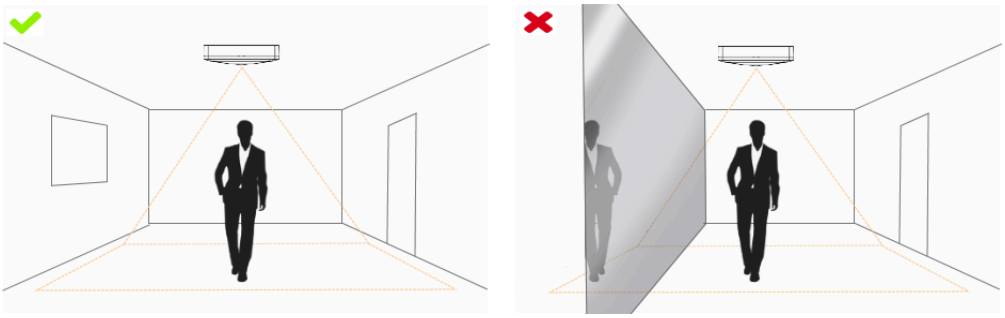
• Avoid getting very strong light, like sunlight.



• Make sure there are no moving objects interfering in the counting area. For example, do not install the sensor too close to a door.



• Avoid installing the sensor near a mirror or avoid drawing the line to the mirror.



Illuminance Requirements for AI Analysis

Region People Counting

- We recommend that the illuminance is greater than 20Lux.
- We recommend enabling WDR function, which will make the image effect better.

Line Crossing Counting and People Flow Analysis

- We recommend that the illuminance is greater than 50Lux.
- When the illuminance is between 20~50Lux, we recommend disabling WDR function.
- When the illuminance is > 50Lux and the scene has a clear contrast between light and dark (such as a corridor), we recommend enabling WDR function.

To know the illuminance of the current scene, you must use an illuminance meter, or you can refer to the following common environmental illuminance values:

Place/Environment	Illuminance
Indoors at dusk	10 Lux
cloudy indoor	5~50 Lux
sunny indoor	100~1000 Lux

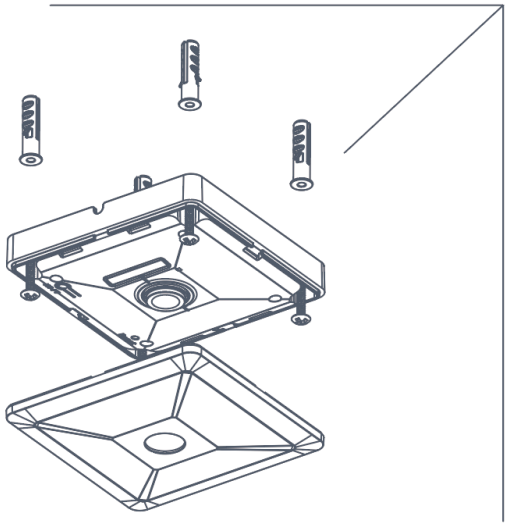
Installation Step

Step 1: Ensure the thickness of ceiling is more than 30 mm, then attach the mounting sticker to the ceiling and drill 4 holes with a diameter of 6 mm.

Step 2: Fix the wall plugs into the ceiling holes.

Step 3: Remove the cover on the device, then fix the device to the wall plugs via mounting screws; remember to adjust the mounting direction according to the detection area requirement and direction sticker on the inner cover.

Step 4: Take the cover back to device; note that the Milesight Logo should be facing the LED indicator.



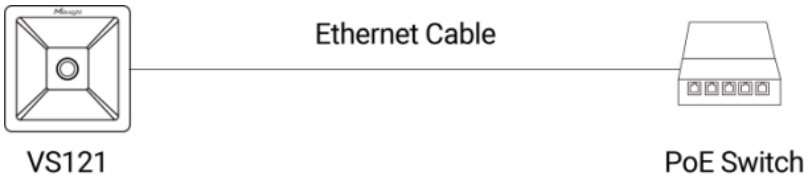
Factors Affecting Accuracy

1. When the color of hair or clothes is close to the floor color, it becomes difficult for the algorithm to identify the correct object.
2. When the floor and wall colors are black, it reduces the brightness of the scene due to light absorption.
3. When the contrast between light and dark in the scene is too strong, it can cause people to be backlit, making detection more difficult.

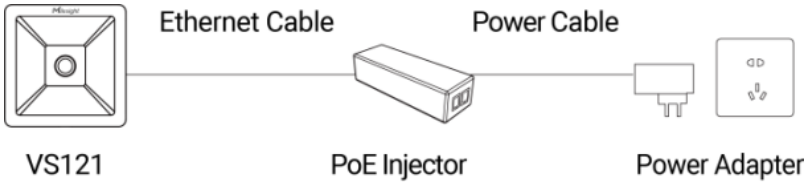
Chapter 5. Power Supply

VS121-P can be powered by 802.3af standard PoE or DC 5V power adapter. Choose one of the following methods to power up the device.

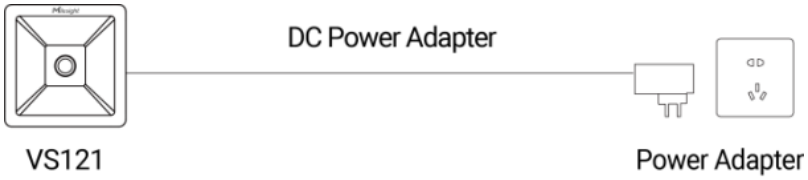
- Powered by PoE Switch



- Powered by PoE Injector



- Powered by DC Power Adapter



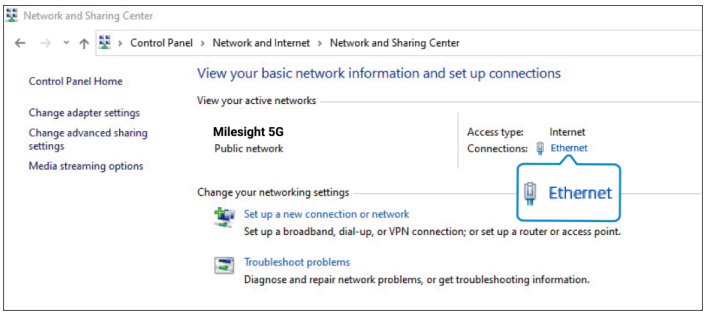
Chapter 6. Access the Sensor

VS121-P provides user-friendly web GUI for configuration and users can get access to it via Ethernet port. The recommended browsers are Chrome, Microsoft Edge, and Safari. The default Ethernet IP of the sensor is **192.168. 5.220** (can be found on the label).

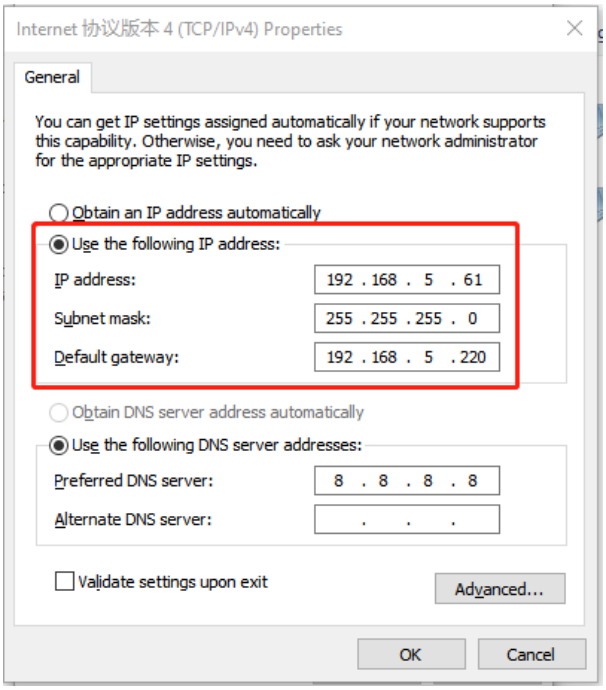
Step 1: Power on the device and connect the Ethernet port to a PC.

Step 2: Change the IP address of computer to 192.168.5.0 segment as below:

1. Go to Start→Control Panel→ Network and Internet → Network and Sharing Center→Ethernet→Properties→Internet Protocol Version 4(TCP/IPv4).

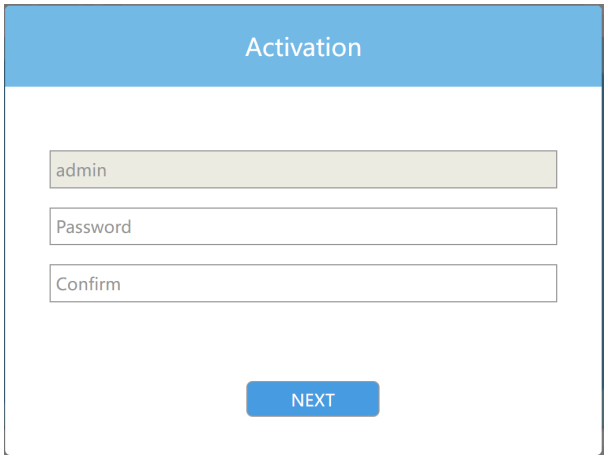


2. Enter an IP address that in the same segment with sensor(e.g. 192.168.5.61, but please note that this IP address shall not conflict with the IP address on the existing network).



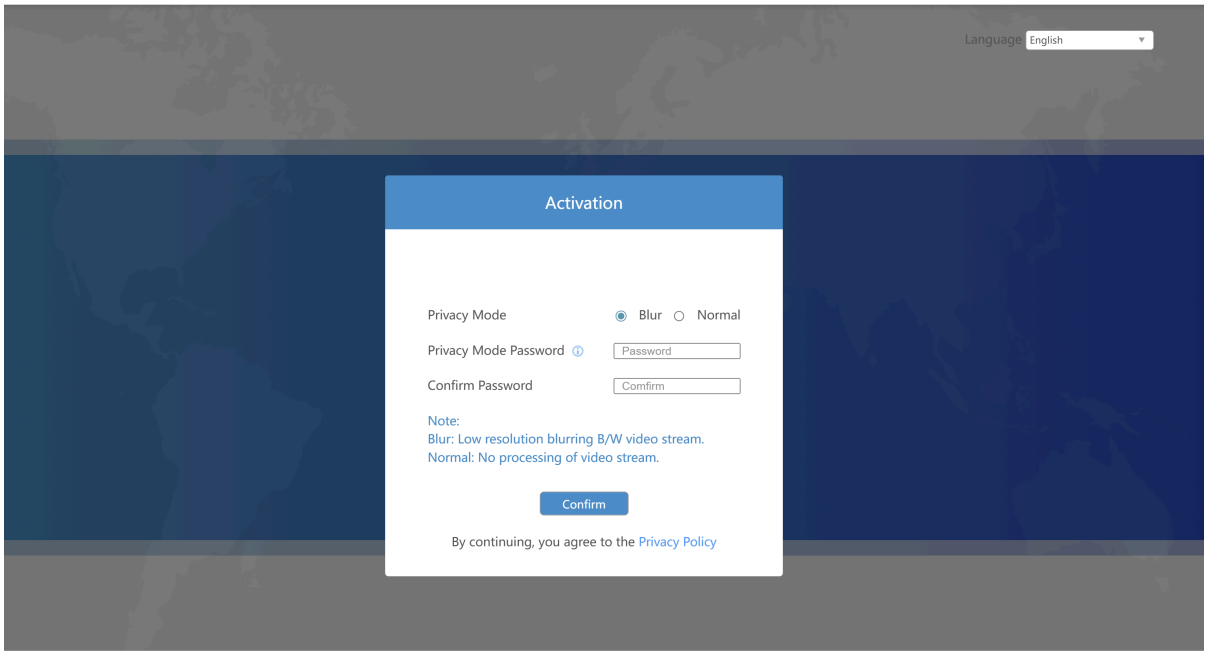
Step 3: Open the Browser and type 192.168.5.220 to access the web GUI.

Step 4: Users need to set the password and three security questions when using the sensor for the first time.



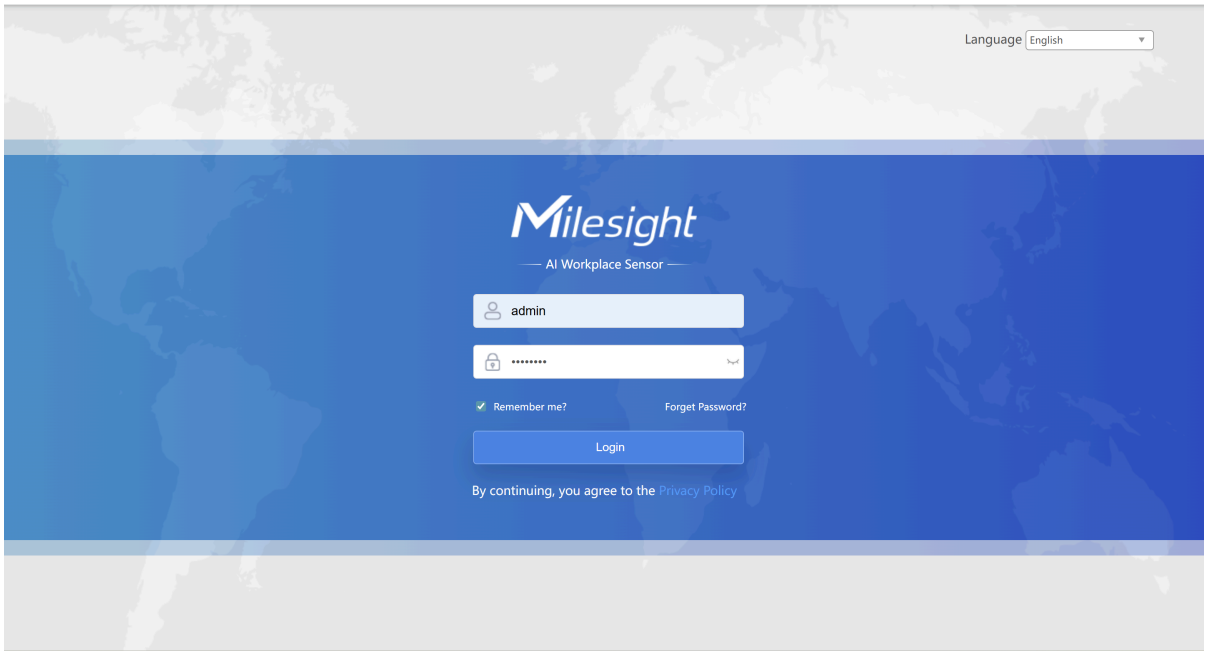


Step 5: Select the Privacy Mode for the live view display.



If you would like to switch modes in the future, please go to Privacy Settings.

Step 6: After configuration, log in with username (admin) and custom password.



Note:

1. Login password must be 8 to 63 characters long and contain numbers, lowercase letters, uppercase letters and special characters. If the password is entered incorrectly five times, the account will be locked for 10 minutes.
2. It is recommended that users regularly update their passwords to enhance device security and prevent unauthorized access.
3. You can click the “forgot 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.

Chapter 7. Operation Guide

Live Video

After logging on to the device web GUI successfully, user is allowed to view live video as follows:



Parameters	Description
Configuration	Click to access the configuration page.
People Counting (Region)	**People Counting (Region):** show the mapped or non-mapped regions of people counting. **Line Crossing Counting:** show the detection line and counting people it detected. **People Flow Analysis:** show the detection area and people it detected.

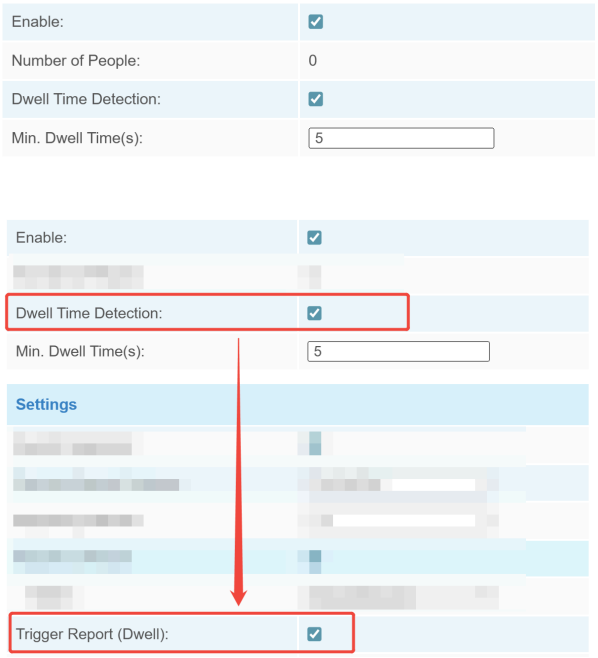
People Counting

Region People Counting

Region People Counting provides automatic, real-time statistics on the number of people within specified regions. With high-precision sensors ensuring seamless data collection, managers can easily track the current occupancy status of each space. It is ideal for conference centers and other venues that require dynamic monitoring of space utilization. Enable this feature if you need to monitor real-time headcount, detect overcrowding, or track personnel movement within certain regions.

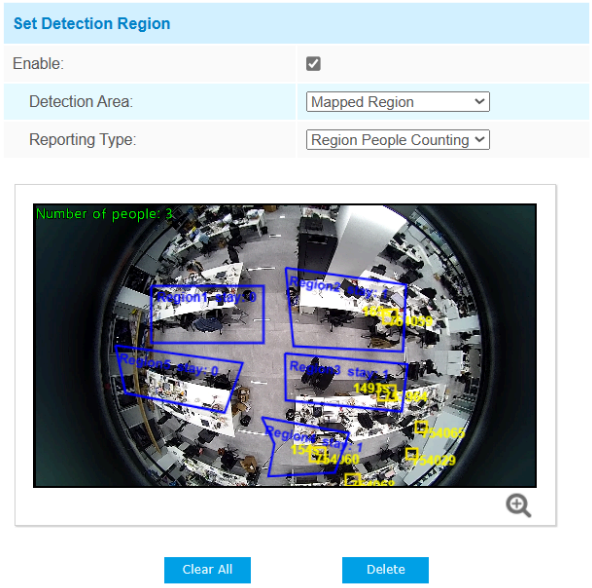
Step 1: Go to **People Counting** → **Region People Counting**, to enable region people counting feature, it will show current number of people.

If you want to know dwell time of objects within the area, enable **Dwell Time Detection** and set **Min. Dwell Time**. When the object dwells in the area longer than the set **Min. Dwell Time**, its dwell time will be reported.



Note:
Dwell time detection reports the average and maximum dwell times for **each** region.

Step 2: Draw the detection region. If you want to count the total number of people in the live view, skip this step.



1. When you want to distinguish multiple areas within the live view, enable **Set Detection Region**, choose Mapped/Non-mapped Region.

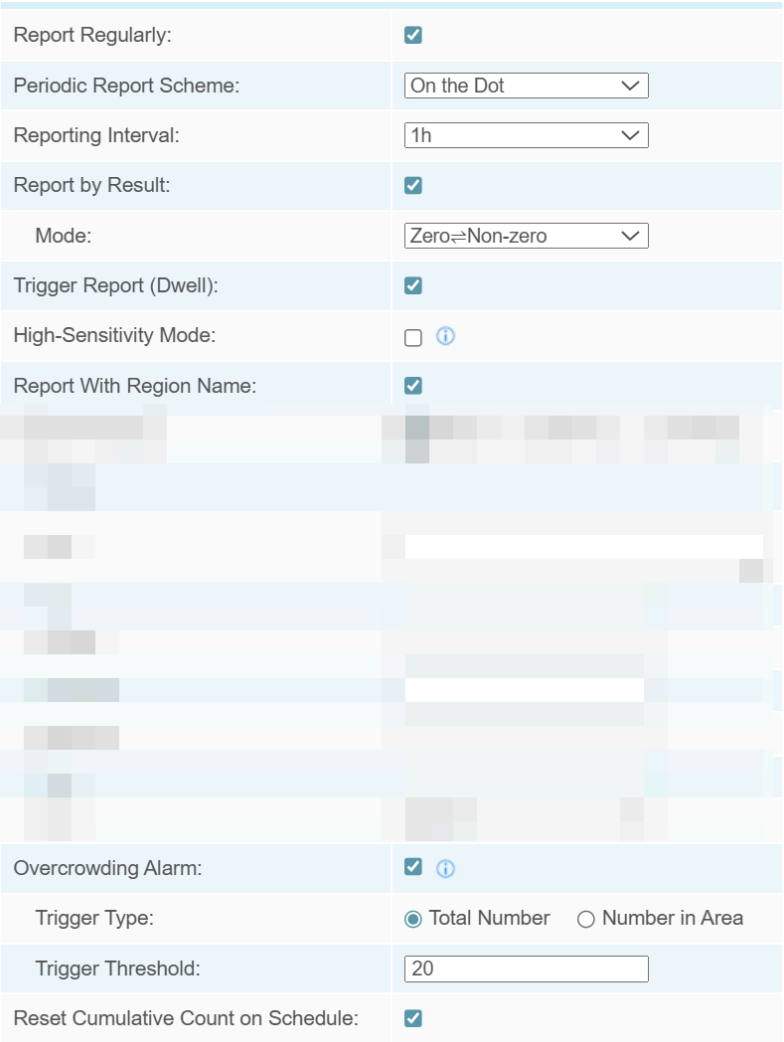
Parameters	Description
Mapped Region	Only people who are in the mapped region will be detected. There are two reporting types: **Occupancy:** report the occupancy status of per mapped region. **Region People Counting:** report the specific number of people of per mapped region.
Non-mapped Region	Only people who are not in the mapped region will be detected.

2. Move the mouse inside the live view to begin drawing the region, click to zoom in on the display.
3. Left-click to start drawing and drag the mouse to draw a line, left-click again to continue drawing an edge in a different direction, and right-click the mouse to complete the drawing. Then customize the region name. The point can be dragged to adjust the location and length, up to 16 regions are supported with maximum

10 segments each. You can click on a specific area to **Delete** it, or click **Clear All** to remove all regions.

4. Click **OK** to finish drawing.

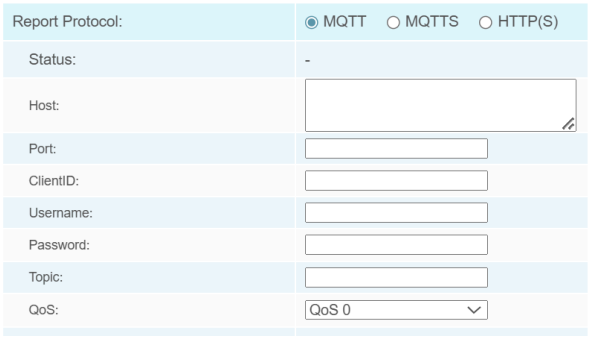
Step 3: Report setting.



Parameters	Description
Report with Timestamp	Enable or disable report the data with timestamp.
Report Regularly	Select the periodic report of "On the Dot" or "From Now On". **On the Dot:** Report at each integer moment. For example, current time is 0:07, when the interval is set to 10 minutes, it will report at 0:10, 0:20, 0:30, and so on.
Periodic Report Scheme	
Reporting Interval	

Parameters	Description
	From Now On: Begin reporting from this moment onwards and regularly report based on the interval cycle.
Report by Result	Report according to the following changes of people number result: • Zero to Non-zero/Non-zero to Zero • Once result changes
High-Sensitivity Mode	When enabled, the speed of trigger report will increase. **Note:** Trigger report speed will increase when High-Sensitivity Mode enabled, but the frequency of counting results changing will also rise.
Report With Region Name	Enable the reporting of custom region names.
Overcrowding Alarm	When the number of people is over the trigger threshold, the DO and COM will be breaked, when the number is within the threshold, DO and COM be spliced.
Trigger Type	Select the trigger type. If there is not area, the trigger type is total people number of live view. **Total number:** total people number of all drawn areas. **Number in area:** the number of people in any one area.
Trigger Threshold	The threshold people number to trigger the DO.
Reset Cumulative Count on Schedule	Enable to periodically reset cumulative count on schedule. Support up to 5 reset schedules. Cumulative Count includes: Total In/Out counting of each detection region. Max./Avg. Dwell Time of each detection region. Whenever you modify a reset time record, the reset schedule for line crossing counting will be automatically updated accordingly.

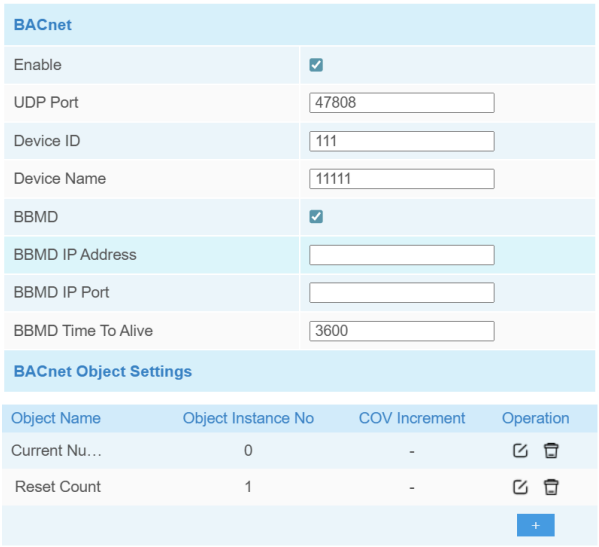
Step 4: Protocol Integration Setting.



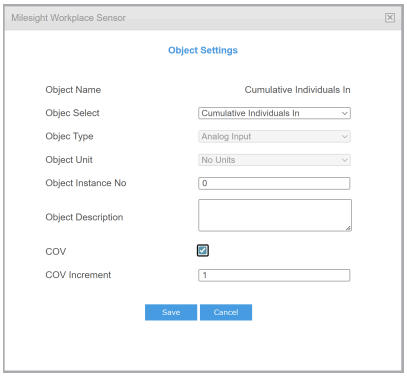
Parameters	Description
MQTT/MQTTS	
Host	MQTT broker address for receiving data.
Port	MQTT broker port for receiving data.
Client ID	The unique identity of the client to the server. It must be unique when all clients are connected to the same server, and it is the key to handle messages at QoS 1 and 2.
Username	The username used for connecting to the MQTT broker.
Password	The password used for connecting to the MQTT broker.
Topic	Topic name used for publishing.
QoS	QoS0, QoS1, and QoS2 are optional.
HTTP(S)	
HTTP Notification URL	Select among “URL 1”, “URL 2” and “URL 3”.
Enable	Enable to configure this URL.
Connection Test	Click to send test message to URL to check connectivity.
HTTP Method	Fixed as Post.
Snapshot	Enable or disable the snapshot feature. **Note:** the option is only available for normal privacy mode.

Parameters	Description
URL	The device will post the people counting data in json format to this URL.
User Name	The username used for authentication.
Password	The password used for authentication.

Step 5: BACnet Setting. If you don't need to connect to the BMS system using the BACnet protocol, skip this step.

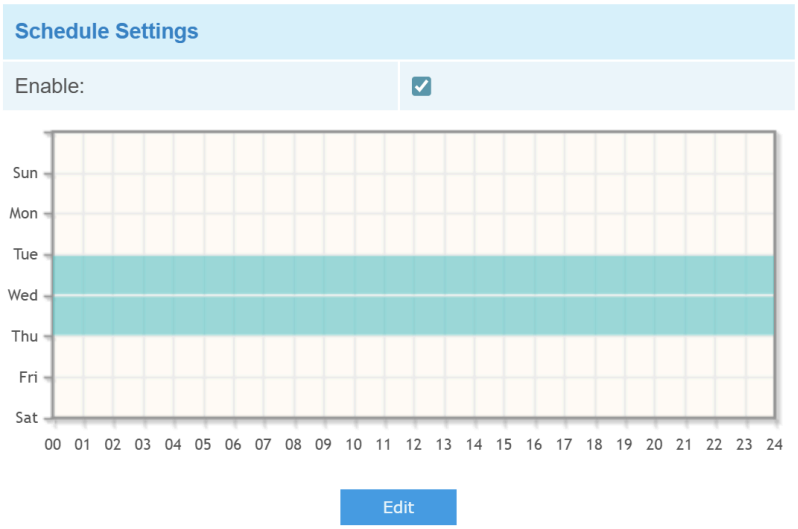


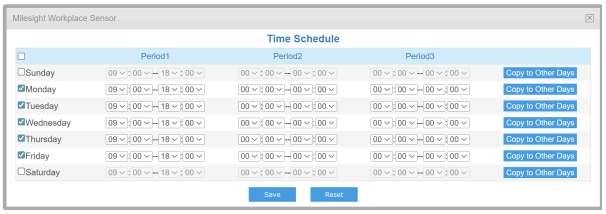
Parameters	Description
UDP Port	Set communication port of BACnet/IP. Range: 1-65535. The default port is 47808.
Device ID	The unique BACnet device identifier that must avoid conflicts with other devices. The default value is the 6th to 11th characters of SN.
Device Name	The name to represent the device.
BBMD	Enable BBMD(BACnet/IP Broadcast Management Device) if BACnet devices of different network subnets should work together. **IP Address:** Fill in the IP address of BBMD device or external device registrar. **IP Port:** Fill in the UDP/IP port for external device registration.

Parameters	Description
	Time To Live: Number of seconds used on external device registration.
BACnet Object Settings	
Object Name	Show the name of the BACnet object.
Object Select	Select the variable data for the device as an object.
Region	Select one of the detection region which object you select.
Object Instance No.	Set the unique object instance number.
Object Description	Set the object description.
COV	Enable, when object value changes, it will send notification of new value to BACnet client.
COV Increment	Set the minimum change value for the current object.

Step 6: If you want the device to count and report data continuously, skip this step.

To pause during specific periods, enable **Schedule Settings** and define weekly time blocks.





For example, as illustrated in the figure, if you select 9:00 AM to 6:00 PM from Monday to Friday, the device will only upload data within this time window. Data reporting will be disabled during all other periods. By clicking **Copy to Other Days** button on the right, you can copy all time periods at once, without having to modify each one individually.

Step 7: After completing all the settings, scroll to the bottom and click **Save** to save all your changes.

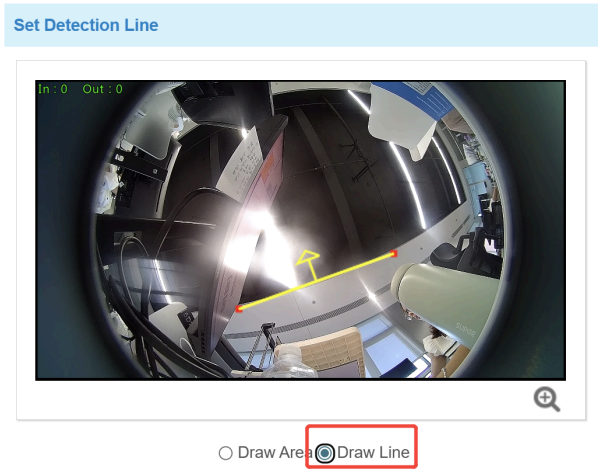
Step 8: You can view the data through periodic report and trigger report.

Line Crossing Counting

Line Crossing Counting uses a virtual line to accurately count people entering and exiting, with direction detection. It is suitable for entrances, passageways, and partitions. Enable this feature if you need to track the number of people entering or leaving an area, manage access, or distinguish the direction of foot traffic.

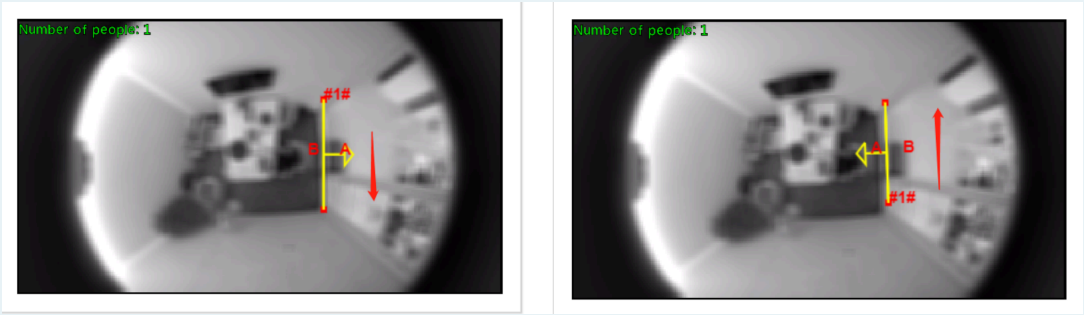
Step 1: Go to **People Counting** → **Line Crossing Counting**, to enable line crossing counting feature.

Step 2: Navigate to the live view at the bottom of the page, and click **Draw Line** to draw a detection line. You can draw only one line, click to zoom in on the display, consisting of up to four segments, crossing along the direction of the arrow means “In” and the opposite is “Out”.

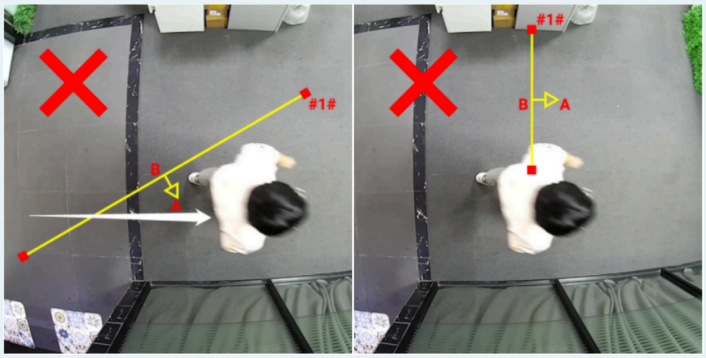


Note:

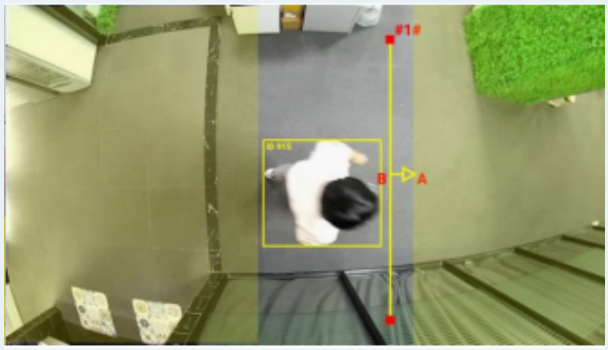
1. The arrow direction of the detection line depends on your drawing direction.



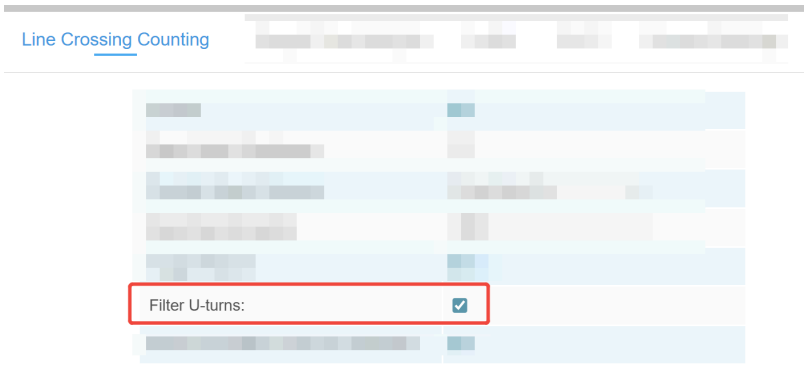
2. Ensure that the detected targets can pass through the detection line completely. It's recommended that the detection line is perpendicular to the In/Out direction and on the center of detection area without other objects around.



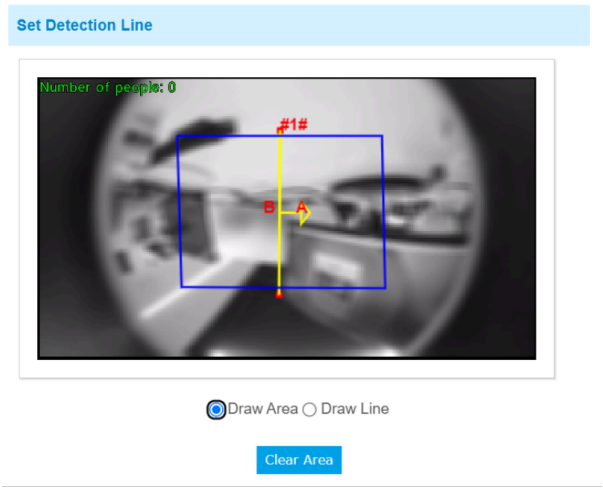
3. A redundant identification area needed to be left on both sides of the detection line for the target. This is to ensure that the sensor has stable recognition and tracking of this target before it passes the detection line, which will make the detection and count more accurate.



Step 3: The device supports the Filter U-turns function, filtering out the people who are actually not entering or exiting the entrance, to avoid repeated counting. If you don't have a need to filter out people, skip this step.



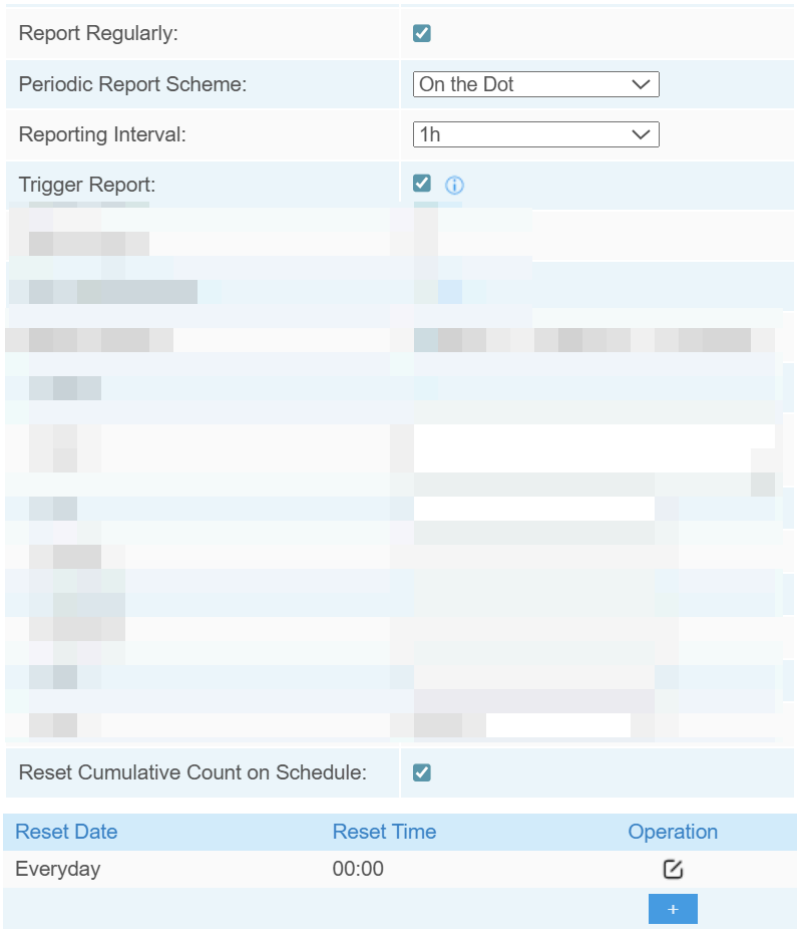
1. Enable Filter U-turns, navigate to the live view at the bottom of the page, and click **Draw Area** to draw a area around the detection line. People who remain or loiter within this area will not be included in the count. You can click to zoom in on the display.



2. Left-click to start drawing and drag the mouse to draw an edge. Then left-click again to continue drawing an edge in a different direction. Right-click the mouse to complete the drawing. The area can be dragged to adjust the location and length.
3. Click **OK** to finish drawing.

Note:
If you need to filter out staff or deliverers, enable **Filter Staff/Deliverer**, a physical button should be set at the entrance, and the button signal should be inputted into the device via DI interface to realize collaboration. The next one count will be discarded in 8 seconds once a signal is detected via DI.

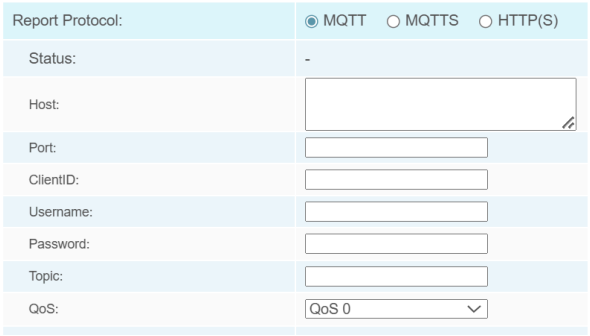
Step 4: Report setting.



Parameters	Description
Report with Timestamp	Report the data with timestamp.
Periodic Report Scheme	Select the periodic report of "On the Dot" or "From Now On". **On the Dot:** Report at each integer moment. For example, current time is 0:07, when the interval is set to 10 minutes, it will report at 0:10, 0:20, 0:30, and so on. **From Now On:** Begin reporting from this moment onwards and regularly report based on the interval cycle.
Reporting Interval	
Trigger Report	Report immediately when there is a change of the line crossing people counting number. Any further crossings within 15 seconds are accumulated and reported together at the end of the 15-second period.

Parameters	Description
	Note: Please set the periodic reporting interval to over 30 seconds when both trigger and periodic reporting are enabled.
Reset Cumulative Count on Schedule	Enable to periodically reset cumulative line cross counting values on schedule. Support up to 5 reset schedules. Whenever you modify a reset time record, the reset schedule for region people counting will be automatically updated accordingly.

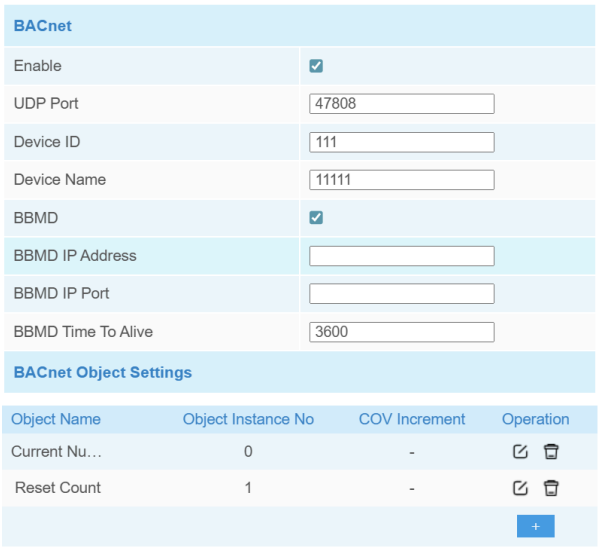
Step 5: Protocol Integration Setting.



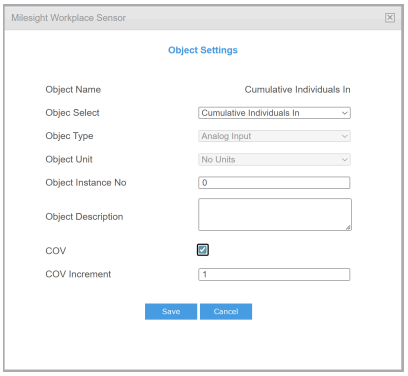
Parameters	Description
MQTT/MQTTS	
Host	MQTT broker address for receiving data.
Port	MQTT broker port for receiving data.
Client ID	The unique identity of the client to the server. It must be unique when all clients are connected to the same server, and it is the key to handle messages at QoS 1 and 2.
Username	The username used for connecting to the MQTT broker.
Password	The password used for connecting to the MQTT broker.
Topic	Topic name used for publishing.
QoS	QoS0, QoS1, and QoS2 are optional.

Parameters	Description
HTTP(S)	
HTTP Notification URL	Select among “URL 1”, “URL 2” and “URL 3”.
Enable	Enable to configure this URL.
Connection Test	Click to send test message to URL to check connectivity.
HTTP Method	Fixed as Post.
Snapshot	Enable or disable the snapshot feature. **Note:** the option is only available for normal privacy mode.
URL	The device will post the people counting data in json format to this URL.
User Name	The username used for authentication.
Password	The password used for authentication.

Step 6: BACnet Setting. If you don't need to connect to the BMS system using the BACnet protocol, skip this step.

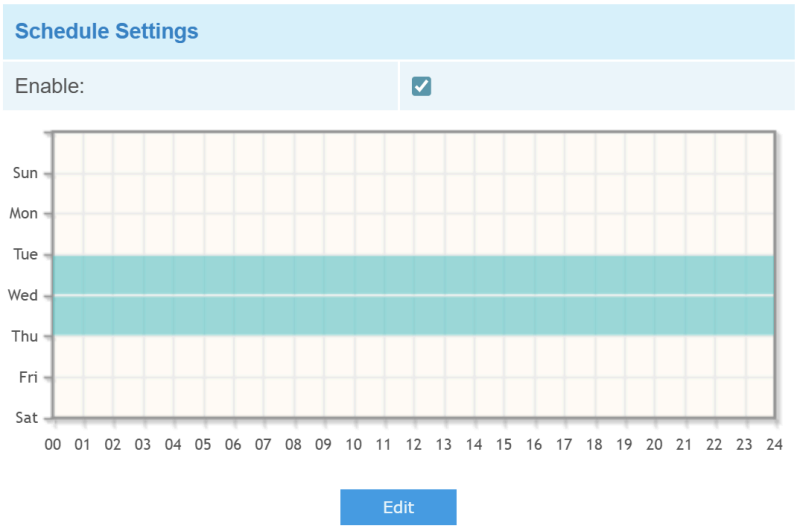


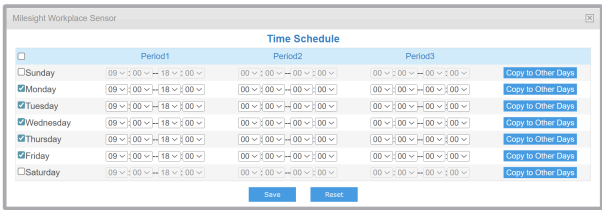
Parameters	Description
UDP Port	Set communication port of BACnet/IP. Range: 1-65535. The default port is 47808.

Parameters	Description
Device ID	The unique BACnet device identifier that must avoid conflicts with other devices. The default value is the 6th to 11th characters of SN.
Device Name	The name to represent the device.
BBMD	Enable BBMD(BACnet/IP Broadcast Management Device) if BACnet devices of different network subnets should work together. **IP Address:** Fill in the IP address of BBMD device or external device registrar. **IP Port:** Fill in the UDP/IP port for external device registration. **Time To Live:** Number of seconds used on external device registration.
BACnet Object Settings 	
Object Name	Show the name of the BACnet object.
Object Select	Select the variable data for the device as an object.
Object Instance No.	Set the unique object instance number.
Object Description	Set the object description.
COV	Enable, when object value changes, it will send notification of new value to BACnet client.
COV Increment	Set the minimum change value for the current object.

Step 7: If you want the device to count and report data continuously, skip this step.

To pause during specific periods, enable **Schedule Settings** and define weekly time blocks.





For example, as illustrated in the figure, if you select 9:00 AM to 6:00 PM from Monday to Friday, the device will only upload data within this time window. Data reporting will be disabled during all other periods. By clicking **Copy to Other Days** button on the right, you can copy all time periods at once, without having to modify each one individually.

Step 8: After completing all the settings, scroll to the bottom and click **Save** to save all your changes.

Step 9: You can view the data through periodic report and trigger report.

People Flow Analysis

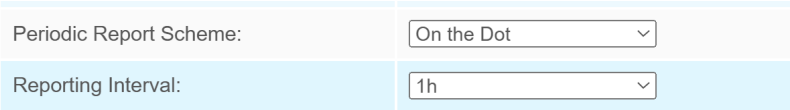
People Flow Analysis uses custom polygonal zones to track and visualize real-time movement between different boundaries. The system records how people enter and exit through various sides, showing clear patterns of flow within the area. This is ideal for public spaces and other settings where in-depth analysis of movement paths and flow directions is needed.

Step 1: Go to **People Counting** → **People Flow Analysis**, to enable people flow analysis feature.

Step 2: Move the mouse inside the live view to begin drawing the region, click to zoom in on the display. Customize a triangle or a convex quadrangle to count the flow of people moving from one edge to another, such as from B to D.

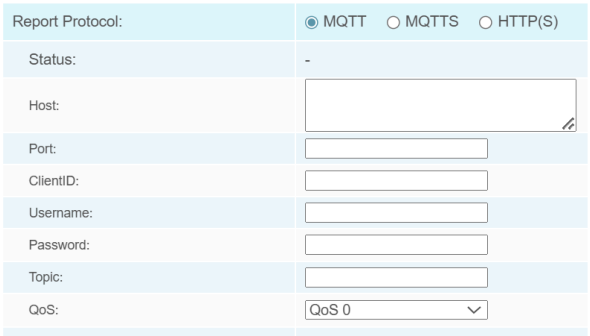


Step 3: Report setting.



Parameters	Description
Periodic Report Scheme	Select the periodic report of "On the Dot" or "From Now On". **On the Dot:** Report at each integer moment. For example, current time is 0:07, when the interval is set to 10 minutes, it will report at 0:10, 0:20, 0:30, and so on. **From Now On:** Begin reporting from this moment onwards and regularly report based on the interval cycle.
Reporting Interval	

Step 4: Protocol Integration Setting.

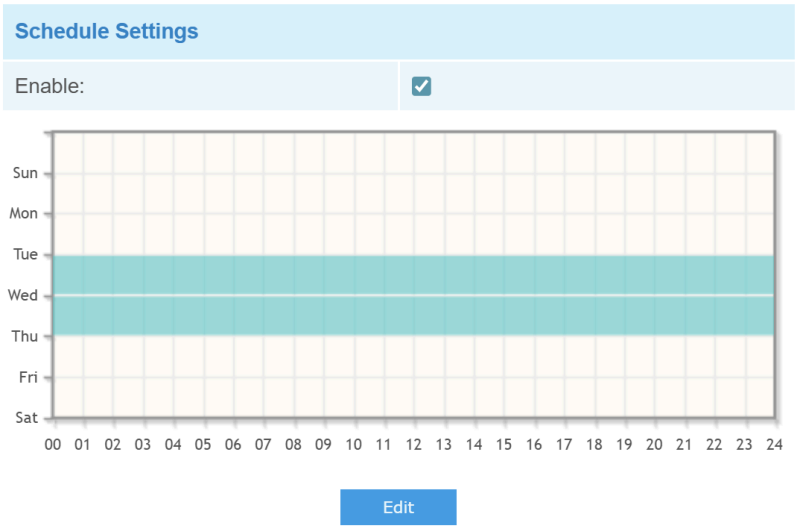


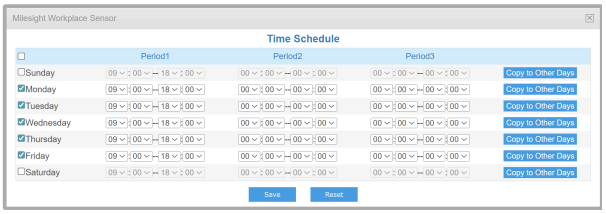
Parameters	Description
MQTT/MQTTS	

Parameters	Description
Host	MQTT broker address for receiving data.
Port	MQTT broker port for receiving data.
Client ID	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 messages at QoS 1 and 2.
Username	The username used for connecting to the MQTT broker.
Password	The password used for connecting to the MQTT broker.
Topic	Topic name used for publishing.
QoS	QoS0, QoS1, and QoS2 are optional.
HTTP(S)	
HTTP Notification URL	Select among “URL 1”, “URL 2” and “URL 3”.
Enable	Enable to configure this URL.
Connection Test	Click to send test message to URL to check connectivity.
HTTP Method	Fixed as Post.
Snapshot	Enable or disable the snapshot feature. **Note:** the option is only available for normal privacy mode.
URL	The device will post the people counting data in json format to this URL.
User Name	The username used for authentication.
Password	The password used for authentication.

Step 5: If you want the device to count and report data continuously, skip this step.

To pause during specific periods, enable **Schedule Settings** and define weekly time blocks.





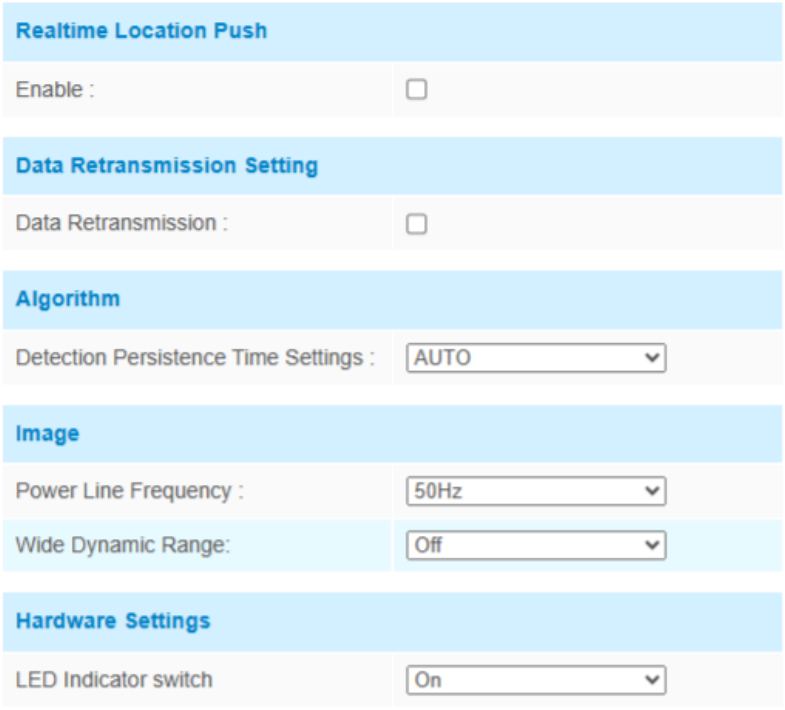
For example, as illustrated in the figure, if you select 9:00 AM to 6:00 PM from Monday to Friday, the device will only upload data within this time window. Data reporting will be disabled during all other periods. By clicking **Copy to Other Days** button on the right, you can copy all time periods at once, without having to modify each one individually.

Step 6: After completing all the settings, scroll to the bottom and click **Save** to save all your changes.

Step 7: You can view the data through periodic report.

Advance Settings

General Settings



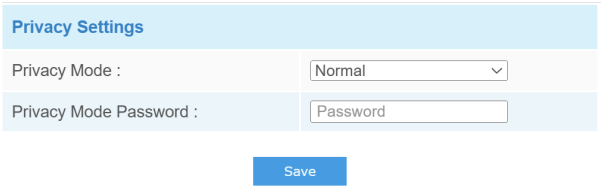
Parameters	Description
Realtime Location Push	Work as a TCP server to push the realtime location information of people to TCP clients. **Note:** The TCP port should be different from other used service ports.
Data Retransmission Setting	Enable to resend stored data packets from the disconnected period when the device's network connection is restored. Every recipient can receive 1,000 pieces of data at most (totally 3,000 pieces). This only works with the trigger report and periodic report of region people counting, line cross counting or people flow analysis without snapshot information.
Recognition Scheme	Select the recognition scheme of region people counting based on your detection environment.

Parameters	Description
	Algorithm 1: Suitable for monitoring complex environments which have many objects, like office supplies (books, printers, lamps, etc.) **Algorithm 2:** Suitable for monitoring simple and clean environments like meeting rooms.
Detection Persistence Time Settings	To address the issue of short-term detection interruptions caused by partial occlusion (e.g., raised hands or clothing), the device introduces a Detection Persistence Time setting. This feature allows the system to retain the same target ID within a defined duration, even if the target momentarily disappears from view. It ensures more accurate dwell time statistics, especially in environments like elevators or meeting rooms. 1. If the target remains at or returns to its original position before the duration expires, the original ID is preserved. 2. If the target fails to return to its original position after the duration expires, a new ID will be assigned. 3. If another target occupies the original position before the duration expires, the IDs of the two targets may be exchanged. Users can choose between two modes: **Auto:** The device automatically determines persistence based on algorithm logic. **Custom:** Users can manually define a time to maintain the target ID after disappearance for improved tracking continuity. **Note:** This feature is intended for environments with low movement and a limited number of people, such as elevator waiting areas. Using it in crowded or highly dynamic settings may reduce detection accuracy.
Image	**Power Line Frequency:**Select based on your power source frequency standard, 60 Hz and 50 Hz are available.

Parameters	Description
	Wide Dynamic Range: This function which can capture and display both bright and dark areas in the same frame that enables details of objects in both bright and dark areas to be visible. It's recommended to enable this function when the scene has a clear contrast between light and dark (such as a corridor).
Hardware Settings	**LED Indicator Switch:** Enable or disable LED indicator when device is in normal operation.

Privacy Setting

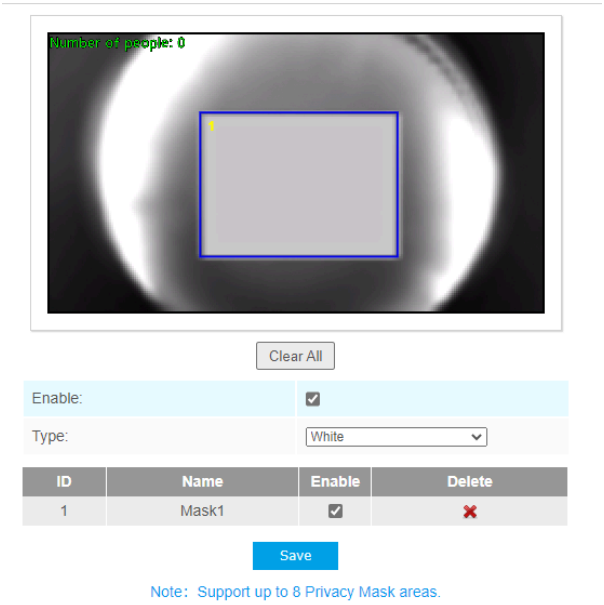
Users can switch the view mode here when they want to change how the screen is presented. This password is the same one you set when you first enabled Privacy Mode during login.



Note:
If you want to change Privacy Mode password, press and hold the reset button on the device for more than 10 seconds. After the device resets, log in again and follow the prompts to set a new password.

Privacy Mask

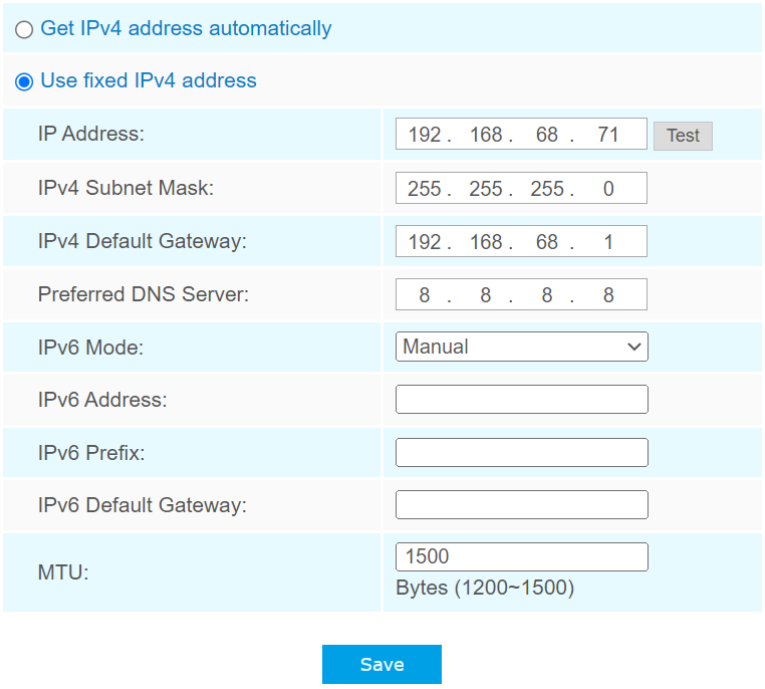
Privacy mask enables to cover certain areas on the live video to prevent certain spots in the surveillance area from being viewed and prevent people within the area from being counted. You can set 8 mask areas at most.



Parameters	Description
Enable	Check the checkbox to enable the Privacy Mask function.
Clear All	Clear all areas you drew before.
Type	Select the color for the privacy areas, there are two colors available: White and Black.

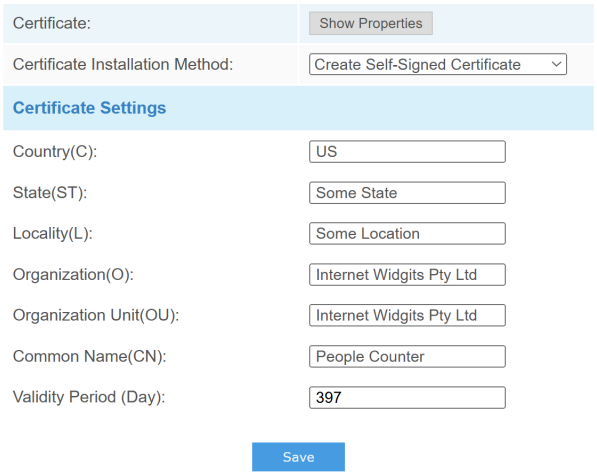
Network

TCP/IP



Parameters	Description
IP Address	An address that used to identify the sensor on the network.
Test	Click test button to test if the IP address is conflicting.
IPv4 Subnet Mask	It is used to identify the subnet where the sensor is located.
IPv4 Default Gateway	The default router address.
Preferred DNS Server	The DNS Server translates the domain name to IP address.
IPv6 Mode	Select from “Manual”, “Router Advertisement” or “DHCPv6”.
IPv6 Address	IPv6 address used to identify the sensor on the network.
IPv6 Prefix	Define the prefix length of IPv6 address.
IPv6 Default Gateway	The default router IPv6 address.
MTU	Maximum transmission unit. The default value is 1500. Range: 1200~1500.

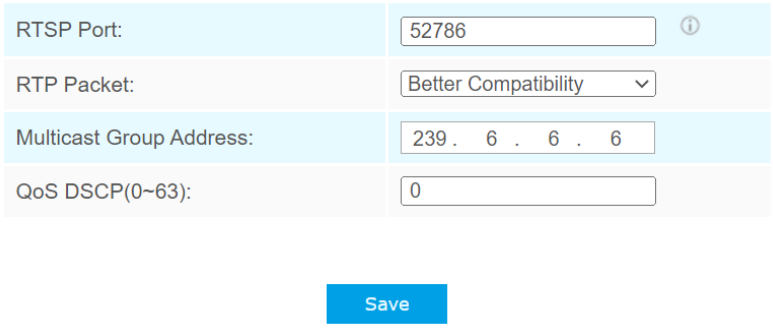
HTTPS



Parameters	Description
Certificate	Click to show the Certificate Properties.
Certificate Installation Method	**Create Self-signed Certificate:** upload the custom CA certificate, client certificate and secret key for verification. **Direct Installation Certificate:** upload the ".pem", ".crt", or ".cer" format custom direct installation certificate for verification.
Direct Installation Certificate	
Key Password	If the uploaded direct installation certificate requires key decryption, enter the password here to verify the certificate.
Create Self-signed Certificate	
Country(C)	Input the country code of your country, like US, CN, FR
State (ST)	Input the name of your State or Province, like California
Locality (L)	Input the name of your city, like San Francisco
Organization (O)	Input the name of your company or organization
Organization Unit(OU)	Input the name of your department or unit
Common Name(CN)	Specify the domain name of the server (e.g., your-domain.com). The client will use this name to verify whether the certificate matches the server it is accessing.
Validity Period (Day)	Input the certificate validity period, default: 397

RTSP

RTSP is only available for Normal privacy mode.



Parameters	Description
RTSP Port	The port of RTSP, the default is 554.
RTP Packet	Select from “Better Compatibility” and “Better Performance”.
Multicast Group Address	Configure the address of multicast group.
QoS DSCP	The valid value range of the DSCP is 0-63.

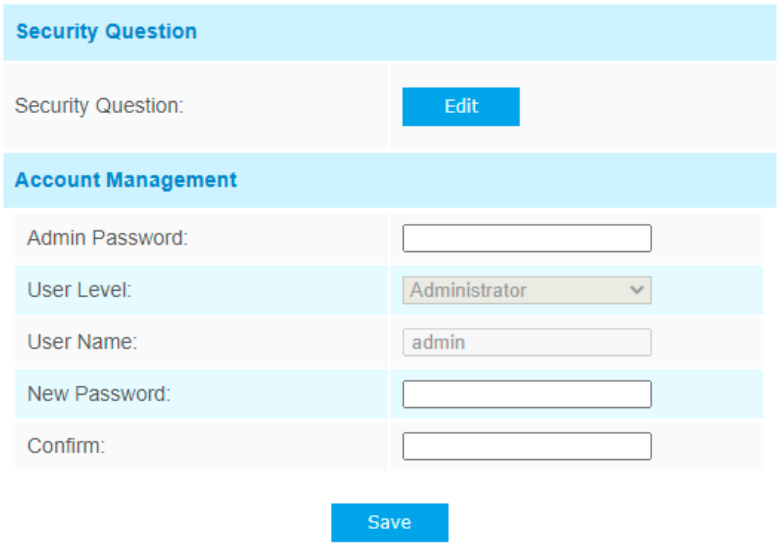
RTSP URL	
Stream	**URL**
Primary Stream	rtsp://IP:RTSP Port/main

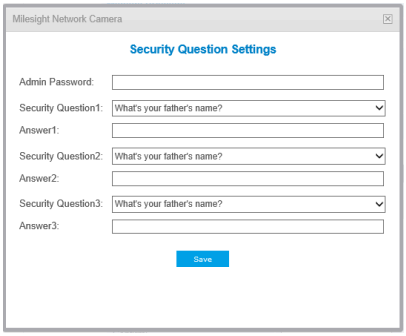
Note:

- DSCP refers to the Differentiated Service Code Point, the value of DSCP is used in the IP header to indicate the priority of the data.
- A reboot is required for the settings to take effect.

System

User

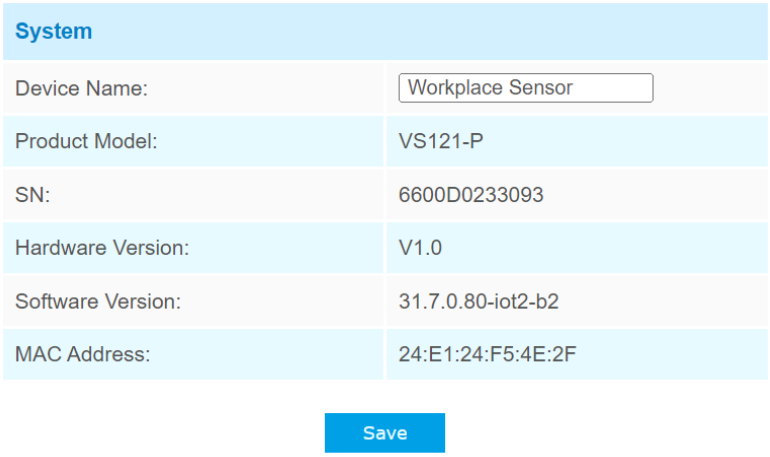


Parameters	Description
Security Question	Click **Edit** button to set three security questions for your device. In case that you forget the password, you can click **Forget Password** button on login page to reset the password by answering three security questions correctly.  There are twelve default questions below, you can also customize the security questions. 

Parameters	Description
Account Management	**Admin Password:** enter the correct admin password before adding an account. **User Level:** It's fixed as Administrator. **User Name:** It's fixed as admin. **New Password:** Input password for the account. **Confirm:** Confirm the password.

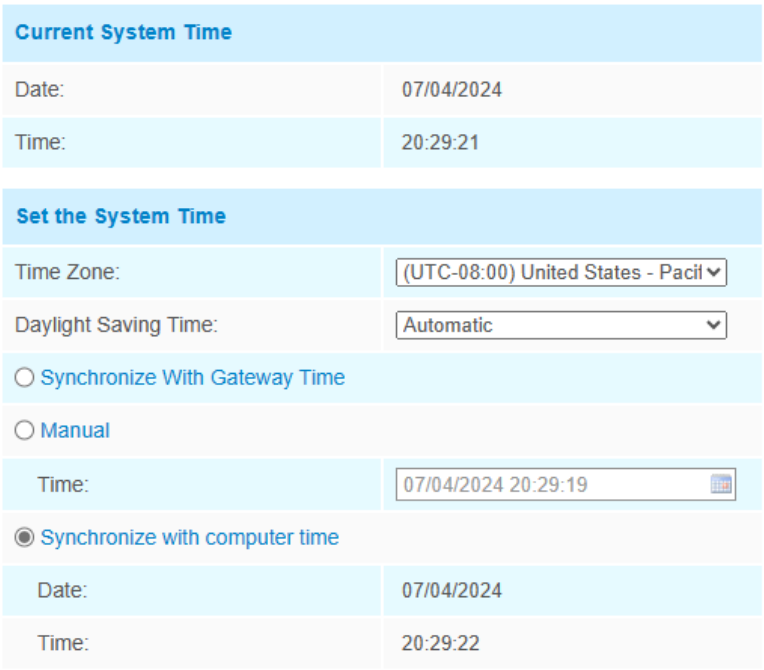
System Info

All information about the hardware and software can be checked on this page.



Date & Time

Here you can check and set the system time.

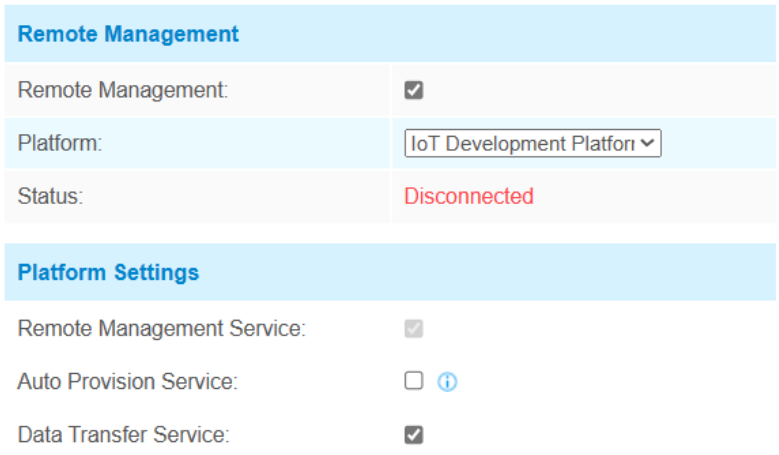


Parameters	Description
Current System Time	Current date & time of the system.
Time Zone	Select a time zone according to your location.
Daylight Saving Time	Enable or disable the daylight saving time.
NTP server	Synchronize the system time with NTP server.
	Server Address: Setup the address of NTP server.
	NTP Sync: Update the time according to the interval time regularly.
Manual	Set the system time manually.
Synchronize with computer time	Synchronize the system time with the computer.

Remote Management

Milesight provides remote management service for this device via Milesight DeviceHub platform or Development Platform.

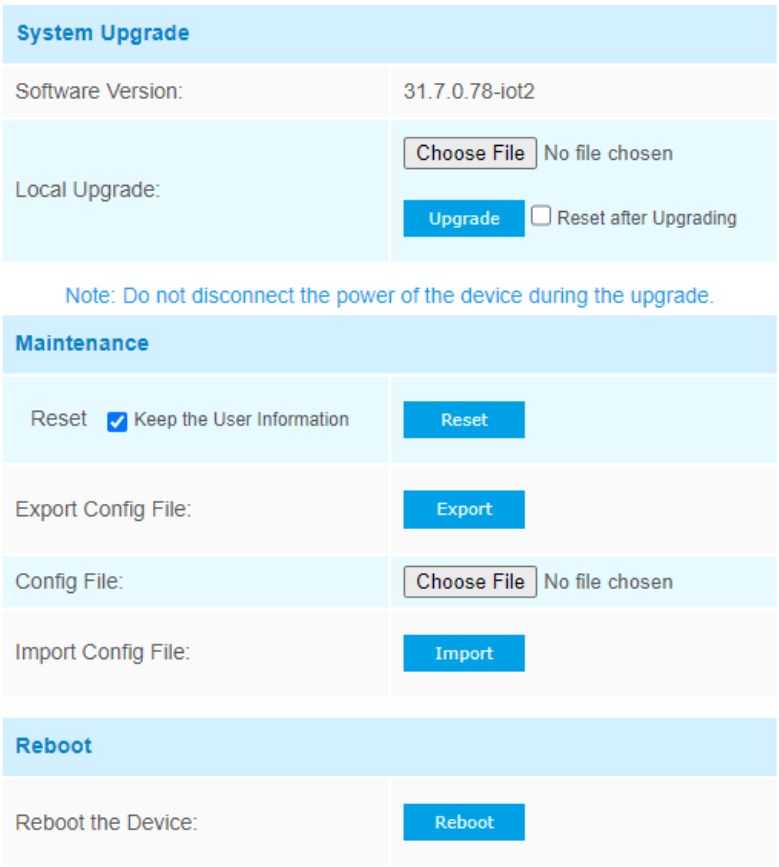
Note:
Before connecting, do ensure that the device has been connected to the network via Ethernet port, and there is seamless Internet connection.



Parameters	Description
Remote Management	
Remote Management	Enable or disable to manage the device through Milesight platforms.
Platform	DeviceHub, DeviceHub 2.0 or IoT Development Platform is optional.
Status	Show the connection status between the device and the platform.
DeviceHub	
Server Address	IP address or domain of the DeviceHub management server.
Activation Method	Select activation method to connect the device to the DeviceHub server, the options are **Authentication Code** and **Account**.
DeviceHub 2.0	
Server Address	IP address or domain of the DeviceHub 2.0 management server.
Synchronize Device Name	Enable or disable to synchronize device name on devicehub 2.0.
IoT Development Platform	
Remote Management Service	Enable to change the device settings via Milesight Development platform.

Parameters	Description
Remote Management	
Auto Provisioning	Enable to receive and deploy the configurations from Milesight Development Platform after the device is connected to Internet.
Data Transfer Service	Report people counting data to Milesight Development platform.

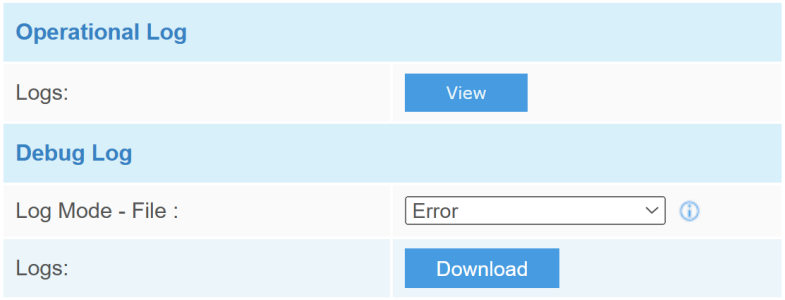
System Maintenance

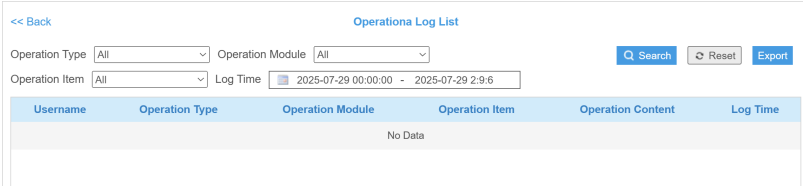


Parameters	Description
System Upgrade	**Software Version:** The software version of the sensor. **Local Upgrade:** Click the **Choose File** button and select the upgrading file, then click the **Upgrade** button to upgrade. After the system reboots successfully, the update is done. You can check **Reset after Upgrading** to reset the device after upgrading it.

Parameters	Description
	Note: Do not disconnect the power of the device during the upgrade process. The device will be restarted to complete the upgrading.
Maintenance	**Reset settings:** Click **Reset** button to reset the device to factory default settings. **Keep the User Information:** Check this option to keep the user information when resetting. **Export Config File:** Export configuration file. **Import Config File:** Click the **Choose File** button and select the configuration file, click **Import** button to import configuration file.
Reboot	Restart the device immediately.

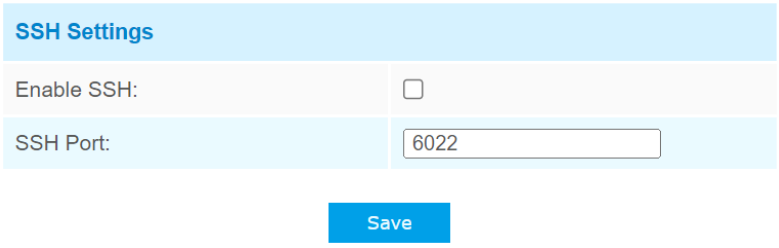
Log Management



Parameters	Description
Operational Log	
Logs	Please choose the operation and the time range for the logs you wish to view.  You can choose to **Search**, **Reset**, or **Export** this operation log.
Debug Log	

Parameters	Description
Log Mode - File	Select the desired level of log files to download for troubleshooting. Error: Records errors that are abnormal and affect critical functions. Debug: Records detailed internal operational and status information. **Note:** For regular use, please select the "Error" log level. Selecting the "Debug" level may cause some earlier logs to be overwritten.
Logs	Click **Download** to export the debug logs.

Security Service



Parameters	Description
Enable SSH	Enable SSH feature.
SSH Port	Set the port to access this sensor via SSH.

About

User can view some open source software licenses about the sensor by clicking the View Licenses button.



Chapter 8. Communication Protocol

VS121-P will post the people counting data in json format to HTTP URL or MQTT broker.

Region People Counting - Periodic Report

Occupancy Status

```
{
"event":"Region People Counting",
"report_type": "interval",
"device_info":{
   "device":"Workplace Sensor",
   "device_sn":"369362028335",
   "device_mac":"00:16:28:FA:8E:68",
   "ip_address":"192.168.0.99"
},
"time_info":{
   "timezone":"UTC+8:00",
   "dst_status":false,
   "start_time":"2022/12/20 18:15:52",  //Period start time
   "end_time":"2022/12/20 19:15:52"   //Period end time
},
"current_total":10,
"max_counted":12,//Maximum number of people during the reporting interval
"total_mapped_regions":2,
"regions_name": [Region1, Region2], //Do not send this information if no region is specified
"numbering_regions":[1,2],
"occupancy":[1,0]
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)"
  //HTTP Post only
}
```

Region People Counting

```
{
"event":"Region People Counting",
"report_type": "interval",
"device_info":{
   "device":"Workplace Sensor",
```

```
    "device_sn":"369362028335",
    "device_mac":"00:16:28:FA:8E:68",
    "ip_address":"192.168.0.99"
},
"time_info":{
    "timezone":"UTC+8:00",
    "dst_status":false,
    "start_time":"2022/12/20 18:15:52",       //Period start time
    "end_time":"2022/12/20 19:15:52"        //Period end time
},
"current_total":10,
"Max_counted":12, //Maximum number of people during the reporting interval
"total_mapped_regions":2,
"numbering_regions":[1,2],
"current_counted":[5,5] ,
"numbering_regions": [1, 2], //Do not send this information if no region is specified
"occupancy": [1, 0] //Do not send this information if no region is specified
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)"
  //HTTP Post only
}
```


Region People Counting - Trigger Report

Occupancy Status


```
{
"event":"Region People Counting",
"device_info":{
    "device":"Workplace Sensor",
    "device_sn":"369362028335",
    "device_mac":"00:16:28:FA:8E:68",
    "ip_address":"192.168.0.99"
},
"time_info":{
    "time":2022/12/20 18:15:52",
    "timezone":"UTC+8:00",
    "dst_status":false
},"
report_type": "trigger",
```

```
"current_total":10,
"total_mapped_regions":2,
"numbering_regions":[1,2],
"occupancy":[1,0],
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)”
  //HTTP Post only
}
```


Region People Counting


```
{
"event":"Region People Counting",
"device_info":{
    "device":"Workplace Sensor",
    "device_sn":"369362028335",
    "device_mac":"00:16:28:FA:8E:68",
    "ip_address":"192.168.0.99"
},
"time_info":{
    "time":2022/12/20 18:15:52",
    "timezone":"UTC+8:00",
    "dst_status":false
},
"report_type": "trigger",
"current_total":10,
"total_mapped_regions":2,
"numbering_regions":[1,2],
"current_counted":[5,5] ,
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)”
  //HTTP Post only
}
```


Dwell Time Detection - Periodic Report


```
{
"event":"Dwell Time Detection",
"report_type": "interval",
"device_info":{
    "device":"Workplace Sensor",
```

```
    "device_sn":"369362028335",
    "device_mac":"00:16:28:FA:8E:68",
    "ip_address":"192.168.0.99"
},
"time_info":{
    "timezone":"UTC+8:00",
    "dst_status":false,
    "start_time":"2022/12/20 18:15:52",      //Period start time
    "end_time":"2022/12/20 19:15:52"         //Period end time
},
"dwell_time_data":[
{
"region":1,
"max_dwell_time":156464,          //unit: s
"avg_dwell_time": 156464          //unit: s
},
{
"region":2,
"max_dwell_time":156464,          //unit: s
"avg_dwell_time": 156464          //unit: s
}
]
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)"  //HTTP Post only
}
```


Dwell Time Detection - Trigger Report


```
{
"event":"Dwell Time Detection",
"report_type": "trigger",
"device_info":{
"device":"Workplace Sensor",
"device_sn":"369362028335",
"device_mac":"00:16:28:FA:8E:68",
"ip_address":"192.168.0.99"
},
"time_info":{
"time":2022/12/20 18:15:52",
```

```
"timezone" : "UTC+8:00",
"dst_status":false
},
},
"dwell_time_data":[
 {
"region":1,
"people_id":1,
"dwell_start_time":"2022-12-20T18:15:52+03:00",
"dwell_end_time":"2022-12-20T19:15:52+03:00" ,
"duration":5646   //Unit: ms
 },
{
"region":2,
"people_id":2,
"dwell_start_time":"2022-12-20T17:15:52+03:00",
"dwell_end_time":"2022-12-20T19:15:52+03:00",
"duration":5646   //Unit: ms
}
]
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)"  //HTTP Post only
}
```


Line Crossing Counting - Periodic Report


```
{
"event":"Line Crossing Counting",
"report_type": "interval",
"device_info":{
"device":"Workplace Sensor",
"device_sn":"369362028335",
"device_mac":"00:16:28:FA:8E:68",
"ip_address":"192.168.0.99"
},
"time_info":{
"timezone":"UTC+8:00",
"dst_status":false,
"start_time":"2022/12/20 18:15:52",      //Period start time
```

```
"end_time":"2022/12/20 19:15:52"          //Period end time
},
"in_counted":10,          //Periodic in
"out_counted":10,         //Periodic out
"capacity_counted":0,       //=in_counted-out_counted
"total_data":{
"in_cumulative_counted":10,  //Cumulative in
"out_cumulative_counted":10,  //Cumulative out
"capacity_cumulative_counted":0     //=in_cumulative_counted-out_cumulative_counted
}
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)"  //HTTP Post only
}
```

Line Crossing Counting - Trigger Report

```
{
"event":"Line Crossing Counting",
"report_type": "trigger",
"device_info":{
"device":"Workplace Sensor",
"device_sn":"369362028335",
"device_mac":"00:16:28:FA:8E:68",
"ip_address":"192.168.0.99"
},
"time_info":{
"time":2022/12/20 18:15:52",
"timezone":"UTC+8:00",
"dst_status":false
},
"line_trigger_data":{
"in":1,
"out":0
}
"snapshot": "/9j/4AAQSkZJRgABAQAAAQABAAD/2wDFABALDA4MChAODQ4SERATGCgaGBY...(Image code)"  //HTTP Post only
}
```

People Flow Analysis - Periodic Report


```
{
"event":"People Flow Analysis",
"report_type":"interval",
"device_info":{
"device":"Workplace Sensor",
"device_sn":"369362028335",
"device_mac":"00:16:28:FA:8E:68",
"ip_address":"192.168.0.99"
},
"time_info":{
"timezone":"UTC+8:00",
"dst_status":false,
"start_time":"2022/12/20 18:15:52",      //Period start time
"end_time":"2022/12/20 19:15:52"         //Period end time
},
"flow_data":{
   "A-A":10, //Number of people from A to A
   "A-B":10, //Number of people from A to B
   "A-C":10,
   "A-D":10,
   "B-A":10,
   "B-B":10,
   "B-C":10,
   "B-D":10,
   "C-A":10,
   "C-B":10,
   "C-C":10,
   "C-D":10,
   "D-A":10,
   "D-B":10,
   "D-C":10,
   "D-D":10
 }
}
```

Chapter 9. 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 directly with Milesight for technical support.

Technical Support Mailbox: iot.support@milesight.com

Online Support Portal: https://support.milesight-iot.com

Resource Download Center: https://www.milesight.com/iot/resources/download-center/

MILESIGHT CHINA

TEL: +86-592-5085280

FAX: +86-592-5023065

Add: Building C09, Software Park Phase III, Xiamen 361024, Fujian, China