Ultra ToF People Counter

VS135-HL

User Guide

Safety Precautions

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

- Though the device is compliant with Class 1 (IEC/EN 60825-1:2014), please **DO NOT** look at the ToF sensor too close and directly.
- The device must not be disassembled or remodeled in any way.
- To avoid risk of fire and electric shock, do keep the product away from rain and moisture before installation.
- Do not place the device where the temperature is below/above the operating range.
- **Do not touch the device directly to avoid the scalds when the device is running.**
- The device must never be subjected to shocks or impacts.
- Make sure the device is firmly fixed when installing.
- Do not expose the device to where laser beam equipment is used.
- Use a soft, dry cloth to clean the lens of the device.

Declaration of Conformity

VS135 is in conformity with the essential requirements and other relevant provisions of the CE, FCC, and RoHS.

For assistance, please contact

Milesight technical support:

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Revision History

Date	Doc Version	Description
March 23, 2024	V1.0	Initial version
May 20, 2024	V1.1	1. Compatible with Milesight Development Platform; 2. Add SSH enable/disable option; 3. Add shopping cart detection; 4. Add ToF lighting mode and noise filtering; 5. Add validation record task list; 6. Add Enhanced Detection Mode; 7. Support to configure WLAN IP address; 8. Update installation distance; 9. Change default WLAN IP address as 192.168.2.1.
Jul. 30, 2024	V1.2	1. Add OpenVPN; 2. Add detection line list; 3. Add Multi-Device Stitching.
Feb. 12, 2025	V1.3	1. Add configuration of Wi-Fi passwords at login, user passwords are required to contain 4 styles. 2. Add Obstacle Exclusion. 3. Add Occlusion Detection. 4. Add a cooldown period for trigger reports, and report data after the cooldown. 5. Support Individual Filter of Group Counting. 6. Supports automatic replacement of device information when subscribing to a topic. 7. Add LED indicator switch and diagnostic function for support. 8. Support for the master device to report the status of node devices in multi-device stitching mode. 9. Support for downloading logs and Ping detection.

Contents

1. Product Introduction

1.1 Overview

VS135 is a high-end people counting sensor that is based on deep learning AI and second-generation ToF technology. It is capable of adapting to various complex scenarios while ensuring excellent privacy protection. This sensor possesses an impressive accuracy of up to 99.8% in people counting, fully meeting your needs, and it delivers exceptional performance for both indoor and outdoor applications. With high ceiling mounting of up to 6.5m and an IP65 waterproof rating, it adapts seamlessly to any environment.

1.2 Key Features

- Up to 99.8% accuracy with the 2nd generation ToF technology and AI algorithm.
- Allow to collect more accurate people counting data by differentiating children / adults and detecting staffs via identification like staff lanyards for clearer people analysis.
- Smart U-turn detection to filter redundant counting of people wandering in the area.
- Support queuing management via dwell time detection and regional people counting.
- Support advanced Heat Map function which provides deeper insights by visually representing the distribution and intensity of foot traffic.
- With radar sensor based ESG friendly working mode, it allows to experience full-speed operation when occupied while switching to a power-saving sleep mode when unoccupied.
- By incorporating 3-axis sensors for automatic height calibration, it ensures enhanced precision and guarantees accurate data analysis.
- Working well even in low-light or completely dark environments with great lighting adaptability
- Free from privacy concerns without image capturing.
- Automatically detect the optimal installation height, facilitating fast deployment and intelligent detection.
- High compatibility of data transmission(HTTP/MQTT).
- Support local data storage and data retransmission to collect data securely.
- Quick and easy management with Milesight DeviceHub and Milesight Development Platform.

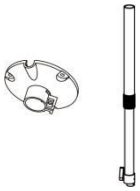
2. Hardware Introduction

2.1 Packing List

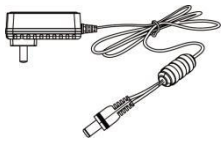
1 × VS135 Device

4 × Ceiling Mounting Kits

8 × Staff Tags



1 × Multifunctional Bracket Kit (Optional)



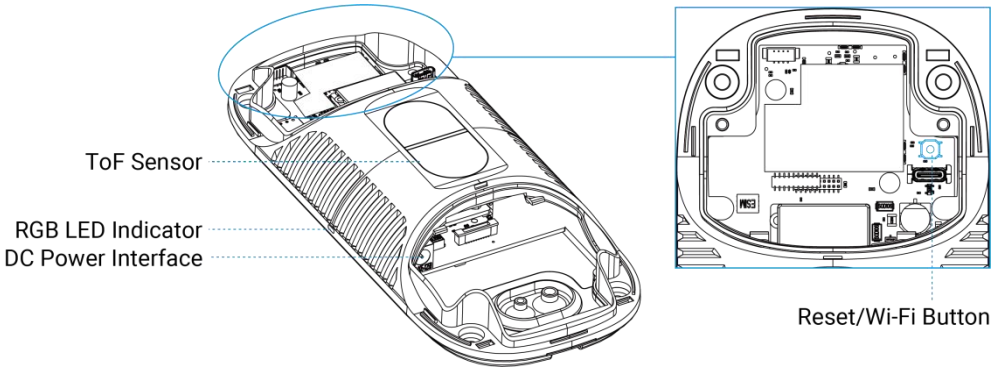
1 x Power Adapter

1 × Quick Guide

1 × Warranty Card

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

2.2 Hardware Overview

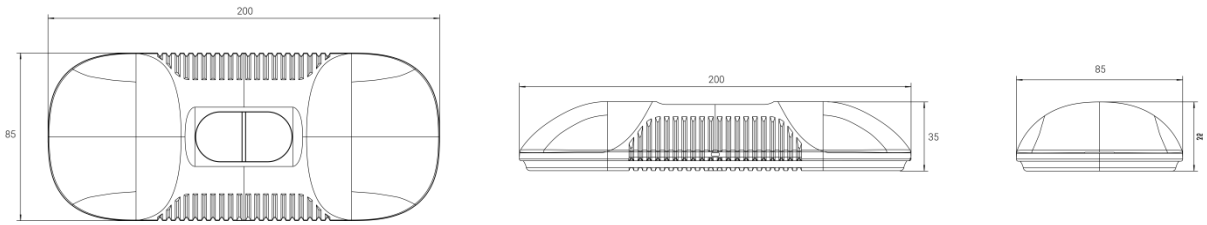


2.3 Button Descriptions

Function	Action	LED Indication
Turn On/Off Wi-Fi	Press and hold the power button for more than 3	Turn On/Off: Blue light blinks for 3 seconds. Wi-Fi On: Blue light on.

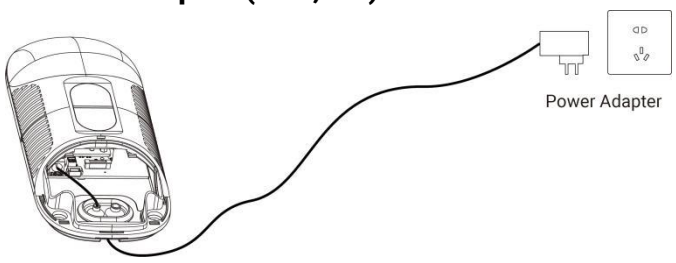
	seconds.	Wi-Fi Off: Green light on.
Reset to Factory Default	Press and hold the reset button for more than 10 seconds.	Green light blinks until the reset process is completed.

2.4 Dimensions (mm)



3. Power Supply

- **Powered by DC Power Adapter (12V, 2A)**



4. Access the Sensor

VS135 provides user-friendly web GUI for configuration access via Wi-Fi. Users need to customize the password when using the device for the first time. The default settings are as below:

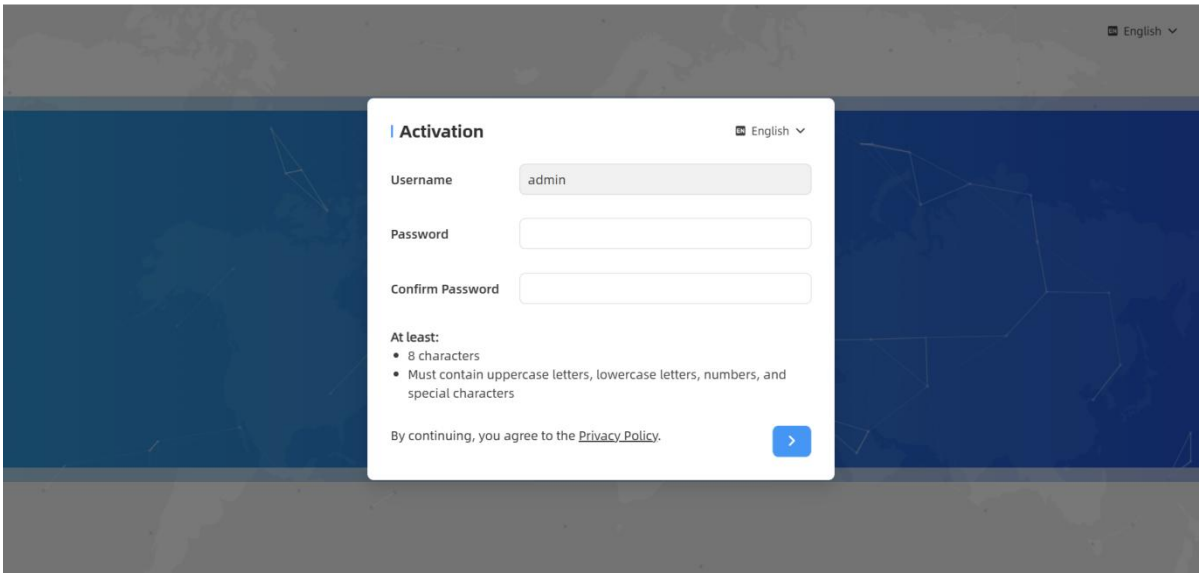
Wi-Fi SSID: People Counter_xxxxxx (can be found on the device label)

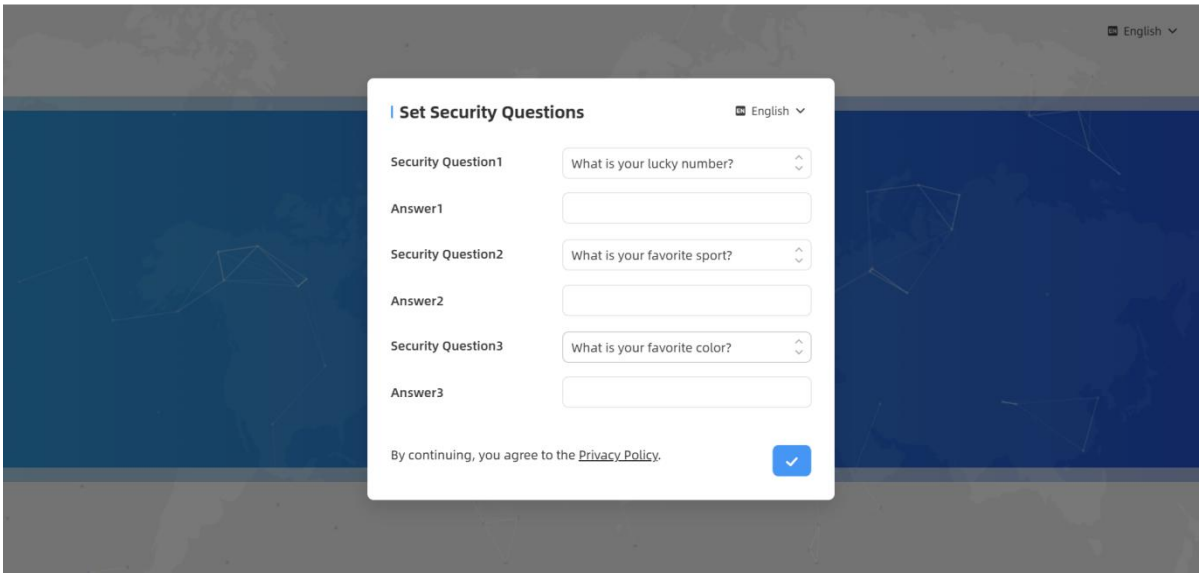
Wi-Fi IP: 192.168.2.1

Here are the wireless method way of accessing the web GUI:

Step 1: Enable the Wireless Network Connection on your computer, search for corresponding Wi-Fi SSID to connect it, then type 192.168.2.1 to access the web GUI.

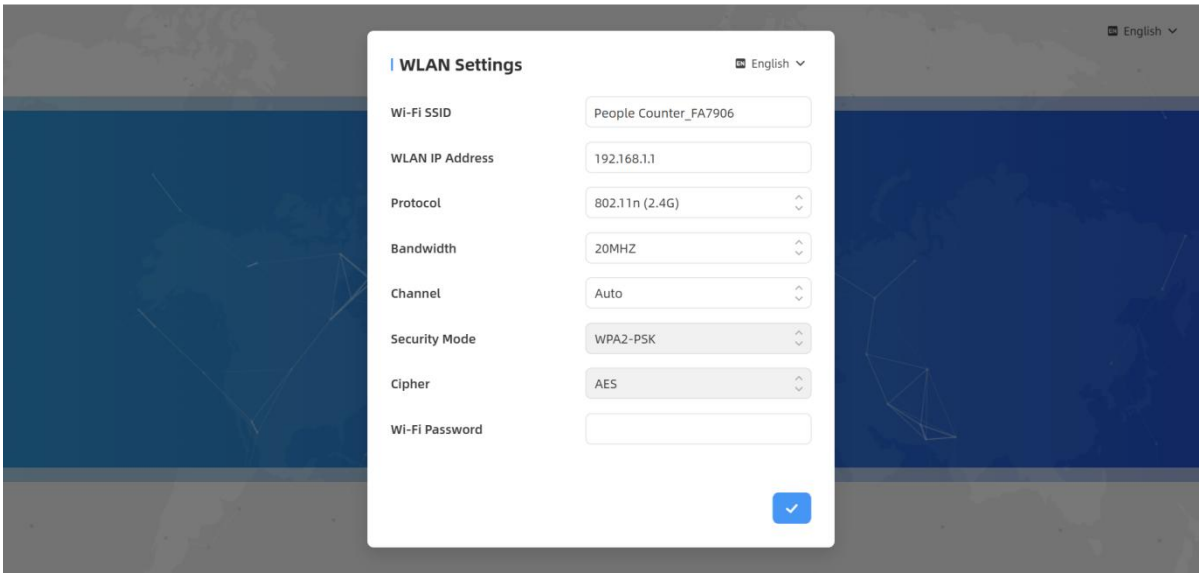
Step 2: Users need to set the password and three security questions when using the sensor for the first time.





Step 3: After configuration, log in with username (admin) and custom password.

Step 4: Set the Wi-Fi password.



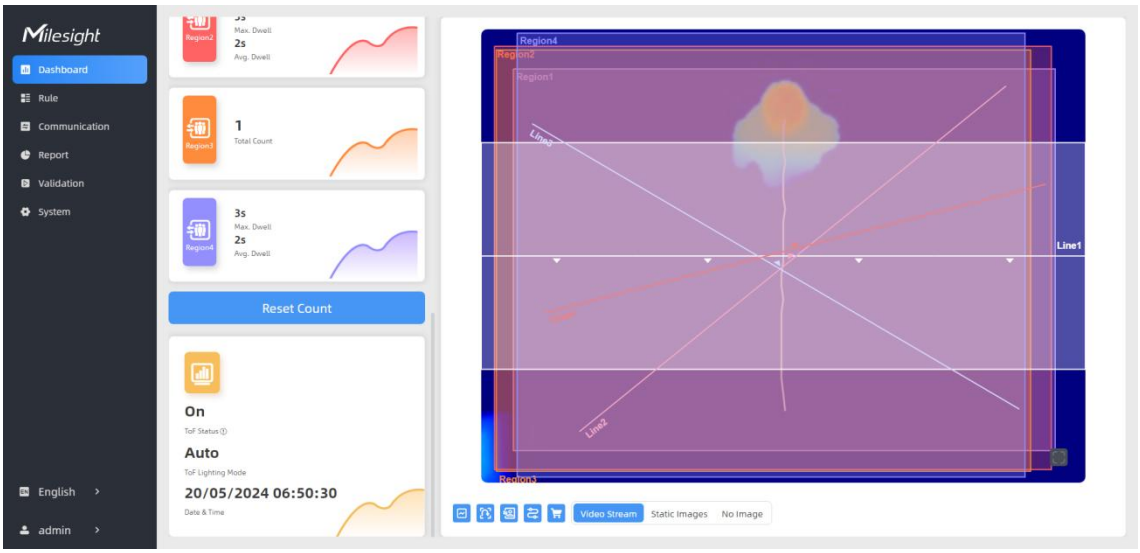
Note:

1) Password and Wi-Fi 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) 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.

5. Operation Guide

5.1 Dashboard

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



Parameters	Description
	**Hide Capacity:** Hide the total count data capacity; **Staff Excluded:** Exclude staff data from statistical data; **Children Excluded:** Exclude children data from statistical data.
Reset Count	Clear all accumulated entrance and exit people counting values.
	Click to show detection lines, U-turn areas, detection regions, tracking lines and shopping cart as needed. **Note:** These functions will not be shown here when they are disabled in **Counting Strategy** configuration.
Scence Preview	Select video stream preview, static image preview or no image preview as needed.

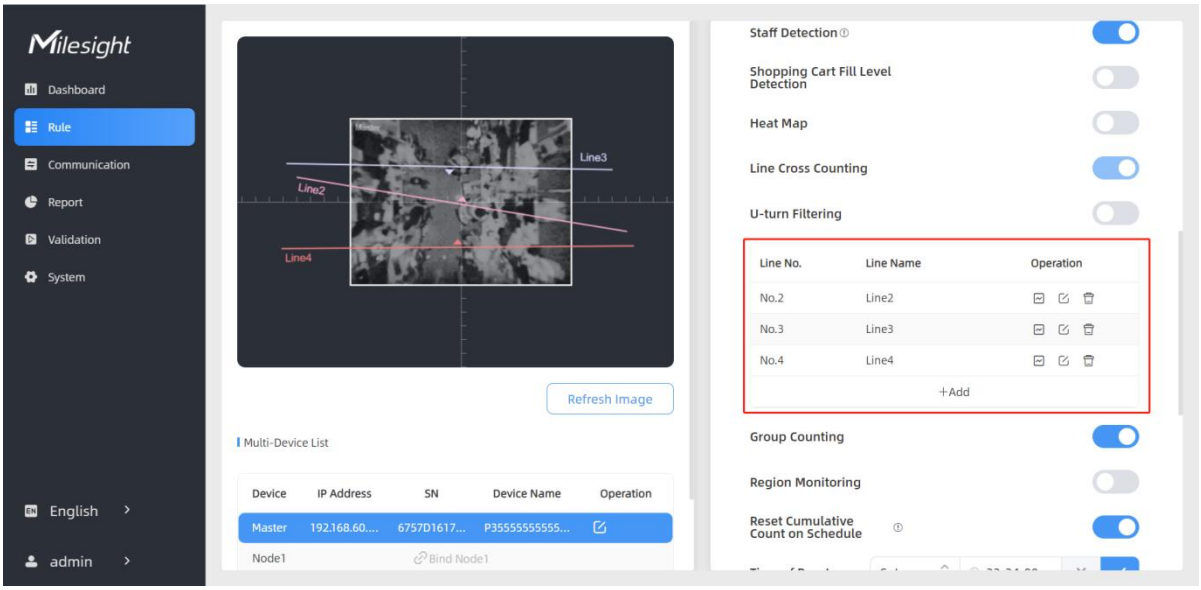
5.2 Rule

5.2.1 Basic Counting Settings

Draw Detection Lines

Users can draw detection lines to record the people count values which indicate the number of people enter or exit.

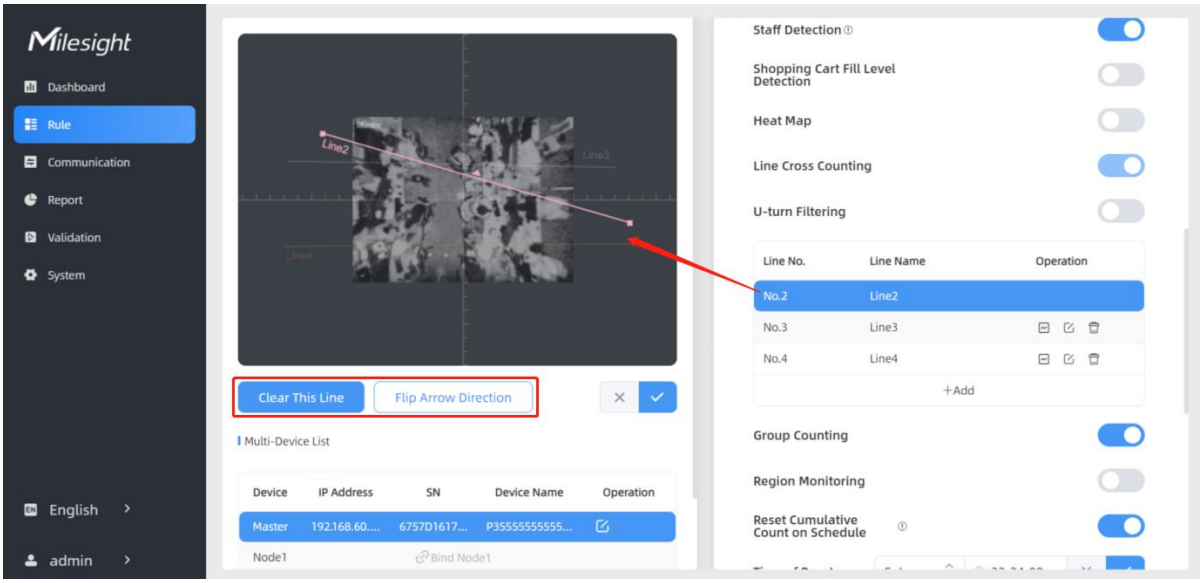
Step 1: Find the list of detection lines.Click **+Add** to draw a new detection line or click  to edit the existed detection line on the live view.



Step 2: Left-click to start drawing and drag the mouse to draw a line, left-click again to continue drawing a different direction edge, and right-click the mouse to complete the drawing. The line can be dragged to adjust the location and length. One device supports at most 4 broken lines with maximum 4 segments each.

Step 3: If users want to redraw this line, click **Clear This Line** or drag the vertices of the broken line to adjust The arrow direction of the detection line depends on your drawing direction. If

users need to flip the line, click **Flip Arrow Direction**. Then click to finish drawing.



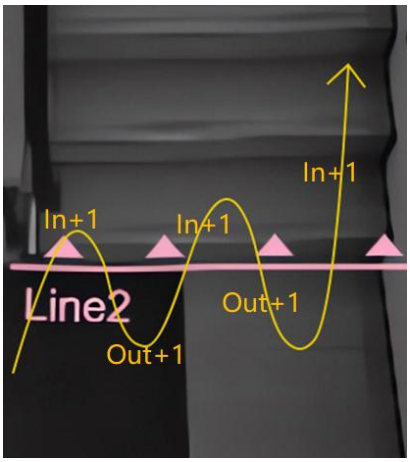
Note:

1) Ensure that the detected target 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 the detection area without other objects around.
2) Redundant identification spaces are needed on both sides of the detection line for the target detection. It ensures the stable recognition and tracking of the target before passing the detection line, which will make the detection and count more accurate.

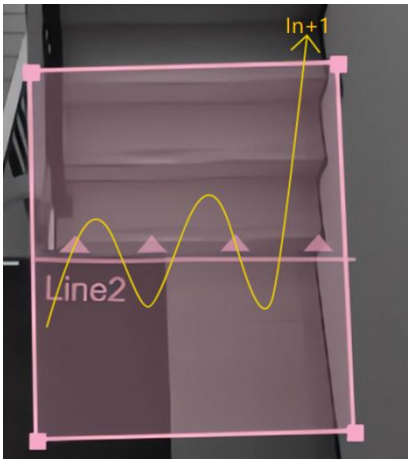
Draw U-turn Area

VS135 supports the U-turn filtering function, filtering out the people who are actually not in / out of the entrance, to avoid repeated counting. Users can draw an area for every line and the device will count the In and Out values only when people pass this area.

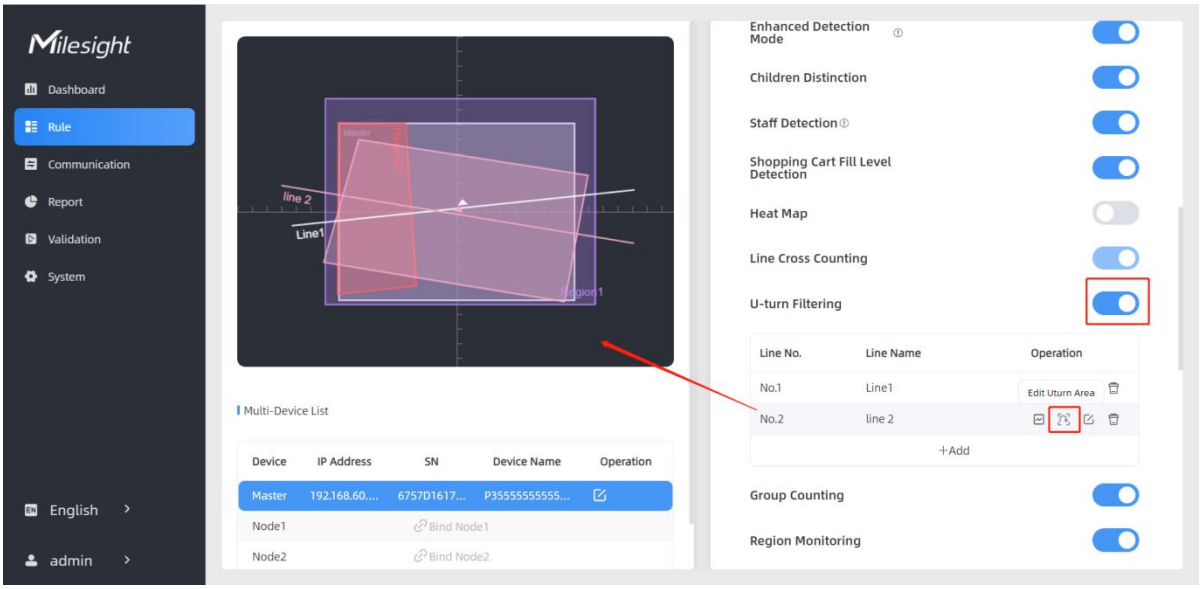
Disable U-turn filtering:



Enable U-turn filtering:



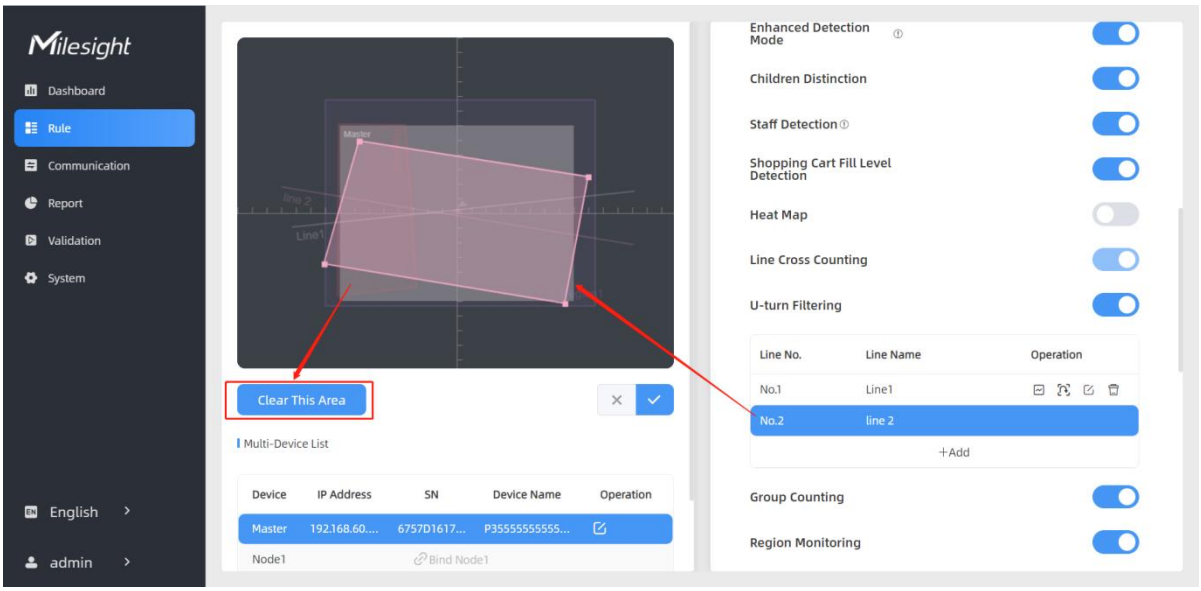
Step 1: Enable U-turn Filtering. Users can click to edit U-turn areas for existed detection line on the live view.



Step 2: Left-click to start drawing and drag the mouse to draw an edge. Then left-click again to continue drawing a different direction edge. Right-click the mouse to complete the drawing. The area can be dragged to adjust the location and length. One device supports up to 4 broken lines with maximum 10 segments each.

Step3: If users want to redraw the line, click **Clear This Area** or drag the vertices of the area to adjust. Then click  to finish drawing.

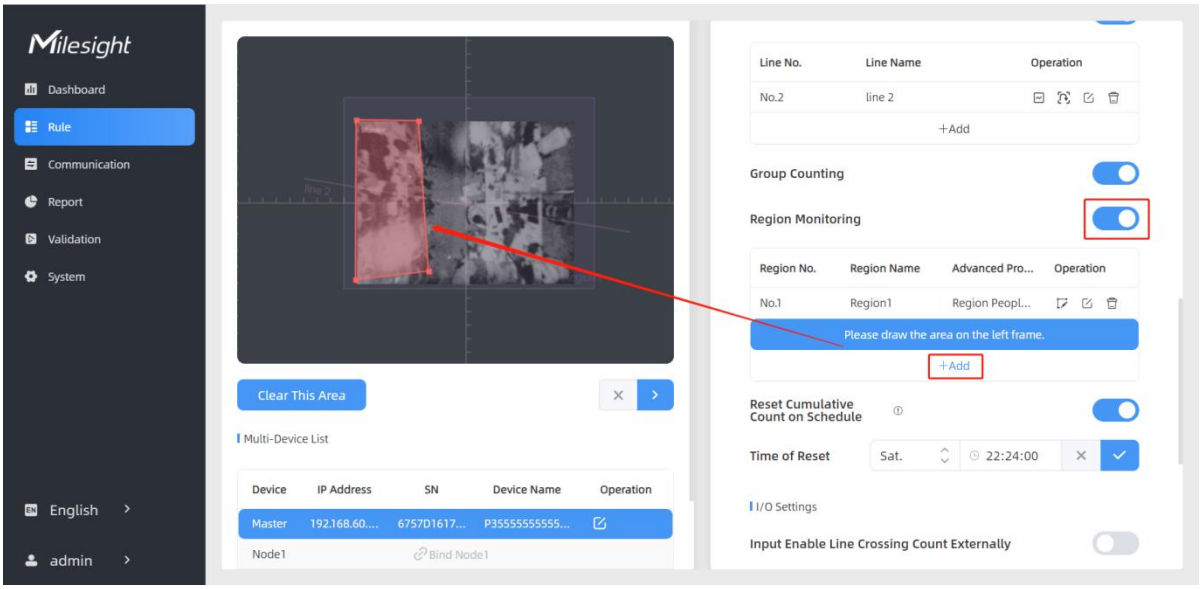
Step 4: If users need to delete a certain U-turn area, click  , then click **Clear This Area** to delete.



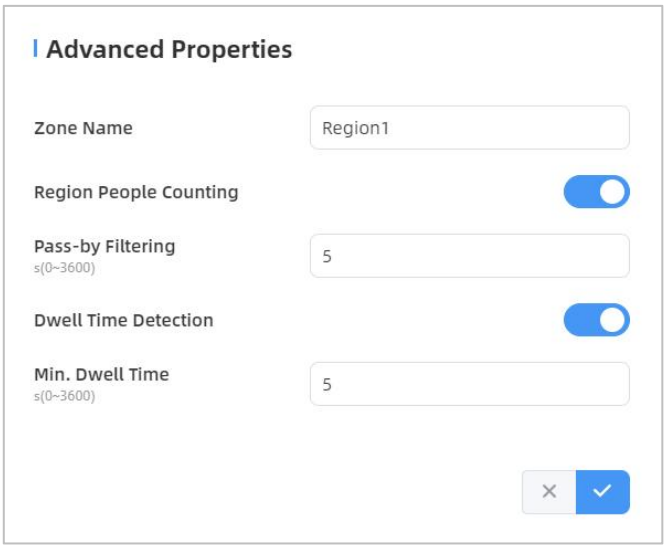
Draw Monitoring Region

VS135 supports monitoring the number and the dwell time of people in the region, providing more valuable analysis data.

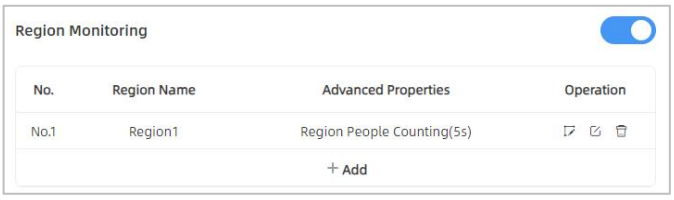
Step 1: Enable Region Monitoring**.** Click **+Add** to add the region monitoring on the live view. Up to 4 regions are supported with maximum 10 segments each.



Step 2: Customize the zone name and enable Region People Counting or Dwell Time Detection as needed.

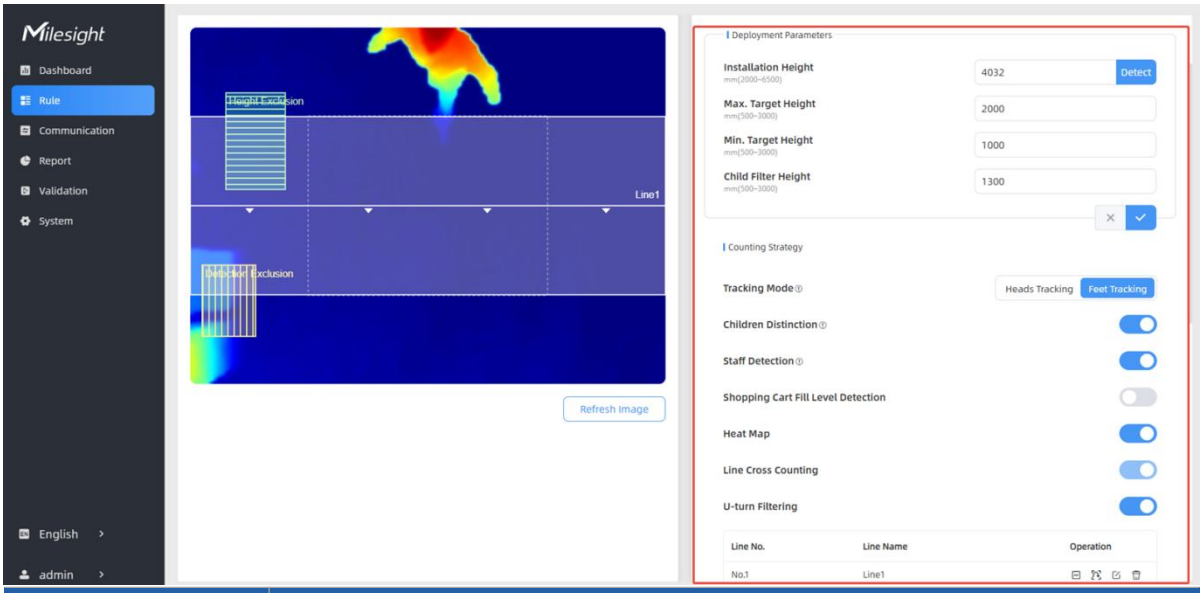


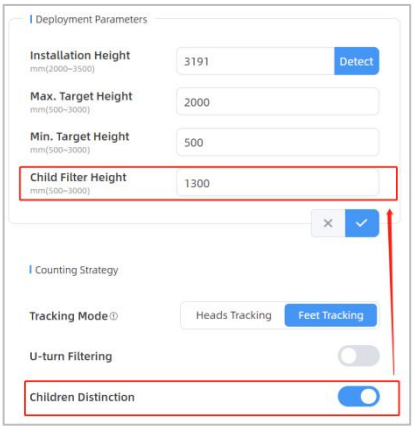
Step 3: The configuration is displayed in the list after the configuration is complete. You can redraw the areas by clicking the redraw button in the list. Click the edit button to modify the advanced settings of the areas or click delete button to delete the areas separately.

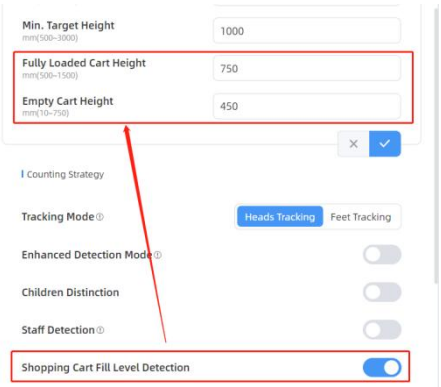
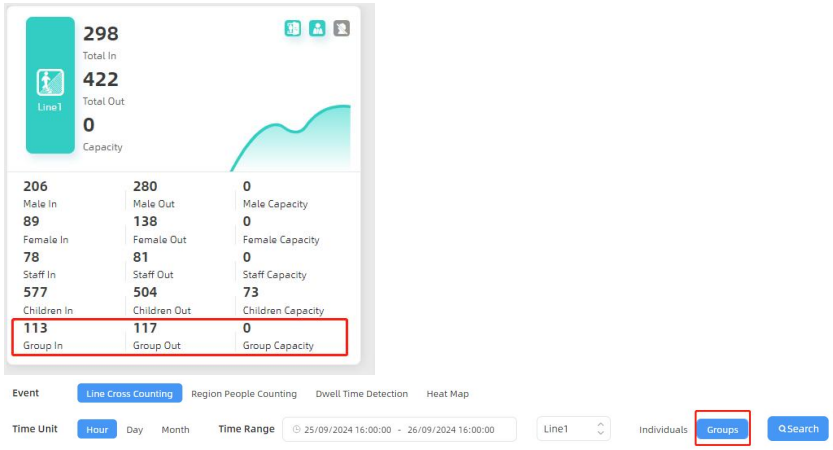


Rule Configuration

Users can set the rules to ensure accurate counting.



Parameters	Description
Installation Height	Set the device installation height. Click **Detect** to detect the current installation height automatically. **Note:** 1) Ensure that there is no object directly below the device avoiding interfering the height detection. 2) The automatic detection of the installation height is not supported with dark floor/carpet (black, grey, etc.)
Max. Target Height	Set the maximum target height, then the device will ignore the objects higher than this setting value.
Min. Target Height	Set the minimum target height, then the device will ignore the object shorter than this setting value.
Tracking Mode	Select the tracking mode of counting, including Heads Tracking and Feet Tracking.
Children Distinction	The device will detect the people shorter than child filter height as children. 
Staff Detection	The device will detect the people who wear reflective stripes as staff tags on the visible parts (neck, shoulders, etc.) as staffs.

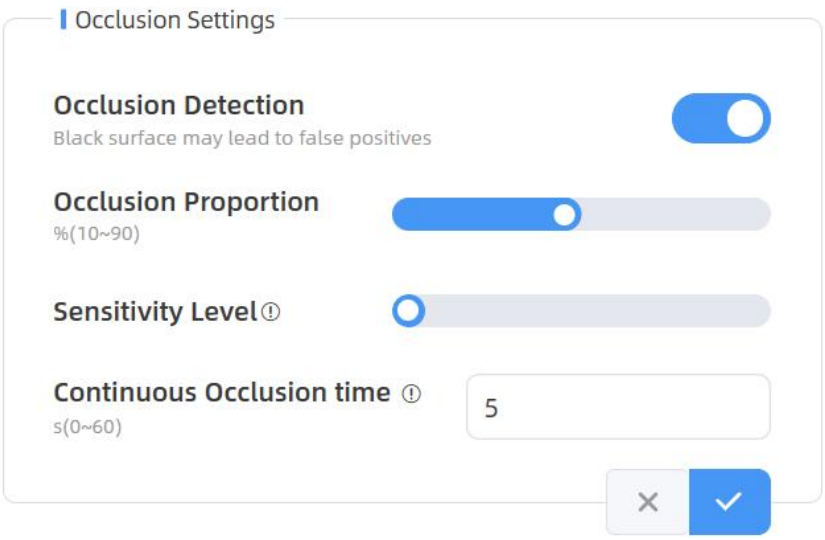
	Reflective stripe requirements: width > 2cm, 500 cd/lux.m^2
Shopping Cart Fill Level Detection	The device will count the carts of different status according to the preset shopping cart heights. **Note:** 1) Line cross counting and region people counting will include cart counting if this option is enabled. 2) The shopping carts will not trigger the device to send trigger reports immediately, but the device will only send trigger reports when people pass through. 
Heat Map	Click to enable Heat Map function. Heat Map function can analyze person movement to reveal insights for better business management with the intuitive and accurate statistical analysis results in time or space pattern as needed. Support Motion Heat Map and Dwell Heat Map. The motion heat map shows where the most people flow. And the dwell heat map shows the areas where people stay for the longest time.
U-turn Filtering	Enable or disable U-turn Filtering.
Group Counting	Click to enable the group counting function that based on the distance, moving direction and speed difference to gain deeper insights into customer' behaviors. You can see the effect in Dashboard and generate report through choose Time Range in **Report.**  **Individual Filter:** When enabled, device will only count two or more

	individuals as a group. **Note:** This function is only applicable for line cross people counting.
Region Monitoring	Enable or disable Region Monitoring.
Reset Cumulative Count on Schedule	Enable to periodically reset cumulative count on schedule. Cumulative Count includes: Total In/Out cou.nting of each detection line. Max./Avg. Dwell Time of each detection region.

Note:

Due to the error in ToF distance measurement (0.035 m), the Max. Target Height should be set as maximum pedestrian height plus 0.035 m and the Min. Target Height as minimal pedestrian height minus 0.035 m in the actual applications. For example, if the pedestrian height is 1.6 m to 1.8 m, the Max. and Min. Target Height should be configured as 1.835 m and 1.565 m respectively.

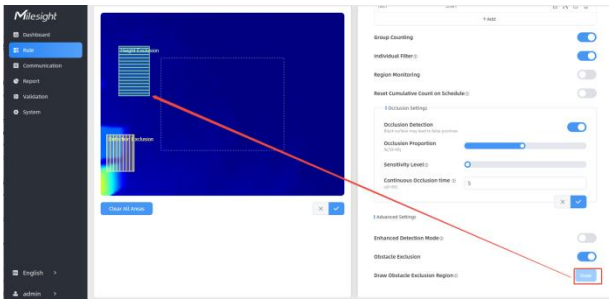
Occlusion Settings



Parameters	Description
Occlusion Detection	This feature can be enabled in the event of an occlusion so that the sensor can be detected in time if it has been maliciously occluded. Alarms are issued when occlusion occurs, and notification of deactivation is given when occlusion is lifted. **Note:** 1) Not recommended for use in environments with black carpets. 2) When multi-device stitching mode is enabled, the occlusion setting parameters of the master and node devices are synchronized. Regardless of which device is masked, the master device will trigger the trigger the alarm.
Occlusion Proportion	Set the threshold for the percentage of the entire field of view that must be occluded to trigger an alarm. Default: 50%.
Sensitivity Level	Adjust the sensitivity of the occlusion trigger. The higher the level, the

	easier it is to detect occlusion, but the false alarm rate increases. Default: 2.
Continuous Occlusion time	Set the duration the sensor must be obscured before an alarm is issued.

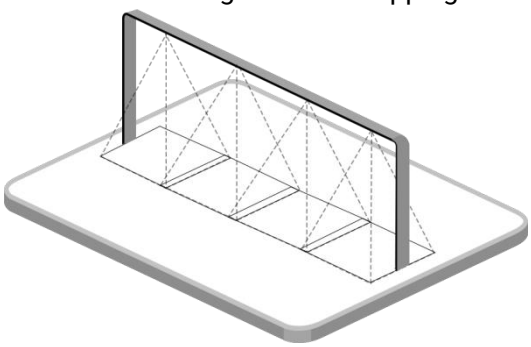
Advanced Settings

Parameters	Description
Enhanced Detection Mode	Turn on when any one of the following situations occurs, it will ensure normal counting and detecting: ● The depth image is abnormal; ● There is obstacle in the live view; ● Installation conditions are not met.
Obstacle Exclusion	When there is an immovable static obstacle within the detection range of the device, and the detection line or region cannot be adjusted to avoid the obstacle, this function can be activated to filter out obstacles similar to humans.
Draw Obstacle Exclusion Region	***Step 1:*** Click **Draw** button. ***Step 2:*** Left-click the live view to start drawing and drag the mouse to draw an edge. Left-click again to continue drawing a different direction edge. Right-click the mouse to complete the drawing.  The region can be dragged to adjust the location and length. One device supports up to 4 regions with maximum 10 segments each. ***Step 3:*** Choose the method of exclusion. **Detection Exclusion:** Select it when you don't want to detect anything in this area. You can just draw the highest part of the obstacle, the

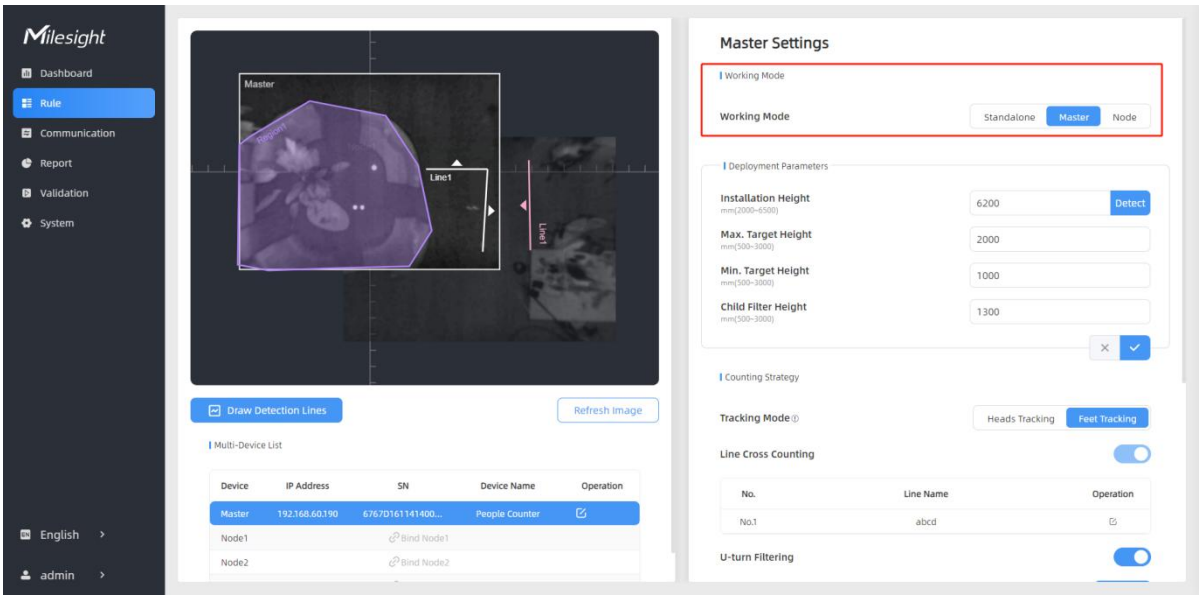
	device will use this highest part as a reference to automatically exclude this specific area. (For example, in a shelf scene, you can just frame the top end of the shelf, then the shelf won't be mistakenly detected as a person.) **Height Exclusion:** Select it when you want to avoid mixing obstacles with targets and creating false detections. You can just box out the parts that are easy to confuse with the targets. (For example, in the scene of a gate passage, you can draw the shape of the gate to avoid the device misjudging a child passing through as an adult, as the child may blend into the shape of the gate.) ***Step 4:*** Click ✓ to complete drawing.

5.2.2 Multi-Device Stitching

Multi-device stitching is mainly used to monitor a larger detection area than just the area covered by a single device. When using this feature, devices should be installed next to each other and ensure the **detection areas** are tangent or overlapping.



Before using this feature, set one device as **Master Mode** and other devices as **Node Mode**.



- **Master Mode**: Receive target tracks and view from the device, responsible for all counts, rule setting, data push and other functions.Report by wireless communication mode.
- **Node Mode**: Only extends the view of the master device.

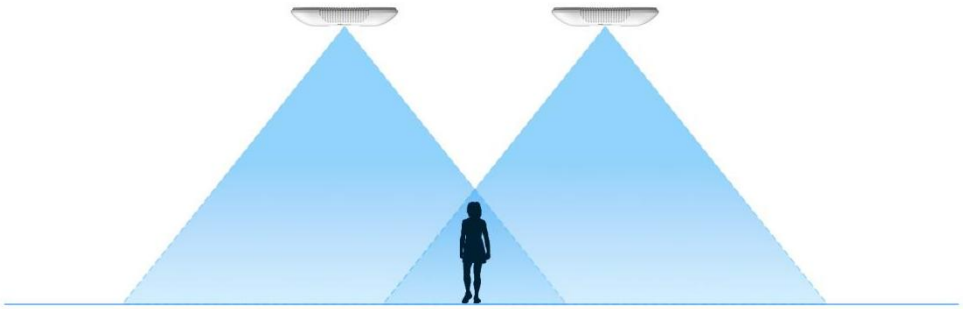
Here is the device multi-stitching compatible list of VS13x series:

Stitching	Master Device	Node Devices	Stitching Number
Support	VS135-P	VS135-P	8
	VS135-P-High	VS135-P-High	
	VS135-L08EU	VS135-P, VS135-HL, VS135-LoRa, VS135-L08EU	4
	VS135-L08EU-High	VS135-P-High, VS135-HL-High, VS135-LoRa-High, VS135-L08EU-High	
	VS135-HL	VS135-P, VS135-L08EU, VS135-LoRa, VS135-HL	
	VS135-HL-High	VS135-P-High, VS135-L08EU-High, VS135-LoRa-High, VS135-HL-High	
	VS135-LoRa	VS135-P, VS135-L08EU, VS135-HL, VS135-LoRa	
	VS135-LoRa-High	VS135-P-High, VS135-L08EU-High, VS135-HL-High, VS135-LoRa-High	
Not Support	VS135-P	VS135-LoRa, VS135-L08EU, VS135-HL	-
	VS135-P-High	VS135-LoRa-High, VS135-L08EU-High, VS135-HL-High	
	VS135 standard versions	VS135 high ceiling mount versions	
	VS135 high ceiling mount versions	VS135 standard versions	
	VS133-P	VS135-P	

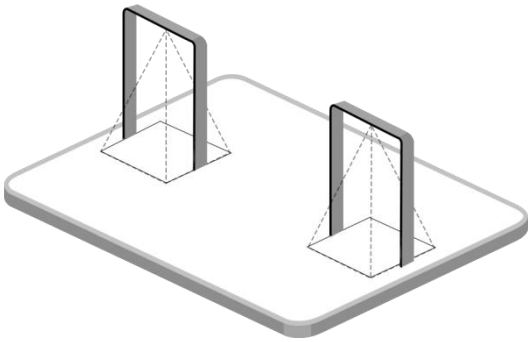
	VS135-P	VS133-P	

Note:

1) Ensure the head of one person can be seen on both live views at the same time.

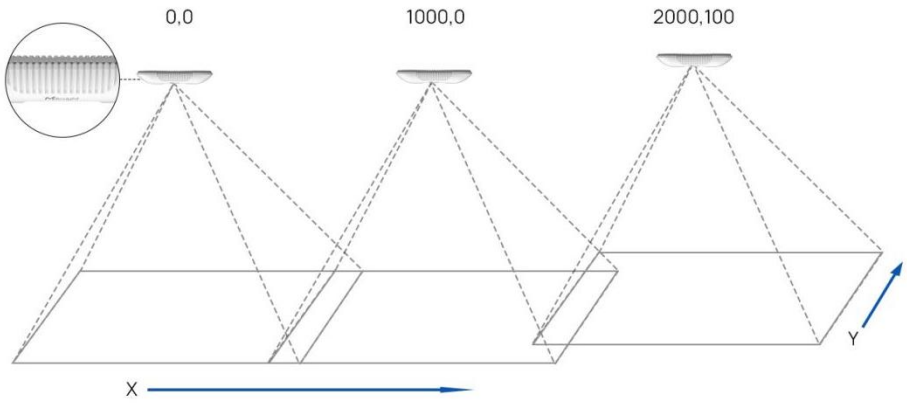


2) The devices can also be installed without overlapping as required.



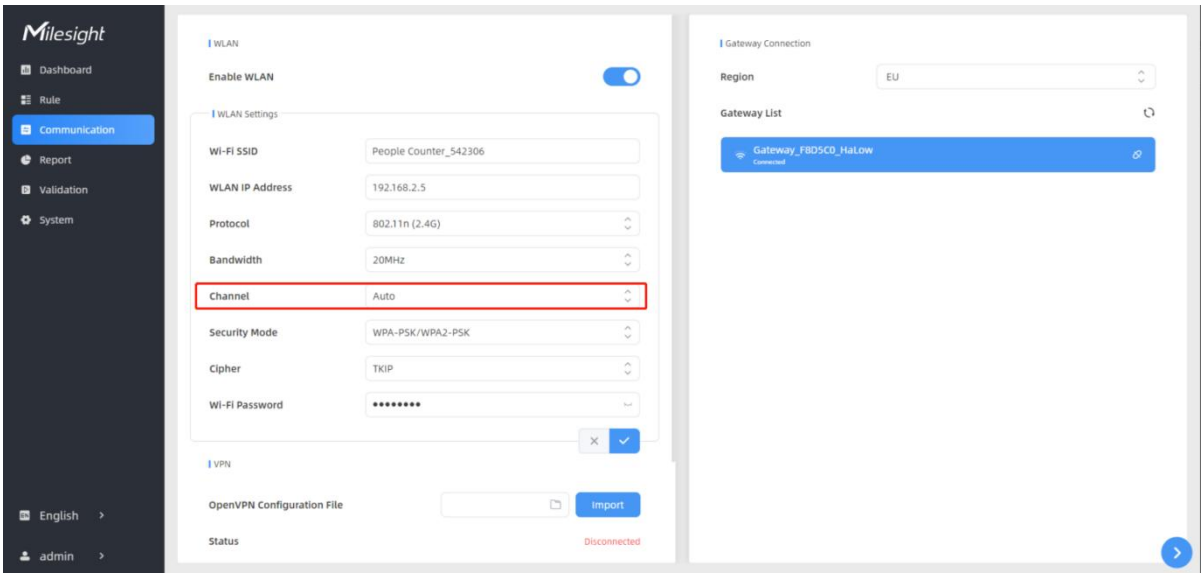
Device Positioning

Device positioning is done via X&Y coordinates. For example, the installation direction of the master device is shown as below, the logo needs to be facing the front. When the master device's coordinate is (0, 0), the coordinates of the node devices are all positive values.

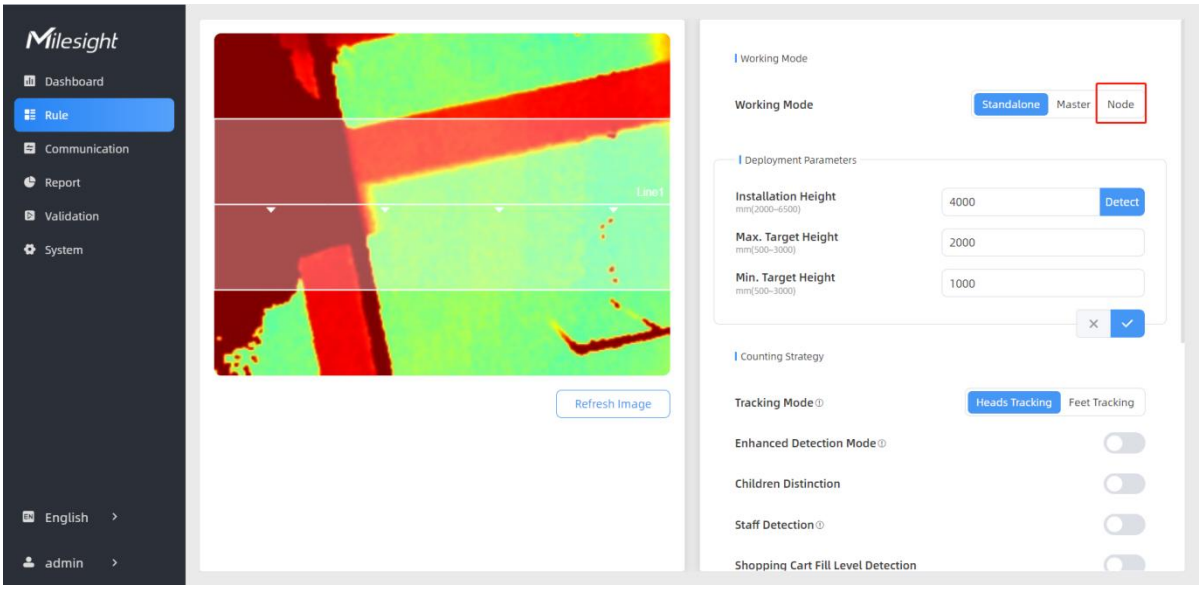


Node Device Setting

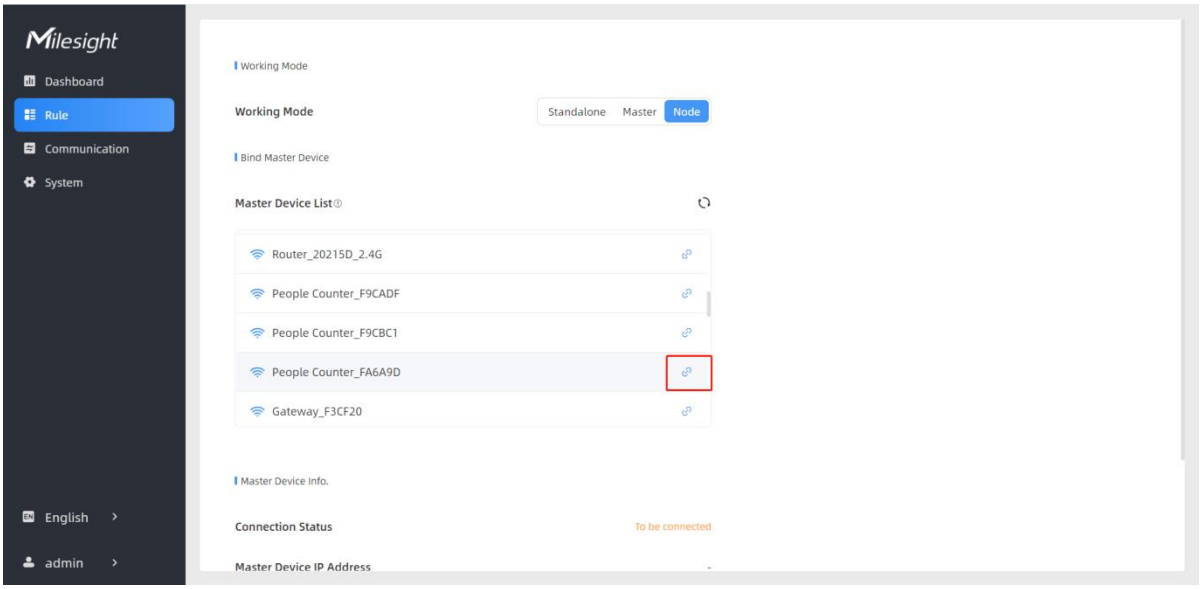
Step 1: change WLAN IP Address of node devices to different subnets from master device's WLAN IP address and Wi-Fi Halow gateway's WLAN IP address.



Step 2: Select Node for the working mode and wait for the device to reboot.



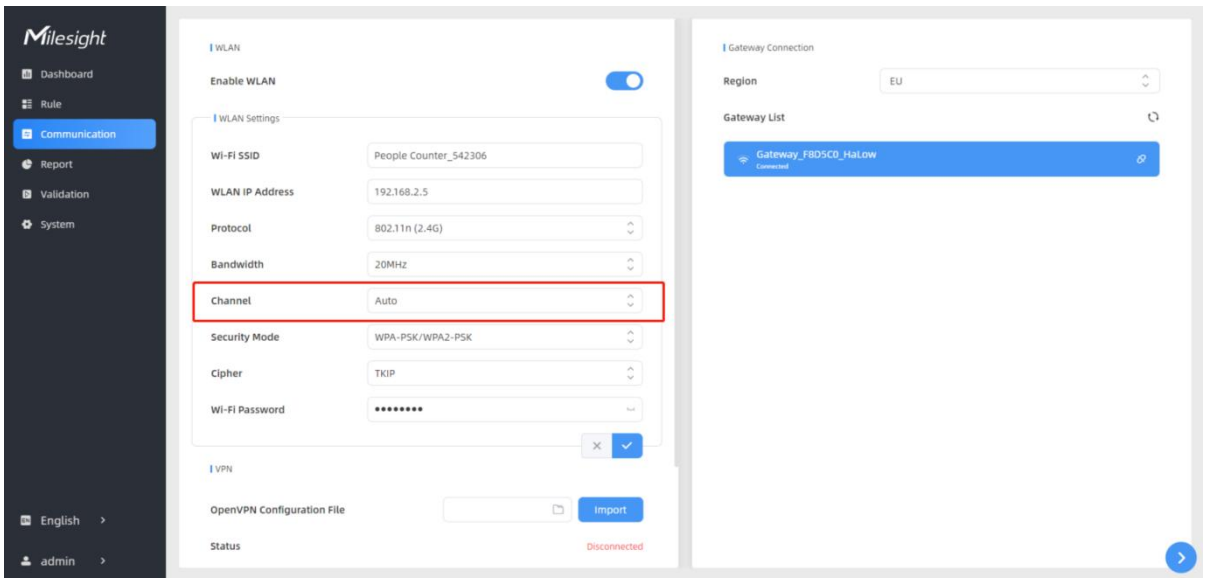
Step 3: Find the Wi-Fi access point of master device and connect.



Parameters	Description
Connection Status	Show the connection status between the node device and master device.
Master Device IP Address	Show master device's IP address. When this IP address is under the same network with node device, the node device can bind to the master device.
Master Device SN	Show the master device's serial number.
Master Device Name	Show master device name.
Unbind Master Device	Click **Unbind** to release the connection status, this device will be deleted from the list of the master device.

Master Device Setting

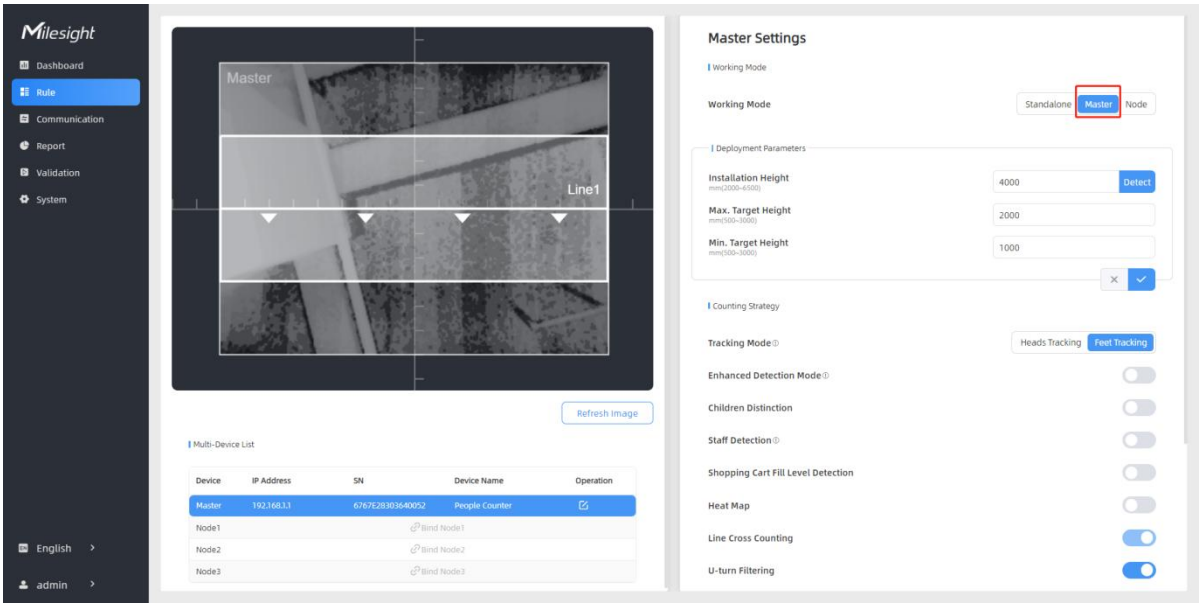
Step 1: When work mode is on Standalone or Node mode, select the WLAN channel to an idle channel. Users can use test App (like Wi-Fi Analyzer) to check ideal WLAN channels to reduce interference.



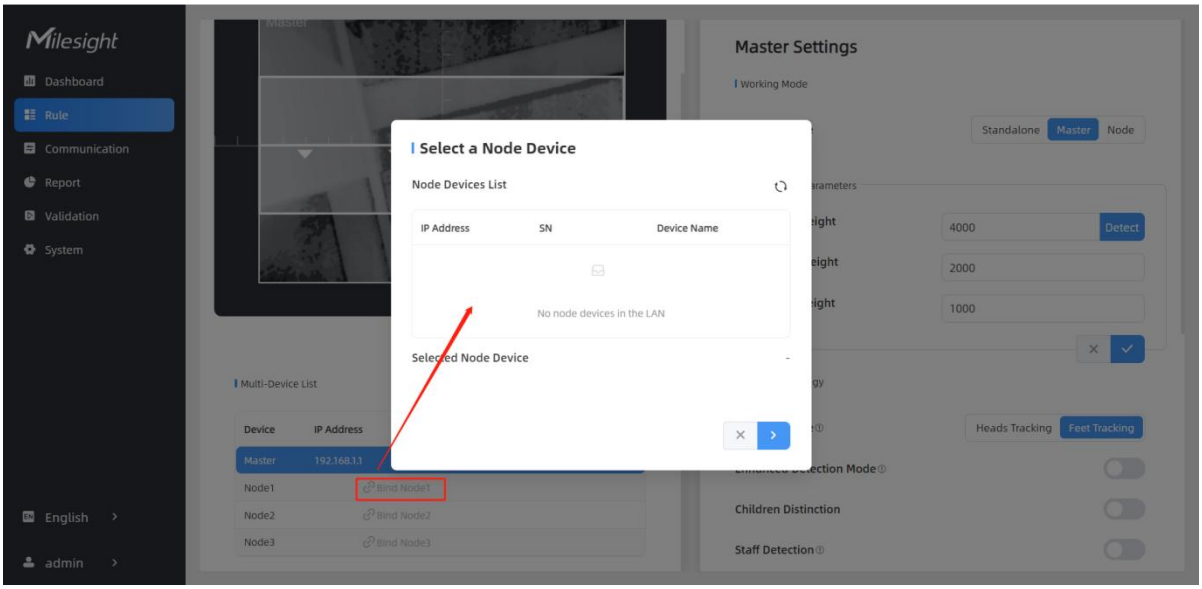
Note: the scene preview and people counting results are dependent on the WLAN channel selection, also the distance between node devices and master device. Please adjust the distance to ensure accurate scene preview or counting results.

WLAN Channel	Video Stream	Static Image/No Image	Counting Inaccuracy
Occupied Channel	Not Support	≤ 6.5m	> 6.5m
Idle Channel	≤8m	≤10m	>10m

Step 2: Select **Master** as the working mode and wait for the device to reboot.

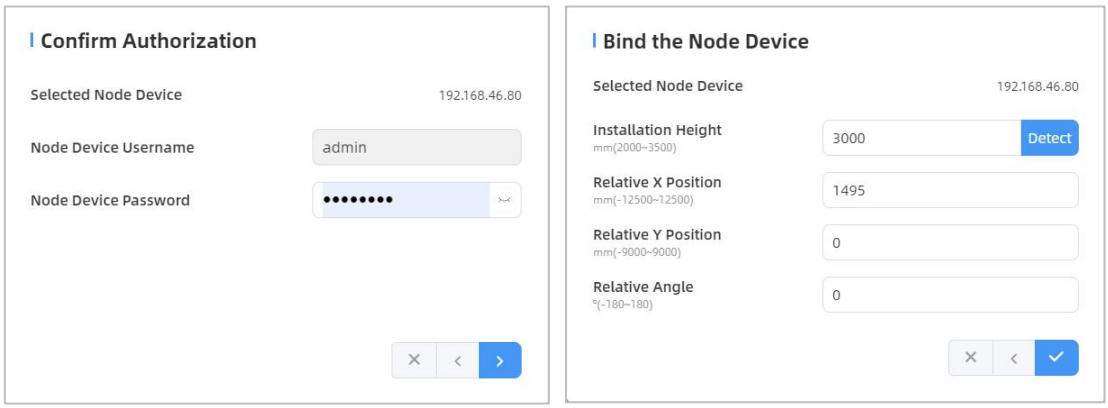


Step 3: Go to the master device web GUI, then click **Bind Node** in the Multi-Device List. The device will use multicast protocol to search for the unbound node devices under the same local network.

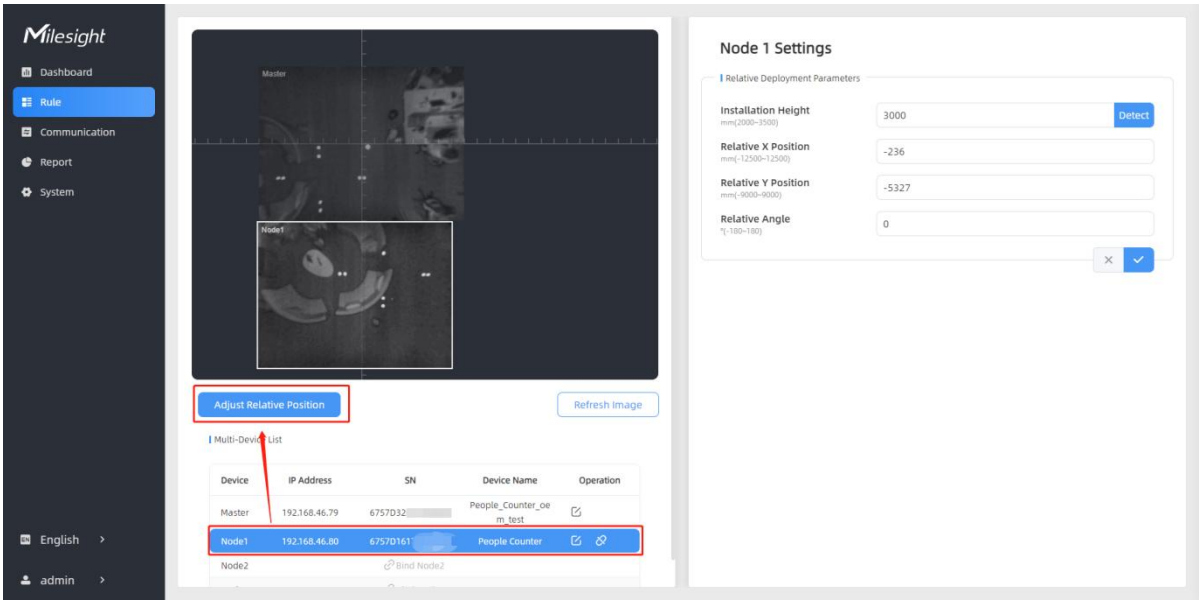


Step 4: Select the node device and type the login password of the node device.

Step 5: Fill in the installation height of a node device and relative position information if these parameters are already measured. If not, save default settings and skip to Step 6.

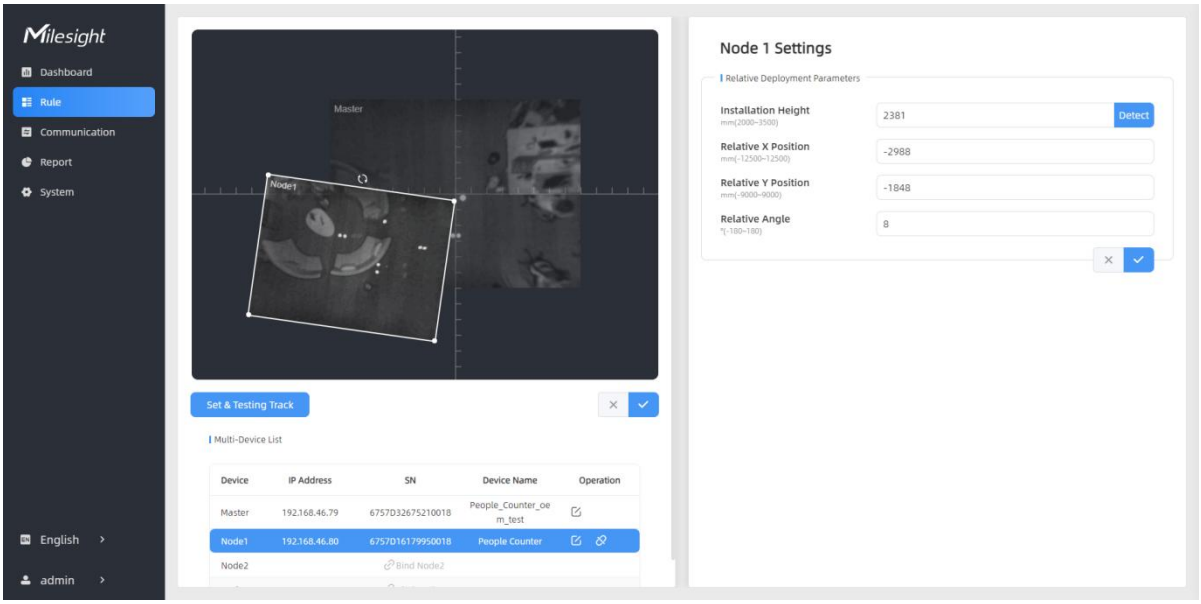


Step 6: Select the node device on the Multi-Device List, click **Adjust Relative Position**.



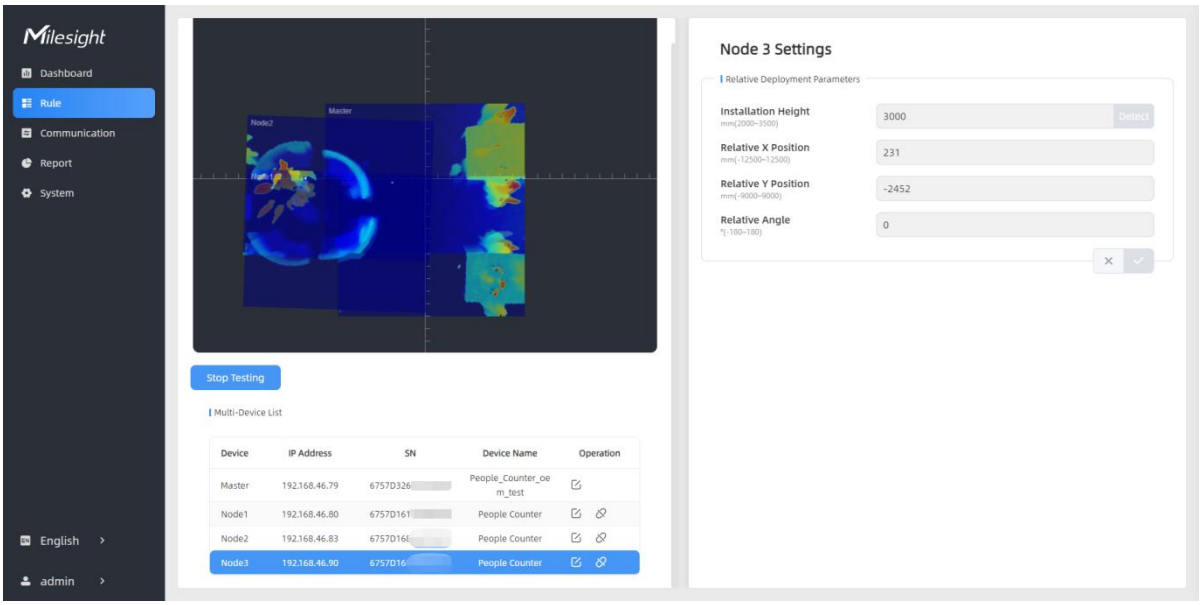
Drag the live view of node device to adjust the location and angle, and the relative position

parameters will change automatically as your operations. Besides, users can also adjust the size of this live view.



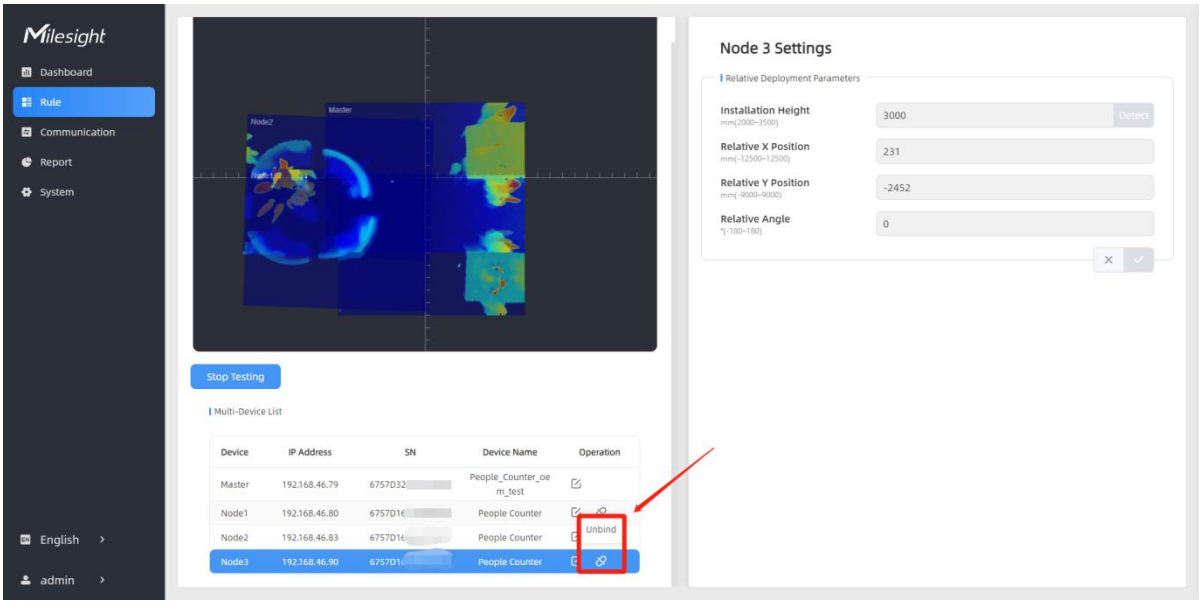
Tips: cut the staff tags or other reflective stripes into pieces and stick them to the ground of overlapping areas, then drag the live view of node devices to make highlight markers in the two live views overlap. This allows equipment splicing configuration **without measurement**.

Step 7: Click **Set & Testing Track**, then check if the tracking lines are connected and smooth when people pass on the live views of multiple devices. If not, click **Stop Testing** to adjust the node device's live view location slightly.



Step 8: When all settings are completed, users can draw detection lines and even U-turn areas on the new stitching live view the same as standalone mode devices.

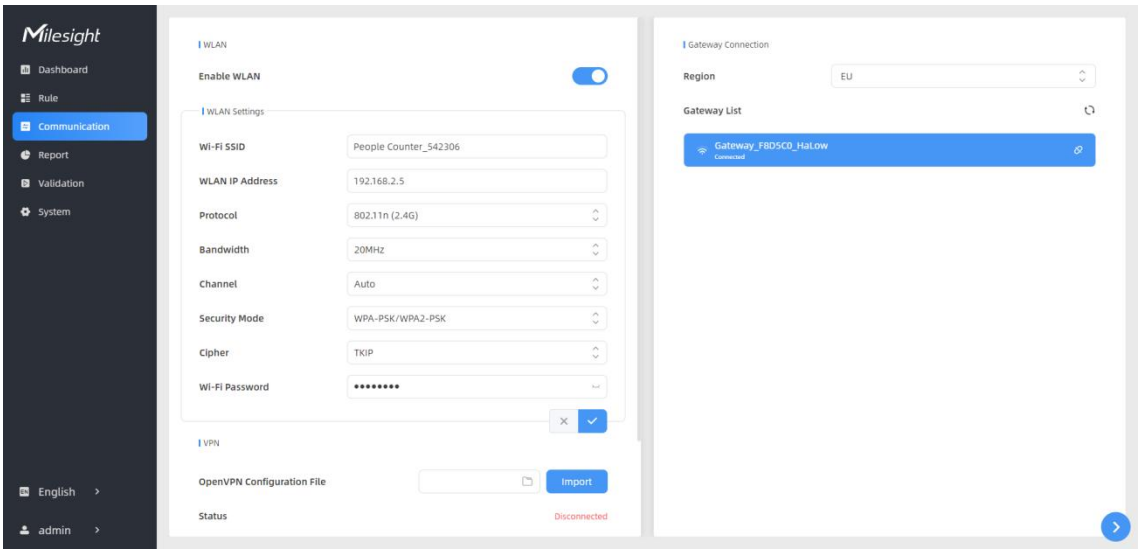
Step 9: Click **Unbind** to disconnect the node device if necessary.



5.3 Communication

5.3.1 Network Configuration

VS135-HL supports Wi-Fi for web access and Wi-Fi HaLow for data transmission.



WLAN

Parameters	Description
Enable WLAN	Enable or disable Wi-Fi feature. If disabled, users can use button to enable it.
Wi-Fi SSID	The unique name for this device Wi-Fi access point, defined as People Counter_xxxxxx (can be found on the device label).
WLAN IP Address	Configure WLAN IP address for web access, the default IP address is

	192.168.2.1.
Protocol	802.11g (2.4 GHz) and 802.11n (2.4 GHz) are optional.
Bandwidth	20 MHz or 40 MHz are optional.
Channel	Select the wireless channel. Auto, 1,...11 are optional.
Security Mode	It's fixed as WPA2-PSK.
Cipher	It's fixed as AES.
Wi-Fi Password	Customize the password, 8-63 characters, including numbers, lowercase letters, uppercase letters and special characters.

VPN

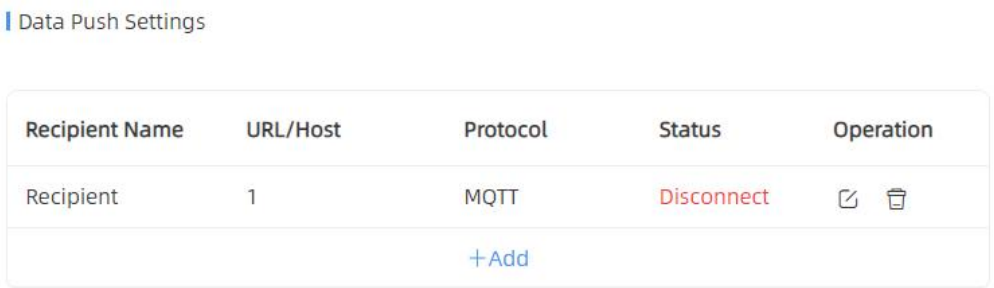
Parameters	Description
OpenVPN Configuration File	Import the *.conf* or *.ovpn* format OpenVPN client configuration profile.
Status	Show the connection status of the device and the VPN server: Disconnected, Connecting or Connected.
Device Virtual IP	Show the virtual IP of device.
Sever Virtual IP	Show the virtual IP of VPN Server.
Duration	Show the connection duration.

Gateway Connection

Parameters	Description
Region	Select the region of Wi-Fi HaLow which is the same as the region on the Wi-Fi HaLow Gateway.
Gateway List	Click to scan the Wi-Fi access point of Wi-Fi HaLow Gateway and click to connect it.

5.3.2 Recipient

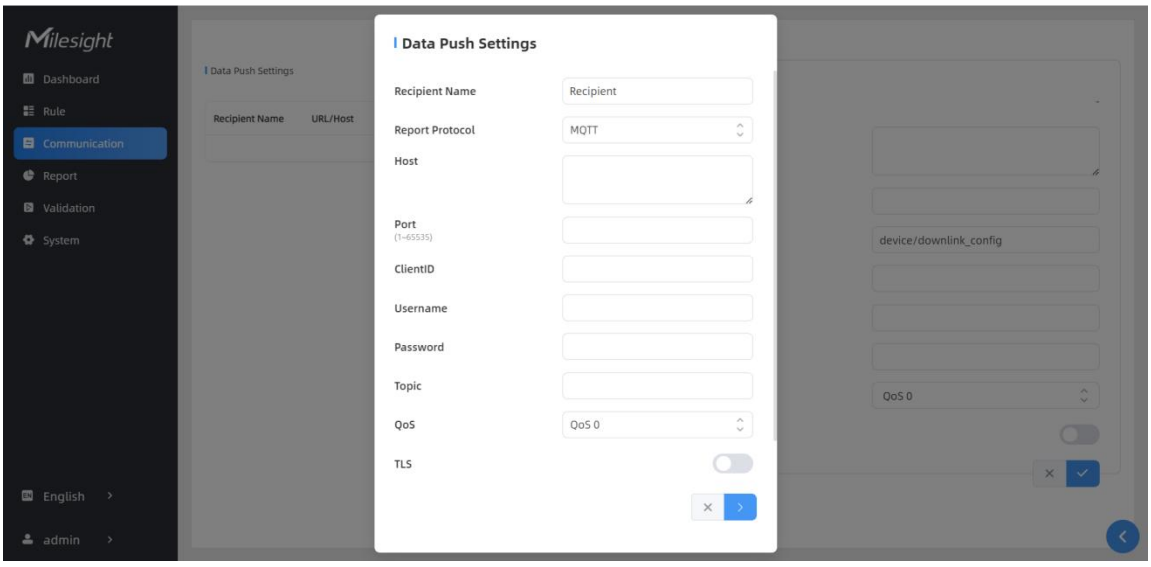
VS135 supports to add data receivers (supports HTTP(s)/MQTT(s)). The device will proactively push data to the receivers according to the configured reporting scheme.

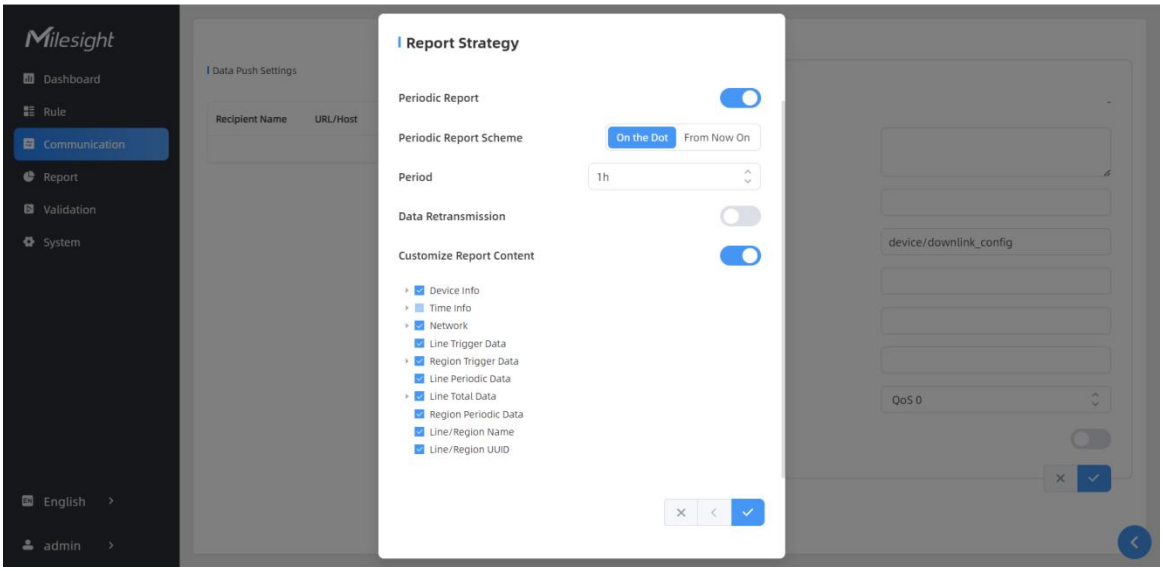


Parameters	Description
Recipient Name	Show the recipient name.
URL/Host	Show the URL/host of HTTP(s) server or MQTT broker.
Protocol	Show the report protocol.
Status	Show connection status from device to HTTP(s) server or MQTT broker.
Operation	Click to edit the information or delete the recipient.

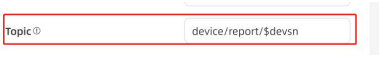
Note:

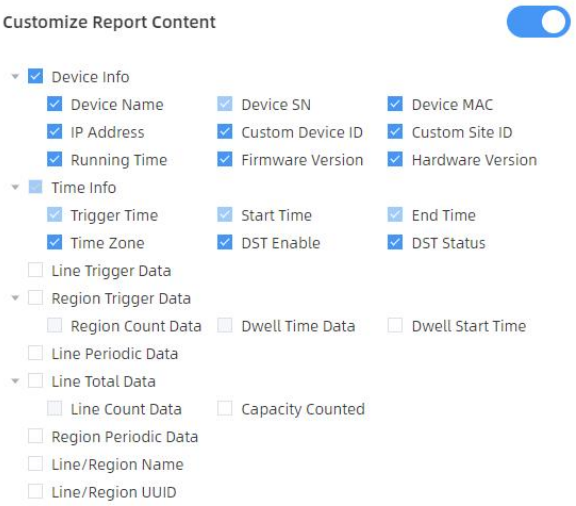
- Up to 8 receivers can be added.
- When working mode is the Node mode, the device will not support Data Push Settings.





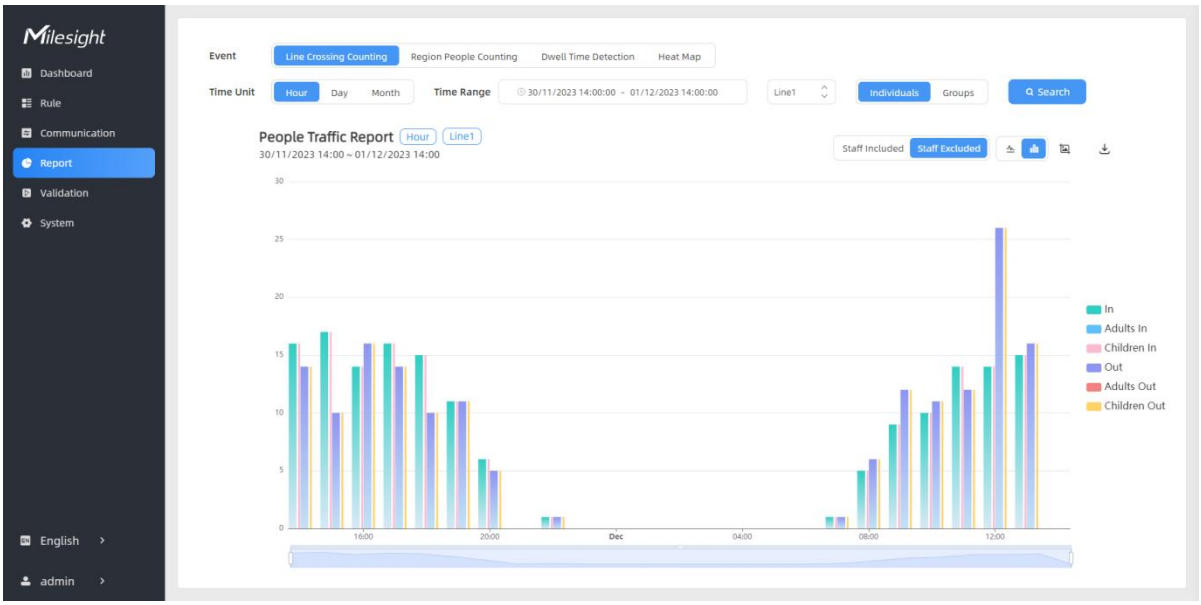
Parameters	Description
Recipient Name	Customize the recipient name.
Report Protocol	HTTP(s) or MQTT is optional.
HTTP(s)	
URL	The device will post the people counting data in json format to this URL.

Connection Test	Click **Test** to send test message to URL to check connectivity.
Username	The username used for authentication.
Password	The password used for authentication.
MQTT	
Host	MQTT broker address to receive data.
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 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. These strings will be replaced with device info when subscribing to a topic: $devsn：Device SN $prdmd：Product Model $devid：Customized Device ID $siteid：Customized Site ID  **Note:** Please replace the specific information when subscribing the topics to test if works.
QoS	QoS0, QoS1, and QoS2 are optional.
TLS	Enable the TLS encryption in MQTT communication.
Certificate Type	CA Signed Server or Self Signed is optional. **CA signed server certificate:** verifying with the certificate issued by Certificate Authority (CA) that is pre-loaded on the device. **Self signed certificates:** upload the custom CA certificates, client certificates and secret key for verification.
Report Strategy	
Trigger Report	Report immediately when there is a change of the line crossing people counting number or region people counting number.
Counting Report Control	Enable if you don't want to receive frequent trigger reports from line cross counting and region people counting. You will unify the cumulative data after the cooldown period.
Cooldown Period	During the cooldown period, any triggers will not be report. Once the cooldown period ends, reporting will resume.
Periodic Report	Select the periodic report of “On the Dot” or “From Now On”. **On the Dot:** The device will report at the top of each hour. For example, When the interval is set to 1 hour, it will report at 0:00, 1:00, 2:00 and so on; 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.
Periodic Report Scheme	
Period	
Data	Enable to resend stored data packets from the disconnected period when

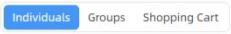
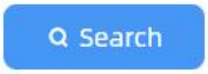
Retransmission	the device's network connection is restored. Every recipient supports to receive 50,000 pieces of data at most.
Customize Report Content	Customizable selection of content to be reported, avoiding data redundancy.  **Note:** When the device is in Master mode, the **Node Device Info.** will appear. Including SN, MAC, Software, Product Model, IP, and Connection Status.

5.4 Report

VS135 supports visual line chart or bar chart generation to display people traffic and supports report exporting. Before using this feature, do ensure that the device time is correct on **System** page.

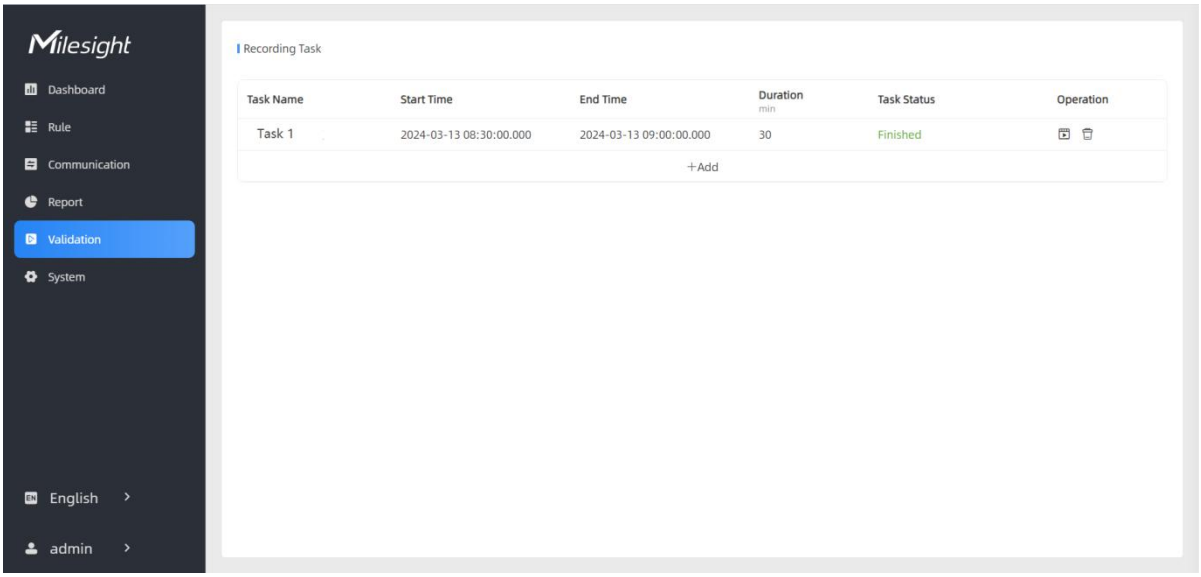


Parameters	Description
Event	Select the event which you want to query the report. Line crossing

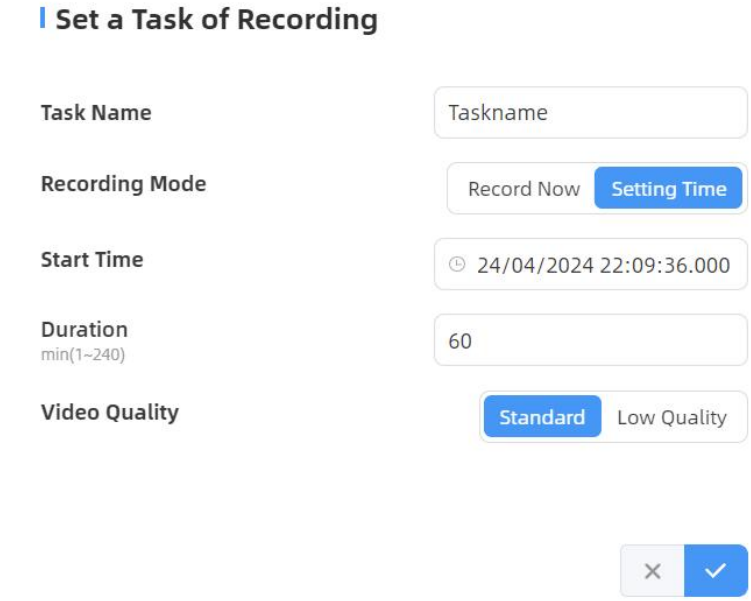
	counting, region people counting, dwell time detection and heat map are optional.
Time Unit	Select the unit to generate the graph or export the data.
Time Range	Select the time range to generate the graph.
	Select the line to display the graph.
	Select the individuals counting reports, groups counting reports or shopping cart reports. **Note:** Shopping Cart will display only when it is enabled.
	Select the region to display the graph.
Report Type	For heat map report, Motion Heatmap and Dwell Heatmap are optional.
	Click to generate the graph according to the time range and line option.
Export	Export the historical traffic data as CSV file according to the selected time unit. The device can store up to one million data records to CSV file.
Staff Included/Excluded	Select whether to contain staff counting values on the graph.
	Select the display type as line or bar.
	Click to screenshot the chart.
	Download the graph screenshot.

5.5 Validation

Video validation function can assist users in verifying the accuracy of people counting by setting up a video task of recording.



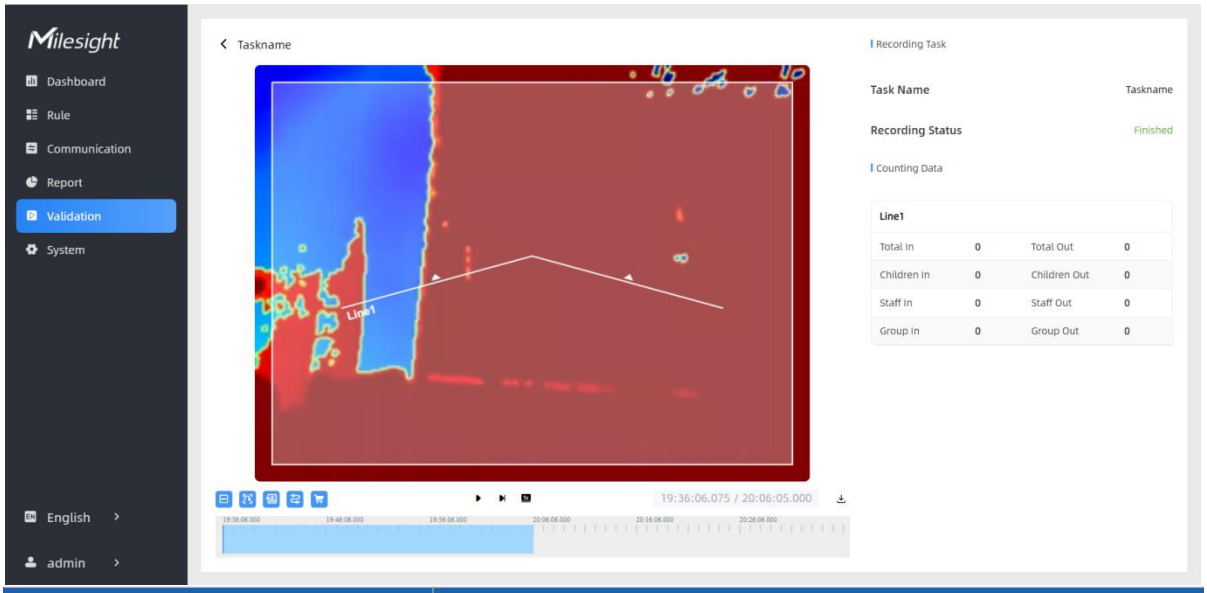
Parameters	Description
Task Name	Show the task name.
Start/End Time	Show the start time and end time of this video.
Duration	Show the length of the video.
Task Status	Show the video task status.
Operation	Click to check the video details, stop recording or delete the task.
+Add	Click to add a video task. One device can add up to 24 tasks.

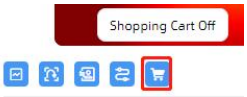


Parameters	Description
Task Name	Customize a name for this task.
Recording Mode	Record Now or Setting Time is optional.
Start Time	Set the start recording time.
Duration	Set the duration of the recording, the duration of all tasks should not be more than 240 minutes.
Video Quality	When video quality is low, the video size will be smaller and quicker to download.

Note:

- The setting time range of different tasks can not be overlap.
- Detection rules and ToF frequency parameters cannot be modified during the recording process.
- If the validation videos need to be played locally, please contact Milesight IoT support for a specialized player.



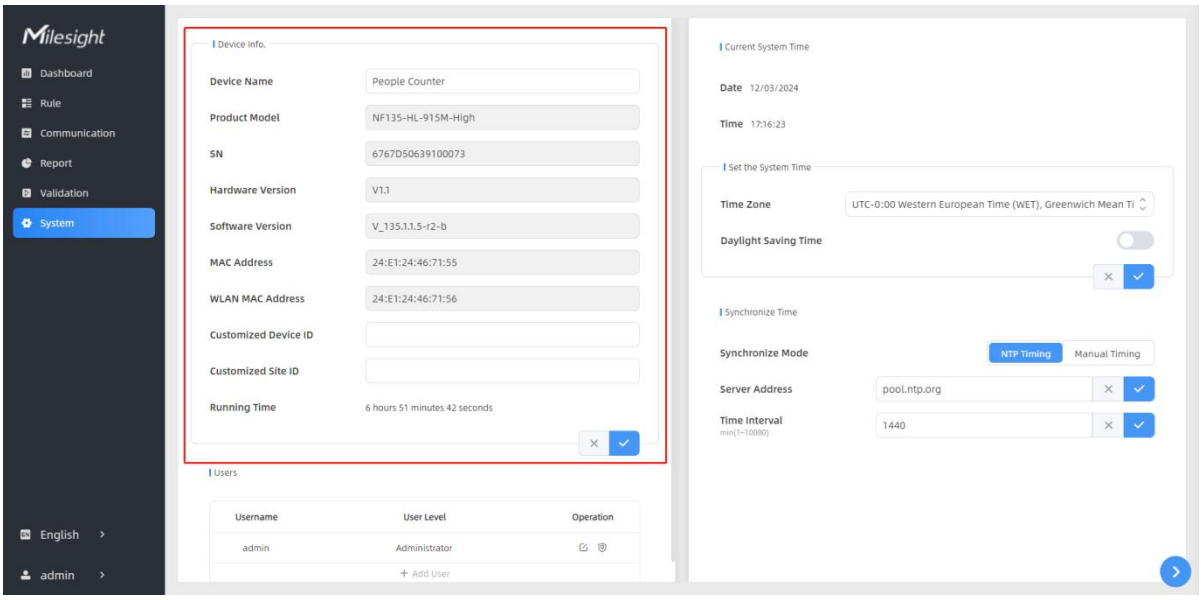
Parameters		Description
Playback Button		Enable/Disable detection lines in the recording footage.
		Enable/Disable u-turn area in the recording footage.
		Enable/Disable detection region in the recording footage.
		Enable/Disable tracking line in the recording footage.
		Enable/Disable detection icons of shopping cart.
		Rewind/Pause/Play/Forward(supports switching between 0.5x, 1x, 2x, and 4x playback speed).
	15:20:50.035 / 15:21:04.000	Start time and end time of the recording.
		Download video stream footage.

Note: The playback progress bar video stream footage highlights the video frame where the data changes.

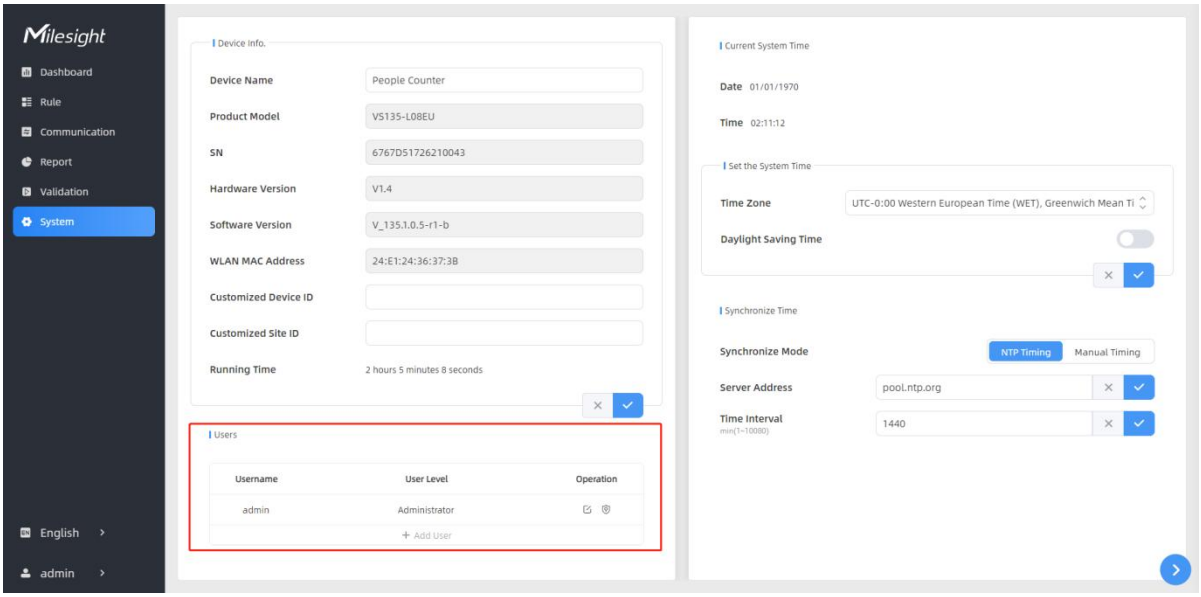
5.6 System

5.6.1 Device Info

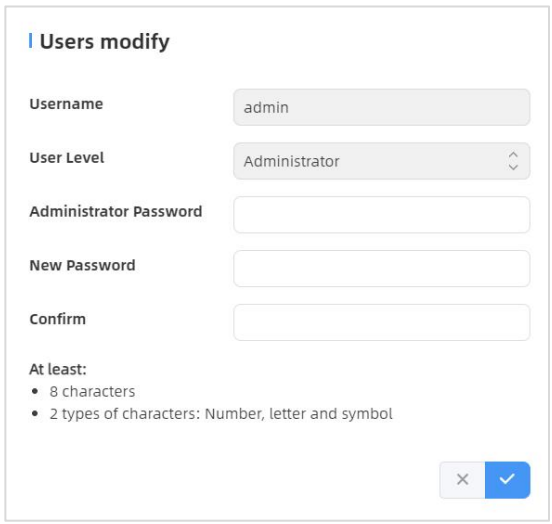
All information about the hardware and software can be checked on this page. Besides, users can modify the device name, customize device ID and site ID for large amounts of devices management.



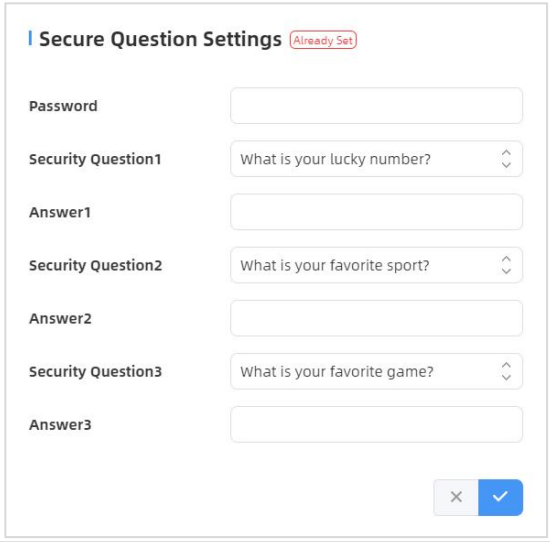
5.6.2 User



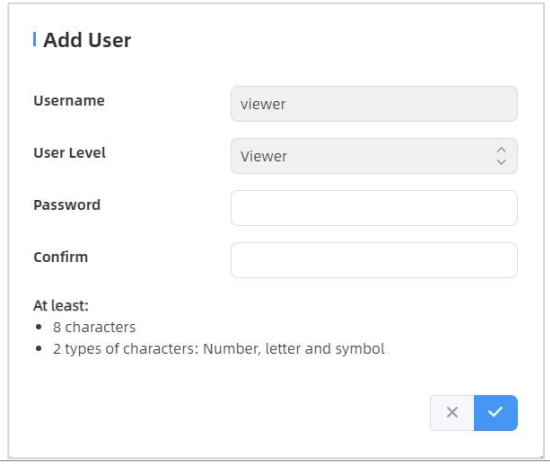
Parameters	Description
	You can change the login password of this device.



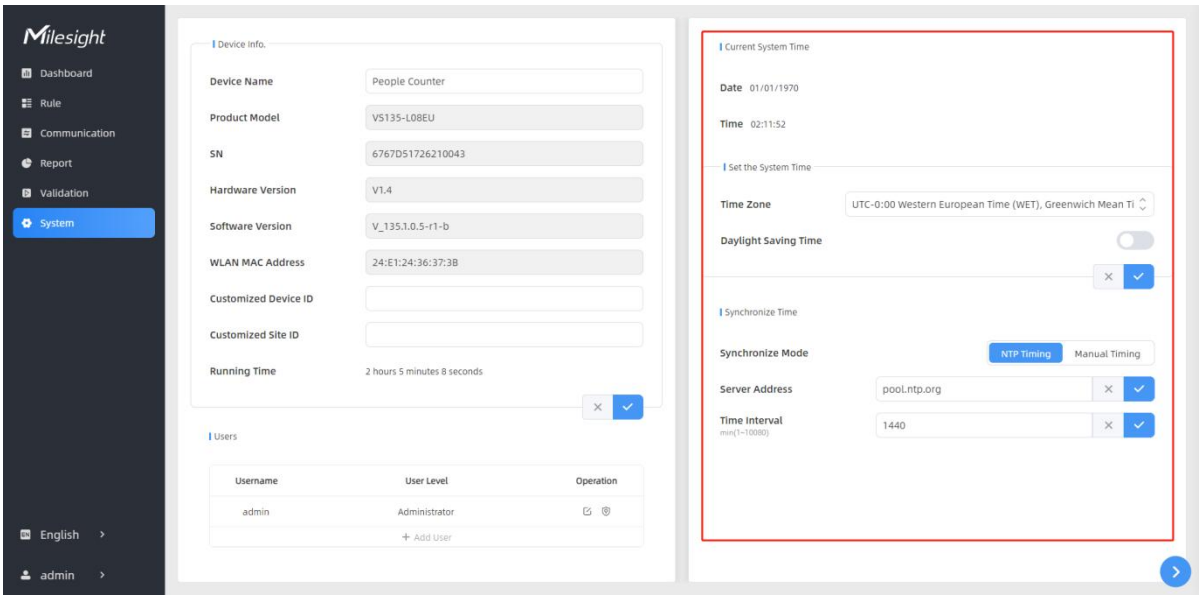
Click to set three security questions for your device. In case that you forget the password, you can click **Forget Password** button on login page to reset the password by answering three security questions correctly.



Click to add a viewer, who will only have access to the "Dashboard" and "Report" interfaces.



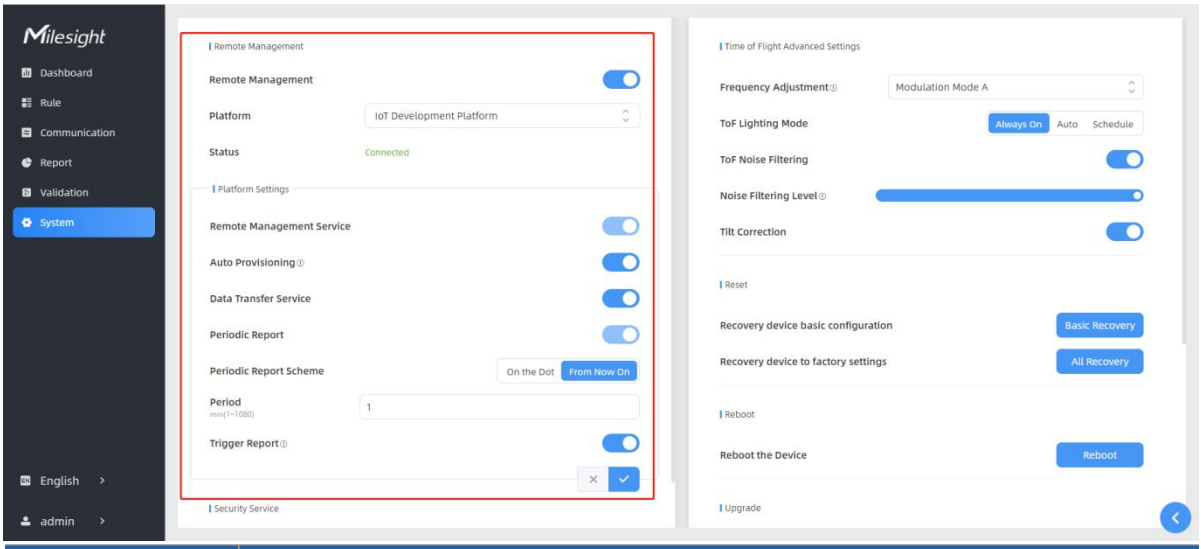
5.6.3 Time Configuration



Parameters	Description
Time Zone	Choose the time zone for your location.
Daylight Saving Time	Enable or disable Daylight Saving Time (DST). **Start Time:** the start time of DST time range. **End Time:** the end time of DST time range. **DST Bias:** the DST time will be faster according to this bias setting.
Synchronize Mode	NTP Timing or Manual Timing is optional.
Server Address	NTP server address to sync the time.
Time Interval	Set the interval to sync time with NTP server.
Setting Time	Set the device time manually.
Synchronize with computer time	Synchronize the time with your computer.

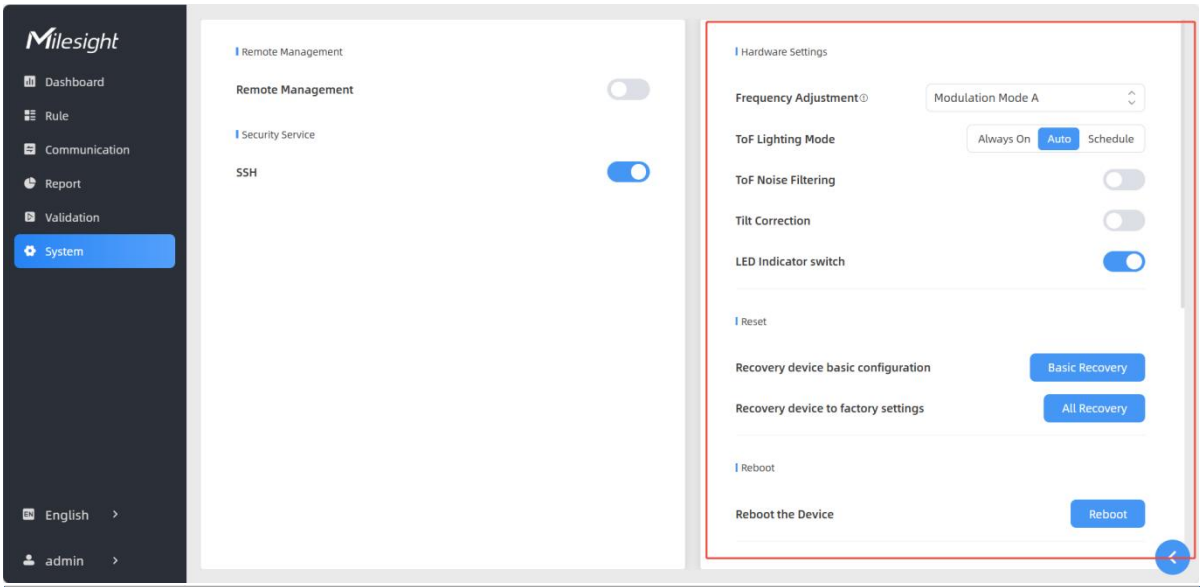
5.6.4 Remote Management

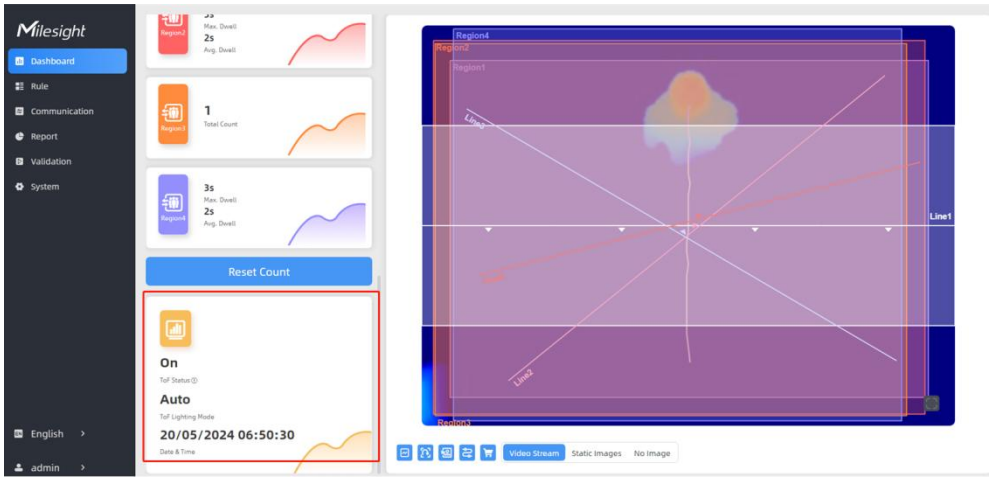
Milesight provides remote management service for this device via Milesight DeviceHub platform or Milesight Development Platform. Before connecting, do ensure the device is connected to the network and Internet connection is stable.

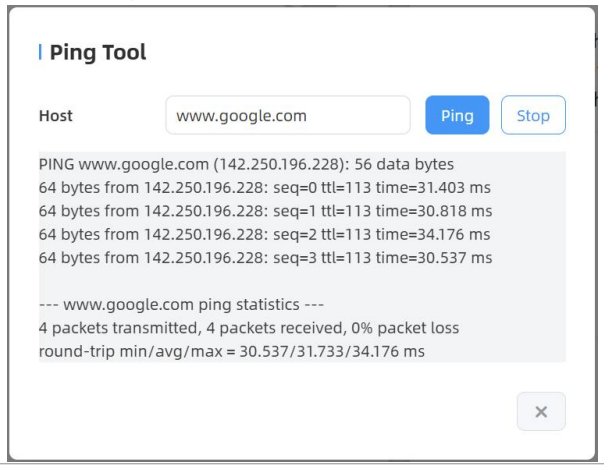


Parameters	Description
Remote Management	
Remote Management	Enable or disable to manage the device through Milesight platforms.
Platform	DeviceHub or IoT Development Platform is optional.
Status	Show the connection status between the device and the DeviceHub.
DeviceHub	
Server Address	IP address or domain of the DeviceHub management server.
Activation Method	Select activation method to connect the device to the DeviceHub server, options are **Authentication Code** and **Account**.
IoT Development Platform	
Remote Management Service	Enable to change the device settings via Milesight Development platform.
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.
Security Service	
SSH	Enable or disable SSH access. The SSH port is fixed as 22.

5.6.5 System Maintenance



Parameters	Description
Frequency Adjustment	Adjust the ToF frequency modulation mode to avoid the interference of surrounding IR devices. When using Multi-Device Stitching, please avoid using the same mode with other node devices. **Note:** If there is only one option, please contact Milesight IoT support: iot.support@milesight.com
ToF Lighting Mode	Adjust the ToF light mode as Always On, Auto or Schedule. When using Auto mode, the device will turn off the ToF light when radar detects no person for some times to save the power. **Note:** 1) ToF light off will not affect the periodic report. 2) During validation, the ToF lighting will be fixed as On irregardless of its lighting mode configuration. 3) When using ToF Lighting Mode, the Dashboard will display relevant information. 
ToF Noise Filtering	Filter the noisy point on the screen when working with dark floor or carpet.

Noise Filtering Level	Set the appropriate noise filtering level according to the actual image, the more difficult it is to see the target, the larger the filter value should be set.
Tilt Correction	Enable to automatic compensation of person height values when the device is mounted at a tilt.
LED Indicator switch	Enable or disable LED indicator when device is in normal operation.
Reset	**Recovery device basic configuration:** keep the IP settings and user information when resetting.
	Recovery device to factory settings: reset device to factory default, which needs to verify admin password.
Reboot	Restart the device immediately.
Upgrade	Click the folder icon and select the upgrading file, then click the **Upgrade** button to upgrade. The update will be done when the system reboots successfully. **Note:** The upgrade process takes about 1-10 minutes. Do not turn off the power and complete automatic restart after the upgrade.
Backup and Restore	**Export Config File:** Export configuration file.
	Import Config File: Click the file icon and select the configuration file, click **Import** button to import configuration file.
Diagnostics	**System Log:** Download log files that can be used for troubleshooting.
	IP Ping: Type the IP address or URL to test network connection. 

6. Installation Instruction

Parameter definition:

Parameters	Explanation	Value
H	Installation height	Standard Version: ≤3.5 m High Ceiling Mount: ≤6.5 m
d	Minimum detection distance of VS135	Standard Version: 0.5 m High Ceiling Mount: 2 m

Δd	Distance measurement error of VS135	0.035 m
h_{max}	Maximum pedestrian height	Example 1.8 m
h_{min}	Minimum pedestrian height	Example 1.7 m
α	ToF horizontal field of view angle	Standard Version: 98° High Ceiling Mount: 60°
β	ToF vertical field of view angle	Standard Version: 80° High Ceiling Mount: 45°
x	Length of detection range	
y	Width of detection range	

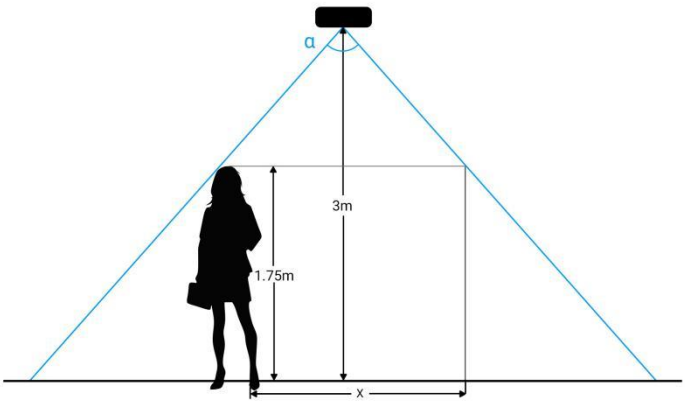
6.1 Installation Height

- The maximum installation height is 3.5 m and the minimum installation height is h_{max}+d+Δd. For example, when the maximum pedestrian height is 1.8 m, then the minimum installation height is 1.8+0.5+0.035=2.335 m.
- The maximum installation height is 6.5 m and the minimum installation height is h_{max}+d+Δd. For example, when the maximum pedestrian height is 1.8 m, then the minimum installation height is 1.8+2+0.035=3.835 m.

6.2 Covered Detection Area

The monitored area refers to the range visible to the device, which is displayed on the dashboard. The detection area, which is smaller, refers to the range within the monitored area where the device can detect changes in the number of people.

The detection area covered by the device is related to the field of view angle of the device, the installation height and the target height. The length of the detection area is approximately x=2 × tan(α/2) × (H-h-0.05) and the width of the detection area is approximately y=2 × tan(β/2) × (H-h-0.05).



For example, if the Minimum height of pedestrians is 1.75 m, the detection area corresponding to each installation height is as follows:

Standard Version:

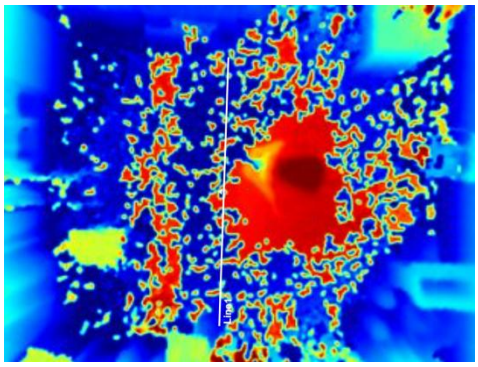
Installation Height (m)	Monitored Area (m)	Detection Area(m)
2.5	5.75 × 4.20	1.84 × 1.34
2.6	5.98 × 4.36	2.07 × 1.51
2.7	6.21 × 4.53	2.30 × 1.68
2.8	6.44 × 4.70	2.53 × 1.85
2.9	6.67 × 4.87	2.76 × 2.01
3.0	6.90 × 5.03	2.99 × 2.18
3.1	7.13 × 5.20	3.22 × 2.35
3.2	7.36 × 5.37	3.45 × 2.52
3.3	7.59 × 5.54	3.68 × 2.69
3.4	7.82 × 5.71	3.91 × 2.85
3.5	8.05 × 5.87	4.14 × 3.02

High Ceiling Mount Version:

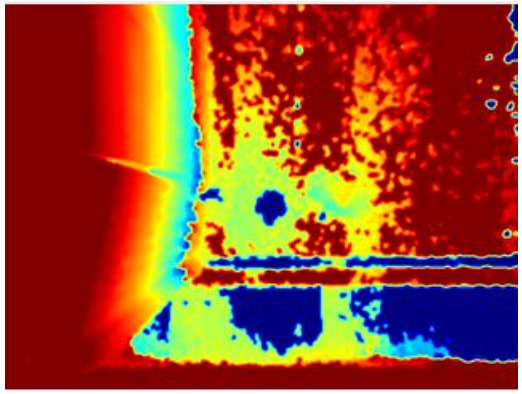
Installation Height (m)	Monitored Area (m)	Detection Area(m)
3.5	4.04 x 2.90	2.08 x 1.49
3.7	4.27 x 3.07	2.31 x 1.66
3.9	4.50 x 3.23	2.54 x 1.82
4.1	4.73 x 3.40	2.77 x 1.99
4.3	4.97 x 3.56	3.00 x 2.15
4.5	5.20 x 3.73	3.23 x 2.32
4.7	5.43 x 3.89	3.46 x 2.49
4.9	5.66 x 4.06	3.70x 2.65
5.1	5.89 x 4.22	3.93 x 2.82
5.3	6.12 x 4.39	4.16 x 2.98
5.5	6.35 x 4.56	4.39 x 3.15
5.7	6.35 x 4.72	4.62 x 3.31
5.9	6.81 x 4.89	4.85 x 3.48
6.1	7.04 x 5.05	5.08 x 3.65
6.3	7.27 x 5.22	5.31 x 3.81
6.5	7.51 x 5.38	5.54 x 3.98

6.3 Environment Requirements

- Dark floor/carpet (black, grey, etc.) will affect the device to count staffs when Staff Detection is enabled.



- Avoid 940nm light which may result in incorrect counting.
- Outdoor sunlight shining on the over channel will not have any effect, but the mirrored reflections that allow sunlight to shine on the ToF Sensor should be avoided.
- Make sure there are no obstacles within the live view of device. Otherwise, the device imaging may appear abnormally red or it will affect people counting. Set the appropriate noise filtering level according to the actual image. The more difficult it is to see the target, the higher the filter value should be.

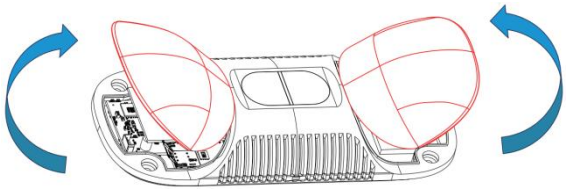


6.4 Installation

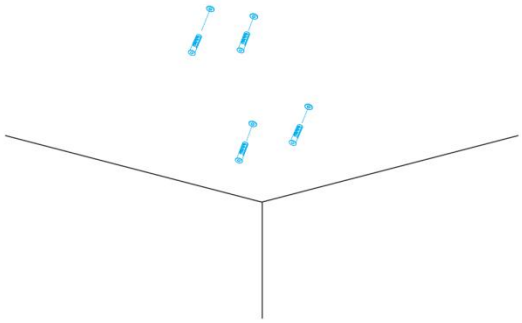
Ceiling Mount

Installation condition: ceiling thickness > 30mm.

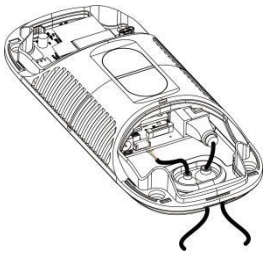
Step 1: Take down the side covers.



Step 2: Fix wall plugs into ceiling holes.



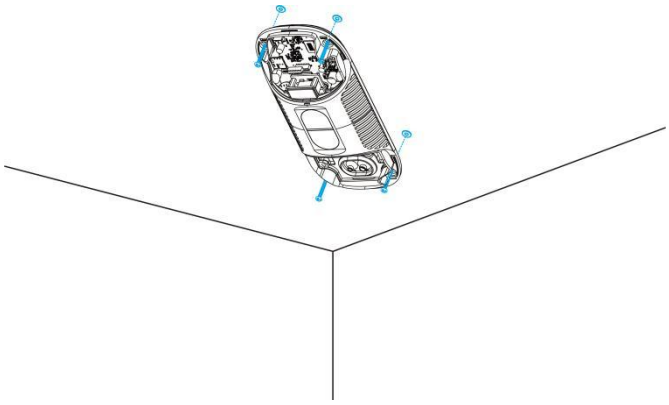
Step 3: Remove rubber plugs on the rubber sleeve, connect all required wires.



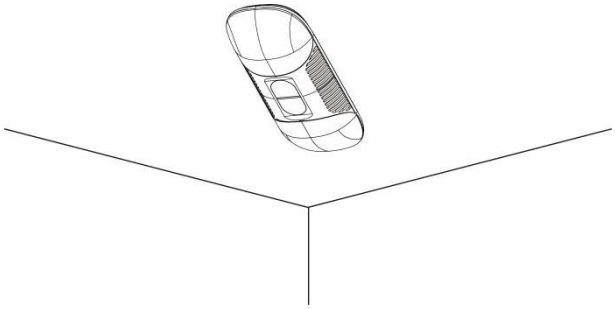
Note:

- Remove the rubber sleeve if waterproof is not required for easy installation.
- Use round wires.
- Ensure the rubber sleeve and the bottom cover are tightly connected without a gap if waterproof is required; if necessary, wrap the waterproof tapes around the wires to avoid any gap.
- Tighten the wires to avoid contact with internal modules.

Step 4: Fix the device to ceiling with mounting screws.



Step 5: Restore side covers.



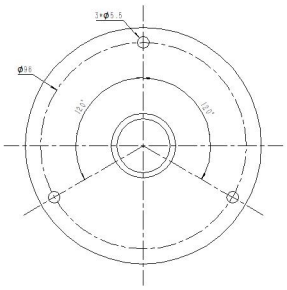
Ceiling/Lintel Mount (with Optional Multifunctional Bracket)

Step 1: Fix the pole to the device with the hole on the device.

Step 2: Adjust the length of the pole, then adjust the direction of 3-axis ball and tighten it with the handle.

Step 3: Determine the mounting location and drill 3 holes, fix the wall plugs into the mounting holes, then fix the bracket base to the wall plugs via mounting screws.

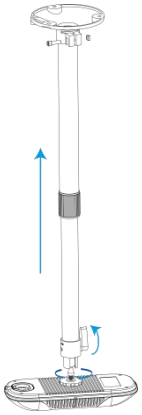
(**Note:** If the wire needs to be extended to the interior of the ceiling or wall, a wire hole with a suitable size is also required to be drilled.)

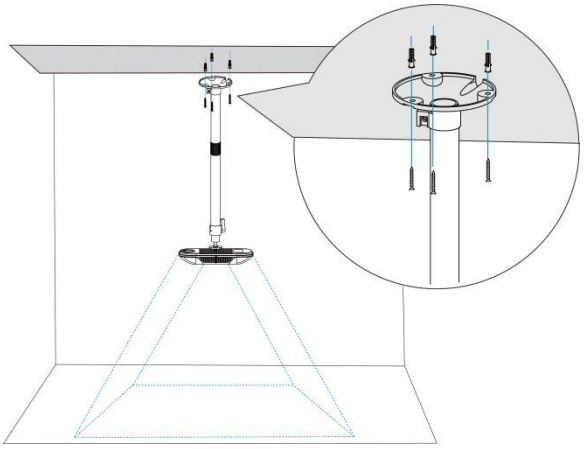


Step 4: Remove the cover on the device, and then connect all required wires and pass them through the inside of pole.

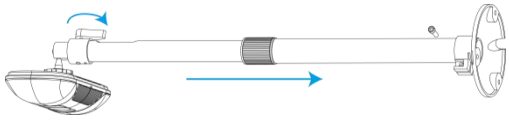
Step 5: Fix the pole to bracket base with screws and nuts.

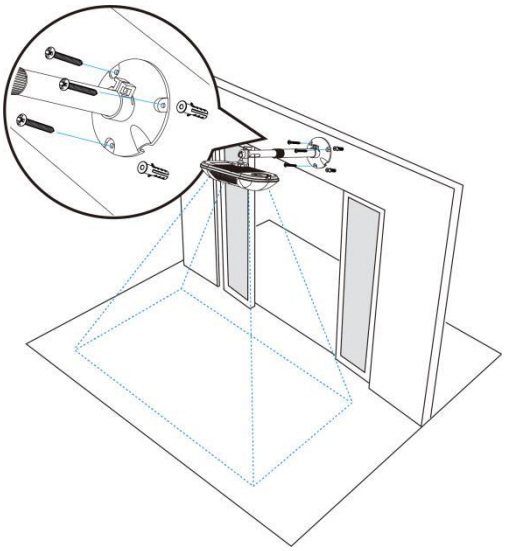
Ceiling Mount





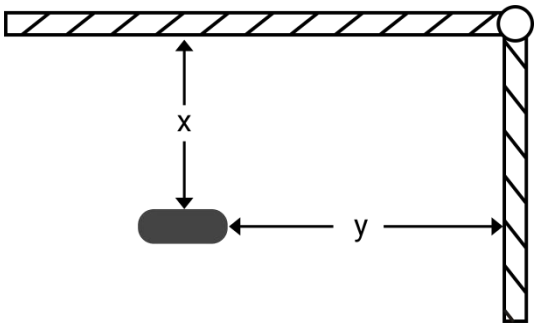
Lintel Mount





Installation Note:

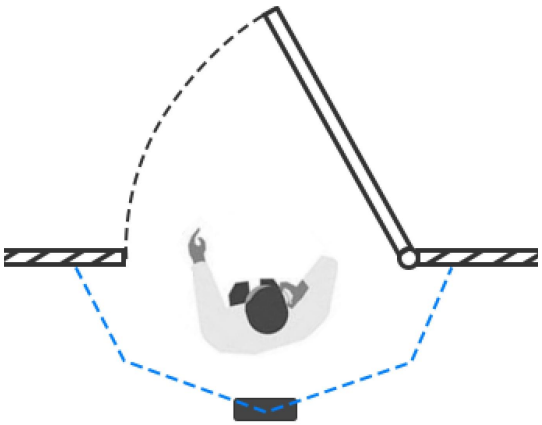
- Ensure that the ToF sensor is facing down and the tilt angle from the ground is no greater than 15° for the standard version, and no greater than 10° for the high ceiling mount version.
- Avoid direct Infrared LED light in the detection area.
- Not suggested to install the sensor close to glass or mirror.
- Ensure that there are no other objects blocking the ToF light within a 50cm radius of the device's field of view.
- Avoid installing the device against the wall and ensure the distance between the device and the wall as follows:



Condition	Standard Environment	The carpet/floor is Dark (need to set max noise filtering level)
Normal imaging	x>50cm, y>60cm	x>50cm, y>75cm
Normal counting	x>50cm, y>50cm	x>50cm, y>50cm

- When you install devices on the top of swinging doors, it is suggested to keep the door normally open. If the door must be normally closed, please install the device on the other side of the door to keep away from the door's movement. And it is suggested to keep away

from the door with a distance of at least 40cm.



6.5 Factors Affecting Accuracy

- Wearing a fisherman's hat or carrying a cardboard box on the shoulder: The target will not be recognized because it will become unlike a human in depth map.
- Handheld or cart-carrying a humanoid doll with sufficient height to pass by: The doll will be mistakenly detected as people because it is human-like in depth map.

7. Communication Protocol

VS135 will post the people counting data in json format to HTTP URL or MQTT broker.

7.1 Periodic Report


```
{
    "device_info": {
        "cus_device_id": "11111111111111111111111111111111111111",
        "cus_site_id": "3aaaaa",
        "device_name": "P3222222222222222222222222222222",
        "device_sn": "6757D16179950018",
        "firmware_version": "V_135.1.0.6-r1",
        "hardware_version": "V1.0",
        "ip_address": "192.168.60.212",
        "running_time": 11110,
        "wlan_mac": "24:E1:24:54:23:0A"
    },
    "network_info": {
        "network_status": "true",
        "iccid": "89860117838009934120",
```

```
        "imei": "860425047368939",
        "cell_id": "340db80",
        "lac": "5299"
    },

    "line_periodic_data": [{
        "children_in": 0,
        "children_out": 0,
        "empty_cart_in": 0,
        "empty_cart_out": 0,
        "full_cart_in": 0,
        "full_cart_out": 0,
        "group_in": 0,
        "group_out": 0,
        "in": 0,
        "line": 1,
        "line_name": "Line1",
        "line_uuid": "00000000-2cf7-9870-584b-ebdd1bd8b3d3986a",
        "no_full_cart_in": 0,
        "no_full_cart_out": 0,
        "out": 0,
        "staff_in": 0,
        "staff_out": 0
    }],
    "line_total_data": [{
        "capacity_counted": 3,
        "children_in_counted": 1,
        "children_out_counted": 0,
        "empty_cart_in_counted": 0,
        "empty_cart_out_counted": 0,
        "full_cart_in_counted": 0,
        "full_cart_out_counted": 0,
        "group_in_counted": 37,
        "group_out_counted": 34,
        "in_counted": 37,
        "line": 1,
        "line_name": "Line1",
        "line_uuid": "00000000-2cf7-9870-584b-ebdd1bd8b3d3986a",
```

```
        "no_full_cart_in_counted": 0,
        "no_full_cart_out_counted": 0,
        "out_counted": 34,
        "staff_in_counted": 0,
        "staff_out_counted": 0
    }],
    "region_data": {
        "dwell_time_data": [{
            "avg_dwell_time": 9,
            "children_avg_dwell_time": 65,
            "children_max_dwell_time": 3452,
            "max_dwell_time": 452,
            "region": 1,
            "region_name": "Region1",
            "region_uuid": "00000000-71f8-34a4-08cd-eb36ced99d0deccf",
            "staff_avg_dwell_time": 28,
            "staff_max_dwell_time": 247
        }],
        "region_count_data": [{
            "current_children": 3,
            "current_empty_cart": 0,
            "current_full_cart": 0,
            "current_no_full_cart": 0,
            "current_staff": 0,
            "current_total": 3,
            "region": 1,
            "region_name": "Region1",
            "region_uuid": "00000000-71f8-34a4-08cd-eb36ced99d0deccf"
        }]
    },
    "nodeDeviceInfo": [{
        "devSn": "6767D14554440058",
        "ip": "192.168.9.102",
        "mac": "24:E1:24:54:23:0B",
        "product": "VS135-HL",
        "status": "connect",
        "version": "V_135.1.0.8-a2"
    }],
```

```
    "time_info": {
        "dst_status": false,
        "enable_dst": false,
        "end_time": "2024-05-30T12:27:00+08:00",
        "start_time": "2024-05-30T12:26:00+08:00",
        "time_zone": "UTC+8:00 China Standard Time (CT/CST)"
    }
}
```


7.2 Trigger Report-Line Crossing People Counting


```
{
    "device_info": {
        "cus_device_id": "123",
        "cus_site_id": "456",
        "device_mac": "24:E1:24:54:23:09",
        "device_name": "666",
        "device_sn": "6767D14555570021",
        "firmware_version": "V_135.1.0.7-r1",
        "hardware_version": "V1.1",
        "ip_address": "192.168.60.191",
        "running_time": 287,
        "wlan_mac": "24:E1:24:54:23:0A"
    },
    "network_info": {
        "cell_id": "11",
        "iccid": "89860323245923454625",
        "imei": "864004048752502",
        "lac": "5F0C",
        "network_status": true
    },
    "line_trigger_data": [{
        "children_in": 0,
        "children_out": 1,
        "empty_cart_in": 0,
        "empty_cart_out": 1,
        "full_cart_in": 0,
        "full_cart_out": 0,
        "group_in": 0,
        "group_out": 1,
```

```
        "in": 0,
        "line": 2,
        "line_name": "Line2",
        "line_uuid": "7271ec9c-62d2-40c8-ac41-aaa3610b5d90",
        "no_full_cart_in": 0,
        "no_full_cart_out": 1,
        "out": 1,
        "staff_in": 0,
        "staff_out": 0
    }, {
        "children_in": 0,
        "children_out": 1,
        "empty_cart_in": 0,
        "empty_cart_out": 1,
        "full_cart_in": 0,
        "full_cart_out": 0,
        "group_in": 0,
        "group_out": 1,
        "in": 0,
        "line": 3,
        "line_name": "Line3",
        "line_uuid": "d0c48f90-44df-4ab0-a7d0-77008d3e3bdd",
        "no_full_cart_in": 0,
        "no_full_cart_out": 1,
        "out": 1,
        "staff_in": 0,
        "staff_out": 0
    }],
    "alarm_data": [{
        "alarm_direction": "out",
        "alarm_type": "tailgating alarm",
        "line": 1,
        "line_name": "Line1",
        "line_uuid": "00000000-6b34-a2b6-4263-a145f1c16e5f14e0"
    }],
    "time_info": {
        "dst_status": false,
        "enable_dst": false,
```

```
        "time": "2024-11-15T17:30:52+08:00",
        "time_zone": "UTC+8:00 China Standard Time (CT/CST)"
    }
}
```


7.3 Trigger Report-Region People Counting


```
{
    "device_info": {
        "cus_device_id": "123",
        "cus_site_id": "456",
        "device_name": "666",
        "device_sn": "6767D14555570021",
        "firmware_version": "V_135.1.0.7-r1",
        "hardware_version": "V1.1",
        "ip_address": "192.168.60.191",
        "running_time": 437,
        "wlan_mac": "24:E1:24:54:23:0A"
    },
    "network_info": {
        "cell_id": "11",
        "iccid": "89860323245923454625",
        "imei": "864004048752502",
        "lac": "5F0C",
        "network_status": true
    },
    "region_trigger_data": {
        "region_count_data": [{
            "current_children": 0,
            "current_empty_cart": 1,
            "current_full_cart": 1,
            "current_no_full_cart": 1,
            "current_staff": 0,
            "current_total": 0,
            "region": 1,
            "region_name": "Region1",
            "region_uuid": "00000000-460c-a50f-712e-d1e9b4f65b88ef59"
        }]
    },
```

```
    "time_info": {
        "dst_status": false,
        "enable_dst": false,
        "time": "2024-11-15T17:33:23+08:00",
        "time_zone": "UTC+8:00 China Standard Time (CT/CST)"
    }
}
```


7.4 Trigger Report-Dwell Time Detection


```
{
    "device_info": {
        "cus_device_id": "123",
        "cus_site_id": "456",
        "device_mac": "24:E1:24:54:23:09",
        "device_name": "666",
        "device_sn": "6767D14555570021",
        "firmware_version": "V_135.1.0.7-r1",
        "hardware_version": "V1.1",
        "ip_address": "192.168.60.191",
        "running_time": 460,
        "wlan_mac": "24:E1:24:54:23:0A"
    },
    "network_info": {
        "network_status": "true",
        "iccid": "89860117838009934120",
        "imei": "860425047368939",
        "cell_id": "340db80",
        "lac": "5299"
    },
    "region_trigger_data": {
        "dwell_time_data": [{
            "children": true,
            "duration": 2068,
            "dwell_end_time": "2024-11-15T17:33:45+08:00",
            "dwell_start_time": "2024-11-15T17:33:43+08:00",
            "people_id": 225,
            "region": 1,
            "region_name": "Region1",
            "region_uuid": "00000000-460c-a50f-712e-d1e9b4f65b88ef59",
```

```
                "staff": false
            }]
        },
        "time_info": {
            "dst_status": false,
            "enable_dst": false,
            "time": "2024-11-15T17:33:45+08:00",
            "time_zone": "UTC+8:00 China Standard Time (CT/CST)"
        }
}
```


7.5 Trigger Report-Occlusion Detection Alarm


```
{
    "device_info": {
        "cus_device_id": "123",
        "cus_site_id": "456",
        "device_mac": "00:16:28:94:AE:24",
        "device_name": "133-1.0.8",
        "device_sn": "6757E39092560018",
        "firmware_version": "V_135.1.0.8",
        "hardware_version": "V1.2",
        "ip_address": "192.168.60.213",
        "running_time": 87749,
        "wlan_mac": "24:E1:24:39:F2:5C"
    },
    "time_info": {
        "dst_status": false,
        "enable_dst": false,
        "time": "2025-01-17T14:04:32+08:00",
        "time_zone": "UTC+8:00 China Standard Time (CT/CST)"
    },
    "tof_occlusion_trigger": {
        "device_sn": "6757E39092560018",
        "occlusion_status": "occluded"
    }
}
```


-END-