



Wisenet WAVE AI Plugin for PNM-32084RQZ-8XE4T-W

User Manual: Installation, Activation,
Configuration, Update



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Plugin Overview

Wisenet WAVE AI Plugin for PNM-C32084RQZ-8XE4T-W is a solution developed in a partnership with CVEDIA to provide AI analytics on cameras without embedded analytics capabilities.

Integration Details

- The Plugin can be installed on PNM-C32084RQZ-8XE4T-W alongside the Wisenet WAVE application.
- Enables users to run up to 16 AI channels on PNM-C32084RQZ-8XE4T-W.
- On a single AI channel, users can enable multiple analytics at the same time. This will not impact the performance of the system.

Key Features

Key features of this integration include the detection of people, vehicles, and animals with a variety of associated analytics:

- Intrusion detection
- Area enter/exit
- Loitering
- Object guarding
- Object left behind
- Crowding
- Tailgating
- Line crossing
- Appearance Search (search by vehicle type and color; search by clothing color)

Surveillance operators can configure the analytics and create custom rules for triggering events within the Wisenet WAVE VMS to leverage these alerts and make informed decisions in real-world situations.

This guide will walk you through the installation, setup, and usage of this integration.

Specifications and Requirements

AI Analytics Plugin

- Version 2024.2.5 and higher

Wisenet WAVE VMS

- WAVE AI Plugin is compatible with Wisenet WAVE v5.1.4 or higher and Wisenet WAVE v6.x.x

Supported Hardware Series

- 4ch AI multi-sensor with WAVE VMS, Powered by the NVIDIA Jetson™ Platform (PNM-32084RQZ-8XE4T-W)

System Requirements

- Ubuntu 22 with Jetpack 6.0
- 5GB disk space

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Section 1: Installation and Activation

Installation: Linux

To install the AI plugin for Wisenet WAVE VMS on a Linux platform, please follow these steps:

- 1 Ensure you have Wisenet Wave Server installed on your machine.
- 2 Access your terminal application. This can typically be found in your system's applications menu.
- 3 Run the automated installation script.

```
curl -sqko - https://get.cvedia.com/wave-jetson | sudo bash
```

Press "Enter" to execute the command. This script will automatically download and install the AI plugin for Wisenet WAVE VMS.



Notes

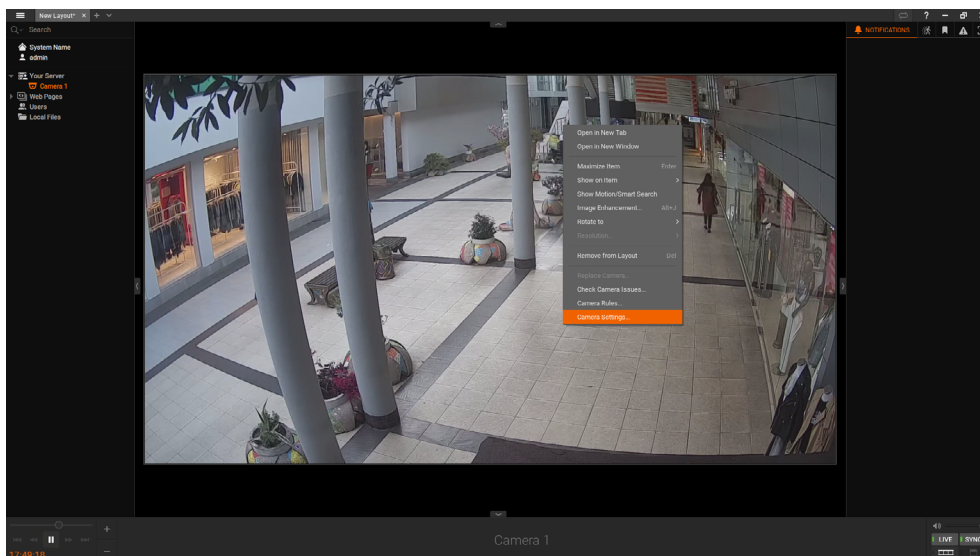
Follow on-screen prompts:

- During the installation process, you may be prompted to enter your system password to grant the necessary permissions. Enter your password and press "Enter".
- The script will handle the download and installation of all required components. Please wait until the installation is complete.

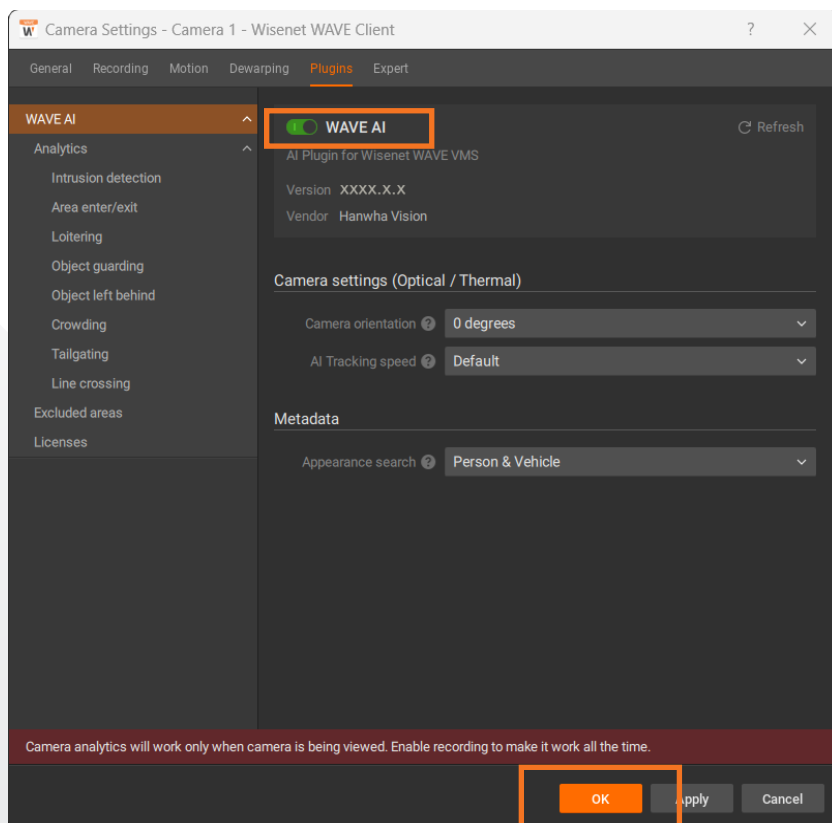
- 4 Verify installation.
Once the installation is finished, you can verify the plugin installation by opening the Wisenet WAVE VMS client and checking the "Plugins" tab in Camera Settings.

Enabling the Plugin

- 1 Open the Wisenet WAVE VMS Client and connect to the server where you installed the AI plugin.
- 2 Right-click on a connected camera or a video stream and select "Camera Settings."



- 3 Navigate to the Plugins section of the Camera Settings window and enable the plugin. Click the "Apply" button before proceeding with any further configuration.



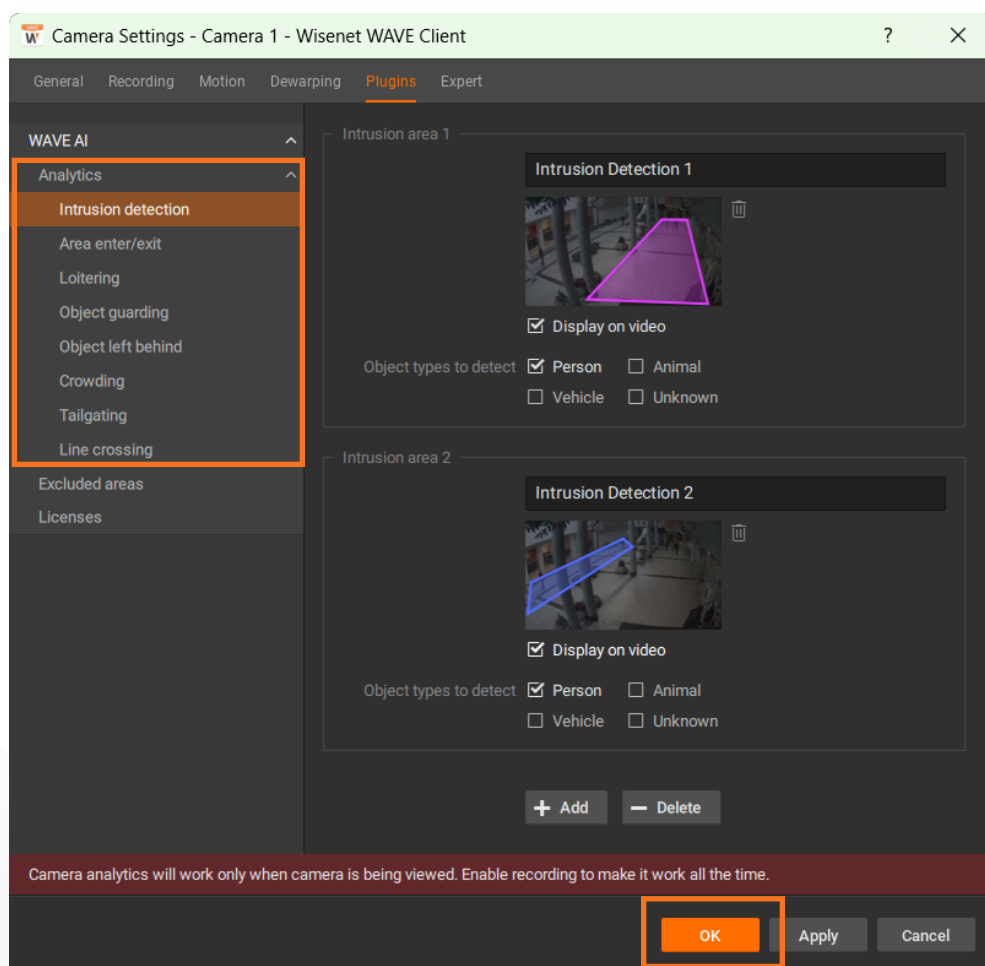


Notes

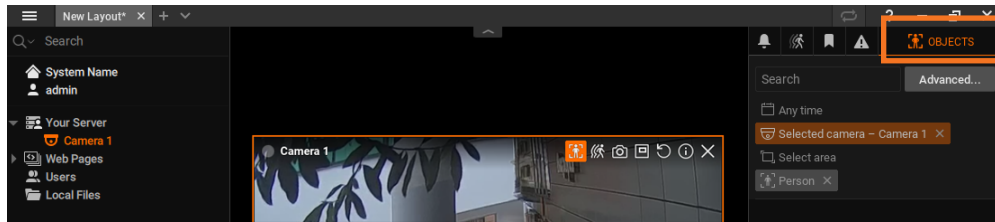
- Analytics work only when the camera is being viewed or recording is enabled.
- If you don't see the toggle to enable the plugin right away, please click on the WAVE AI title on the left sidebar first.

4 Apply a license to activate the plugin, and configure the analytics from the left sidebar menu.

5 Click “OK” to save the settings.



- 6 Go to the “OBJECTS” tab on the top right to preview the detected objects.



- 7 To generate events, define the camera rules in WAVE:

- Right-click on the camera and select “Camera Rules.”
- Add a new rule based on Analytic Events.

- 8 Monitor the events in the “EVENTS” tab.

- The image of the event may not represent the exact moment when the event was triggered. The system shows the best available crop based on the object size and detection confidence level, to prevent showing occluded or partially cut objects.

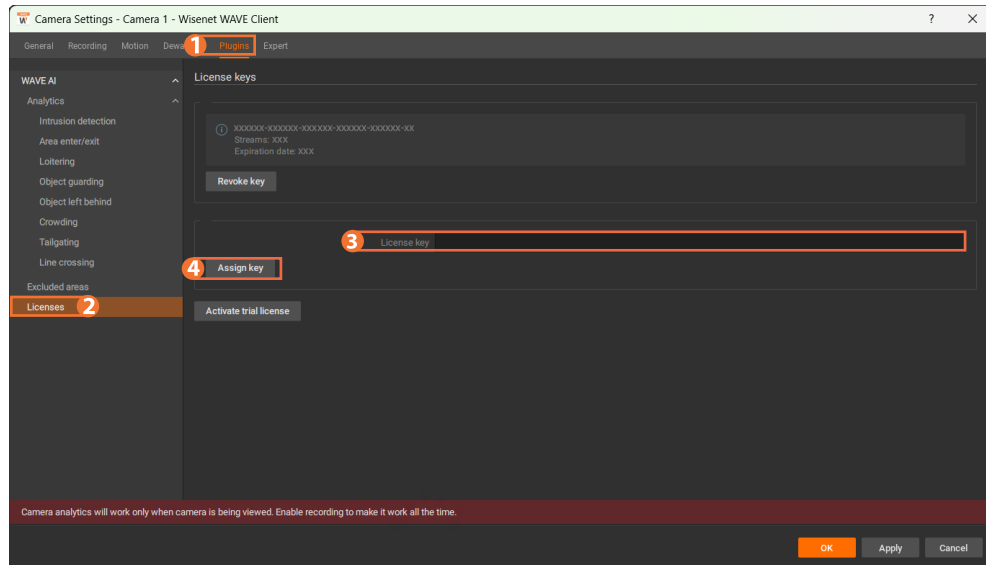


Learn More

- Visit **Section 2: Analytics Configuration** of this manual for additional configuration guidance on AI plugin.
- Visit the official WAVE VMS guide: <https://wavevms.com/data/help/index.html> to learn more about creating rules and monitoring events.

Applying a License to Activate the Plugin

- 1 Navigate to Camera Settings and open the Plugins tab.
- 2 Select Licenses on the left side menu panel.
- 3 Activate a trial license or apply a purchased key (keys) in the designated field.
- 4 Click "Assign key" and **apply the settings before closing the window.**



Notes

- Once activated, the license is bound to the device (the WAVE server).
- The number of streams indicates a maximum number of concurrent cameras running analytics. To increase this limit, obtain a new license with additional streams and activate it.
- To use the same license key on a different device, deactivate it by clicking the "Revoke Key" button in the Licenses window.

Section 2: Analytics Configuration

Different types of analytics allow you to configure one or more detection areas or lines, choose the types of objects to detect, and select additional related parameters.

Analytics are active only if at least one area or one line is defined.

Please note that you can enable multiple analytics at the same time. This will not impact the performance of the system.



Best Practice Guide

Users can optimize the performance of the AI Analytics Plugin for Wisenet WAVE VMS with our best practice configuration advice. You can download the PDF file from the product page on the official website:

<https://hanwhavisionamerica.com/product/pnm-c32084rqz-8xe4t-w-multi-sensor-wave-vms/>

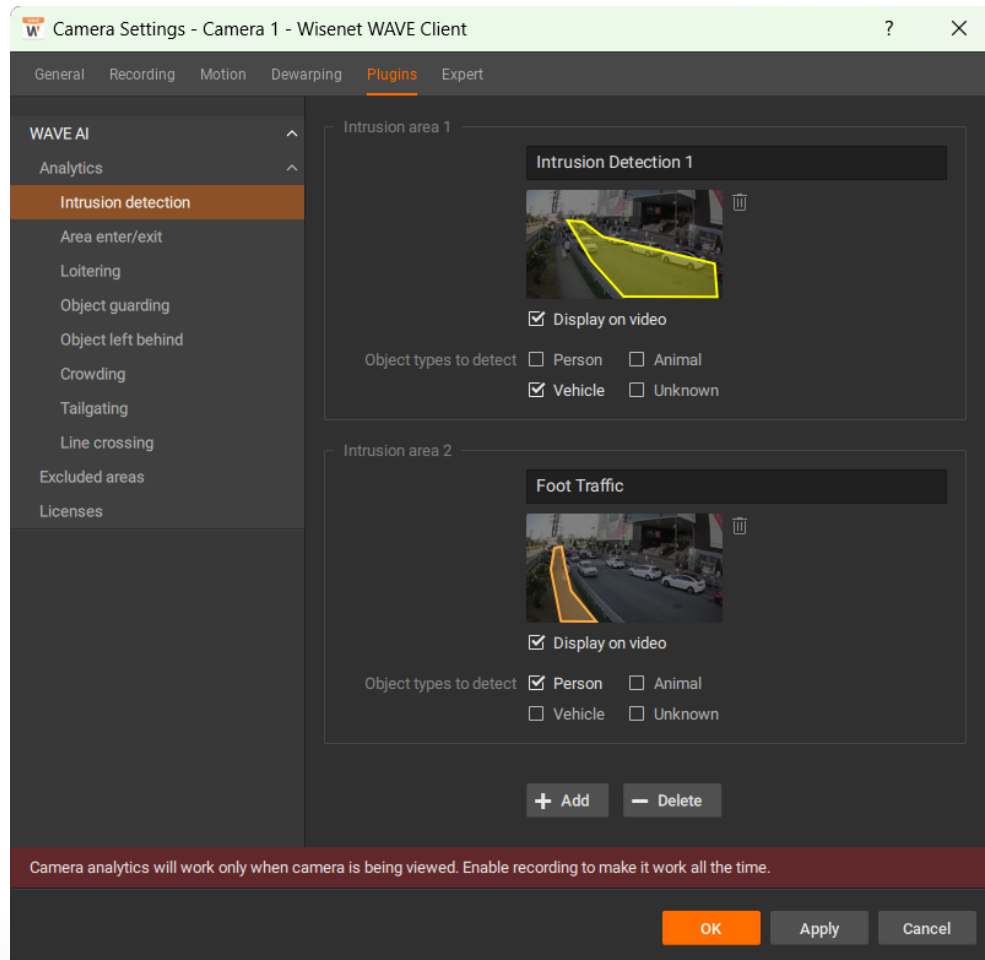
This document covers how to define detection areas and lines, enhance accuracy, minimize false positives, and offers practical insights and instructions to ensure your surveillance system is fine-tuned for maximum efficiency and reliability.

Intrusion Detection



Definition

Detects objects that move inside a defined intrusion area. The event is triggered for any new target object (person, vehicle, animal) entering the area.



Configuration steps

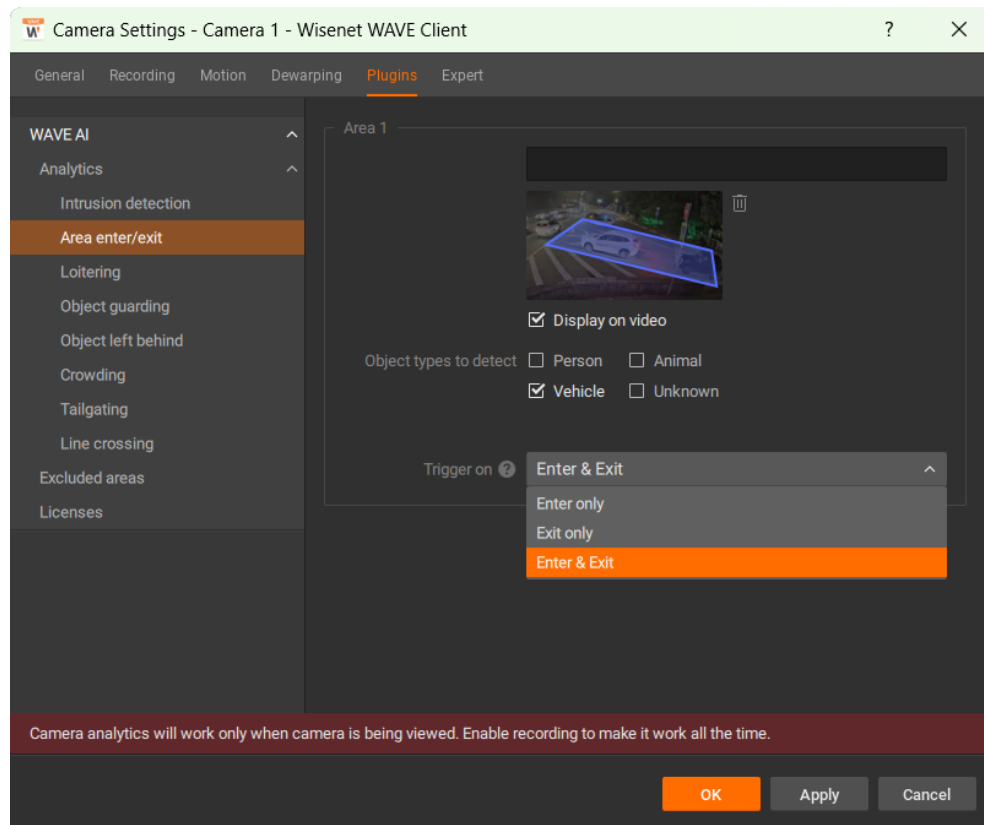
- Navigate to Camera Settings > Plugins > WAVE AI > Intrusion Detection.
- Click directly on the image under “Intrusion area 1” to define the intrusion detection zone. Draw a custom polygon to encompass the area for intrusion detection.
- Tick the “Display on Video” box to visualize the defined area on the live video stream.
- Select the different Object Types (person, vehicle, animal, unknown) that you would like to detect within each defined area.
- Additional zones can be defined by clicking “+ Add”. Draw a different polygon under “Intrusion area 2” if necessary.

Area Enter/Exit



Definition

Detects objects that enter/exit a defined area. This analytic can be employed to monitor objects detected in the area without triggering an intrusion event.



Configuration steps

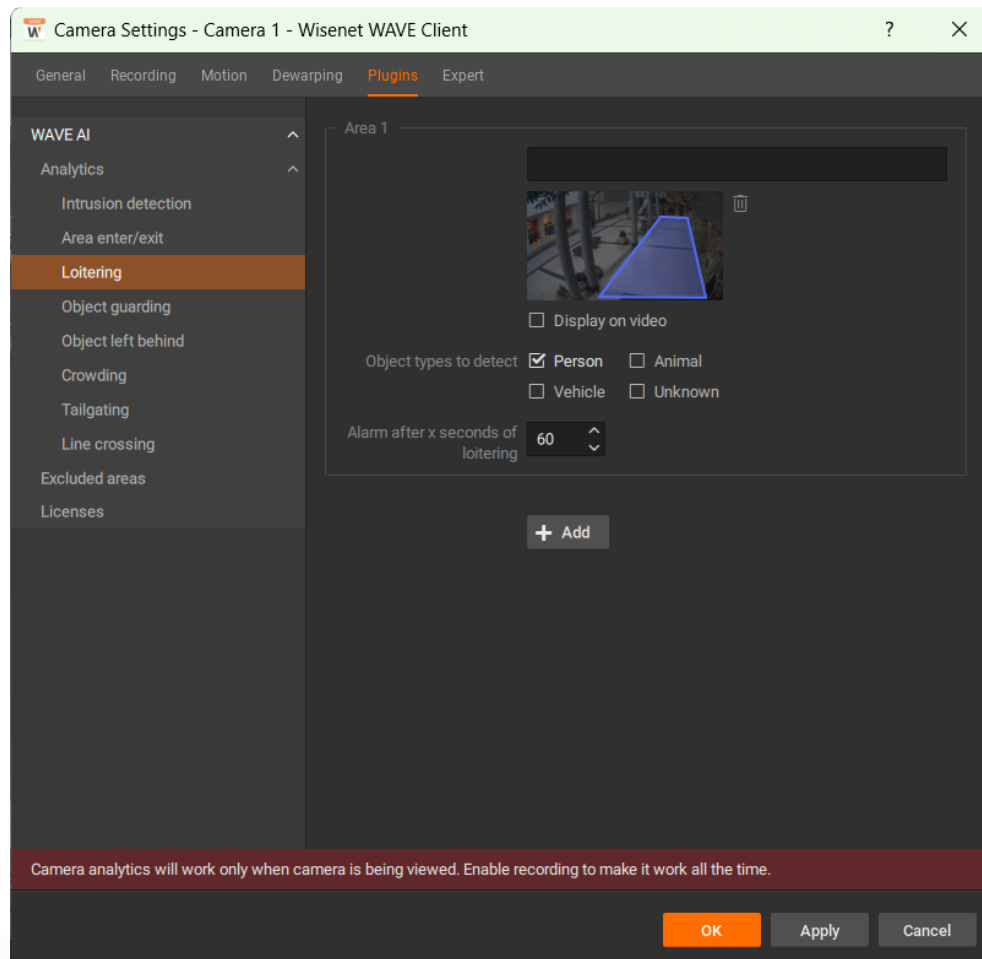
- Navigate to Camera Settings > Plugins > WAVE AI > Area Enter/Exit.
- Click directly on the image under “Area 1” to define the zone. Draw a custom polygon to encompass the area for object detection.
- Tick the “Display on Video” box to visualize the defined area on the live video stream.
- Select the different Object Types (person, vehicle, animal, unknown) that you would like to detect within each defined area.
- Select which event to trigger - Enter & Exit, Enter Only & Exit Only
- Additional zones can be defined by clicking “+ Add”. Draw a different polygon under “Area 2” if necessary.

Loitering



Definition

Detects objects that stay in the defined area longer than a specified time. By default, an event will be triggered when a target object remains in the area for a duration of 10 seconds.



Configuration steps

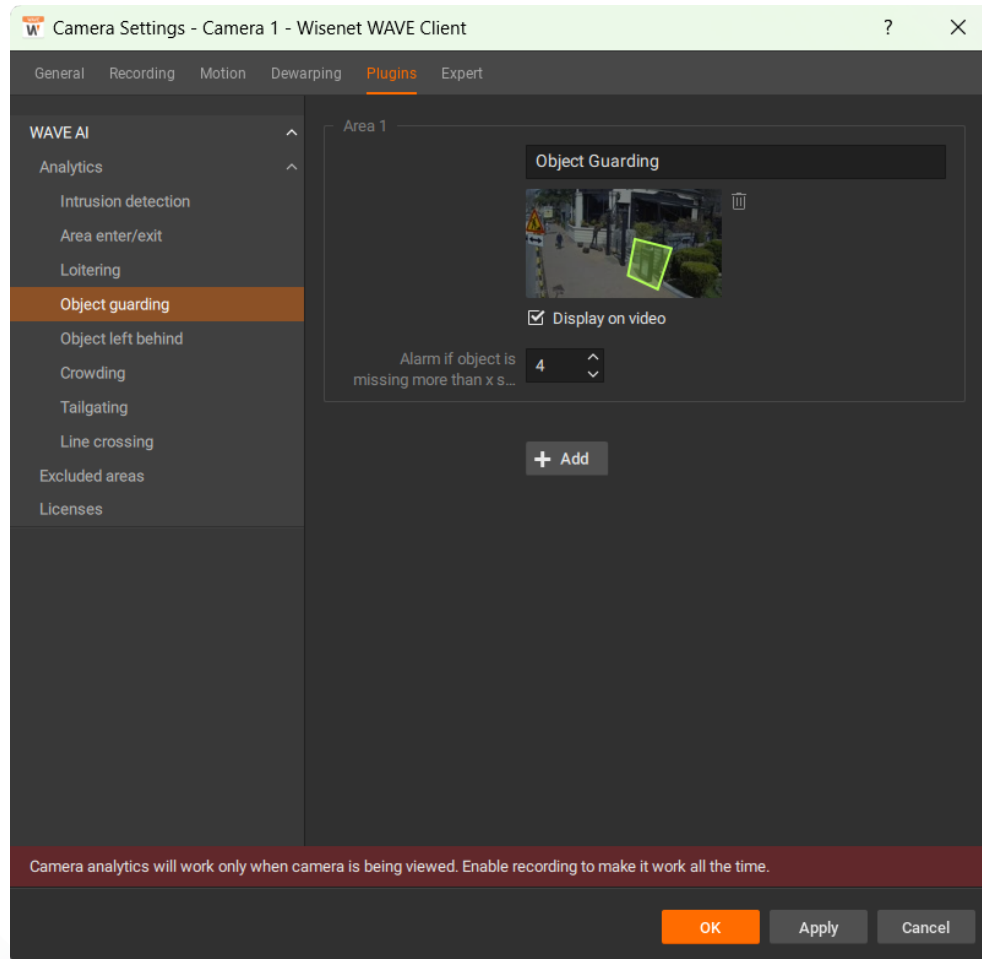
- Navigate to Camera Settings > Plugins > WAVE AI > Loitering.
- Click directly on the image under "Area 1" to define the zone. Draw a custom polygon to encompass the area for object detection.
- Tick the "Display on Video" box to visualize the defined area on the live video stream.
- Select the different Object Types (person, vehicle, animal, unknown) that you would like to detect within each defined area.
- Set the duration threshold for triggering events.
- Additional zones can be defined by clicking "+ Add". Draw a different polygon under "Area 2" if necessary.

Object Guarding



Definition

Detection of objects being removed from a specified area, indicating potential theft.



Configuration steps

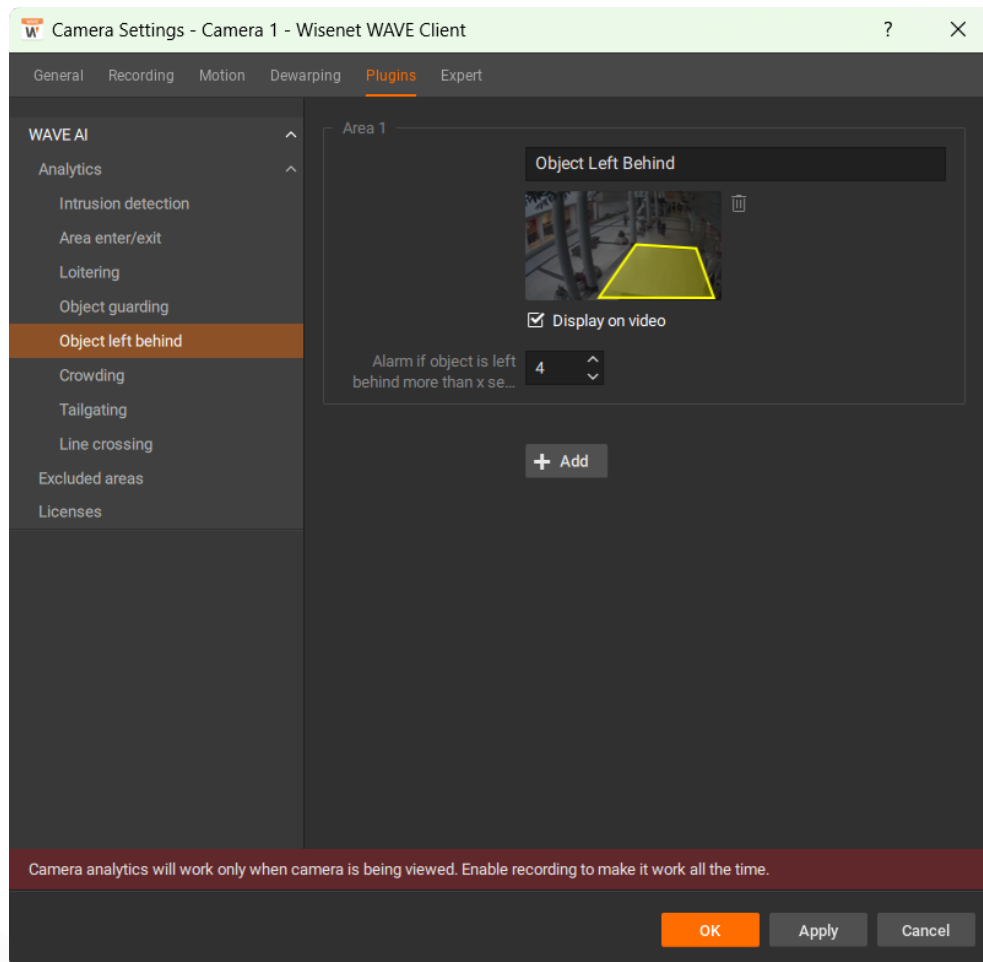
- Navigate to Camera Settings > Plugins > WAVE AI > Object guarding.
- Click directly on the image under "Area 1" to define the zone. Draw a custom polygon to encompass the area for object guarding.
- Tick the "Display on Video" box to visualize the defined area on the live video stream.
- Set the duration threshold for triggering events.
- Additional zones can be defined by clicking "+ Add". Draw a different polygon under "Area 2" if necessary.

Object Left Behind



Definition

Detection of objects being left in a specified area, indicating potential delivery or object abandonment.



Configuration steps

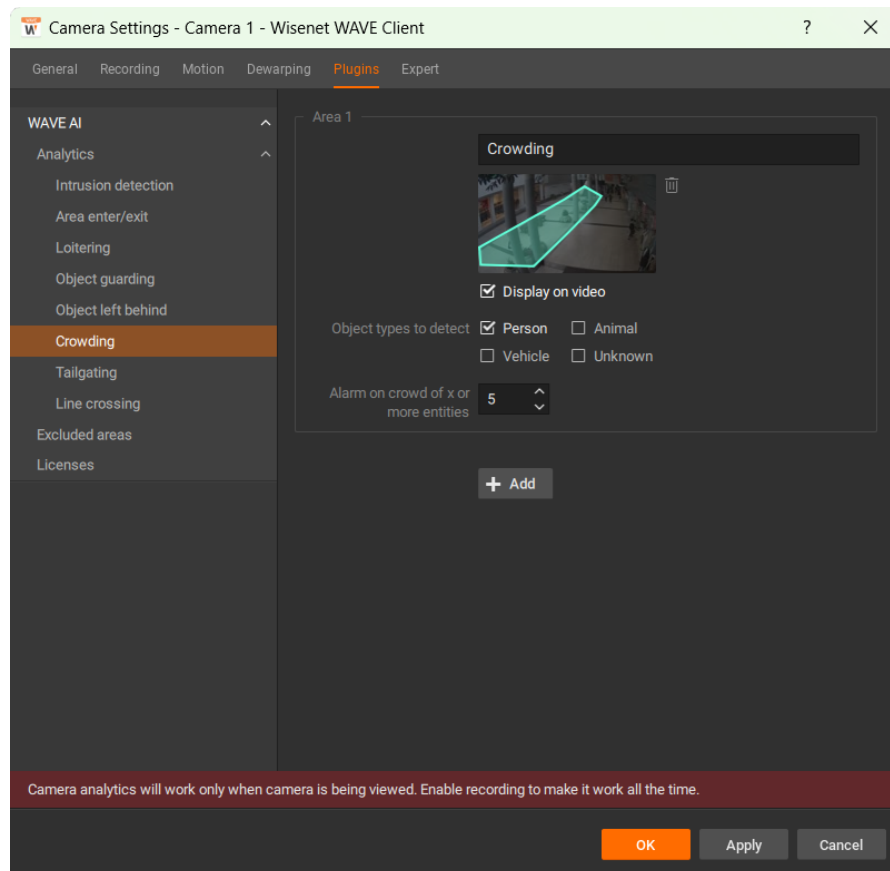
- Navigate to Camera Settings > Plugins > WAVE AI > Object left behind.
- Click directly on the image under "Area 1" to define the zone. Draw a custom polygon to encompass the area to detect objects left behind.
- Tick the "Display on Video" box to visualize the defined area on the live video stream.
- Set the duration threshold for triggering events.
- Additional zones can be defined by clicking "+ Add". Draw a different polygon under "Area 2" if necessary.

Crowding



Definition

Detects when the number of objects within a defined area at any given time reaches a set threshold. For instance, it could be a useful feature to detect a sudden increase of people in a queue in front of an ATM or in a commercial environment.



Configuration steps

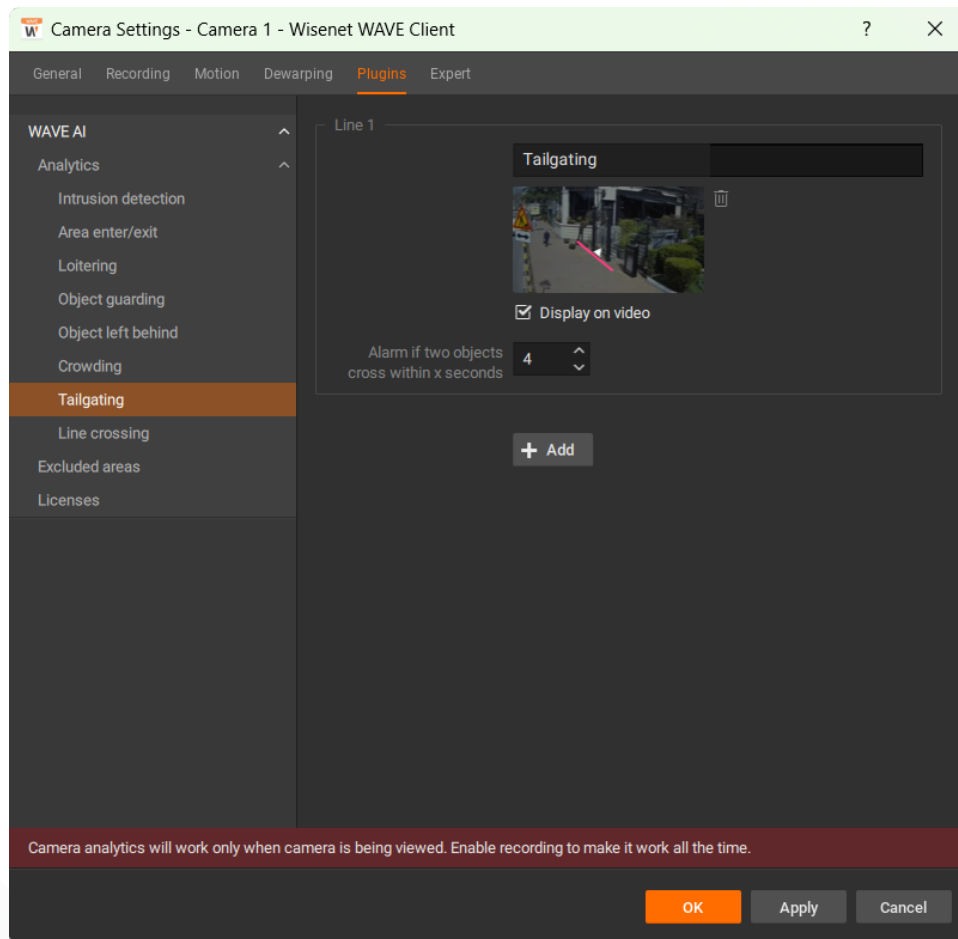
- Navigate to Camera Settings > Plugins > WAVE AI > Crowding.
- Click directly on the image under "Area 1" to define the zone. Draw a custom polygon to encompass the area for object detection.
- Tick the "Display on Video" box to visualize the defined area on the live video stream.
- Select the different Object Types (person, vehicle, animal, unknown) that you would like to detect within each defined area.
- Specify the minimum number of objects required to trigger an event.
- Additional zones can be defined by clicking "+ Add". Draw a different polygon under "Area 2" if necessary.

Tailgating



Definition

The tailgating feature detects if more than one object crosses a virtual line during a predefined time interval. This feature could be useful for detection of multiple individuals or vehicles following each other in close proximity to gain access to a secured area.



Configuration steps

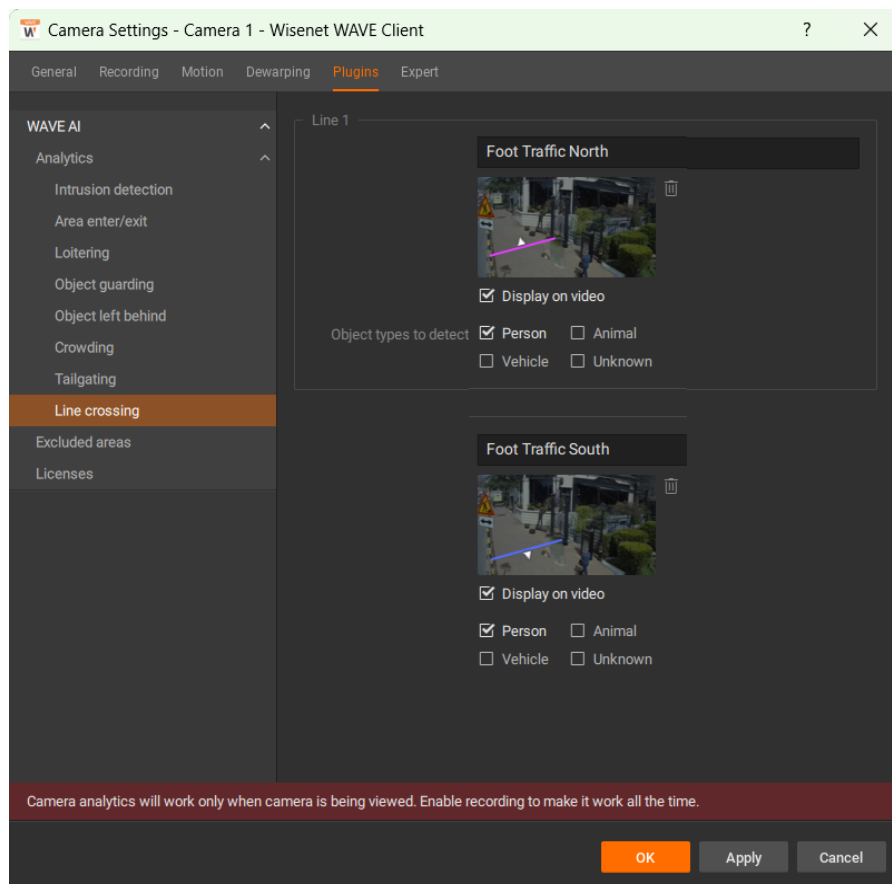
- Navigate to Camera Settings > Plugins > WAVE AI > Tailgating.
- Click directly on the image to create a virtual line.
 - Click once to create new points of the line, then click on the last point to end it.
 - Define the direction of movement for object tracking. Click on the Arrows to choose which direction you would like to use to trigger events.
- Tick "Display on Video" to visualize the configured virtual lines.
- Additional lines can be defined by clicking "+ Add". Draw a different line under "Line 2" if necessary.

Line Crossing



Definition

Detects objects that cross a defined line. You have the option to create a multi-segment virtual line. This feature allows you to select the direction in which you intend to monitor the movement of objects.



Configuration steps

- Navigate to Camera Settings > Plugins > WAVE AI > Line Crossing.
- Click directly on the image to create a virtual line.
 - Click once to create new points of the line, then click on the last point to end it.
 - Define the direction of movement for object tracking. Click on the Arrows to choose which direction you would like to use to trigger events.
- Tick "Display on Video" to visualize the configured virtual lines.
- Select the different Object Types (person, vehicle, animal, unknown) that you would like to detect over line crossing.
- Additional lines can be defined by clicking "+ Add". Draw a different line under "Line 2" if necessary.

Appearance Search

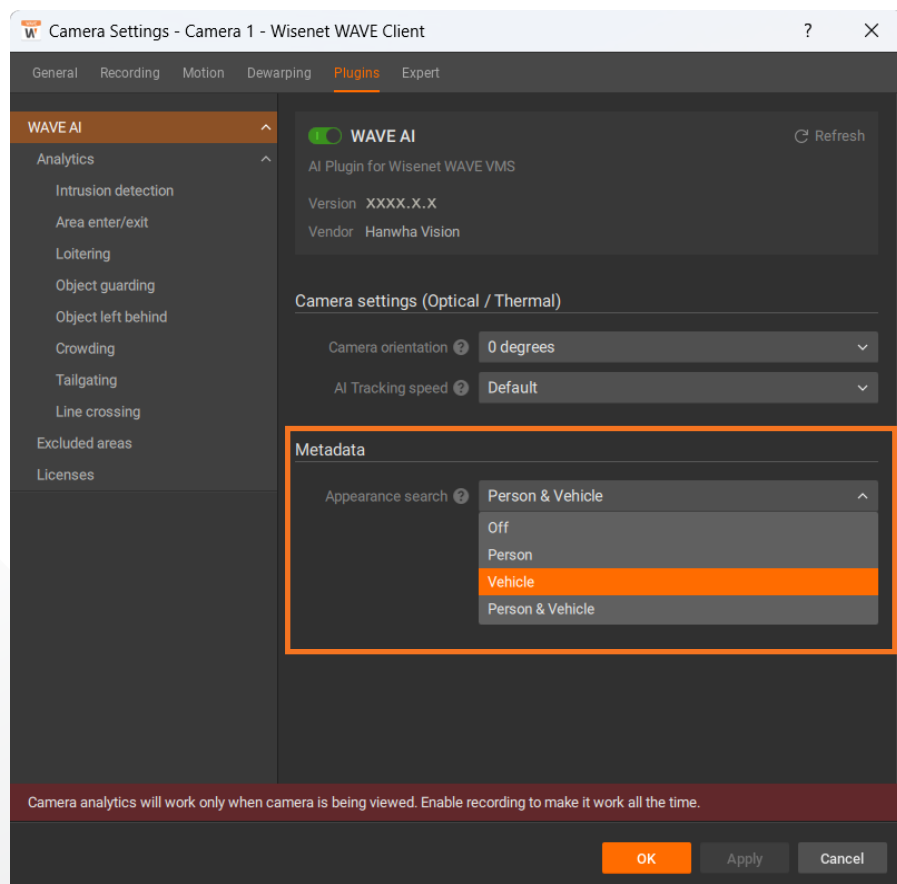


Definition

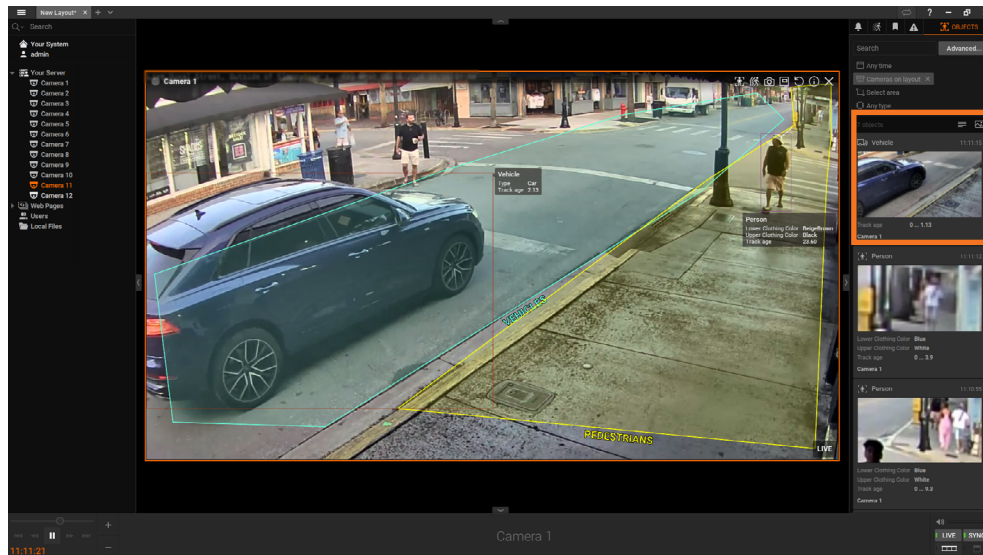
Appearance Search feature allows users to leverage Advanced Object Search within WAVE VMS to identify objects matching search parameters based on clothing color and vehicle color. This feature simplifies the process of locating specific individuals or vehicles within extensive video archives.

To enable Appearance Search feature:

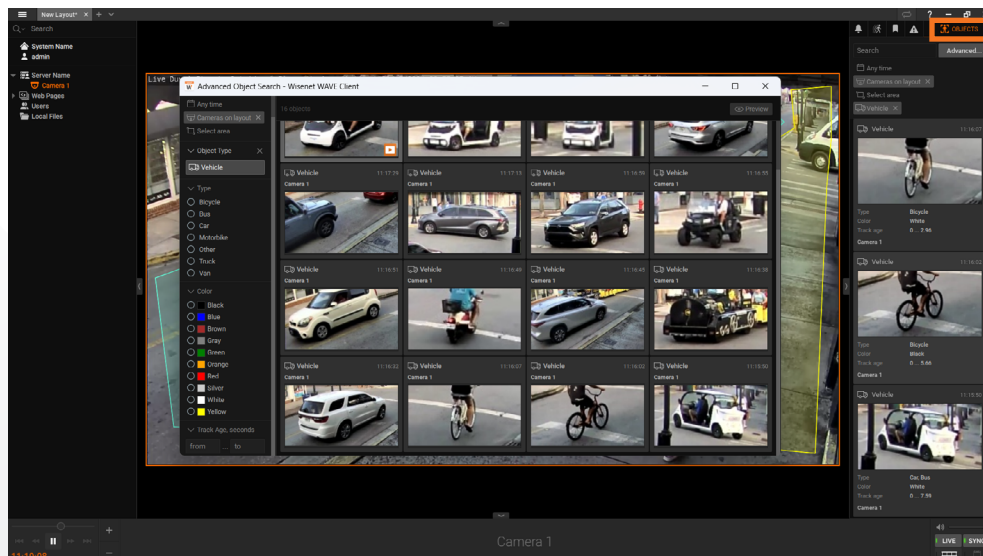
- Navigate to Camera Settings > Plugins > WAVE AI .
- Enable Appearance Search feature by selecting one of the options from the dropdown menu: Person, Vehicle, or Person & Vehicle.



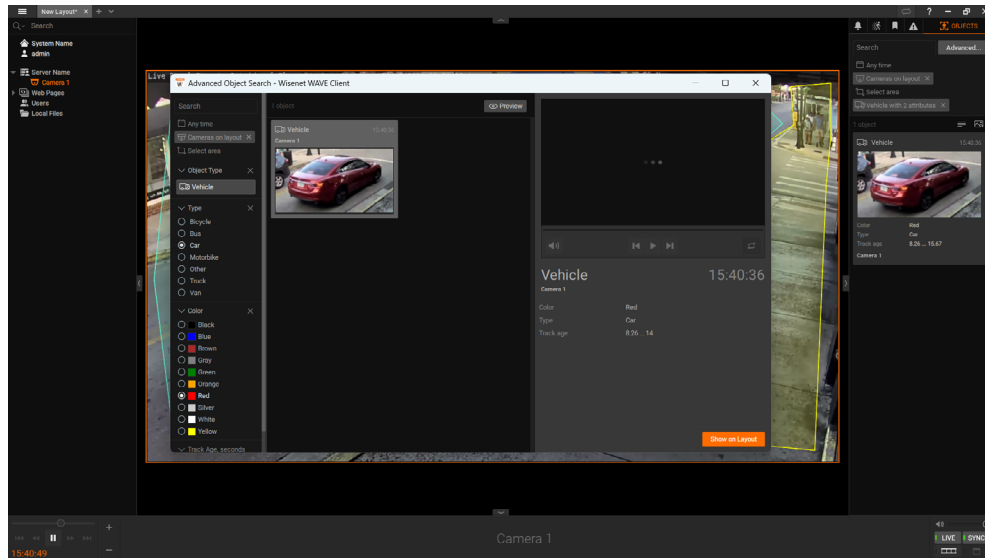
- When a zone or a virtual line is configured for analytics, you will be able to monitor the detections in the "OBJECTS" tab. The color attribute will appear under the thumbnail image of the detected object.



- You can leverage Advanced Search functionality to filter out objects within existing detections based on vehicle and clothing color.

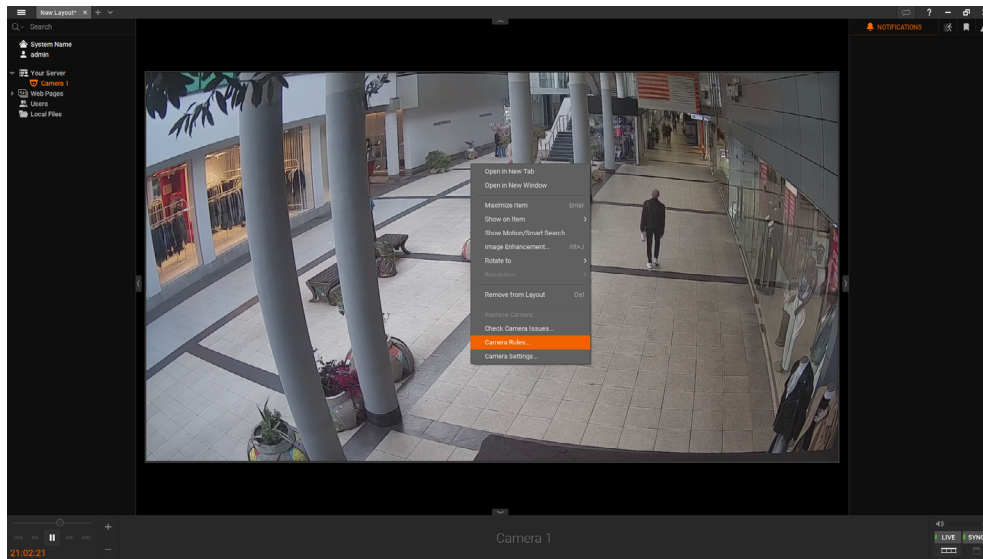


- Select Object Type and the color parameter on the left menu in the Advanced Object Search window. Results from recorded detections will immediately appear for preview.

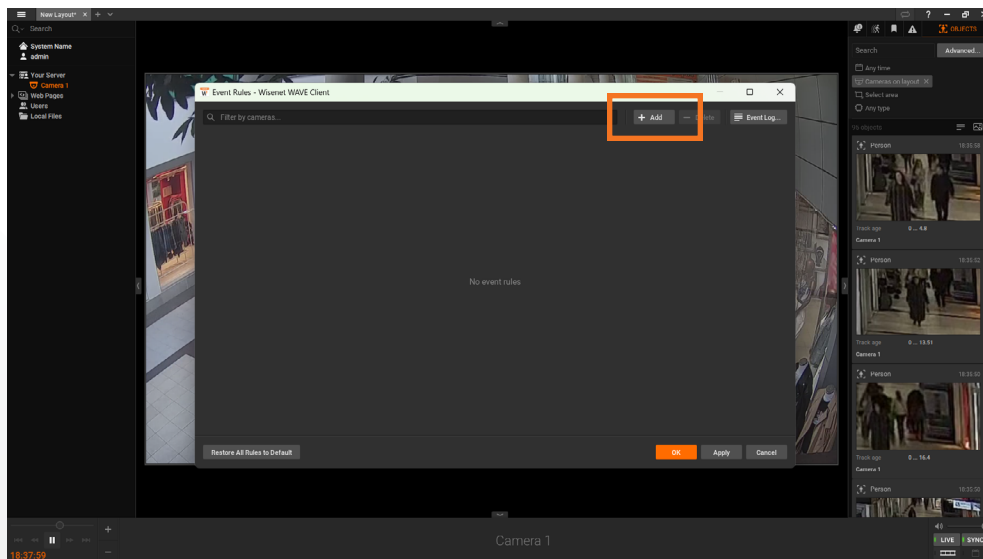


Creating Rules

- 1 Right-click on an open video panel to see the menu options and navigate to camera rules.



- 2 Click in on the "+Add" button at the top right corner.



- a When:** choose “Analytics Event”
 - b At:** select the relevant camera(s)
 - c Event Type:** the event type to be triggered
 - d Do:** specify actions such as desktop notification, email, sound, or bookmark creation.
- Bookmarks allow you to navigate the recording back in time to the exact moment when the event occurred (the video recording function should be enabled)

The screenshot shows the 'Event' configuration window. In the 'When' section, 'Analytics Event' is selected (labeled 'a'), 'Camera 1' is selected (labeled 'b'), and 'Entering the area' is selected as the event type (labeled 'c'). The 'Caption contains' and 'Description contains' fields are both set to 'Keywords separated by space'. In the 'Action' section, 'Send email' is selected (labeled 'd'), triggered to 'All Administrators' with an interval of 1 minute. The 'Additional Recipients' field is empty, and the 'Global Email Settings...' button is visible. The 'Comments' field is empty. At the bottom, there are buttons for 'Restore All Rules to Default', 'OK', 'Apply', and 'Cancel'.



Notes

For event types “Intrusion” and “Loitering”, there will be an additional setting (Starts or Stops) so you can choose whether an event gets triggered when intrusion starts or stops (when you only want to know when a person or a vehicle leaves the area).

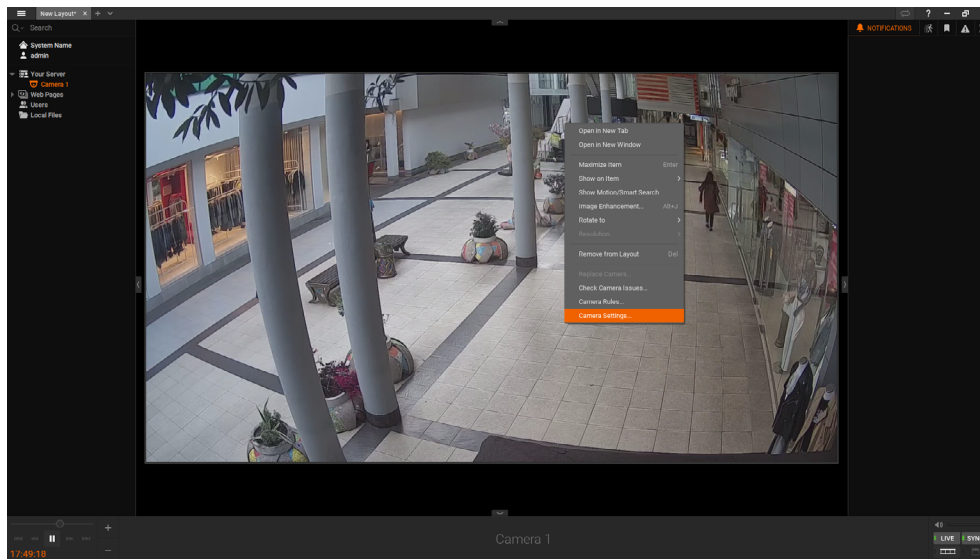
The screenshot shows the 'Event' configuration window with the 'Event Type' dropdown menu open. The 'When' section shows 'Analytics Event' selected, 'Camera 1' selected, and 'Intrusion detection' selected as the event type. The 'Caption contains' and 'Description contains' fields are both set to 'Keywords separated by space'. In the 'Action' section, 'Send email' is selected, triggered to 'All Administrators' with an interval of 1 minute. The 'Additional Recipients' field is empty, and the 'Global Email Settings...' button is visible. The 'Comments' field is empty. At the bottom, there are buttons for 'Restore All Rules to Default', 'OK', 'Apply', and 'Cancel'. The 'Event Type' dropdown menu is open, showing 'Starts' and 'Stops' options, with 'Starts' selected.

Section 3: Plugin Settings

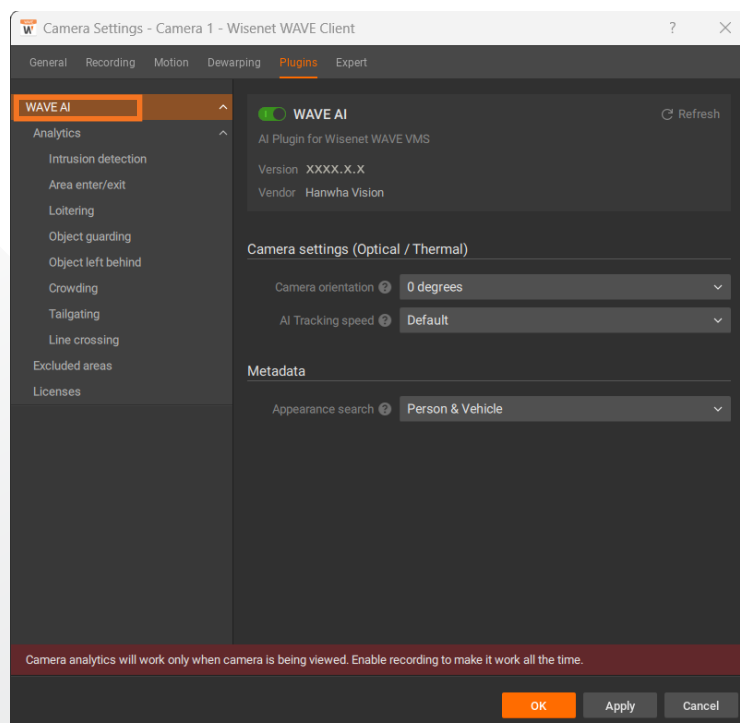
Plugin Settings allow users to optimize analytics performance for their specific use case.

To navigate to the Plugin Settings:

- 1 Right-click on the video stream and select “Camera Settings.”



- 2 Click on the Plugins tab and select WAVE AI on the left menu panel.



Camera Settings

Camera Orientation

If the camera is mounted in a rotated position and you've changed the "Default Orientation" in the General tab of the Camera Settings, make sure to update the "Camera Orientation" in the Plugin Settings to match.

AI Tracking speed

The AI Tracking speed feature enables users to adjust the frame rate at which the AI processes data.

Modifying this from the default setting may impact server performance and reduce the number of AI streams that can run simultaneously on the same device.

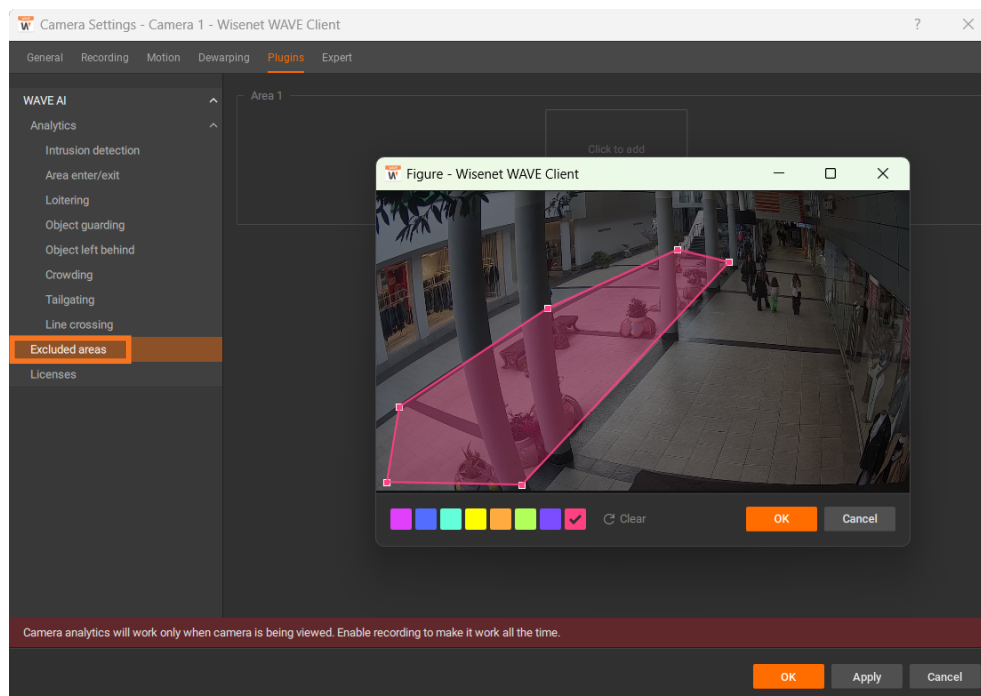
Default:	5 FPS	Optimized for most of the security surveillance use cases.
Fast:	10 FPS	Optimized for tracking faster moving targets (e.g. cyclists).
Very Fast:	15 FPS	Optimized for capturing targets that move very fast (e.g. electric scooters).

Excluded Areas

Objects in excluded areas would not trigger any events from the configured analytics.

To navigate to Excluded Areas settings:

- Right-click on the video stream and select “Camera Settings.”
- Click on the plugin tab and select WAVE AI on the left menu panel.
- Click on Excluded areas on the left side menu panel.



Apply Excluded Area settings to reduce recurring False Positives and enhance detection precision in the area of interest, especially when there is persistent movement in adjacent areas (e.g., a busy road near a sidewalk).



Notes

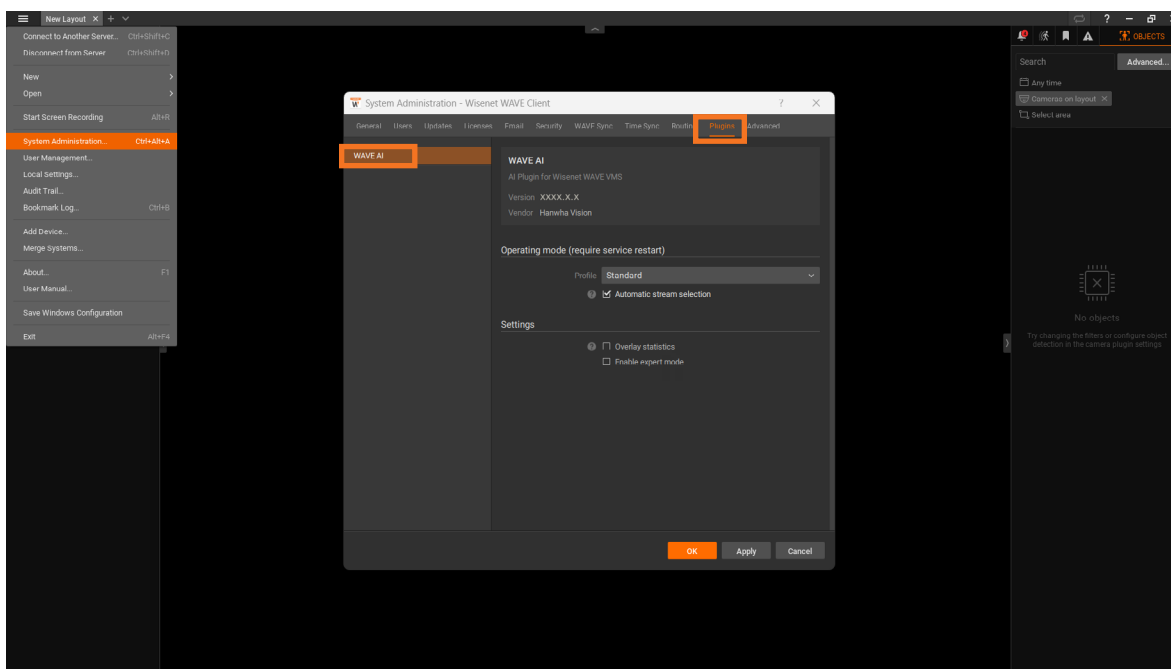
Applying Excluded Area settings does not impact recordings on disc. This feature is not a replacement for privacy masks and should be used to focus detection on specific parts of the scene.

Section 4: System Administration

The plugin includes system-wide settings that apply to all cameras connected to the server. Please note that some settings will only take effect after restarting the media server.

To navigate to System Administration:

- 1 Click on the “hamburger icon” in the top left corner of the WAVE Client and select “System Administration...” or press the Ctrl+Alt+A key combination.
- 2 Navigate to the “Plugins” tab and click on the plugin name on the left menu panel.

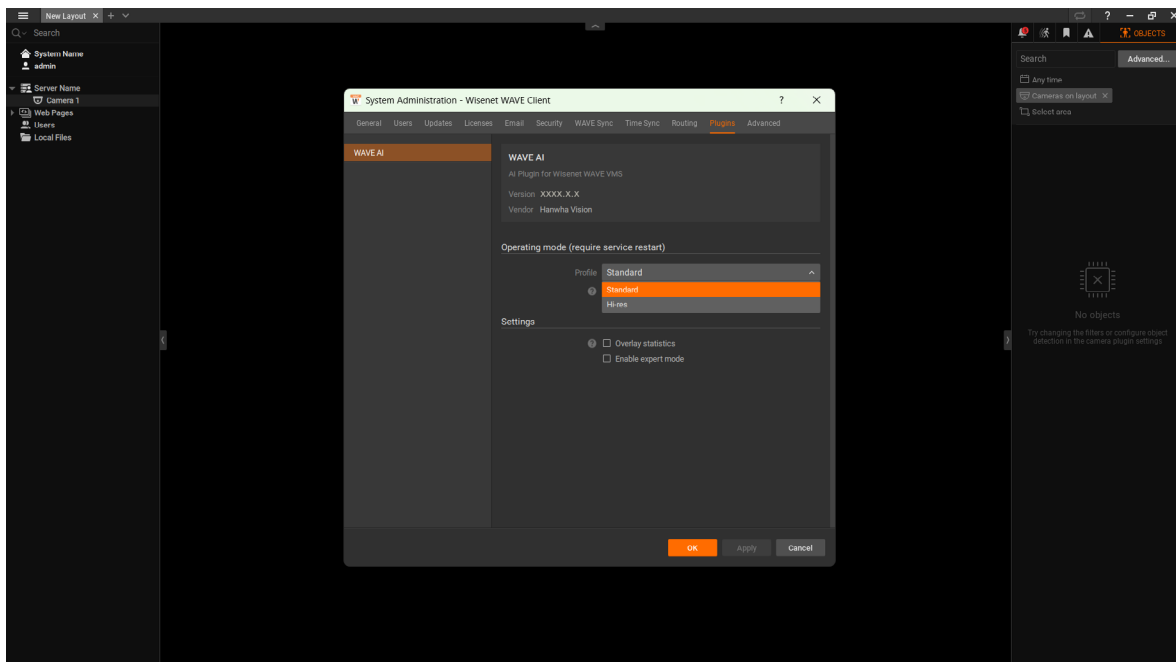


Operating Modes

Important

Changing these settings requires restarting the media server

Operating modes settings allow users to optimize the computational load based on specific surveillance use cases.



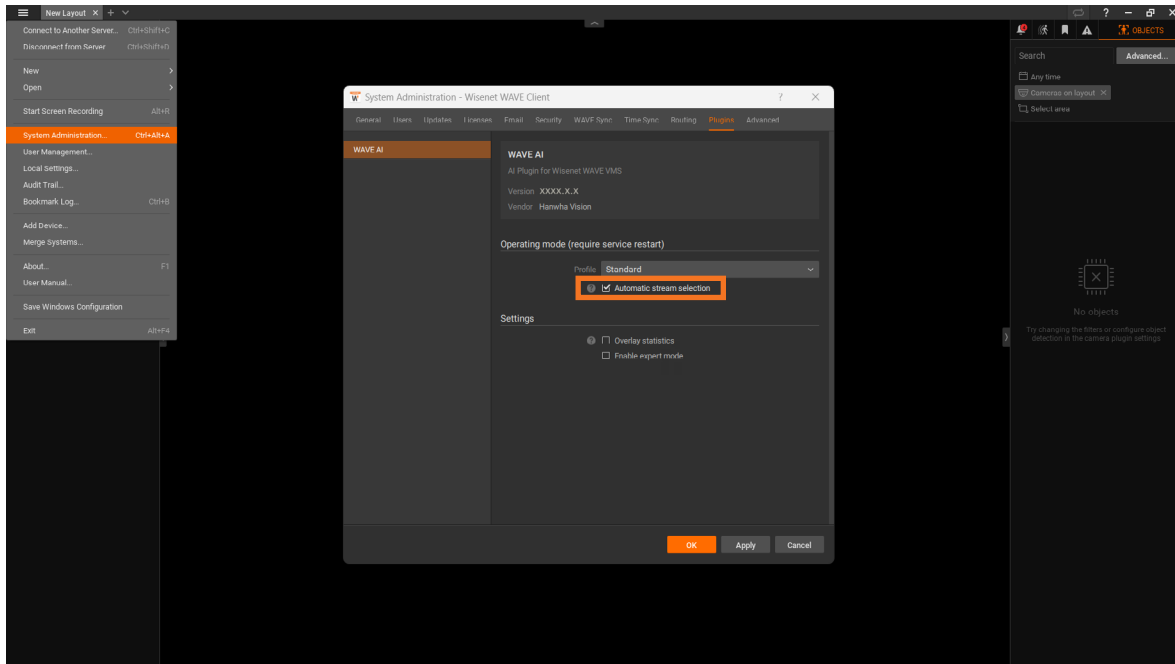
Standard Mode

Standard mode is the default suggested profile, offering optimal performance while maintaining high precision for common security analytics. **This mode uses the secondary camera stream.** This configuration ensures a balance between system performance and detection accuracy.

Hi-res Mode

Hi-res mode utilizes a larger AI model and the primary camera stream, enhancing the detection of smaller targets at a distance or in more crowded environments. Enable this mode only if the Standard mode proves insufficient.

Automatic Stream Selection



When enabled, Automatic Stream Selection configures the streams as follows:

- Standard mode: Uses the secondary stream.
- Hi-res mode: Uses the primary stream.

When disabled, you can override the stream selection for running analytics. Disabling this feature allows you to select either the Primary or Secondary stream for running analytics on each camera.

To navigate to the Camera Stream selection:

- Right-click on the video stream and select “Camera Settings.”
- Click on the plugin tab and select WAVE AI on the left menu panel.



Notes

- The “Camera Stream” selection becomes available only when the “Automatic Stream Selection” is disabled in the Plugin tab of the System Administration settings.

Important

- Starting from version 6 of the Media Server, if you plan to activate the plugin on an RTSP stream or ONVIF cameras without the secondary stream, you must disable the automatic stream selection, or use the Hi-res profile.

Video Streams Configuration

To navigate to Video Streams Configuration:

- Right-click on the video stream and select "Camera Settings."
- Click on the Advanced tab.
- Click on Video Streams Configuration on the left side menu panel.

Secondary Stream (recommended parameters)

- **Resolution:** 640x480
- **Bitrate:** 1 Mbps or higher
- **FPS (Frames Per Second):** 5 FPS or higher



Notes

- **Resolution:** A low resolution can hinder the detection of smaller targets.
- **Bitrate:** A low bitrate leads to strong compression, reducing the quality of the video feed and making it difficult to detect smaller targets.
- **FPS:** A low frame rate may cause loss of detections, while a high FPS will increase the system's computational load.

Settings

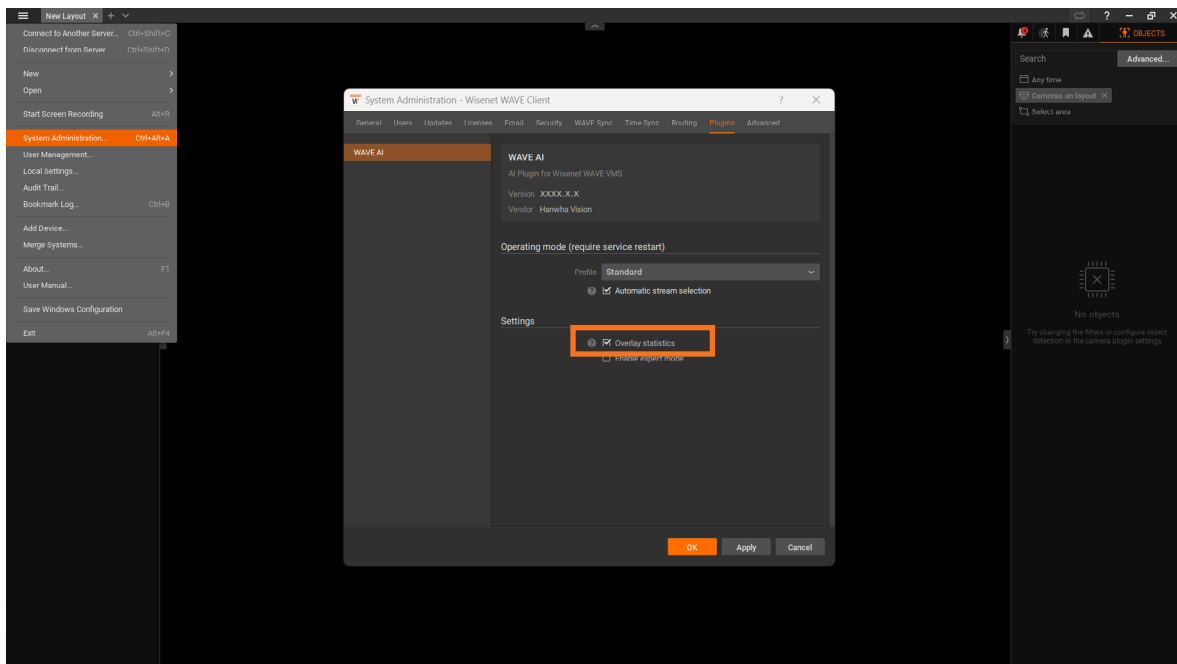
Overlay statistics

The Statistics panel can be useful for debugging, providing insights into system health and hardware utilization.

Important

Don't keep the statistics panel open. When the panel is visualized, it could prevent the Media Server from recording correctly.

In order to visualize the statistics panel, tick the "Overlay statistics" box in the System Administration Settings. Click "OK" to save the settings, and go to the "OBJECTS" tab. You may need to wait a few seconds for the panel to appear.



Statistics Info Includes:

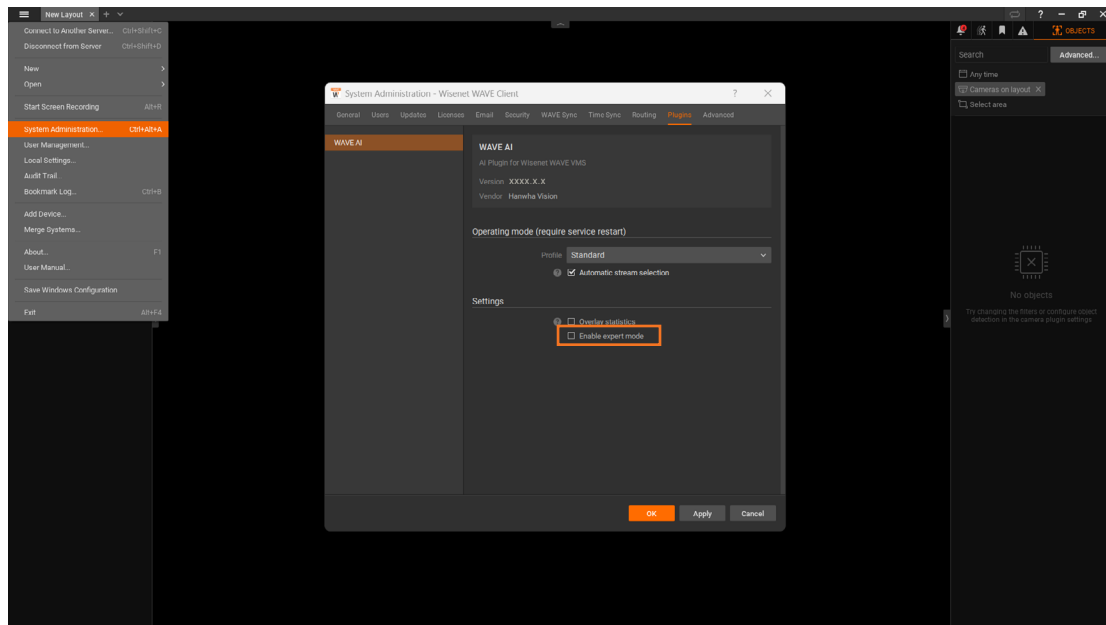
- Engine version
- Plugin version
- Solution version
- WAVE SDK (Client / Server) Version
- Plugin run time
- Mode
- Camera input
- AI input
- Codec
- Frame rate
- Input queue
- Dropped frames
- Instance run time
- # frames processed
- Active licenses

Enable expert mode

Expert mode includes additional features for fine tuning the plugin performance.

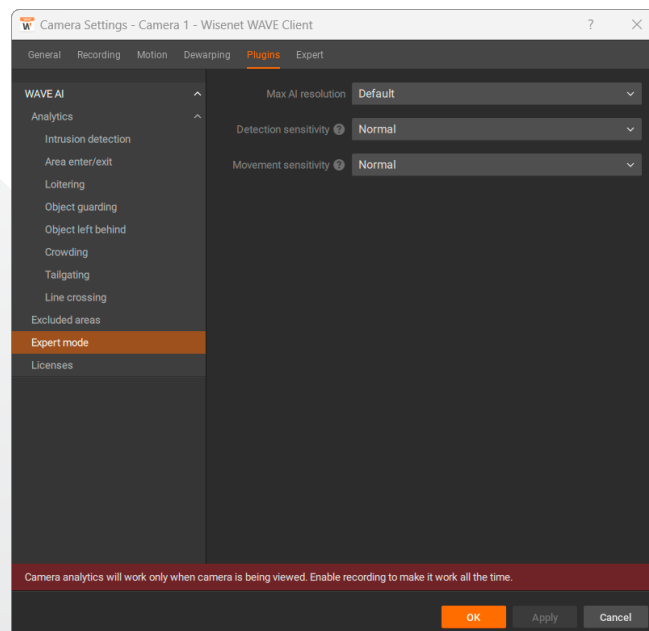
To enable Expert mode:

- Navigate to System Administration -> Plugins -> WAVE AI
- Locate "Settings" block
- Tick the box next to "Enable expert mode"
- Navigate to Expert mode within Plugin settings



To navigate to Expert mode:

- Ensure Expert mode is enabled in "System Administration" settings.
- Right-click on the video stream and select "Camera Settings."
- Click on the plugin tab and select WAVE AI on the left menu panel.
- Click on Expert mode on the left side menu panel.



Max AI Resolution

Max AI Resolution settings allow you to adjust the maximum resolution that the AI will process. By default, the maximum resolution is defined by the Operating mode specified in the System Administration Settings. However, you can modify this to suit specific needs.

- If you set a value higher than the camera's resolution, the plugin will automatically revert to the camera's native resolution.
- Increasing the maximum resolution can enhance detection of very small targets.

Important

Only increase the resolution if required, as it may negatively impact system performance.

Detection Sensitivity

Increasing detection sensitivity improves the ability to detect challenging targets (e.g., smaller, occluded, or affected by lens noise) but may lead to more False Positives. Change "Detection Sensitivity" settings to "High" if the system misses events involving small objects or in busy scenes.

Movement Sensitivity

Movement sensitivity controls how the system determines whether motion is occurring. Environmental factors such as rain, snow, camera noise, and light reflections, can cause false motion detection. Lowering motion sensitivity can minimize these false detections, but it increases the risk of missing fast-moving objects or objects visible for a very short time.

Section 5: Updating the Plugin

Update:

- Check for new plugin versions on the official website:
<https://hanwhavisionamerica.com/product/pnm-c32084rqz-8xe4t-w-multi-sensor-wave-vms/>
- Access your terminal application. This can typically be found in your system's applications menu.
- Run the automated installation script:

```
curl -sqko - https://get.cvedia.com/wave-jetson | sudo bash
```

- Press "Enter" to execute the command. This script will automatically detect a new version.
- All configured settings and applied licenses will be preserved

Section 6: Uninstalling the Plugin

Uninstall:

- Open Terminal: Press Ctrl + Alt + T or search for Terminal in your applications menu.
- In the terminal, type the following command and press Enter:

```
sudo apt remove cvedia-rt hanwha-nxplugin -y
```

- If prompted, enter your administrator password and press Enter.
- The system will automatically remove the plugin. Once done, close the terminal.

Done! The WAVE AI Plugin is now uninstalled.

For more information visit us at
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