Blackjack® Ai™

Servers Powered by DW Spectrum and IVA Ai Server

IVA AI Server Plugin User Manual

REV: 11/22 (Version 2.7r4_v1.6)

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Description

This user guide will describe the features and options of a DW IVA AI Server for use with DW Spectrum IPVMS. This software comes pre-installed on DW Blackjack Ai Servers.

Part 1: IVA AI Server Architecture

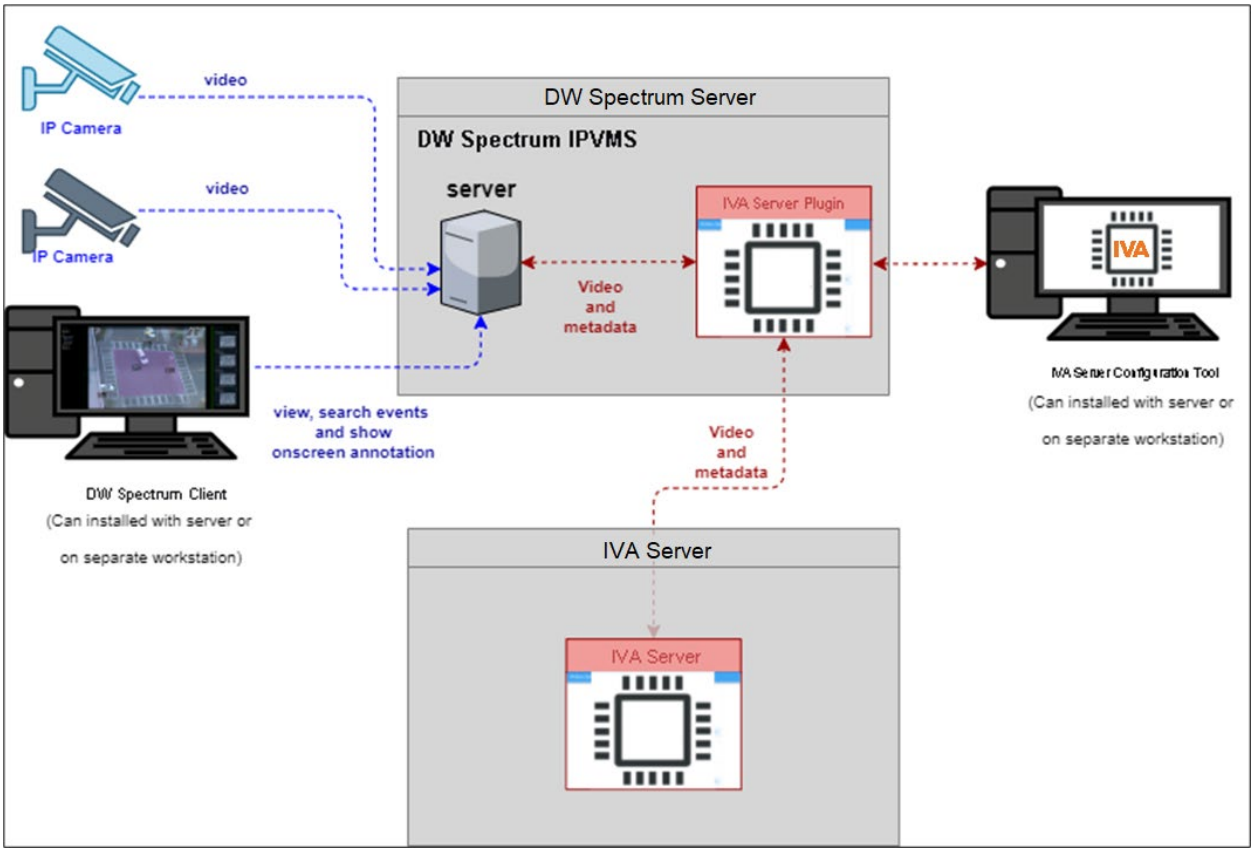
IVA AI Server Plug-in

The IVA AI Server plug-in consists of two components:

- **IVA AI Server Plug-in:** The *IVA AI Server Plug-in* is installed alongside the DW Spectrum IPVMS and provides a link to the IVA AI Server.
- **IVA AI Server:** The *IVA AI Server* component receives the encoded video from DW Spectrum IPVMS, then decodes and processes the video through the analytics engines and rules. It then feeds the metadata back to the IVA AI Server Plug-in to be integrated into the video streams of DW Spectrum IPVMS. This component can be managed with the *IVA AI Server Configuration Tool*.

IVA AI Server Configuration Tool

The *IVA AI Server Configuration Tool* is a standalone application, designed to provide a feature-rich experience when configuring a channel's video analytic features.



Part 2: System Prerequisites

The IVA AI Server component should be installed on a dedicated hardware platform.

Software Requirements

- Supported OS: Ubuntu 18.04 LTS Desktop / Windows 10 / Windows Server 2016 or higher
- Latest GPU drivers (at least 460.73 or higher)
- CUDA Toolkit 11.1

Part 3: Setting Up the DW IVA Server Configuration Tool

Although some cameras' settings can be configured through the DW Spectrum IPVMS Client, the *DW IVA Server Configuration Tool* can be used to provide a complete IVA user experience during the configuration process of the IVA Server.

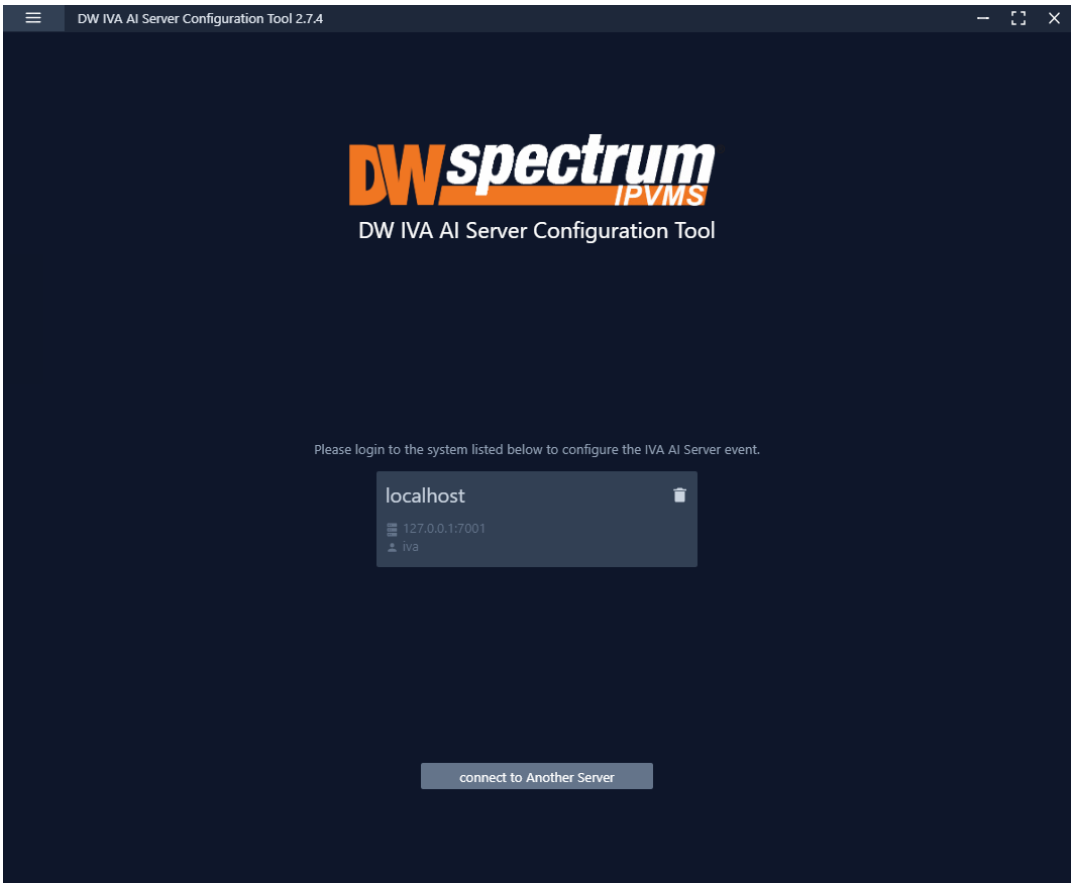
Logging in with the DW IVA Server Configuration Tool

To begin setting up the *DW IVA Server Configuration Tool*:

1) Launch the *DW IVA Server Configuration Tool*. There is an application shortcut on the desktop.

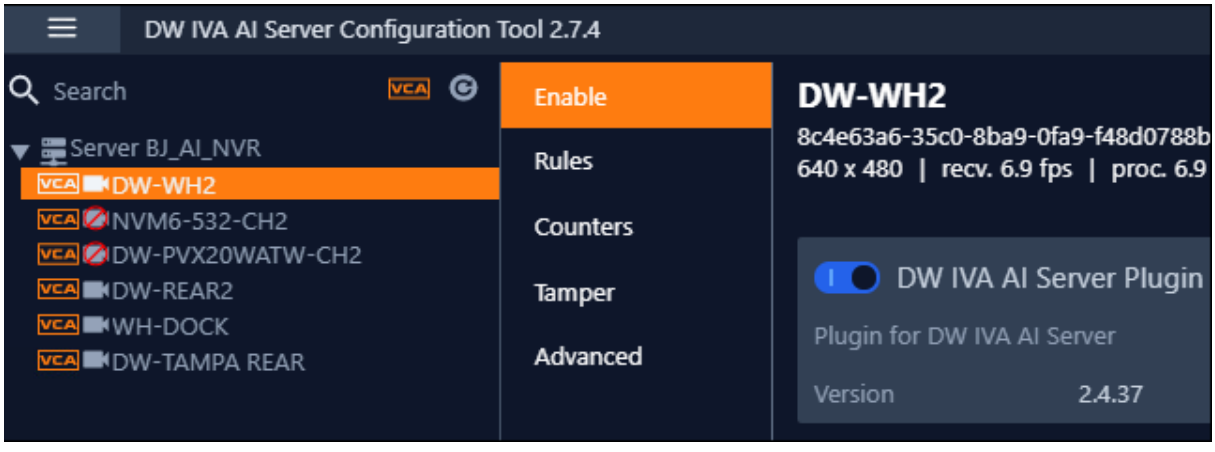
   Select the DW Spectrum IPVMS Server that you want to connect with and log in. It is recommended to use a Local User profile (not a DW Cloud login) when connecting the configuration tool to the server.

****NOTE:** If connecting the *DW IVA AI Server Configuration Tool* to the DW Spectrum Server is being hindered by the message "`Unauthorized. Please check the access credentials and try again.`" after changing the user password, enable the *Digest Authentication* setting of the user profile in the DW Spectrum Client.



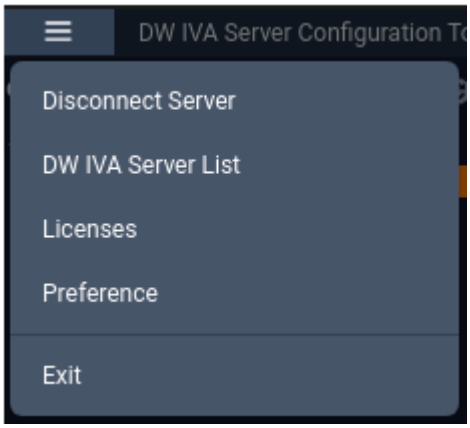
2) Once you are logged in and connected to the DW Spectrum Server through the *DW IVA Server Configuration Tool*, a list will show all added cameras in the left-side panel.

   To view camera analytic rules and configuration, enable the **DW IVA AI Server Plugin** toggle.



Once enabled, you will find the following features in the left-side panel:

- **Search:** This search box can be used to filter the camera list based on the entered device name.
- **VCA:** The VCA button toggles the camera list between showing all cameras on the DW Spectrum System or just the cameras that have the plug-in enabled.
- **Refresh:** This button refreshes the list of cameras from DW Spectrum IPVMS when it is clicked.



Select the **Main Menu** to display the menu options:

- **Disconnect Server:** Disconnects the current session with your DW Spectrum IPVMS Server.
- **DW IVA Server List:** Displays a list of the IVA AI Server(s) your DW Spectrum system is configured to use.
- **Licenses:** Displays a list of the licenses available from the DW IVA Servers.
- **Preference:** Displays a list of the DW IVA Server Configuration Tool's advanced options.

Enable IVA AI Server Plugin

This option shows the status of the plug-in against the selected camera. From here you are change the license type and deep learning features.

- **IVA AI Server Plugin:** Toggle to enable/disable the plug-in for the selected camera.

- **Version:** Shows the current plugin version of IVA AI Server being used.
- **License:** Select the license type that will be used for the camera. This will control which features are available.
- **Tracking Engine:** Defines the tracking engine that will be used for analytics.
    - **Object Tracker:** When selected the tracker will need to 'learn the scene' to determine background from moving foreground objects. Whilst learning the scene the following message will be displayed in the live view, and no objects will be tracked during this time.
    - **DL Object Tracker:** When selected the tracker uses the GPU to detect and track objects in a scene.
        - When the tracking engine is set to use "**Object Tracker**", the objects can be classified using either deep learning models or by using properties extracted from an object in a calibrated scene. If the *Deep Learning Filter* is not used, camera calibration is required to detect the object class.
    - **DL People Tracker:** When selected the tracker uses the GPU to detect and track people in a scene.
- **Apply:** Apply changes to the selected camera.

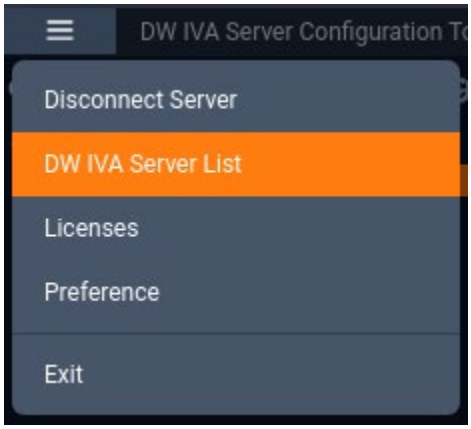
NOTE: The calibration and classification features are not displayed when using the Deep Learning filter, DL Object Tracker, or DL People Tracker. To show the available options, Select the tracker and click Apply.

NOTE: When first selected, the DL trackers will run a model generation process. This optimizes the DL models to run on the available GPU hardware. Irrespective of which tracker is selected, the DL People tracker model, DL Object Tracker model and the DL Filter model will all be optimized in one go. This process can take up to 10 minutes per model and may increase with different GPU configurations. The process will not need to be run again unless the GPU hardware is changed. Whilst optimization is performed a message will be displayed in the live view, and no objects will be tracked during this time.

Part 4: Configure for DW Spectrum IPVMS

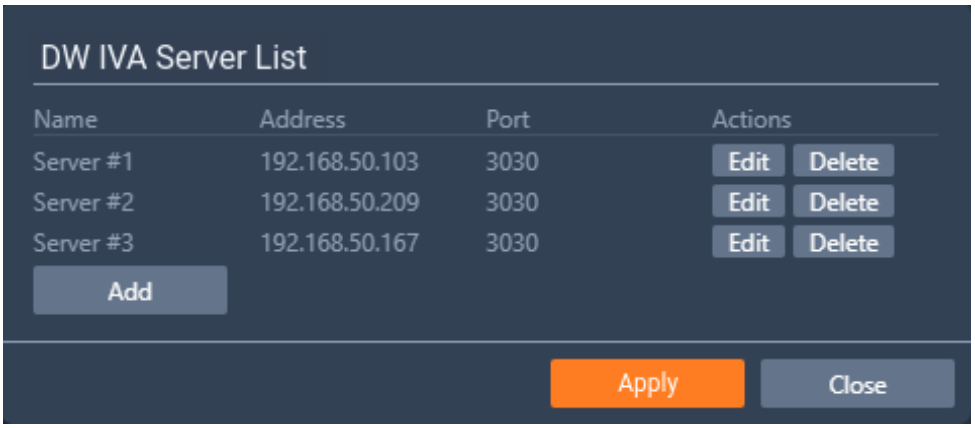
The DW IVA Server will need to be configured for DW Spectrum IPVMS:

1) Open the *IVA AI Server Configuration Tool* and connect with the DW Spectrum Server.
2) After connecting with the DW Spectrum Server, click on the menu icon in the top left, then select **IVA AI Server List**.



3) Click **Add**.
4) Enter the IP address of the DW IVA Server.
5) Leave the port set to **3030**
6) Click **OK** to return to the previous menu.
7) Click **Apply** to save your changes.
8) Click **Close** to close and return to the previous menu.

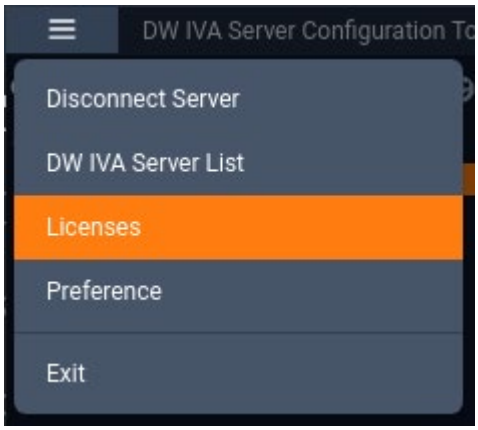
NOTE: You can define up to four (4) IVA AI Servers at a time.

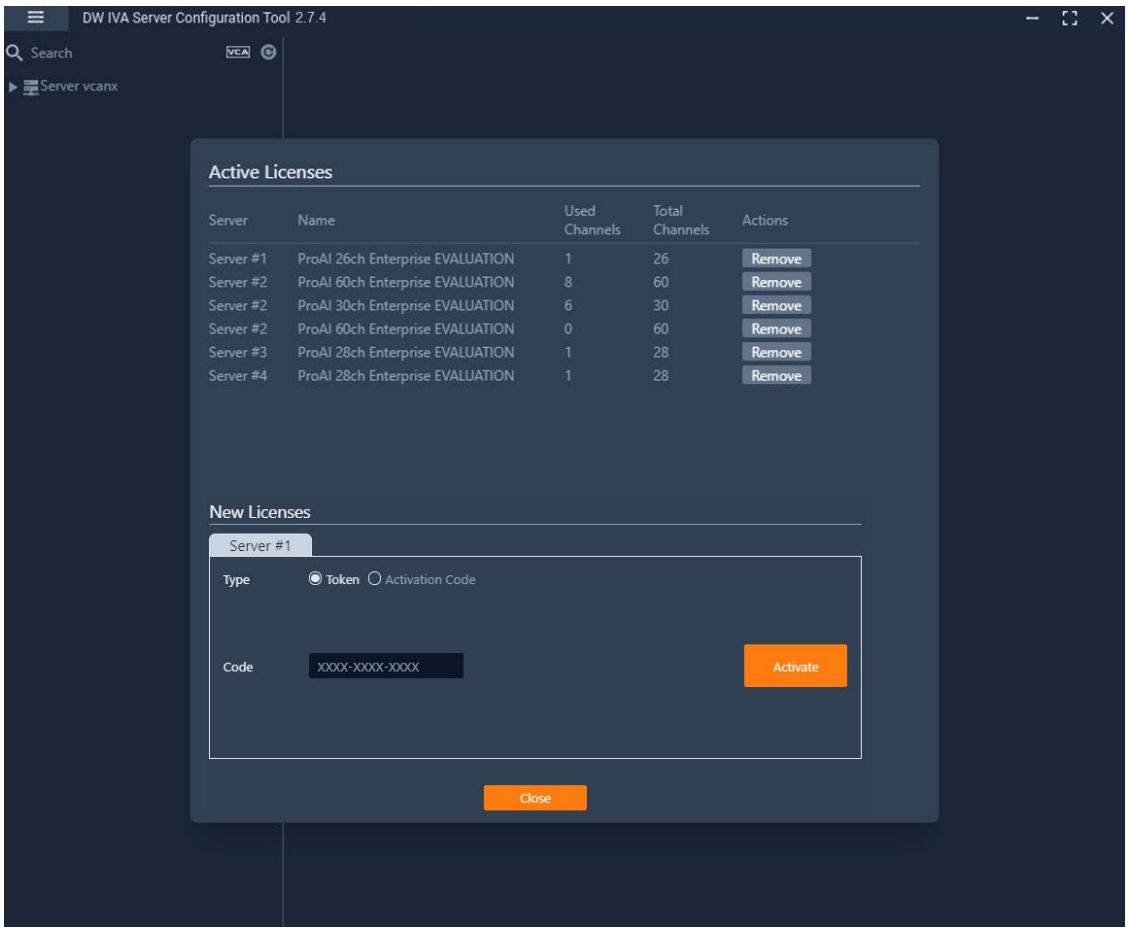

DW IVA Server List
Name
Address
Port
Actions
Server #1
192.168.50.103
3030
Edit
Delete
Server #2
192.168.50.209
3030
Edit
Delete
Server #3
192.168.50.167
3030
Edit
Delete
Add
Apply
Close

Part 5: DW IVA Server Licenses

To use the analytic features of a DW IVA AI Server, a license is required. Licenses can be managed through the DW IVA Server Configuration Tool program.

To view and edit the licenses, select "**Licenses**" from the *Main Menu* in the DW IVA Server Configuration Tool.





Active Licenses

The *Active Licenses* area of the menu provides a list of all available licenses from the configured IVA AI servers, it also displays which licenses are currently allocated.

- **Remove:** Click this button to remove the selected license from the server.

New Licenses

The *New Licenses* area of the menu, server tabs (Server #) are created for each IVA AI server. Select a server tab to view the license activation interface.

- **Type** Specifies the activation method that will be used for your license activation request.
  - **Token** Allows the activation token to be entered to apply further licenses.
    - **Code** Type or paste the token which format into XXXX-XXXX-XXXX where X is an alphanumeric character.
  - **Activation code** Provides the HW GUID to allow further licenses to be applied.
    - **HWGUID:** This is the unique code for the system. Use the HWGUID to obtain an activation code.
    - **CODE:** Type or paste the activation code into the space provided and select Activate.
    - **Copy to clipboard:** Copies the HWGUID to the clipboard.
- **Activate:** Click this button to validate the entered *Code*. The license will then be applied to the selected IVA AI Server.
- **Close:** Click this button to close the *Licenses* page and return to the previous screen.

How to Add a License with a Token

1) In the *Licenses* menu, select the *Server #* tab of the desired server.
2) Enter the code into the **CODE** section.
3) Click **Activate** to validate the code and apply it to the server.

How to Add a License with an Activation Code

1) In the *Licenses* menu, select the *Server #* tab of the desired server to view its **HWGUID**.
2) Obtain an activation code.
3) Enter the activation code into the **CODE** section.
4) Click the **Activate** button to validate the code and apply it to the server.

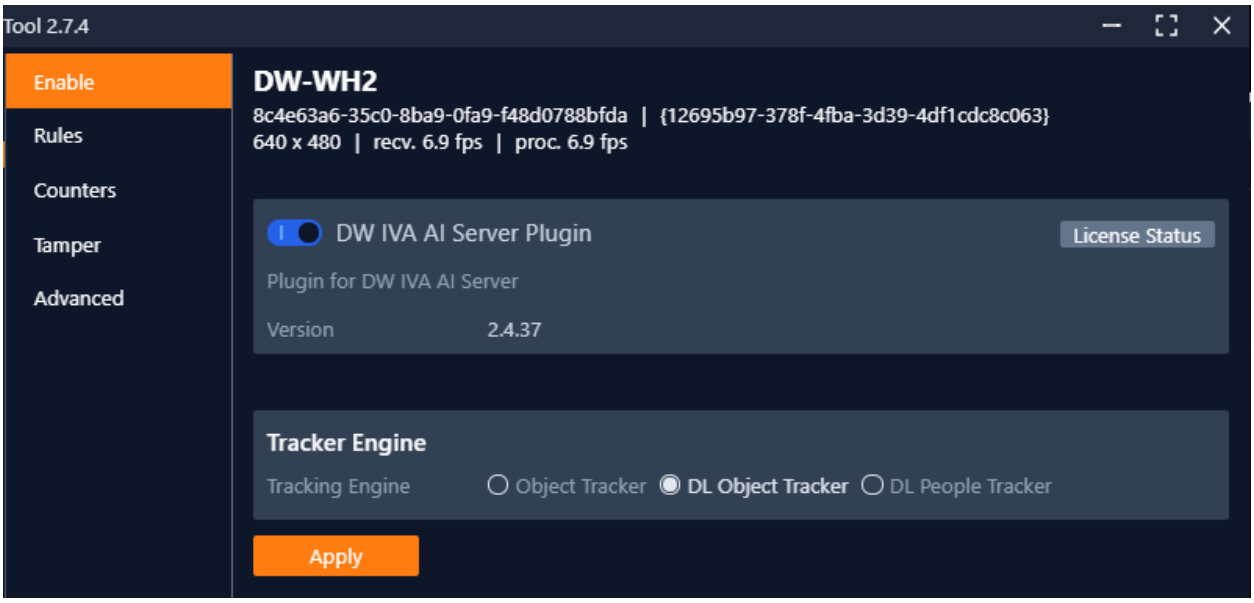
How to Remove License(s)

To delete a license, click the **Remove** button that appears next to the license you would like to remove.

Part 6: Enabling the Analytic Plug-in (*Enable* Tab)

To set up analytics on the DW IVA AI Server, select a camera from the left-side panel. Select the *Enable* tab and enable the *DW IVA Server Plugin* for each camera that you want to apply video analytics for.

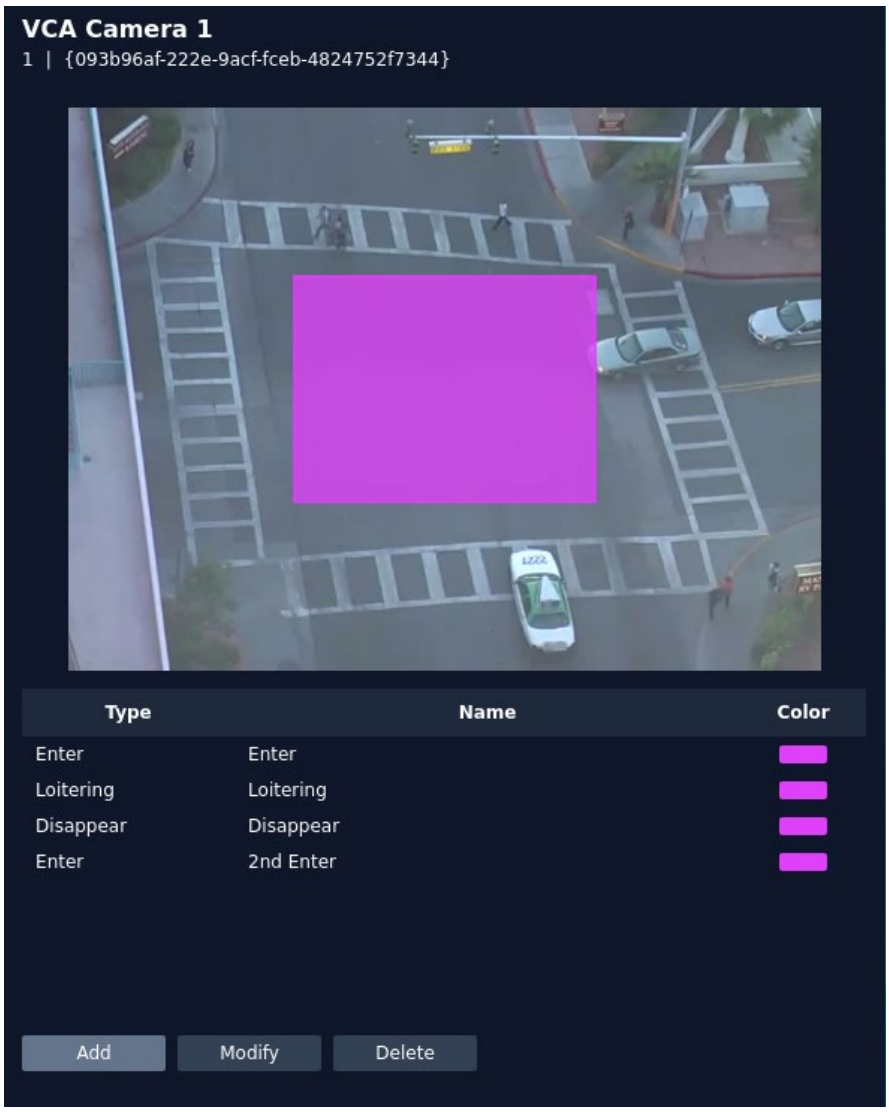
1) Open the *IVA AI Server Configuration Tool* and connect to the DW Spectrum Server.
2) In the left-side panel, click on the **IVA** filter to show all cameras.
3) Select the camera from the list and enable the **DW IVA Server Plugin** toggle for the camera. Repeat this for each camera as needed.
4) In the *Tracker Engine* section, select the type of tracking that the analytics will be used for (*Object Tracker, DL Object Tracker, DL People Tracker*)



Part 7: Analytic Rules (*Rules* Tab)

After selecting a camera in the *DW IVA Server Configuration Tool*, select the *Rules* menu tab. All the analytic rules that have been configured for the selected camera will display.

From this menu, analytic rules can be created/modified or deleted as required. A snapshot of the camera will display on the screen to allow rule areas to be defined and visually drawn.



You can create, edit, or remove rules with the available features:

- **Add:** Click to add a new rule.
- **Modify:** Click to modify the highlighted rule.
- **Delete:** Click to delete the highlighted rule.

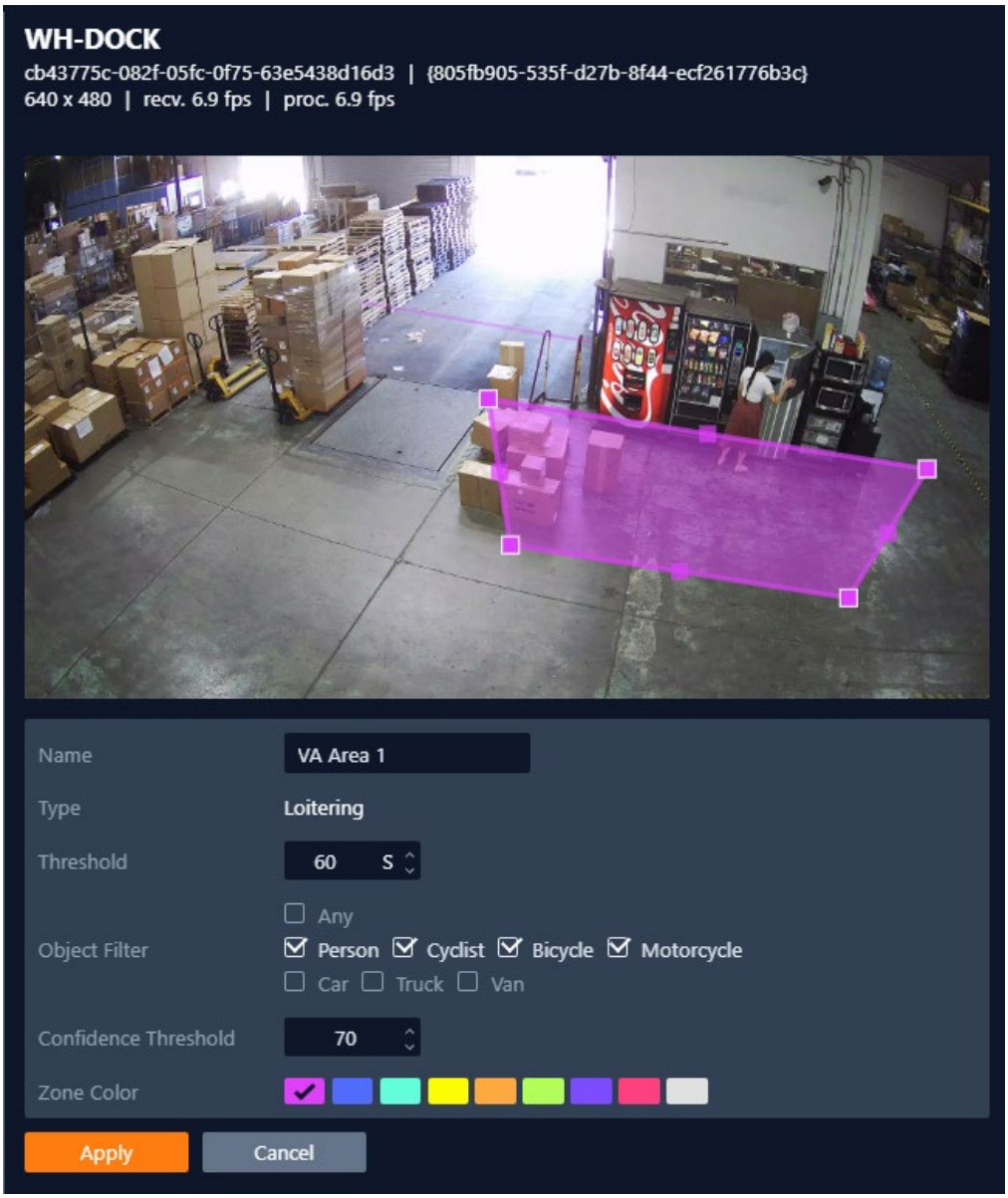
Types of Rules Available

Analytic Area Rules

When creating Analytic Area Rules, the IVA AI Server will overlay a survey zone over the camera video for The IVA AI Server will monitor and track people and objects, while triggering alerts depending on analytic rules.

Area rule types include:

- **Intrusion:** The *Intrusion* rule triggers an event when an object is first detected and has crossed into a specified zone
    - NOTE: The *Intrusion* rule will trigger in the same circumstances as the *Enter* and *Appear* rules. The choice of which rule is most appropriate will depend upon the scenario.
- **Enter:** The *Enter* rule triggers an event when a tracked object crosses the border from outside of a zone to inside the zone.
- **Exit:** The *Exit* rule triggers an event when an object crosses the zone border, moving from inside the zone to outside
- **Loitering:** The *Loitering* rule triggers an event when an object remains present within a zone for a pre-defined period.
- **Appear:** The *Appear* rule triggers an event when an object suddenly starts to be tracked from within a zone.
- **Disappear:** The *Disappear* rule triggers an event when an object suddenly stops being tracked (disappears) from within a zone.
- **Stopped:** The *Stopped* rule triggers an event when an object has remained stationary in a particular zone for a pre-defined period.
    - NOTE: The *Stopped* rule does not detect abandoned objects. It only detects objects which were moving and then became stationary within the zone.

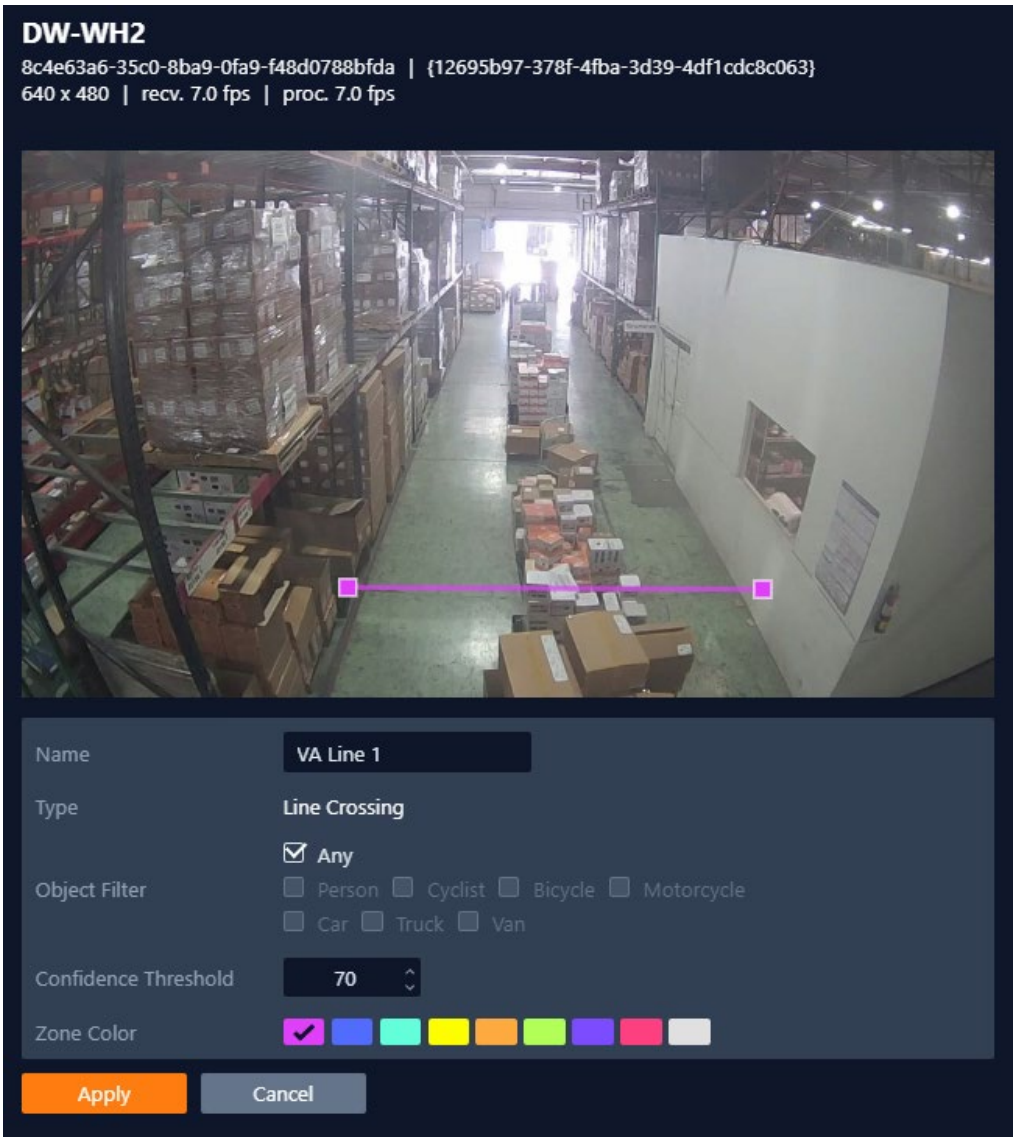


Analytic Line Rules

Analytic line rules mark a survey line for the IVA AI to monitor and to track people and objects. Line rule types include:

- **Line Crossing:** The *Line Crossing* rule triggers an event when an object is first detected crossing the line.
    - NOTE: *Line Crossing* rule will trigger in the same circumstances as the *Direction Violation* rule. The choice of which rule is most appropriate will vary depending on the scenario.

- **Counting Line:** The *Counting Line* triggers an event when movement is detected crossing a detection line in a particular direction, regardless of the angle of the crossing. Additional specifications that can be defined include the required direction of travel and the minimum width of passing objects to trigger the rule.
    - NOTE: *Counting Line* differs from the *Direction* rule in that it does not use the *IVA Object Tracker*. Instead, it detects motion that moves past the line. The *Object Filter* feature is not available when using the counting line rule.
- **Tailgating:** The *Tailgating* rule triggers an event when objects cross over a line within quick succession of each other, within the defined time.
- **Direction Violation:** The *Direction Violation* rule triggers an event when an object crosses the detection line in a specified direction, angle, etc.
    - NOTE: You can also adjust the rule settings using the preview overlay. Click and hold inside the dotted circles and drag the line to the desired angle.

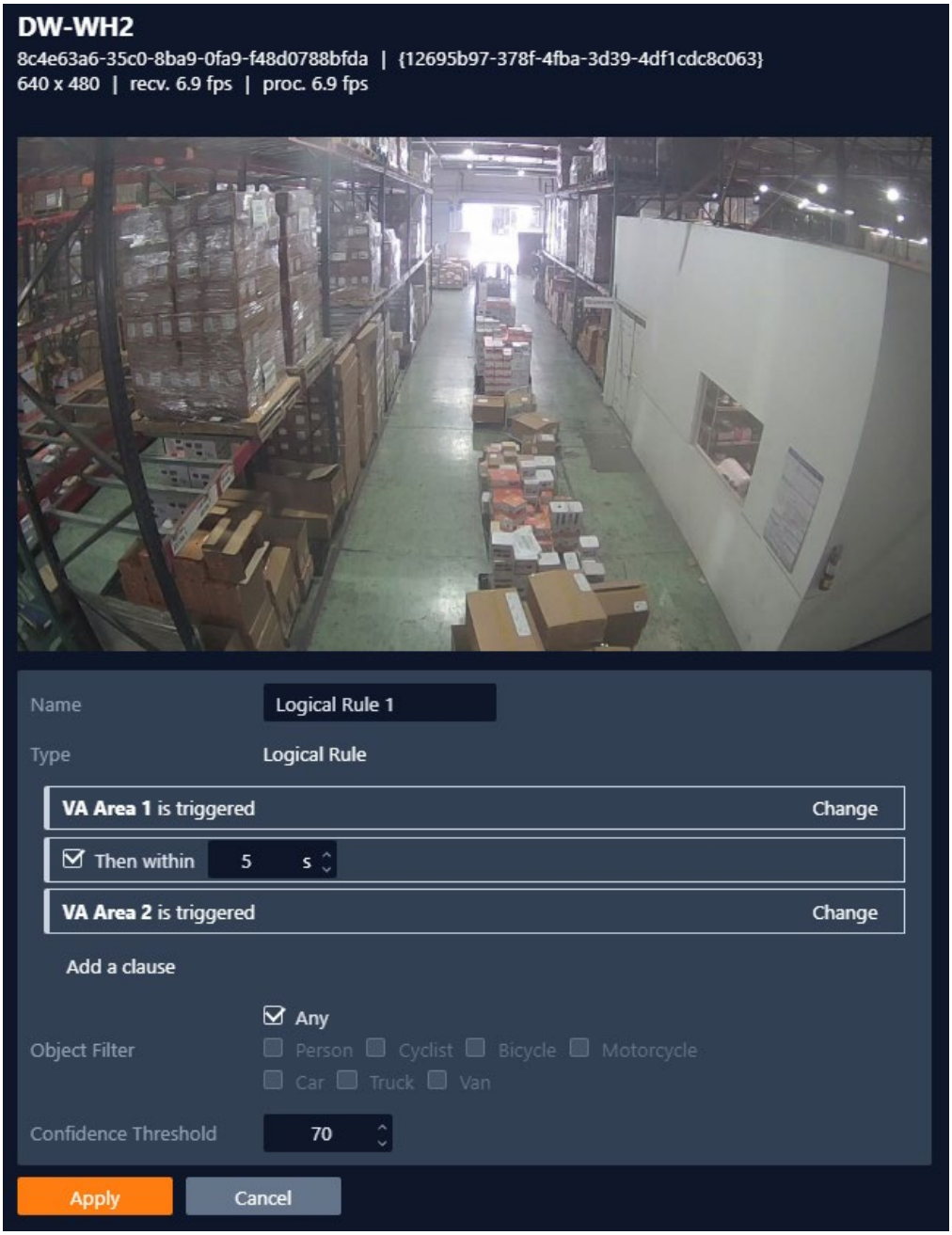


Analytic Filtering Rules

Analytic filtering rules can be applied to reduce false-positives and unwanted analytic triggering.

- **Logical Rule:** A *Logical Rule* extends the standard analytic rules to allow various inputs to be combined using logical expressions. This allows rules to be combined to form a complex filter of events to help reduce false alerts.
    - NOTE: Not all standard rules are available for *Logical* rules.
- **None Detection:** The *None Detection* rule will create an exclusion zone that can be used to map areas of the scene from being analyzed. This can be used to reduce false triggers that might be caused by moving

foliage or busy backgrounds by telling the engine to ignore certain areas.



How to Add a Rule

To create a new rule:

1) Select a camera from the device list then select the **Rules** tab.

2) Click the **Add** button and select the rule type to be added (see the Types of Rules Available section).

- When configuring an **AREA rule**, the engine will overlay a zone on a snapshot image of the camera's view.
- When configuring a **LINE rule**, the engine will overlay a line on a snapshot image of the camera's view.
- Click-and-drag the major and minor nodes to reshape the detection zone or to reorient the detection line as needed. Clicking on a minor node will split the segment and create a more complex shape.
- To remove a segment, right-click on a major node and select "*Delete*".

3) Configure the analytic rule accordingly.
The configuration options for rules include (availability varies by rule type):

- **Name:** Define a name for the rule.
    - **Threshold:** Define, in seconds, the period an object needs to be present within a zone to trigger an event.
- **Object Filter:** Defines if the objects will be filtered before triggering an event.
    - NOTE: The *Object Filter* option is only available when the standard *Object Tracker* and *Deep Learning Object Tracker* are selected in the *Enable* menu.
- **Zone Color:** Select a color for the zone.
    - **Apply:** Apply to save the rule and return to the previous menu.
- **Cancel:** Cancel changes and return to the previous menu.
    - **Direction:** Define the direction that objects will be monitored for movement for triggering detection line events.
    - **A:** Only direction **A** will be monitored across the counting line.
    - **B:** Only direction **B** will be monitored across the counting line.
    - **Both:** Both directions across the counting line will be monitored.
- **Enable Width Calibration:** Turn the object width calibration feature on or off.
    - **Width Calibration:** Define the width calibration value; used to adjust the minimum and maximum width of target objects for triggering an event when crossing the detection line.
- **Enable Shadow Filter:** Turn the shadow filter on or off, this attempts to compensate for shadows cast by objects.
    - **Counter:** Toggle to enable or disable a tally counter for this line.
    - **Reset:** Click to reset the counter.

- **Angle:** Define the direction that objects must move to trigger a *Direction Violation* event.
    - **Acceptance:** Define the allowed variance each side of the angle that will still trigger a *Direction Violation* event
- **Select Rule:** Define the first and second rules that will be used in the *Logical* rule.
    - **Then within:** Define the period between which the standard rules must occur to trigger the *Logical* rule.
- **Add a clause:** Add an additional rule to the logical rule, this displays a new "*Then within*" field for the rule.

4) Select **Apply** to save the rule and return to the previous menu.

NOTE: The *Object Filter* option is only available when the standard object tracker and Deep Learning Object tracker are selected. Filter option availability will change depending on which tracker is being used.

How to Modify a Rule

1) In the *Rules* tab highlight the rule to be modified.
2) Select **Modify** to open the settings for the rule.
3) Modify the rule accordingly.
4) Select **Apply** to save the rule and return to the previous menu.

How to Delete a Rule

1) In the *Rules* tab highlight the rule to be deleted
2) Select **Delete** to delete the rule from the list.

How to Search for IVA Analytic Events

The purpose of the *DW IVA AI Server Configuration Tool* is to connect and send metadata from the analytic engine to the DW Spectrum Server.

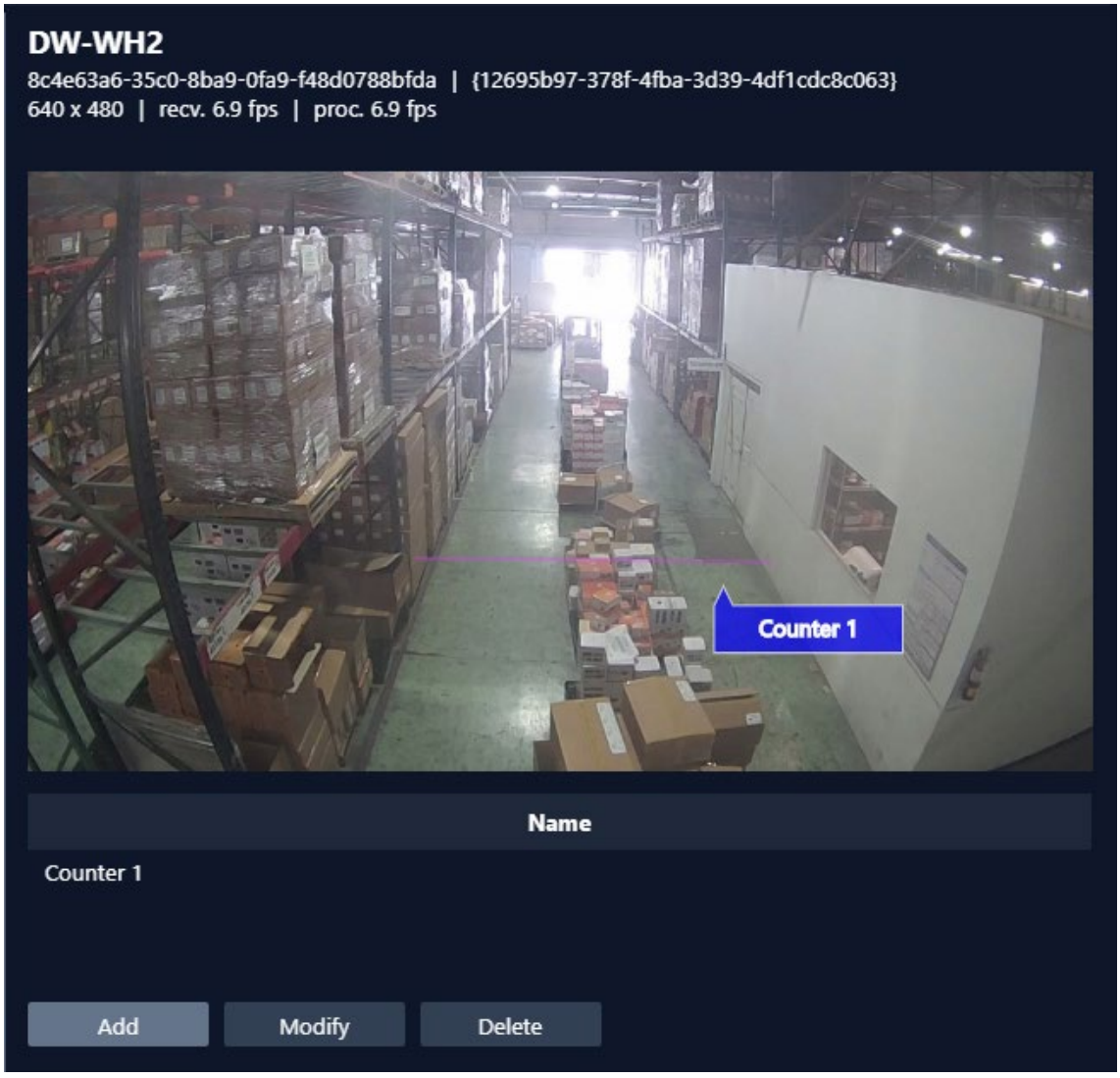
All event searches and object detection searches should be performed through DW Spectrum IPVMS using the *DW Spectrum Client* for desktop computers. For more information on event searches, please refer to the *DW Spectrum IPVMS User Manual*.

Part 8: Counters (*Counters* Tab)

A counter can be added to count the number of times a rule is triggered. For example, tracking the number of people that crossed a *Counting Line*.

You can create, edit, or remove counters with the available features:

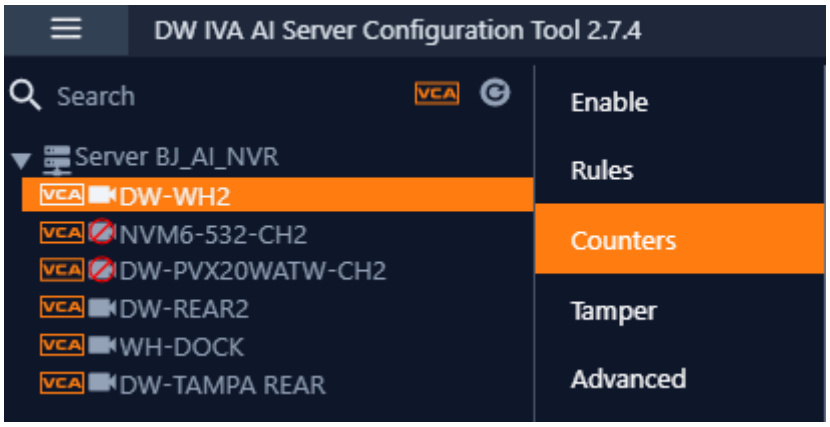
- **Add:** Click to add a new counter.
- **Modify:** Click to modify the highlighted rule.
- **Delete:** Click to delete the highlighted rule.



How to Add a Counter

To add a Counter:

1) Select the camera, then click on the **Counters** tab.

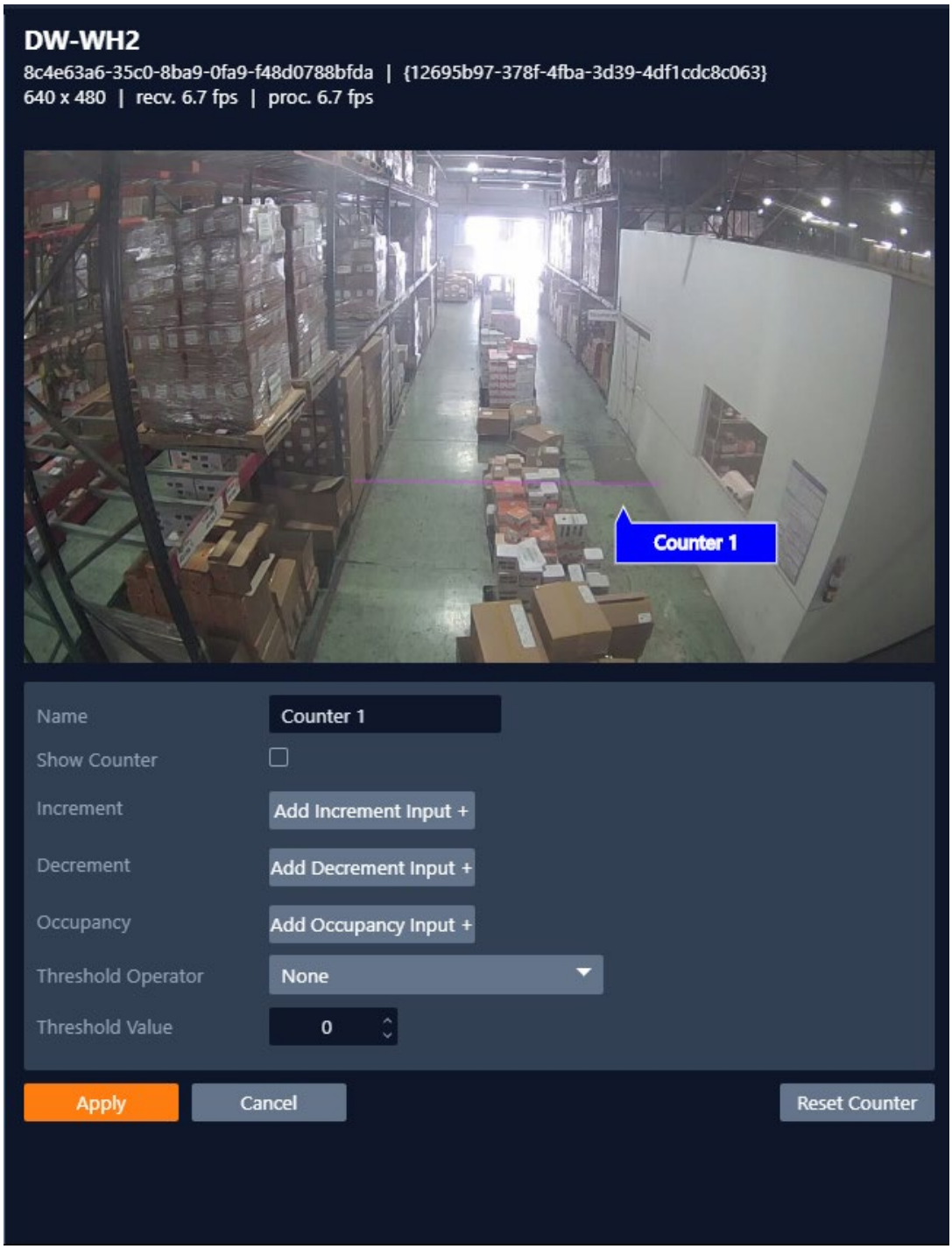


2) In the *Counters* menu, click the **Add** button.
3) Configure the counter as needed.

   The configuration options include:

   - **Name:** Specify a name for the Counter.
   - **Show Counter:** Enable to display the counter in the IVA analytic video stream.
   - **Increment:** Select which rule, when triggered, will add to the Counter.
   - **Decrement:** Select which rule, when triggered, will subtract from the Counter.
   - **Occupancy:** Select a rule to set the Counter to the current number of the rule's active triggers.
   - **Threshold Operator:** Select the scenario in which the Counter will generate an event only when the parameter has been met.
     - Greater than or equal to
     - Less than or equal to
     - Great than
     - Less than
     - Equal to
     - Not Equal to
     - None
   - **Threshold Value:** set the value to which the *Threshold Operator* will increase or decrease the Counter value.
   - **Reset Counter:** click to reset the counter value to 0.

4) Click the **Apply** button to save the Counter settings.



How to Modify a Counter

1) In the *Counters* tab highlight the Counter to be modified.
2) Select **Modify** to open the settings for the rule.
3) Modify the rule accordingly.

4) Select **Apply** to save and return to the previous menu.

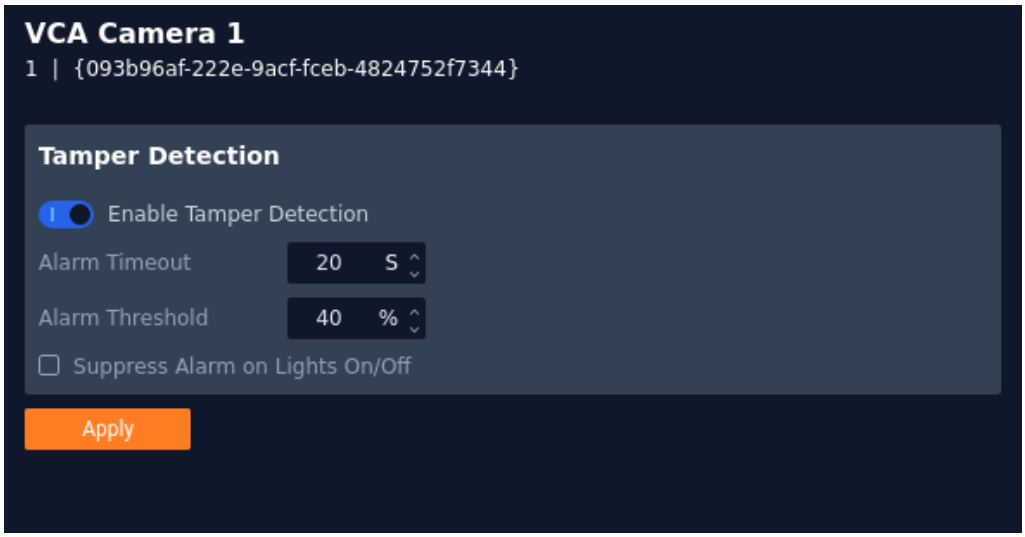
How to Delete a Counter

1) In the *Counters* tab highlight the Counter to be deleted.
2) Select **Delete** to delete the Counter from the list.

Part 9: Tamper Detection

The *Tamper Detection* feature is to detect when camera tampering events to obscure the camera view, such as bagging (physically blocking the camera lens), defocusing, or moving the camera, occur. This is achieved by the IVA AI automatically detecting large persistent changes in the image.

Select the *Tamper* menu tab to configure the *Tamer Detection* settings.



Configuration options include:

- **Enable Tamper Detection:** Toggle to enable/disable the *Tamper Detection* feature for the selected camera.
- **Alarm Timeout:** Defines the length of time, in seconds, that the image must be persistently changed before the alarm is triggered.
- **Alarm Threshold:** Defines the percentage area of the image which must be changed for the tampering to be triggered.
- **Suppress Alarm on light:** Toggle to enable/disable the feature. This feature mitigates scenarios where sudden changes in lighting such as switching on/off indoor lighting can cause false tamper events.
- **Apply:** Click **Apply** to save the current settings.

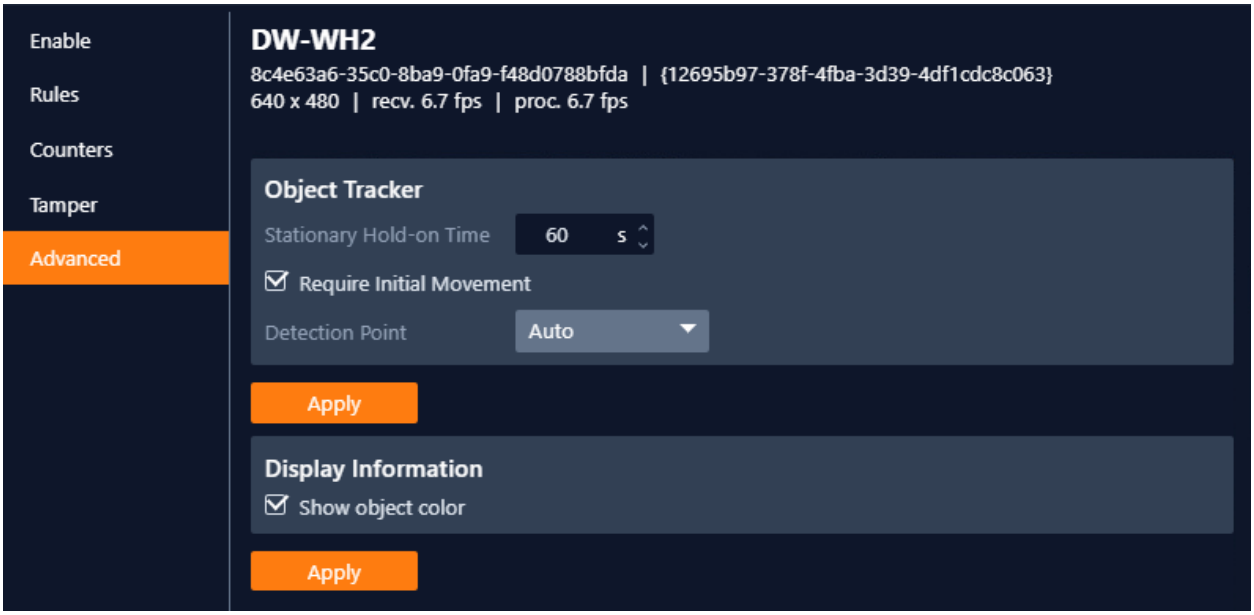
NOTE: The option will reduce sensitivity to genuine alarms and should be used with caution. Remember to **Apply** changes for them to take effect.

Part 10: Advanced

The *Advanced* camera menu contains settings relating to how the analytics engine tracks objects, such as the time threshold for the *Stationary Rule*.

In most installations the default configuration will be sufficient.

Select the *Advanced* menu tab to configure the advanced analytic settings.



Analytics Processing Stream

In the *Analytics Processing Stream* section, select which camera stream (Primary, Secondary) that the IVA AI analytics engine will use for object tracking and analytics.

In most installations, the default configuration will be sufficient.

Object Tracker

The *Object Tracker* section includes the settings used by the IVA AI when tracking objects for analytic rules.

Object Tracker settings include:

- **Stationary Hold-on Time:** Defines the amount of time an object will continue to be tracked and classified once it has stopped moving and has become stationary.

- **Minimum Object Size:** Defines the size of the smallest object that will be considered by the IVA AI engine for tracking.
- **Sensitivity:** Defines the tracker sensitivity. The lower the number, the more sensitive the tracker becomes. Recommended range for common use is **1~16**.
- **Abandoned Object Threshold:** Defines the amount of time used by the *Abandoned* and *Removed* rules before triggering.
- **Detection Point:** Defines the tracking point that will be used to evaluate object detection and pathing for analytic rules.
    - **Auto:** In *Auto* mode the detection point is automatically set based on how the calibration is configured.
    - **Mid bottom** In *Mid bottom* mode the detection point for each object is centered along the bottom line of the bounding box.
    - **Centroid** In *Centroid* mode the detection point for each object is located in the middle of the bounding box.
- **Require Initial Movement:** Toggle to track all object or moving object. It will prevent objects which have not moved from being tracked.
- **Apply:** Click to apply changes to the selected camera.

NOTE: Changing the *Detection Point* setting may affect the point at which objects will trigger an event, depending on the tracked objects pathing.

Scene Change

The *Scene Change* section includes the settings used by the IVA AI when monitoring changes to the camera for the *Tampering* settings.

Scene Change settings include:

- **Area Threshold:** Defines the percentage of the scene's area in which the camera must detect change in order to trigger the *Scene Change* process.
- **Duration:** Defines how long the scene needs to have been altered for before triggering the Scene Change process.
- **Apply:** Click to apply changes to the selected camera.

Display Information

The *Display Information* section includes the settings that determines how object tracking annotations will appear for users.

Display Information settings include:

- **Show object height:** Toggle to enable/disable the object height from being annotated on the camera image.
- **Show object area:** Toggle to enable/disable the object area from being annotated on the camera image.
- **Display Unit:**
  - **Metric:** Click to show all measurement units in metric system
  - **Imperial:** Click to show all measurement units in imperial system
- **Apply:** Click to apply changes to the selected camera.

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