VaxALPR On Camera

Axis Camera Integration

Version 2.0

May 2020

VAXTOR UK (HQ)
8 Martinfield
Welwyn Garden City
Hertfordshire. AL7 1HG / UK
Tel: +44 (0)1707 808650
Info.uk@vaxtor.com

VAXTOR SPAIN
Sector Foresta 1, Bldg AKAL
2nd Floor. 28760 Tres Cantos
Madrid (Spain)
Tel: +34 91 757 22 11
info.eu@vaxtor.com

VAXTOR USA
23201 Lake Center Drive, Suite 211
Lake Forest, CA 92630 (USA)
Toll Free: 877-5-VAXTOR
Outside US: +1-949-444-5829
info.us@vaxtor.com

VAXTOR SINGAPORE
18 Howard Road #07-01/1 1
369585, Singapore
Phone: +65 8613 3554
Info.asia@vaxtor.com

INDEX

1. Introduction

This guide is designed for those responsible for integrating the VaxALPR On Camera software with the standard Axis Camera software.
The VaxALPR On Camera software is a real-time solution for Automatic License Plate Recognition (ALPR) that runs entirely within the Axis camera.

2. VaxALPR On Camera and Axis Camera Events

The VaxALPR On Camera software can be integrated with Axis camera events.
An Axis camera event is a set of conditions (action rules) that define how and when an action will be performed. If multiple conditions are defined, all of them must be met to carry out the action. An event can be triggered or scheduled.

When integrated, every time a license plate is read, VaxALPR On Camera sends a VAPIX / ONVIF event to the Axis Camera. Several different types of events can be sent:

- ALPR: This event is sent each time a license plate is recognized.
- Blacklist: This event is sent each time a license plate on the blacklist is recognized.
- Whitelist: This event is sent each time a license plate on the whitelist is recognized.
- NoList: This event is sent each time a license plate that is not on the whitelist nor on the blacklist is recognized.

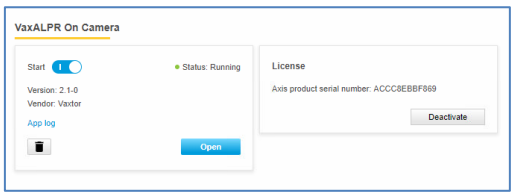
NOTE: The Axis Camera firmware version should be 6.30 or above if you want to use it with the VaxALPR On Camera software. The VaxALPR On Camera software should be configured before Axis camera events.

2.1 Configure VaxALPR On Camera software: VAPIX / ONVIF events

Once the Axis camera is installed and setup, and the basic configuration of the VaxALPR On Camera software is done, we need to configure the send VAPIX / ONVIF events in the reporting options of the VaxALPR On Camera software.

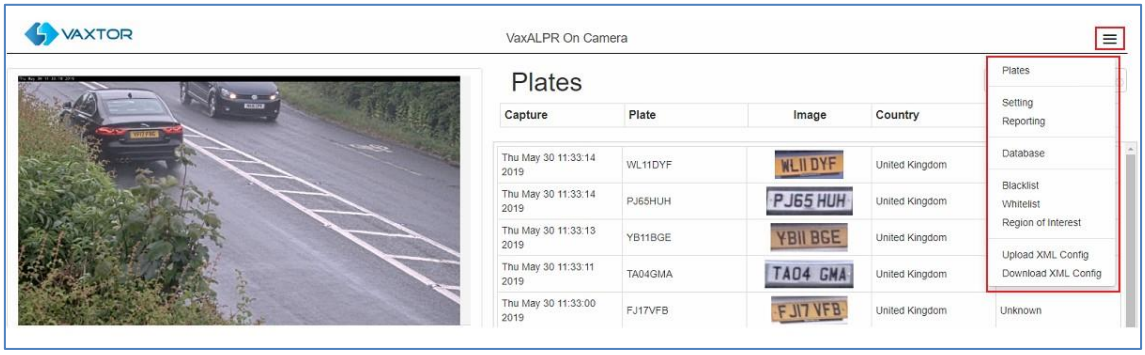
2.1.1 Starting the VaxALPR App

To configure the send VAPIX / ONVIF events in the VaxALPR On Camera software, first start the App by selecting the Axis camera's Settings, click on the Apps Tab and select the VaxALPR On Camera App.
Use the Start Slider to start the ALPR App.
The Status should change to 'Running'.



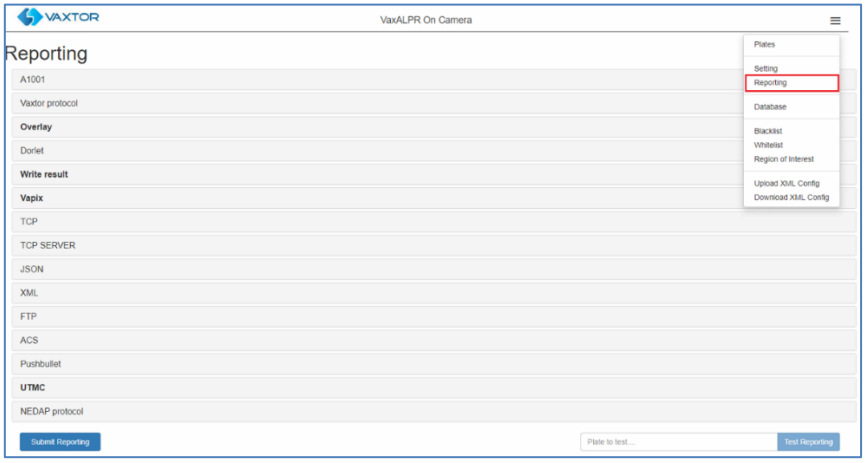
2.1.2 Configuring VaxALPR On Camera

Once the software is running you can configure the VaxALPR On Camera software by clicking on the blue Open button. This will open a new window with the VaxALPR On Camera main interface.



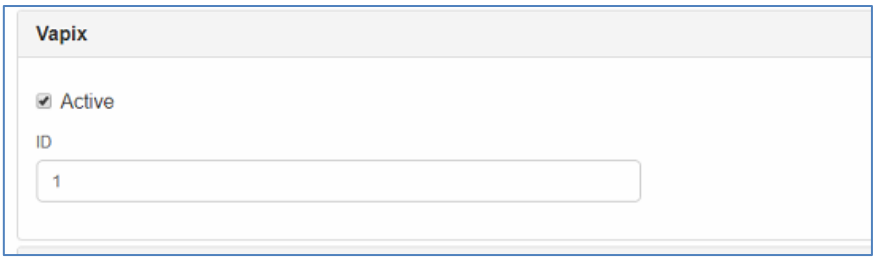
VaxALPR On Camera interface

The icon in the top right corner reveals the options menu. Click on Reporting:



In this case we are going to select Vapix to communicate with the Axis camera's own software:

Tick the **Active** checkbox and the Vapix interface window will appear:



Select an ID (Unique Identifier) for this camera, scroll down and save your changes by clicking on the Submit Reporting button.

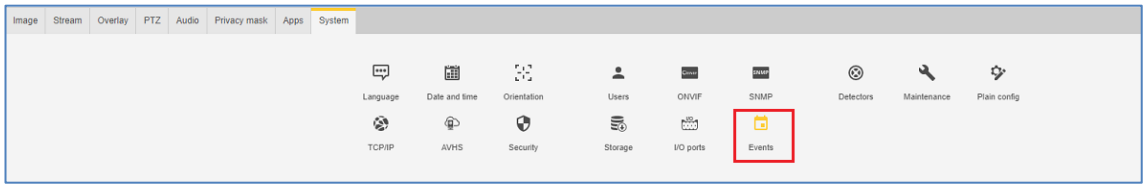
2.2 Adding Axis Camera Events

Once the Vapix reporting has been activated, we need to add the Axis camera events.
There are several options when it comes to creating an event.
Access the Axis camera's setup and under the System Tab select the Events menu. Please refer to the Axis Network Camera manual by clicking on the button situated in the upper right corner.

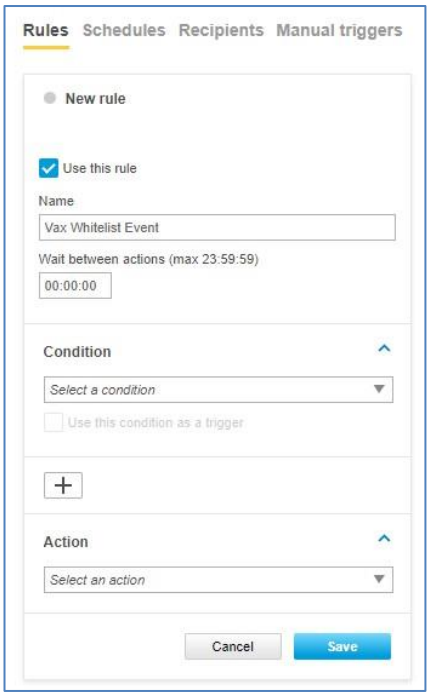
In our case, we want to raise a barrier by triggering a relay output when the VaxALPR On Camera software recognizes a vehicle in the whitelist.

To do this, we need to follow the following steps:

- Go to the Axis camera's main Settings page and click the **System** Tab.
- From here select the Events icon.



- Then click on the Rules Tab and click on the + button to add an initial event rule:



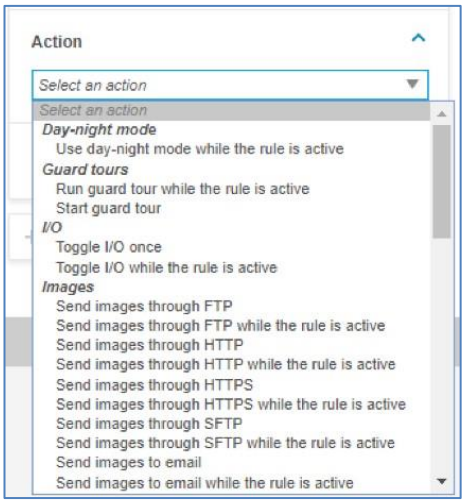
- Give the rule a name, e.g. Vax Whitelist Event.

- Set the time to wait between actions (so they are not triggering too often if a car is parked for example)

- Select an initial Condition from the drop-down list to trigger the event. In this case from the Applications section select Whitelistv2. If you require a second Condition to also be met to trigger the event, then press the + icon at add more conditions.

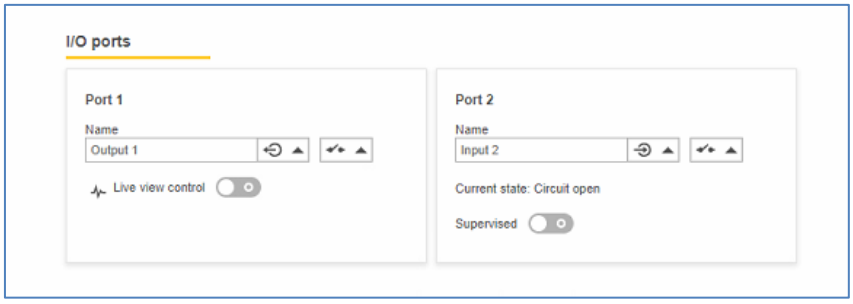
- Conditions may be edited or removed using the Bin icon.

- Add an Action to make something happen when the condition is met. Actions can include toggling an i/o within the camera to sound an alarm or open a relay.

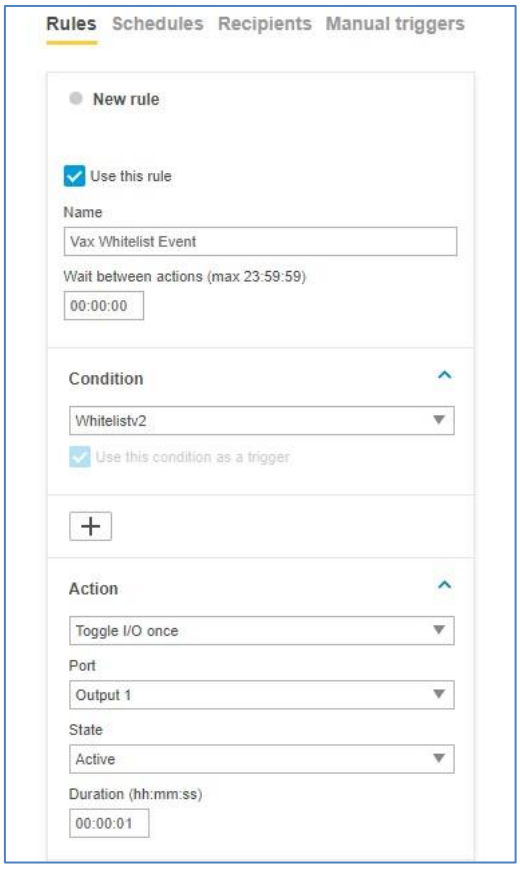


- In this case we are going to trigger a relay within the Axis camera.
  - From the drop-down list select Toggle I/O once.
  - Select an **Output Port** from the drop-down list.

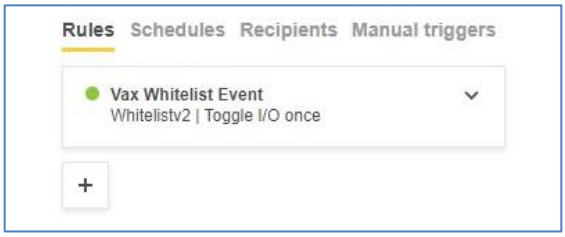
    NOTE: To configure I/O ports access the Axis camera's setup and click on the System Options > I/O ports icon.



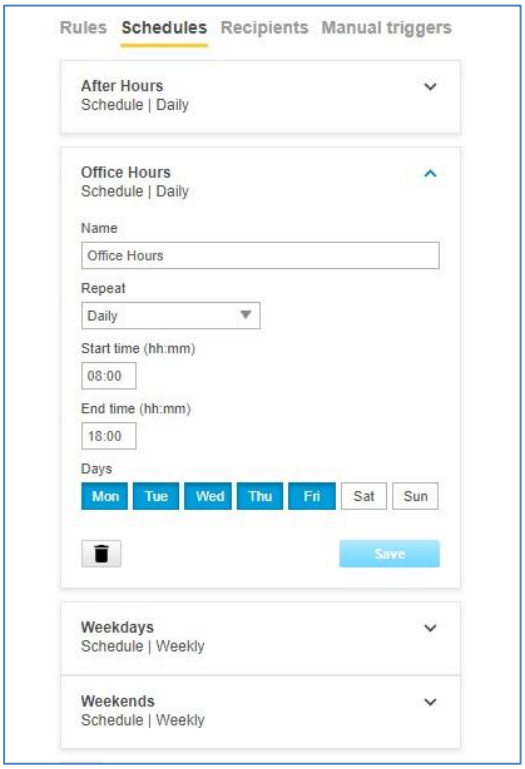
  - Define the **State** that the port should toggle to.
  - Select the **Duration** in seconds of how long the relay should be toggled for. In this case 1 second which will be used to open a barrier.



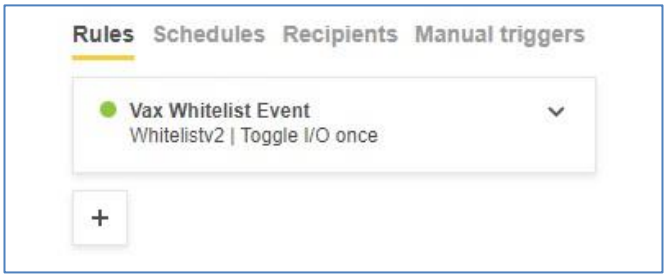
- **Save** the completed Rule and the Rule will appear in the list:



- If a Schedule for this trigger is needed, open the Schedules Tab and select one of the pre-set schedules or define a new one of your own.
Note: if the Rule is to always be active (24/7) – then no schedule is needed.



- **Save** the completed Rule and the Rule will appear in the list:



3. VaxALPR On Camera and the Axis A1001 Network Door Controller

The VaxALPR On Camera software can be integrated with the Axis A1001 Network Door Controller. This device is an IP-based access controller suitable for both small to mid-sized businesses and is compatible with Wiegand access control readers. The Axis A1001 comes with built in software for basic access management and is also open for third party software.

When integrated, the license plates recognized by VaxALPR On Camera are sent in real time to the Axis A1001 Network Door Controllers. The Axis A1001 grants or denies access depending on the user's credentials.

NOTE: The Axis Camera firmware version should be 6.30 or above and the Axis A1001 Network Door Controller should be 1.60.0 or above if you want to use them with the VaxALPR On Camera software.

IMPORTANT: The Axis A1001 Network Door Controller should be installed and setup before continuing. Please refer to the Installation guide at:

https://www.axis.com/global/en/products/axis-a1001/support-and-documentation.

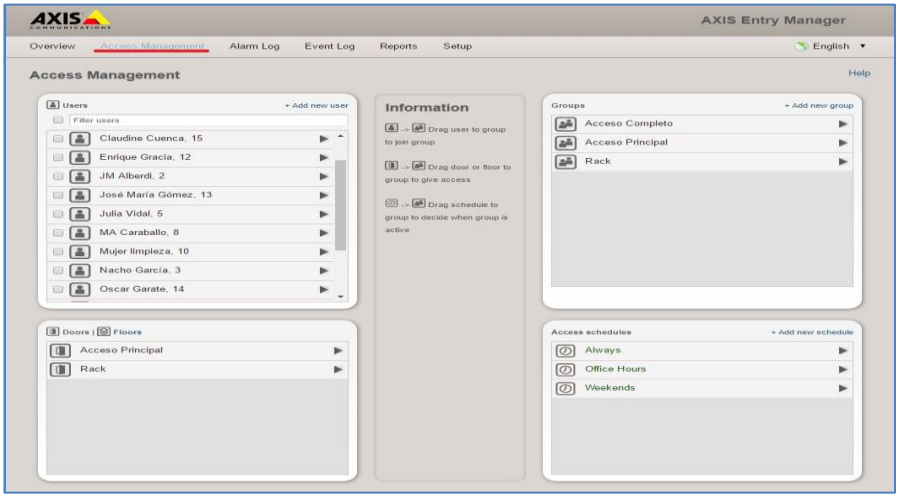
3.1 Configuring Axis 1001 Network Door Controller

The Axis A1001 can be configured with the Axis Entry Manager or any third-party access management solution integrated with the Axis A1001. In this case, we are going to use the Axis Entry Manager which is pre-installed on Axis A1001 Network Controllers.

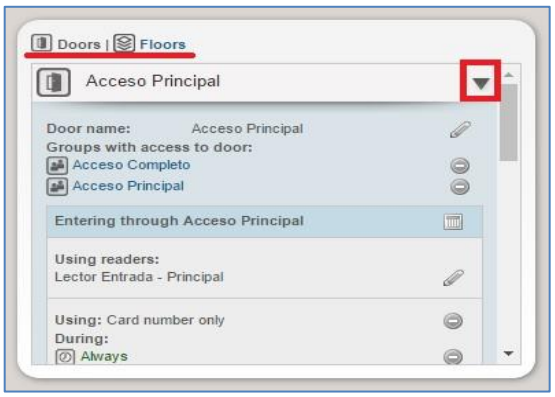
The Axis Entry Manager is an access management solution for small to mid-sized businesses. It consists of one or several Axis A1001 Network Door Controllers with access management software.

To configure the Axis A1001 to use the Axis Entry Manager:

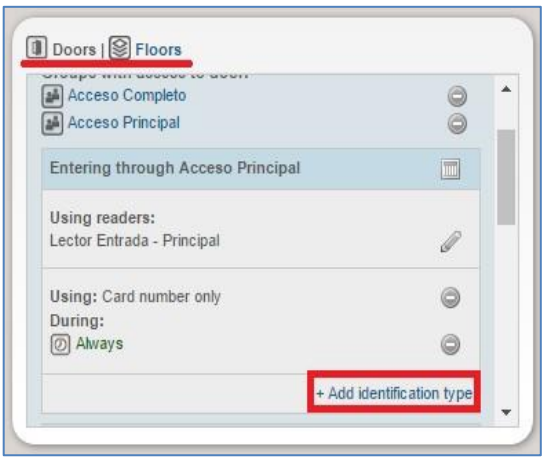
1. Once the Axis A1001 is setup, click on the Access Management Tab.



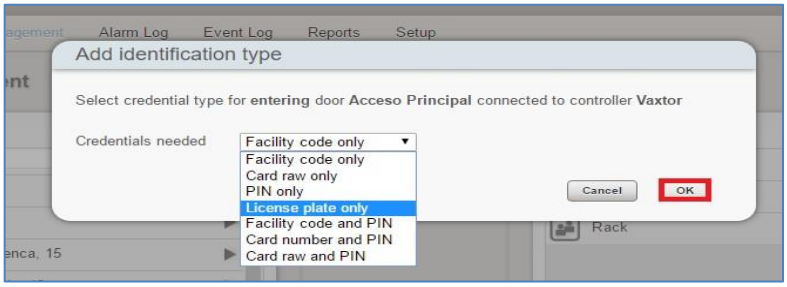
2. Go to the Doors / Floors and click on the option you want to configure. This will display the characteristics of the door or floor.



3. Scroll down and select: **+ Add Identification type:**

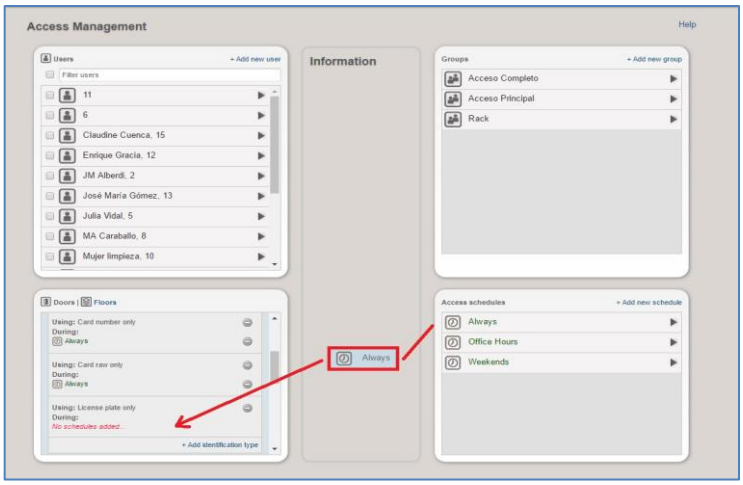


4. This opens a new window. Select the credential type needed from the drop-down list. In this case, select the option **License plate only** and click on the OK button.



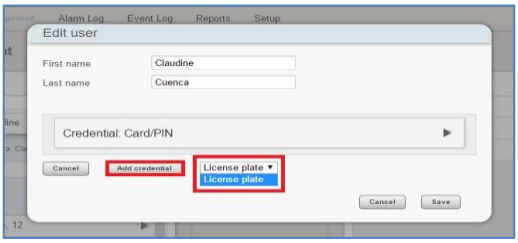
IMPORTANT: The Axis Entry Manager supports multiple identification types at the same time. This means you can also use other identification types alongside the 'License plate only' type such as 'Pin only' or 'Card raw only'.

5. Add a schedule to the new identification type by dragging and dropping one of the Access schedules already created.

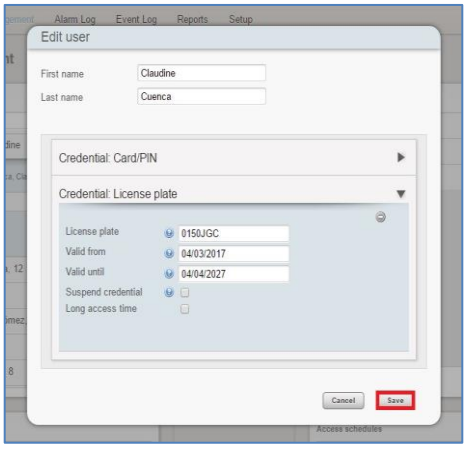


6. Add the License Plate credential to a new or existing user.

   - To add a new user click on the + Add new user button, enter the new user's details and Save.
   - Select a user and open it for editing using the pencil icon.
   - Click on the **Add credential** button. Select **License plate** from the drop-down list and then click on the **Add credential** button once more:



   - This opens a new menu:



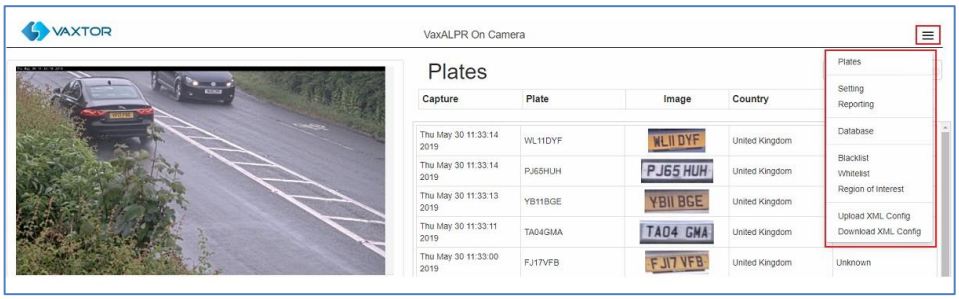
     - Complete the credential by entering the **License plate** number for the user's vehicle along with the **Valid from** and **Valid until** fields.
     - When the **Suspend credential** checkbox is selected, the user cannot access any doors in the system using this credential. Suspension is intended to be temporary. If the user needs to be permanently denied access, it is better to delete the user's profile.

- Select the **Long access time** checkbox to override any existing access control schedules and allow the door to remain unlocked after access has been granted.
- Click on the Save button.

3.2 Configure the VaxALPR On Camera Software to use the Axis 1001 Network Door Controller

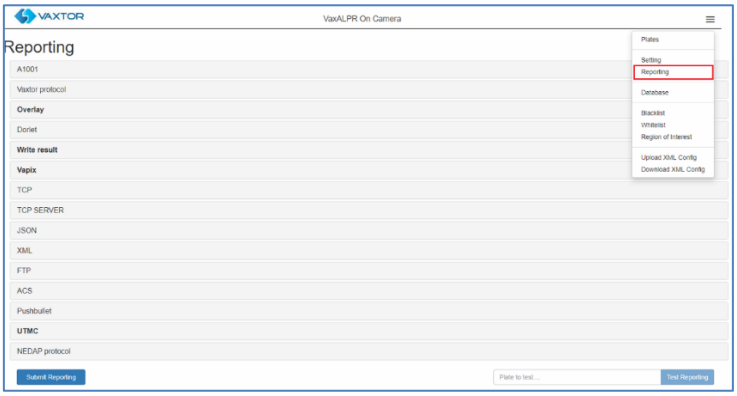
Once the Axis A1001 Network Door Controller is installed and configured, we need to configure the A1001 Network Door Controller in the reporting options of the VaxALPR On Camera software.

1. On the Axis Camera's internal webpage, click on the blue Open button to open a new window with the VaxALPR On Camera main interface.

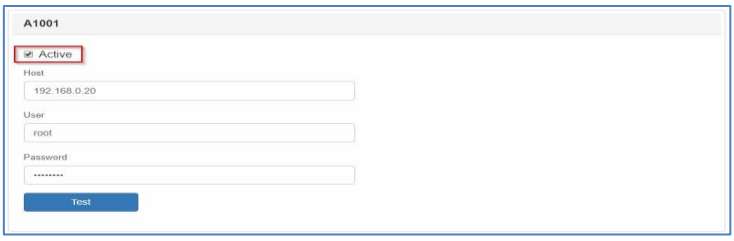


The icon in the top right corner reveals the options menu.

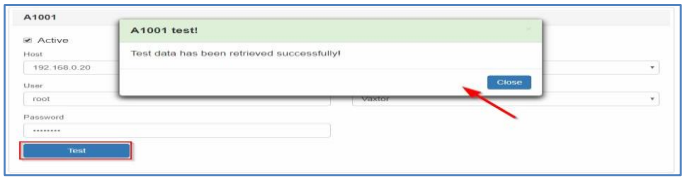
2. Click on Reporting and select A1001 from the top of the list:



3. Click Active and complete the IP address, user name and password of the device to send license plates recognised by the VaxALPR software to the Axis A1001 door controllers:

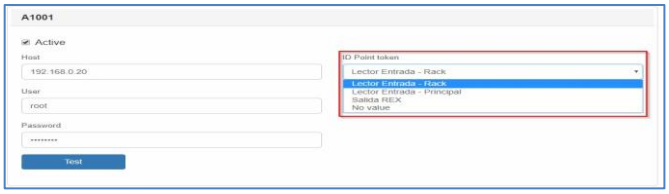


4. Use the blue Test button to check that everything is working. If successful a message will be shown:

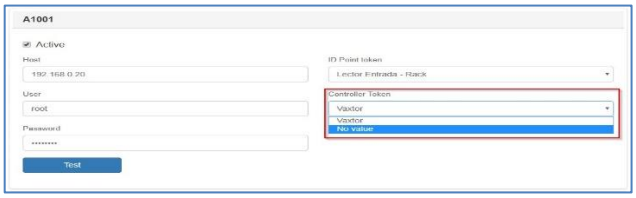


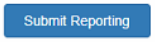
5. After acknowledging this message, you will see a window showing returned **ID Point token** and **Controller Token** messages**.**

6. Select the **ID Point token** and select the reader identification required from the drop-down list. (This corresponds with the one in the Entry Manager setup earlier that will receive the plate information).



7. Next select the **Controller Token and** choose the appropriate option from the drop-down list that corresponds with the Axis A1001 Network Door Controller you wish to use.



8. Finally , scroll down and save your changes by clicking on the 

button to store the configuration to the camera.

3.3 Related Documents

For more information about installation, setup and configuration, we recommend you refer to the following guides:

- Axis Entry Manager:
  https://www.axis.com/en-gb/products/entry-manager
- Axis A1001 Network Door Controller:
  https://www.axis.com/products/axis-a1001/support-and-documentation

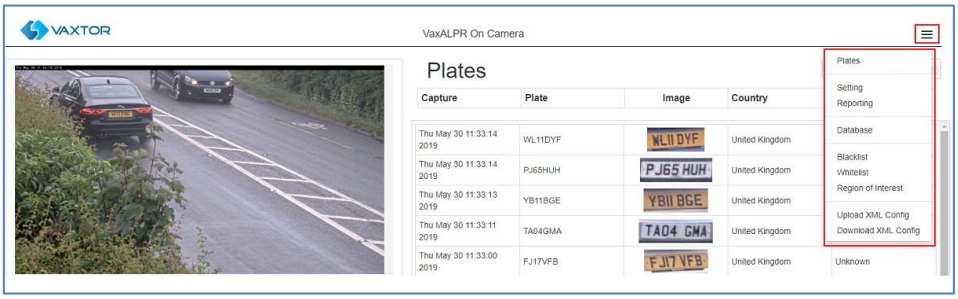
- Vaxtor VaxALPR On Camera Installation and Configuration manuals are available from the Vaxtor Website:
  https://www.vaxtor.com/vaxalpr-on-camera/

4. VaxALPR On Camera and Axis Video Overlay Settings

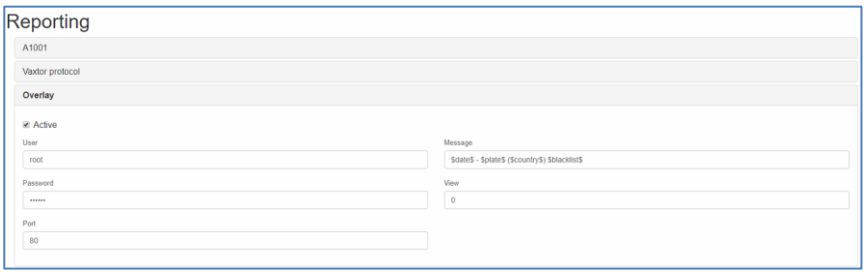
The VaxALPR On Camera software can display dynamic overlay text such as the most recent License Plate details onto the camera video stream.

To set up this option:

1. On the Axis Camera's internal webpage, click on the blue Open button to open a new window with the VaxALPR On Camera main interface.
2. The icon in the top right corner reveals the options:



3. Click on Reporting and select **Overlay** from the list
4. Click on **Active** and edit the Message to be displayed:

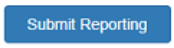


NOTE: You can use dynamic text replacement to match the current plate's information:

- **$image$**: Full JPEG image encoded in base64.
- **$jpegsize$:** JPEG size in bytes.
- **$date$**: Timestamp in ISO8601 format
- **$plate$**: Plate number
- **tag**: Unique hash for this plate number. Same plate number will always give the same tag. Format based on UTMC algorithm.
- **$plateutf8$**: Plate number in utf8 format.
- **$country$**: Full country of origin name.
- **$countrycode$**: 3 letter country code.
- **$state$**: Plate State for USA.
- **$category$**: Plate category for countries that support it.
- **$blacklist$**: Description on the blacklist linked to the plate number.
- **$whitelist$**: Description on the whitelist linked to the plate number.
- **$ifblacklist$ .... $ifblacklist$**: If the plate is on the blacklist, the text in the 'if clause' will be displayed.
- **$ifwhitelist$ .... $ifwhitelist$**: If the plate is on the whitelist, the text in the 'if clause' will be displayed.
- **$ifnolist$**...**$ifnolist$:** If the plate in not on a list, the test in the 'if clause' will be displayed.

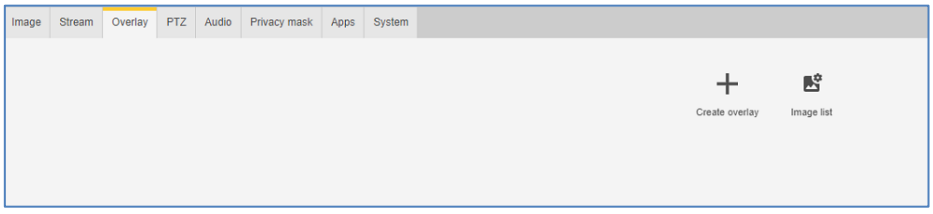
- **$confidence$**: Global confidence (0-100).
- **$charheight$**: Average charheight (pixels).
- **$processingtime$**: Processing time in milliseconds.
- **$left$**: Left coordinate for the plate on the image (pixels).
- **top**: Top coordinate for the plate on the image (pixels).
- **$right$**: Right coordinate for the plate on the image (pixels).
- **$bottom$**: Bottom coordinate for the plate on the image (pixels).
- **$absoluteleft$**: Plate left position based on the total image width (0-1).
- **$absolutetop$**: Plate top position based on the total image height (0-1).
- **$absoluteright$**: Plate right position based on the total image width (0-1).
- **$absolutebottom$**: Plate bottom position based on the total image height (0-1).
- **$width$**: OCR image width.
- **$height$**: OCR image height.
- **ip**: Camera IP address.
- **$roiid$**: Roi ID where the plate number is found.
- **$speed$**: Vehicle speed (Km/h).
- **$multiplate$**: Amount of times that the plate has been read before reporting.
- **$signaled$**: True if the read has been done due to a trigger.
- **id**: Database ID for this read.
- **$direction$**: Enumerate with the vehicle direction (0: Unknown, 1: Towards, 2: Away, 3: Stopped)
- **$directionstr$**: String with the vehicle direction.
- **$safedate$**: Date in format %Y%m%d_%H%M%S in the camera time zone (Useful for filenames).
- **$localdate$**: Date in format %d/%m/%Y in the camera time zone
- **$localtime$**: Date in format %H:%M:%S in the camera time zone.
- **$imageid$**: Signal ID in case of a trigger read.
- **$plateimage$**: Plate crop JPEG image encoded in base64.
- **$platejpegsize$**: JPEG size in bytes.
- **$overviewimage$**: Overview JPEG image encoded in base64.
- **$overviewjpegsize$**: JPEG size in bytes.
- **$epoch$**: Unix epoch (seconds).
- **$utcdate$**: Will report the date at ISO8601 format but always in UTC. (2020-12-31T16:11:30.000Z)
- **etx**: End transmission character (03)
- **stx**: Start transmission character (02)

5. Specify the **View** (the Axis camera view stream identifier). By default, set to 0).

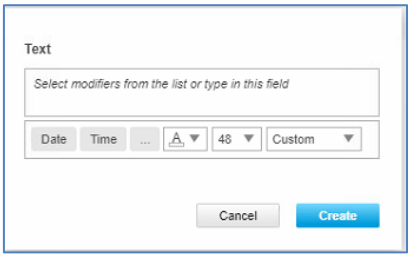
6. Scroll down and save your changes by clicking on the 

button.

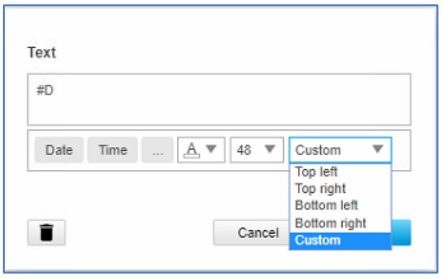
7. Next, go to the Axis camera's main settings page and select the **Overlay** Tab and click on **Create Overlay**:



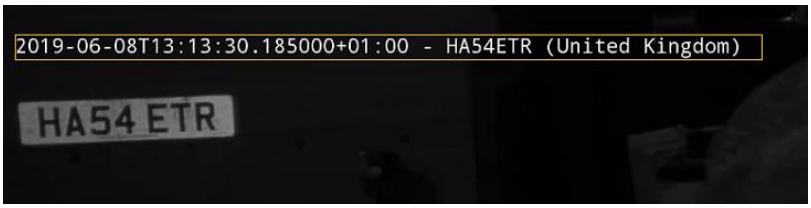
8. Choose the **Text** option:



9. Enter **#D** for the data from the ALPR read.
   You can also use the pre-set modifiers if required and select fonts and the position of the overlay text:



10. Back on the Live view you will be able to see the overlay. You can pick this up with the mouse and change its position more accurately:



5. VaxALPR On Camera – Using an internal SD Card

The VaxALPR On Camera software can save all plate reads as JPEG images to an SD card that has been fitted inside the Axis camera.

All reads will be stored in the SD Card folder: /areas/Vaxreader/YYYYMM-DD/

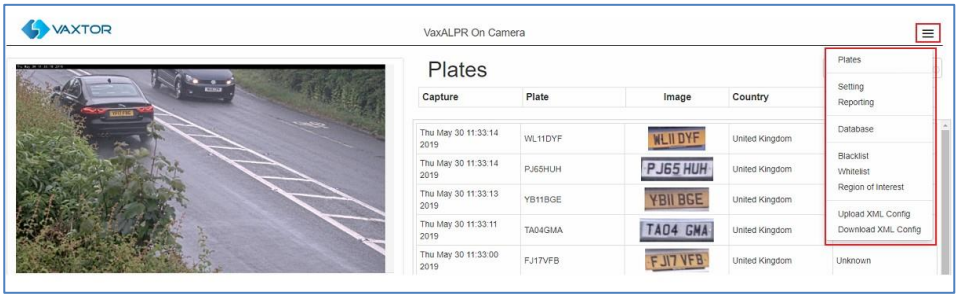
If the plate is in a whitelist or blacklist, the images will be stored in:

/areas/Vaxreader/YYYY-MM-DD/WHITELIST/ or
/areas/Vaxreader/YYYY-MM-DD/BLACKLIST/

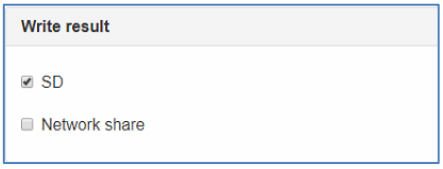
Each image saved will be labelled as **HHMMSS-PLATE.jpg** with the timestamp in UTC/GMT.

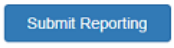
To setup this option, do the following:

1. On the Axis Camera's internal webpage, click on the blue Open button to open a new window with the VaxALPR On Camera main interface.
2. The icon in the top right corner reveals the options:



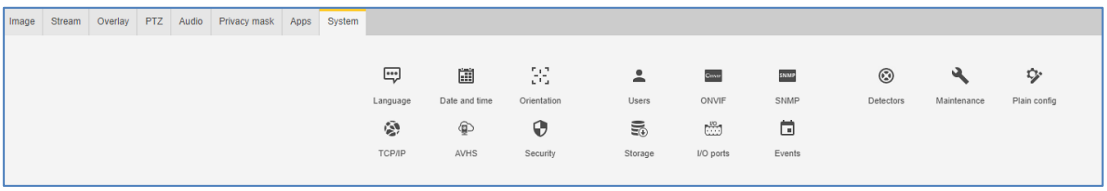
3. Click on reporting and select **Write result** from the list of options and check **SD**.



4. Scroll down and save your changes by clicking on the 

button to save your changes.

5. Next, go to the Axis camera's main settings page and select the **System** Tab and click on **Storage**:



6. Format the card if necessary and then set any other options as required:

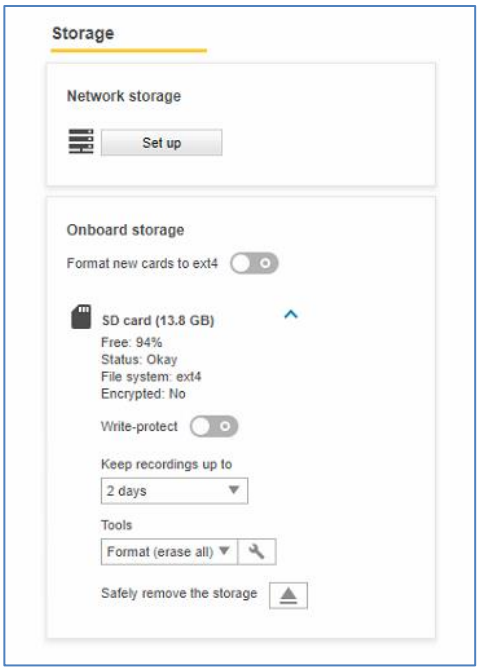


Plate reads will now be written to this location.

6. VaxALPR On Camera – Using Axis Network Share Storage

The VaxALPR On Camera software can save all plate reads as JPEG images to a network share which is a folder created on the local network.

All reads will be stored on the network shore in the folder:

axis<DeviceSerialNumber>/areas/Vaxreader/YYYYMM-DD/

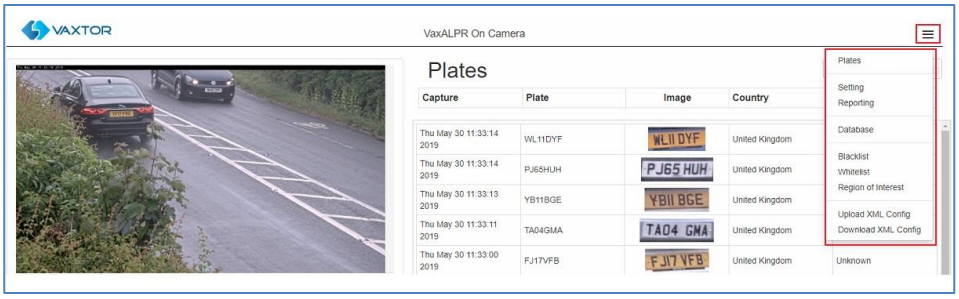
If the plate is in a whitelist or blacklist, the images will be stored in:

axis<DeviceSerialNumber /areas/Vaxreader/YYYY-MM-DD/WHITELIST/ or
axis<DeviceSerialNumber /areas/Vaxreader/YYYY-MM-DD/BLACKLIST/

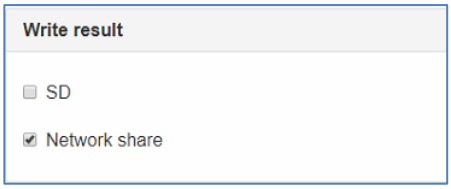
Each image saved will be labelled as **HHMMSS-PLATE.jpg** with the timestamp in UTC/GMT.

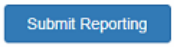
To setup this option, do the following:

1. On the Axis Camera's internal webpage, click on the blue Open button to open a new window with the VaxALPR On Camera main interface.
2. The icon in the top right corner reveals the options:



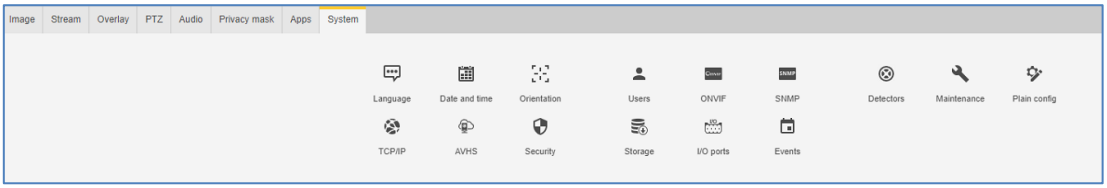
3. Click on reporting and select **Write result** from the list of options and check **Network share**.



4. Scroll down and save your changes by clicking on the 

button to save your changes.

5. Next, go to the Axis camera's main settings page and select the **System** Tab and click on **Storage**:



6. Ensure that you have already setup a public shared folder!
7. Click on Network storage Set up and enter the address of the shared folder:

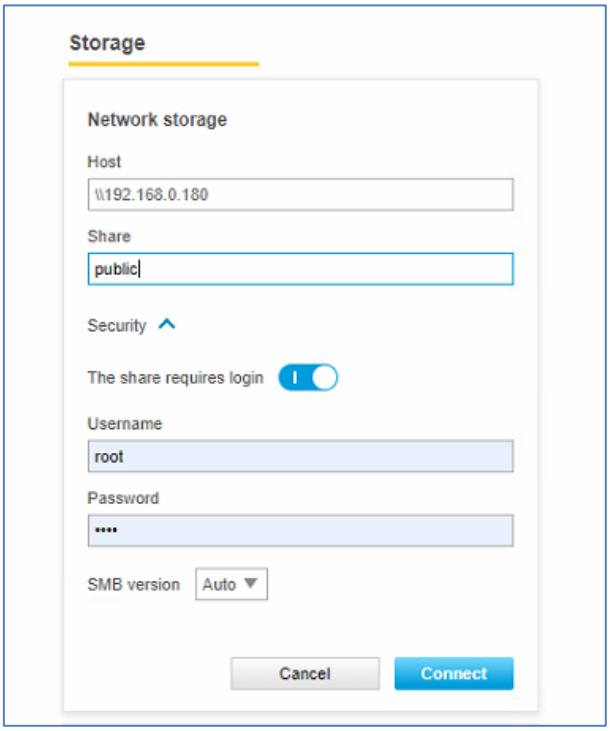


Plate reads will now be written to this location.

7. VaxALPR On Camera and the Axis Camera Station

The VaxALPR On Camera software can be integrated with the Axis Camera Station.
The Axis Camera Station is a video management system for both small to mid-sized installations which is optimized for Axis' network video products.

It is possible to integrate VaxALPR On Camera with Axis Camera Station in 2 different ways:

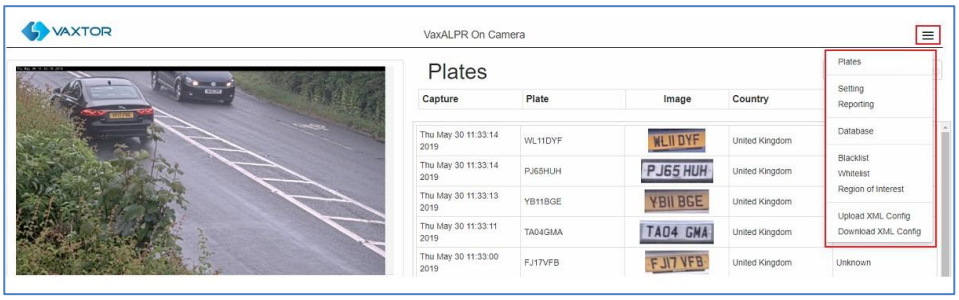
1. Capture VAPIX events to create different actions in the Axis Camera Station (sections 7.1 and 7.2)
2. Create a bookmark in the recording of the LPR camera (sections 7.3 and 7.4).
   Note: It is essential that the date and time of the ACS and the camera are synchronized.

IMPORTANT: Axis recommends that no more than 10,000 bookmarks are added to the Axis Camera Station Software.

7.1 Configure VaxALPR On Camera software: VAPIX / ONVIF events

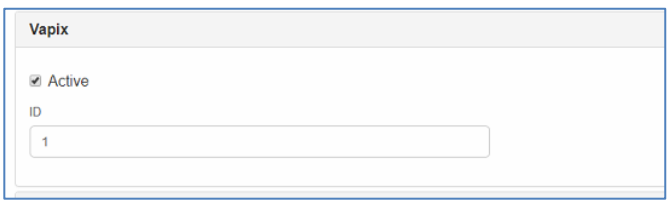
To setup this the ALPR software to send VAPIX / ONFIV events:

1. On the Axis Camera's internal webpage, click on the blue Open button to open a new window with the VaxALPR On Camera main interface.
2. The icon in the top right corner reveals the options:



3. Click on reporting and select **Vapix** from the list of options select **Active**:

4. The Vapix interface window will appear:

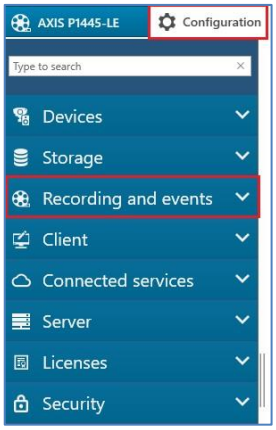


5. Select an ID (Unique Identifier) for this camera, scroll down and save your changes by clicking on the Submit Reporting button.

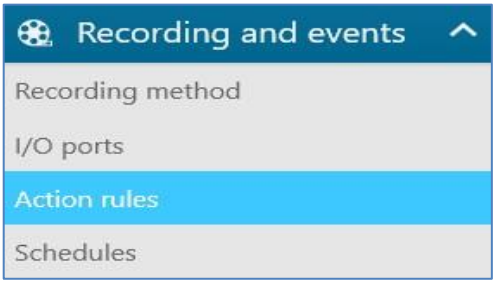
7.2 Capture VAPIX events with the Axis Camera Station

Once VAPIX is configured, we need to setup the Axis Camera Station to receive and handle VAPIX / ONVIF events. Do this as follows:

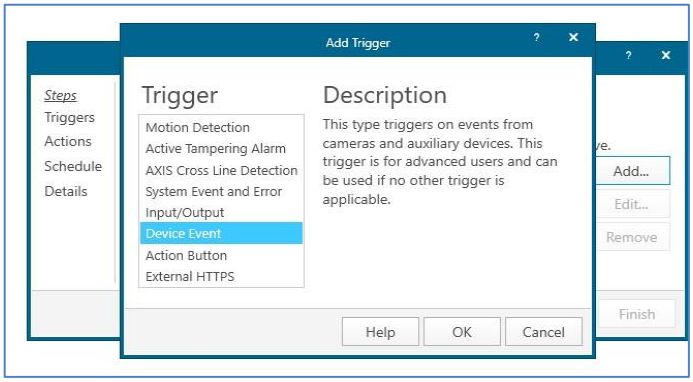
1. On the Axis Camera Station interface, click on the **Configuration** Tab and then **Recordings and Events**:



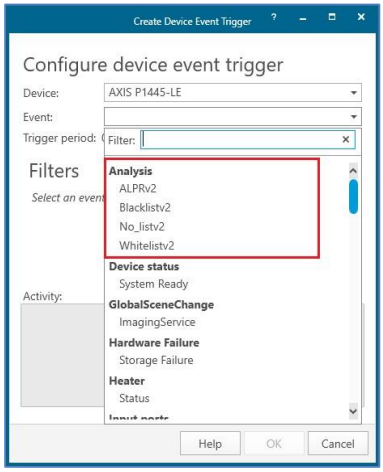
2. Select **Action Rules** and **New** to create a new rule:



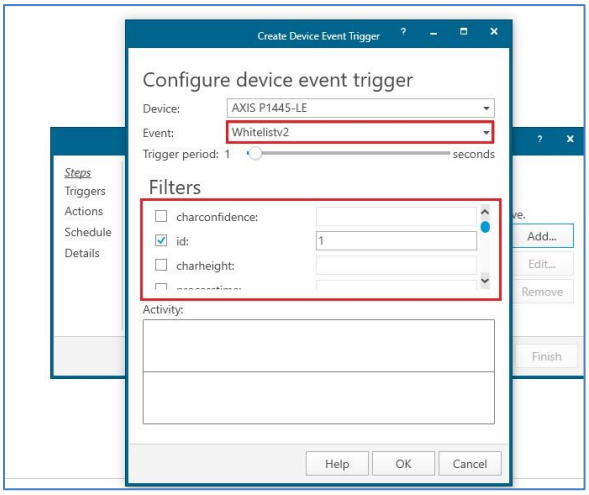
3. Create a new rule following the steps indicated.
First click on the **Add** button to create a new trigger and select the **Device Event** trigger type and click **OK**.



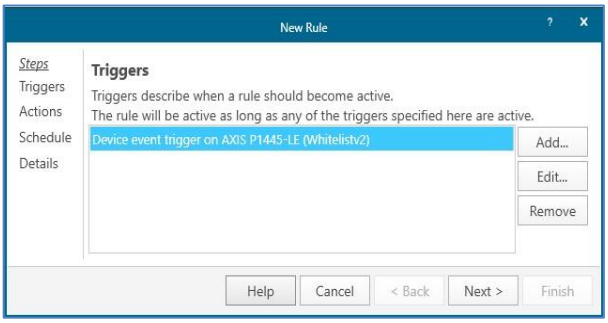
4. Next create the device event trigger:
   - Select a **Device** from the drop-down list. *IMPORTANT*: The camera selected should already have the VaxALPR On Camera software installed and running.
   - Select an **Event** from the drop-down list. *NOTE*: In this case the event should be one of: **Analysis – ALPRv2, Blacklistv2, Whitelistv2** or **No_listv2**.



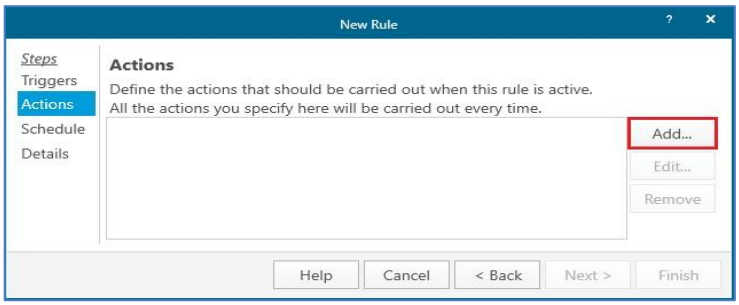
   - Define the **Trigger period** (the time the event will be active).
   - Select the checkbox of any **Filters** you wish to apply. The filters will vary depending on the event type selected.
     ***IMPORTANT**: The values of the filters must coincide with the values configured in the VaxALPR On Camera software.*



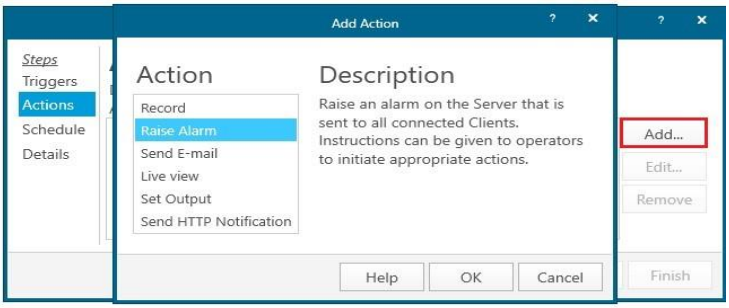
   - Click the **OK** button to save the changes.



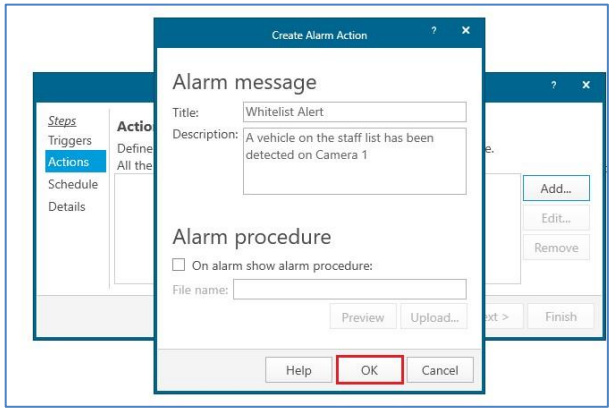
5. Click **Next** to define an action and then Add to define the rule's actions:



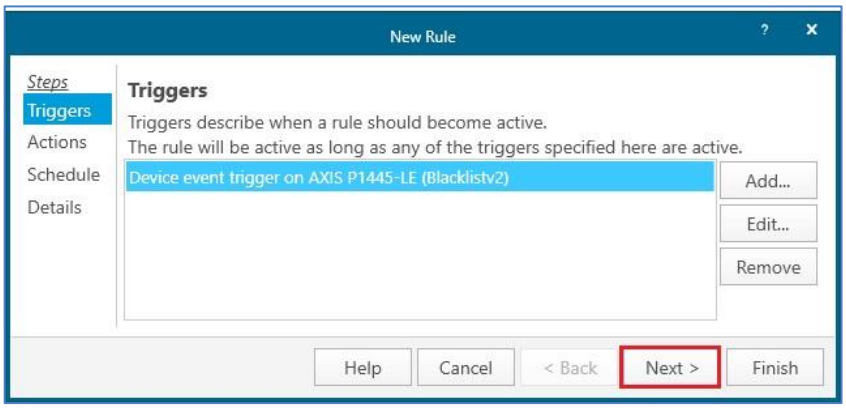
6. Select an action type and click on the **OK** button.
   NOTE: Please refer to the Axis Camera Station manual to know more about the actions that can be taken.
   In this example, we want to raise an alarm when a vehicle in the whitelist is seen.



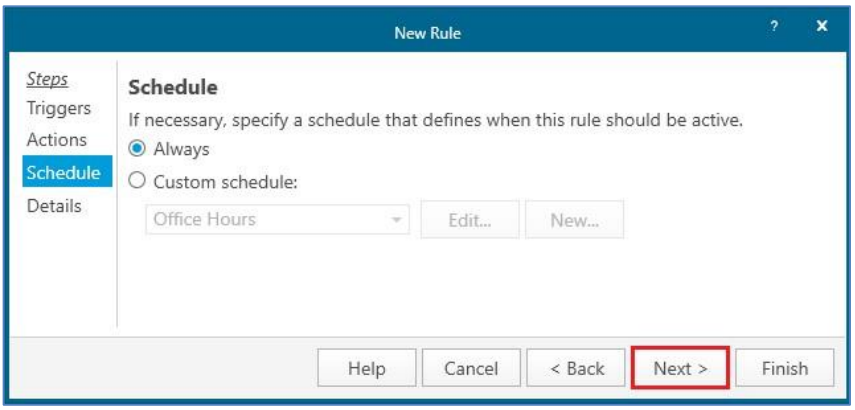
7. Create the alarm message:
   - Enter the **Title** of the alarm message
   - Enter the **Description** of the alarm message
   - Click **OK** to save the changes



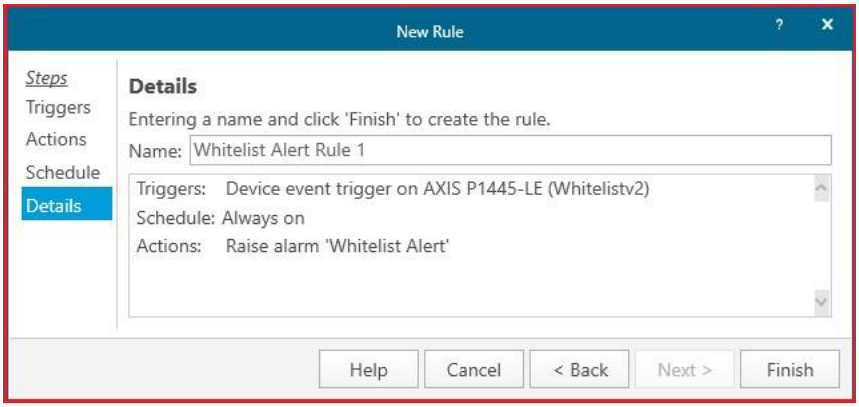
8. Add any additional triggers as required and Click **Next**:



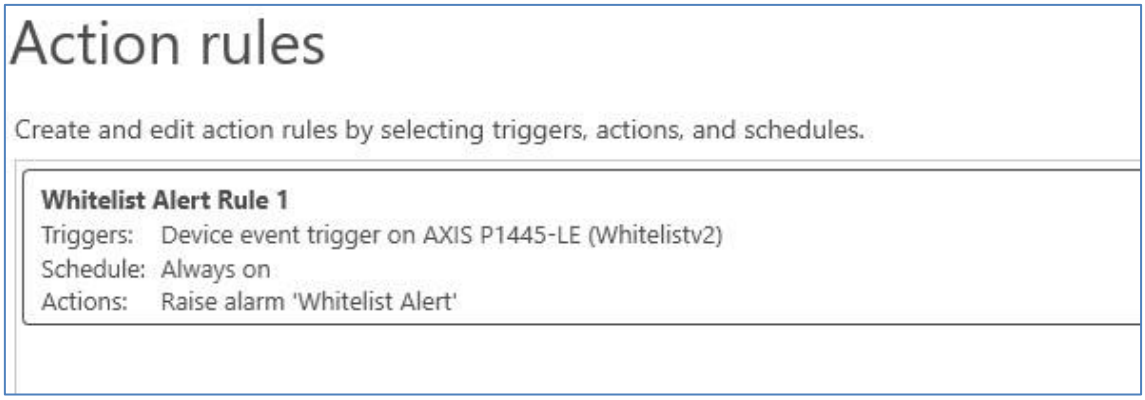
9. Specify when the rule will be active by defining a schedule - then click **Next** button:



10. Enter a name for the new rule and click **Finish**.



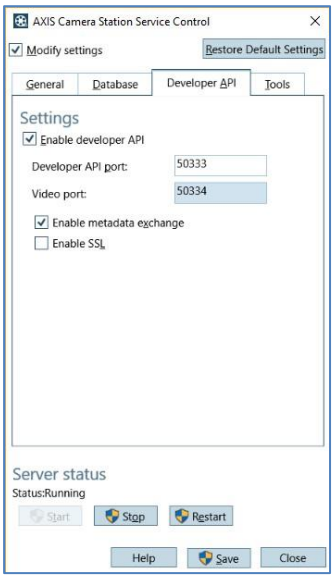
The rule will appear in the Camera Station list of rules.



7.3 Enable the developer API on the Axis Camera Station

To enable the bookmark integration in Axis Camera Station it is necessary to enable the developer API on the Axis Camera Station Service Control.

To open the Axis Camera Station Service Control window, right click on the Axis Camera Station Service tray icon and select "**Open Axis Camera Station Service Control**"

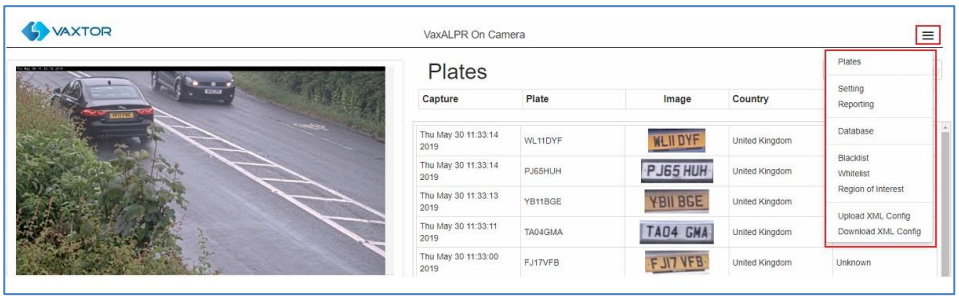


1. Select "**Modify settings**"
2. On the Developer API Tab select "**Enable developer API**"
3. Click on the "**Save**" button. This will restart the service.

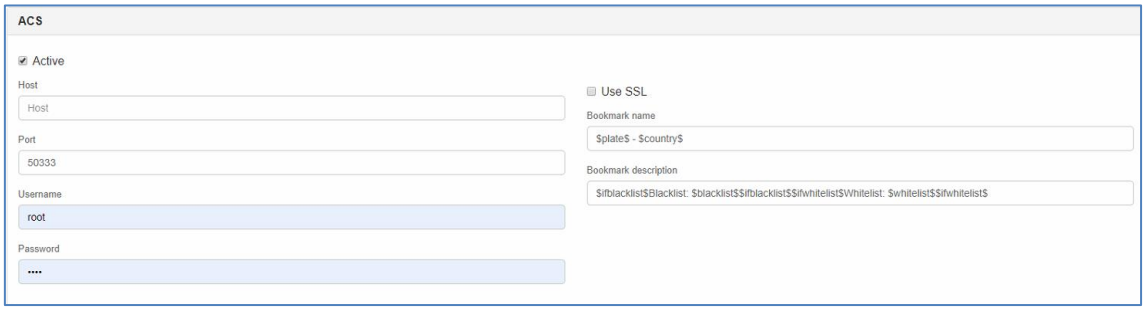
7.4 Configure the Axis Camera Station reporting option

To configure the ACS reporting option in the VaxALPR On Camera software:

1. On the Axis Camera's internal webpage, click on the blue Open button to open a new window with the VaxALPR On Camera main interface.
2. The icon in the top right corner reveals the options:



3. Click on reporting and select **ACS** from the list, - tick Active to open the interface:



4. In the Host box enter the IP address of the ACS server
5. Enter the port number selected as "Axis Camera Station Service Control" – default 50333
6. Enter the username and password for the ACS user.
   (This is a Windows User name and password)
7. Make any changes required to Bookmark name and Bookmark Description fields.
8.

NOTE: You can use dynamic text replacement to match the current plate's information:

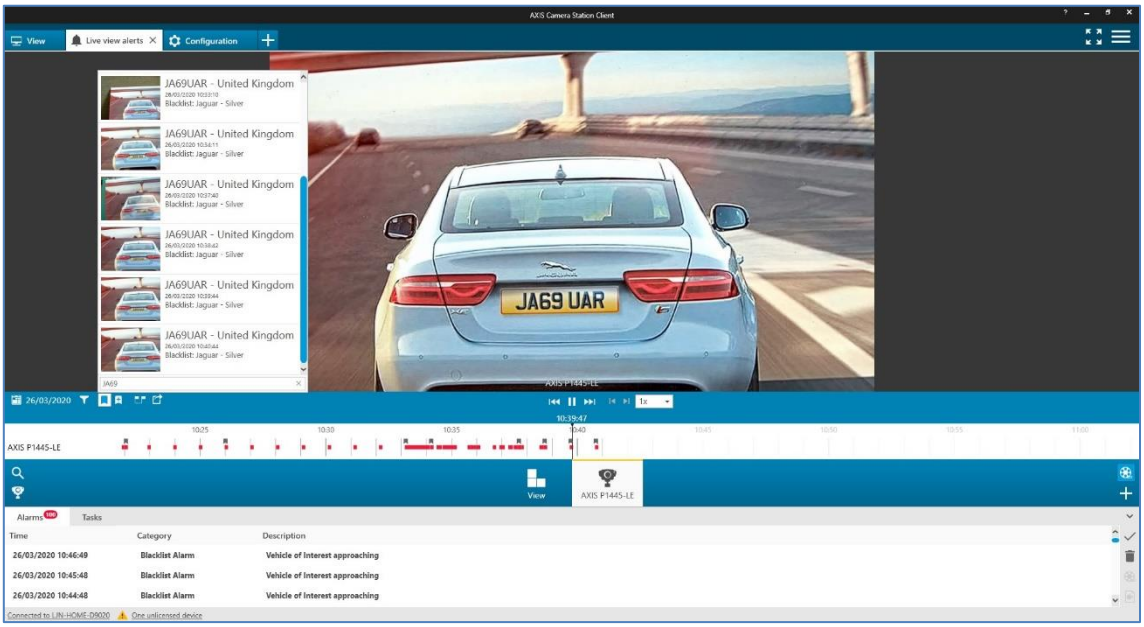
- **$image$**: Full JPEG image encoded in base64.
- **$jpegsize$:** JPEG size in bytes.
- **$date$**: Timestamp in ISO8601 format
- **$plate$**: Plate number
- **tag**: Unique hash for this plate number. Same plate number will always give the same tag. Format based on UTMC algorithm.
- **$plateutf8$**: Plate number in utf8 format.
- **$country$**: Full country of origin name.
- **$countrycode$**: 3 letter country code.
- **$state$**: Plate State for USA.
- **$category$**: Plate category for countries that support it.
- **$blacklist$**: Description on the blacklist linked to the plate number.
- **$whitelist$**: Description on the whitelist linked to the plate number.

- **$ifblacklist$ .... $ifblacklist$**: If the plate is on the blacklist, the text in the 'if clause' will be displayed.
- **$ifwhitelist$ .... $ifwhitelist$**: If the plate is on the whitelist, the text in the 'if clause' will be displayed.
- **$ifnolist$...$ifnolist$:** If the plate in not on a list, the test in the 'if clause' will be displayed.
- **$confidence$**: Global confidence (0-100).
- **$charheight$**: Average charheight (pixels).
- **$processingtime$**: Processing time in milliseconds.
- **$left$**: Left coordinate for the plate on the image (pixels).
- **top**: Top coordinate for the plate on the image (pixels).
- **$right$**: Right coordinate for the plate on the image (pixels).
- **$bottom$**: Bottom coordinate for the plate on the image (pixels).
- **$absoluteleft$**: Plate left position based on the total image width (0-1).
- **$absolutetop$**: Plate top position based on the total image height (0-1).
- **$absoluteright$**: Plate right position based on the total image width (0-1).
- **$absolutebottom$**: Plate bottom position based on the total image height (0-1).
- **$width$**: OCR image width.
- **$height$**: OCR image height.
- **ip**: Camera IP address.
- **$roiid$**: Roi ID where the plate number is found.
- **$speed$**: Vehicle speed (Km/h).
- **$multiplate$**: Amount of times that the plate has been read before reporting.
- **$signaled$**: True if the read has been done due to a trigger.
- **id**: Database ID for this read.
- **$direction$**: Enumerate with the vehicle direction (0: Unknown, 1: Towards, 2: Away, 3: Stopped)
- **$directionstr$**: String with the vehicle direction.
- **$safedate$**: Date in format %Y%m%d_%H%M%S in the camera time zone (Useful for filenames).
- **$localdate$**: Date in format %d/%m/%Y in the camera time zone
- **$localtime$**: Date in format %H:%M:%S in the camera time zone.
- **$imageid$**: Signal ID in case of a trigger read.
- **$plateimage$**: Plate crop JPEG image encoded in base64.
- **$platejpegsize$**: JPEG size in bytes.
- **$overviewimage$**: Overview JPEG image encoded in base64.
- **$overviewjpegsize$**: JPEG size in bytes.
- **$epoch$**: Unix epoch (seconds).
- **$utcdate$**: Will report the date at ISO8601 format but always in UTC. (2020-12-31T16:11:30.000Z)
- **etx**: End transmission character (03)
- **stx**: Start transmission character (02)

If the bookmark name after the dynamic replacement is an empty string then the bookmark will not be added.

9. Scroll down and save your changes by clicking on the Submit Reporting button

Once the system is configured you can see the results of the LPR in the bookmark window inside the Axis Camera Station Client. Use the bookmark Tab and enter plate or partial plate in the search text.



Please refer to the Axis Camera Station manual for further details on bookmarks management.

7.5 Related Documents

For more information about installation, setup and configuration of the ACS, we recommend you refer to the following guides:

- Axis Camera Station:
  https://www.axis.com/en-gb/products/axis-camera-station

Vaxtor VaxALPR On Camera Installation and Configuration manuals are available from the Vaxtor Website:

https://www.vaxtor.com/vaxalpr-on-camera/

Ends.