

VCA Documentation

v1.3.5r3



Chapter 1

Introduction

This is the user manual for the VCAcore video analytics framework. This manual describes how to set up and configure the video analytics to detect events of interest while minimising false alerts.

VCAcore is the video analytics framework developed by VCA Technology and is available on a number of platforms:

- **VCAbridge**, an embedded hardware solution.
- **VCAserver**, an application service for Windows and Linux.

The functionality and UI is designed to be consistent across these platforms, any specific differences will be highlighted where necessary throughout this manual.

The menu on the left-hand-side provides shortcuts to the major topic areas. Alternatively, see the [Getting Started](#) topic for the essentials necessary to get started rapidly.

Chapter 2

Getting Started

This user guide documents each topic in detail, and each topic is accessible via the menu. However, to get started quickly, the essential topics are listed below.

2.1 Fundamentals

- Install or set up the platform on which VCAcore will run.
- Learn how to [navigate](#) VCAcore's interface.
- If running VCAcore on the VCAbridge platform, configure the network and time settings by using the [System Settings](#) page.
- Ensure that VCAcore is licensed for your required functionality by checking the [Activation](#) page.
- Create a [video source](#).
- Create some [zones](#) and [detection rules](#). [Calibrate](#) the channel if necessary.
- Create an [action](#) to send alerts to a third-party system.

2.2 User Credentials

Note that the default username and password for the VCAcore platform are:

- **Username:** admin
- **Password:** admin

2.3 Advanced Topics

Once the basic settings are configured, the following advanced topics may be relevant:

- Set up classifiers by using the [classification](#) function.

- Detect camera tampering or obscuration by using the [tamper detect](#) function.
- Learn how the device detects gross scene changes with the [scene change detection](#) function.
- Customise the annotation that's included in the video display by using the [burnt-in annotation settings](#).
- Adjust advanced settings such as alarm hold off time, detection point and camera shake cancellation by using the [advanced settings](#) page.

Chapter 3

VCAserver

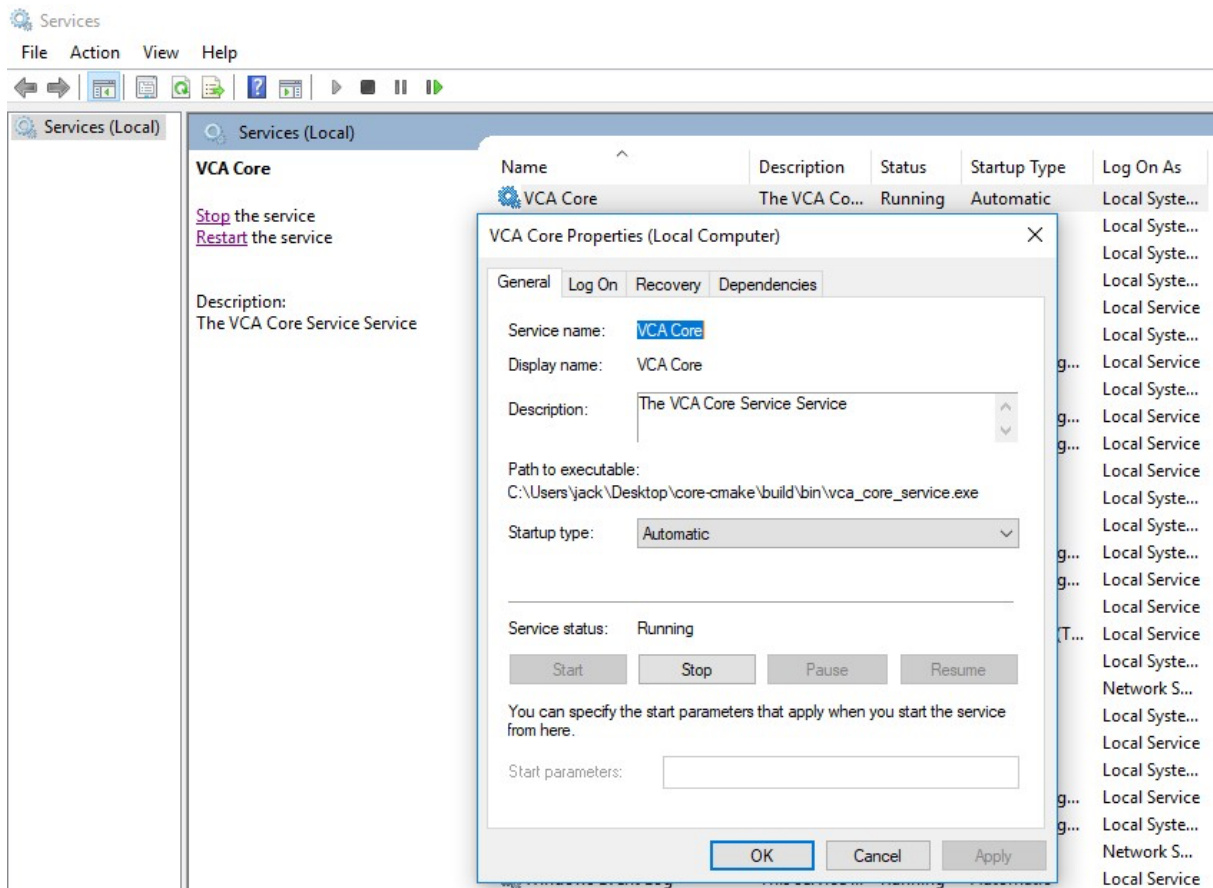
Installation instructions for the various platforms supported by VCAserver vary slightly and are outlined below.

3.1 VCAserver (Windows 10)

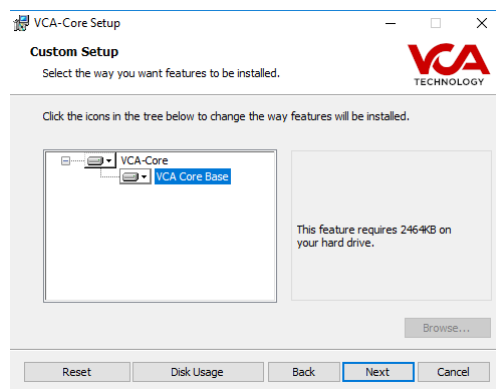
3.1.1 Installation

VCAserver is installed to Windows machines as a service. When installation is complete, the VCAcore service must be started and managed using the Windows service manager.

The configuration file for VCAcore is stored: C:\VCAcore



The VCAserver MSI package installs the base analytics engine, interface and deep learning models.



VCAcore supports GPU acceleration for the deep learning features with the following requirements:

1. A NVIDIA GPU with CUDA Compute Capability 3.5 or higher
2. NVIDIA's CUDA Toolkit 10.0 **must** be installed on the server.

In the absence of a correctly configured or installed GPU, VCAcore will either default to running the deep learning features on the CPU or, algorithms with a strict GPU requirement, will not be available.

Important notes:

1. VCAserver is developed and tested against Windows 10. Although the application may run on other versions of Windows, support is limited to this version only.

3.1.2 Upgrading

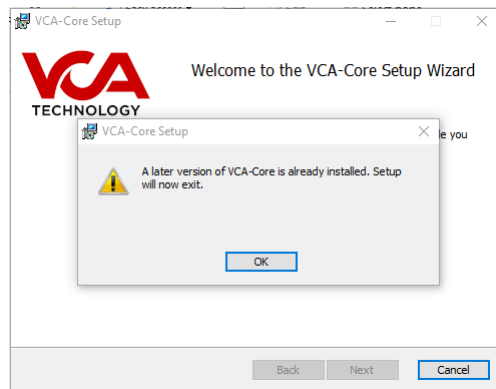
Periodically new versions of VCAserver will be released with new features, please check for software updates on the [VCA Support page](#).

When upgrading VCAserver, first uninstall the existing version and run the new installation package as above.

When updating, the existing configuration file will be persisted and used with the new version. This applies to any version of VCAserver (v1.0.1 or greater)

3.1.3 Downgrading

Downgrading to a previous version of VCAserver is not supported and the installer will raise an error. If a previous version is required, the existing installation and configuration must be deleted before the desired version is installed.



3.2 VCAserver (Ubuntu 18.04)

3.2.1 Installation

VCAserver is installed to as a `systemd` service, as such when installation is complete the VCAcore service must be started and managed using the a `systemd` service manager, e.g. `sudo systemctl start vca-core.service`

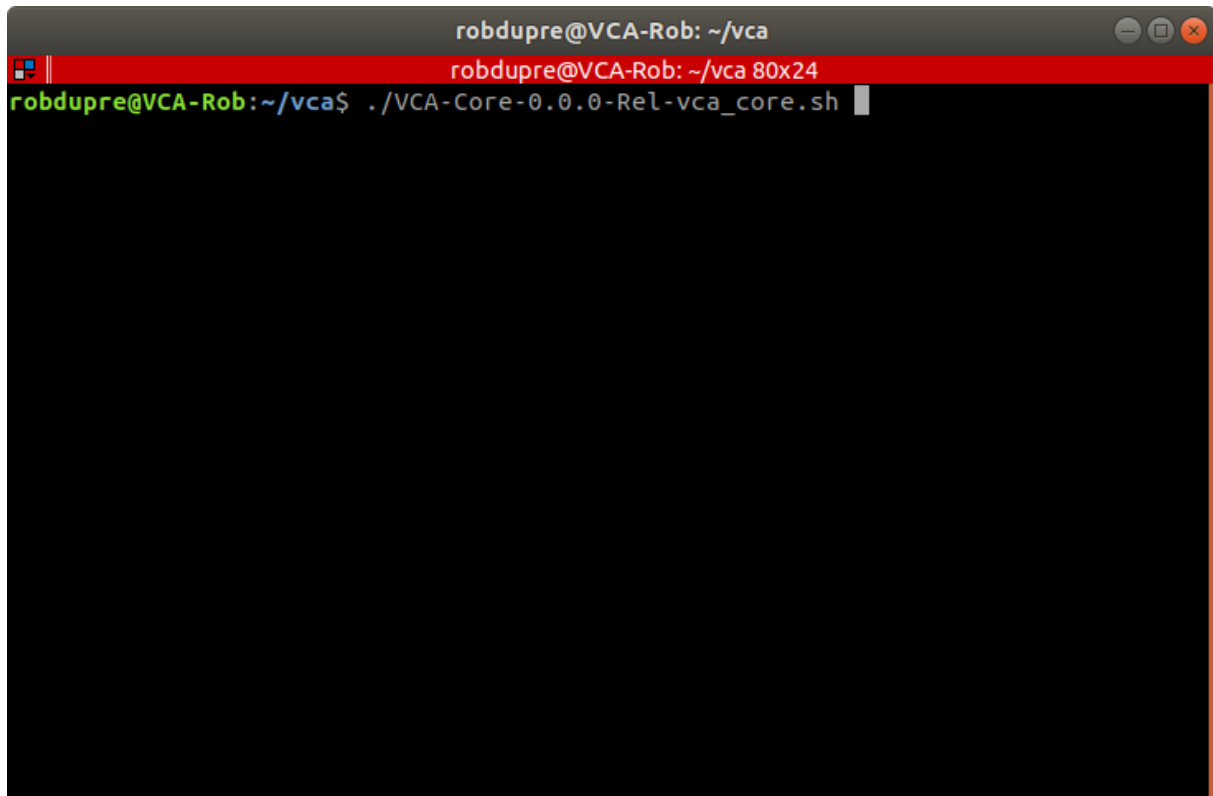
When installed the VCAserver configuration file is stored: `/var/opt/VCA-Core/`

VCAserver on Linux comes as a single archive file containing an `.sh` script, which handles the installation of the VCAcore components.

Once the archive has been downloaded, navigate to folder and unpack the installation scripts from the archive:

- `VCA-Core-**VERSION_NUMBER**-vca_core`

Next run the .sh script: `sudo ./VCA-Core-**VERSION_NUMBER**-vca_core`, (for example e.g. `sudo ./VCA-Core-1.3.0-vca_core.sh`).

A terminal window titled "robdupre@VCA-Rob: ~/vca" with a red header bar. The terminal shows the command `robdupre@VCA-Rob:~/vca$./VCA-Core-0.0.0-Rel-vca_core.sh` being executed. The rest of the terminal is black, indicating the script's output is not visible in this screenshot.

```
robdupre@VCA-Rob: ~/vca
robdupre@VCA-Rob: ~/vca 80x24
robdupre@VCA-Rob:~/vca$ ./VCA-Core-0.0.0-Rel-vca_core.sh
```

The licensing terms and conditions page will be presented. Hit the `Enter` key on the keyboard to navigate to subsequent pages of the T&Cs. Finally, the user will be presented with a choice to accept the license.

VCAserver should be installed as a system service and as such the script must be run with `sudo` rights. The install directory is fixed to `/opt/VCA-Core/`. The installer will also request desired ports for VCAserver's recovery and web servers.


```
robdupre@VCA-Rob: ~/vca
robdupre@VCA-Rob: ~/vca 80x24
B. "Software" means the computer programs and documentation listed and described
  in The Appendix (Licensed Software) attached to this Agreement, as well as any
  archival copies of such computer programs and documentation permitted by this Ag
  reement.
C. "Install" means placing the Software on a computer's hard disk, CD-ROM, flash
  memory or other secondary storage device.

Do you accept the license? [yN]:
y

Install as system service (requires root permissions) [yN]:
y
The archive will be extracted to: /opt/VCA-Core

Using target directory: /opt/VCA-Core
Extracting, please wait...

Unpacking finished successfully

Enter VCACore web server port, or leave blank for default (8080):

Enter VCACore recovery server port, or leave blank for default (9090):
```

VCACore supports GPU acceleration for the deep learning features with the following requirements:

1. A NVIDIA GPU with CUDA Compute Capability 3.5 or higher
2. Current NVIDIA graphics drivers, this can be checked by ensuring `nvidia-smi` runs and the output correlates with your installed GPU.
3. NVIDIA's CUDA Toolkit 10.0 **must** be installed on the server. This can be checked with `nvcc -V`.

In the absence of a correctly configured or installed GPU, VCACore will either default to running the deep learning features on the CPU or, algorithms with a strict GPU requirement, will not be available.

```

robdupre@rob-desktop: ~
robdupre@rob-desktop: ~ 80x24
robdupre@rob-desktop:~$ nvidia-smi
Fri Apr 5 15:35:07 2019
+-----+
| NVIDIA-SMI 390.87              Driver Version: 390.87          |
+-----+-----+
| GPU  Name            Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf    Pwr:Usage/Cap|      Memory-Usage | GPU-Util  Compute M. |
+-----+-----+
| 0   GeForce GTX 750 Ti  Off      | 00000000:01:00.0 On  |          N/A         |
| 35%   42C   P8      2W / 38W | 720MiB / 1999MiB |    58%    Default   |
+-----+-----+

Processes:
+-----+-----+-----+-----+-----+
| GPU   PID    Type   Process name                      | GPU Memory Usage |
+-----+-----+-----+-----+-----+
| 0     1722   G     /usr/lib/xorg/Xorg                 | 358MiB           |
| 0     2200   G     compiz                             | 10MiB            |
| 0     2782   G     compiz                             | 158MiB           |
| 0     3933   G     ...uest-channel-token=13833695216301488359 | 154MiB           |
| 0     16965  G     /snap/pycharm-community/123/jre64/bin/java | 2MiB             |
| 0     29635  C     gimp-2.8                          | 29MiB            |
+-----+-----+-----+-----+-----+
robdupre@rob-desktop:~$

```

Important notes:

1. VCAserver is developed and tested against Ubuntu 18.04. Although the application may run on other versions of Ubuntu, support is limited to this version only.

3.2.2 Upgrading

Periodically new versions of VCAserver will be released with new features, please check for software updates at the [VCA Support page](#).

When upgrading VCAserver, first delete the existing version and run the new installation packages as above.

When updating the existing configuration file will be persisted and used with the new version. This applies to any version of VCAserver (v1.0.1 or greater)

3.2.3 Downgrading

Downgrading to a previous version of VCAserver is not supported. If a previous version is required, the existing installation and configuration must be deleted before the desired version is installed.

3.3 VCABridge

VCABridge will always be shipped with a version of VCAcore pre-installed. Check the software running on your platform is fully up to date and upgrade if necessary from the [system settings](#) page.

3.3.1 Upgrading

Periodically new versions of VCAcore will be released with new features, checking for software updates on the [VCA Support page](#).

For VCABridge, upgrade the firmware from the [system settings](#) page.

When updating on any platform, the existing configuration file will be persisted and used with the new version. This applies to any version of VCABridge (v0.4.11 or greater).

3.3.2 System BIOS

It is also recommended that the BIOS of the unit be updated to the most recent version where possible to leverage any additional security and stability improvements provided by the motherboard manufacturer. The BIOS can be accessed by pressing F2 when first booting the VCABridge. Within the interface the model number is provided allowing the appropriate firmware and upgrade instructions to be downloaded from the manufacturer website.

3.3.3 Upgrading VCABridge From 0.3.xx to 1.0.xx

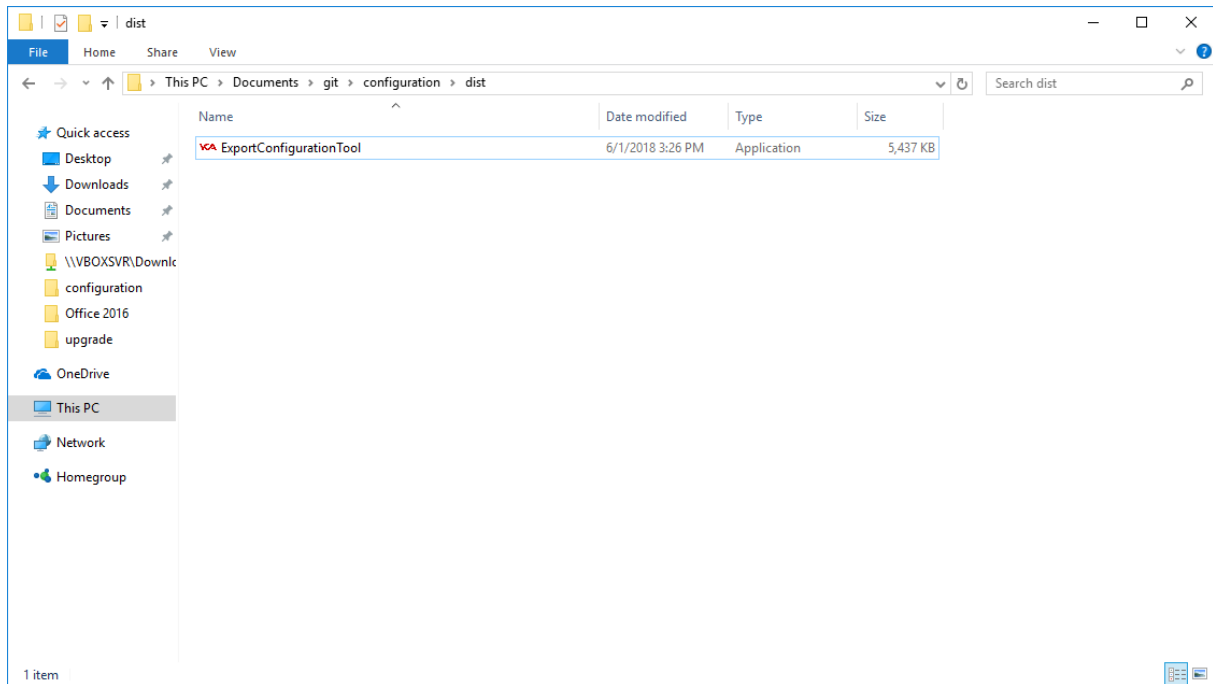
When upgrading the firmware of a VCABridge device running version ****0.3.xx**** an interim upgrade to ****0.4.11**** is required to preserve the configuration file. As such the following steps must be performed:

Important note: The export section needs to be completed **before** upgrading the system.

3.3.3.1 Exporting the old configuration

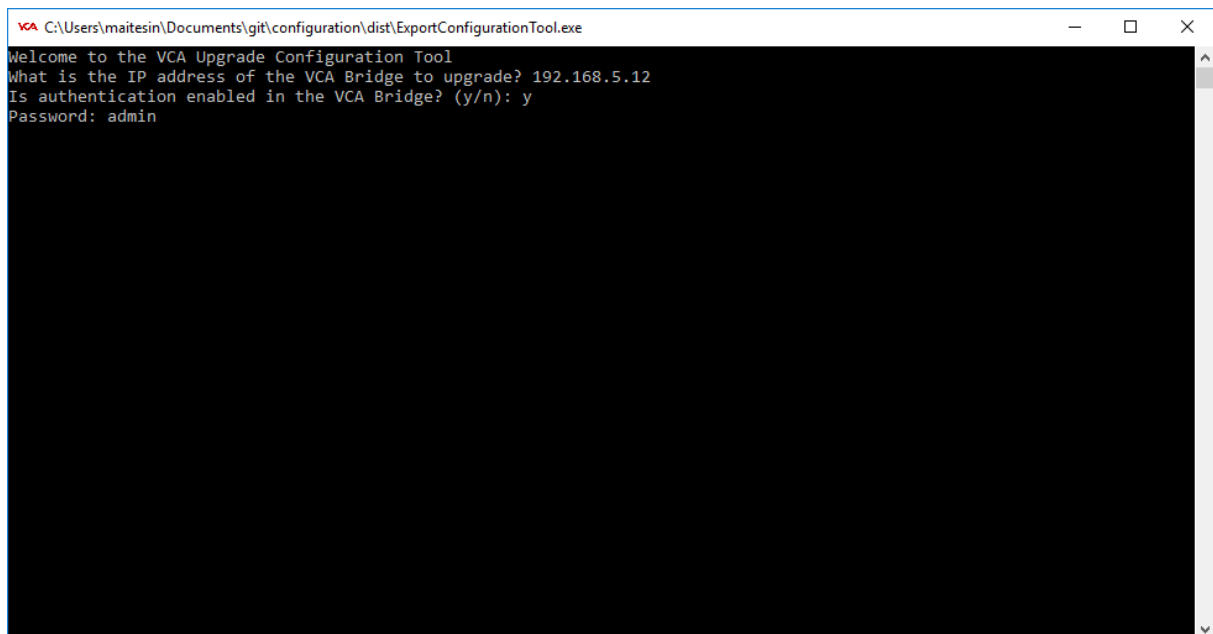
In order to export the current configuration the `ExportConfigurationTool` tool needs be downloaded from our [Support Page](#).

The name of the application is `ExportConfigurationTool` as shown in this image:



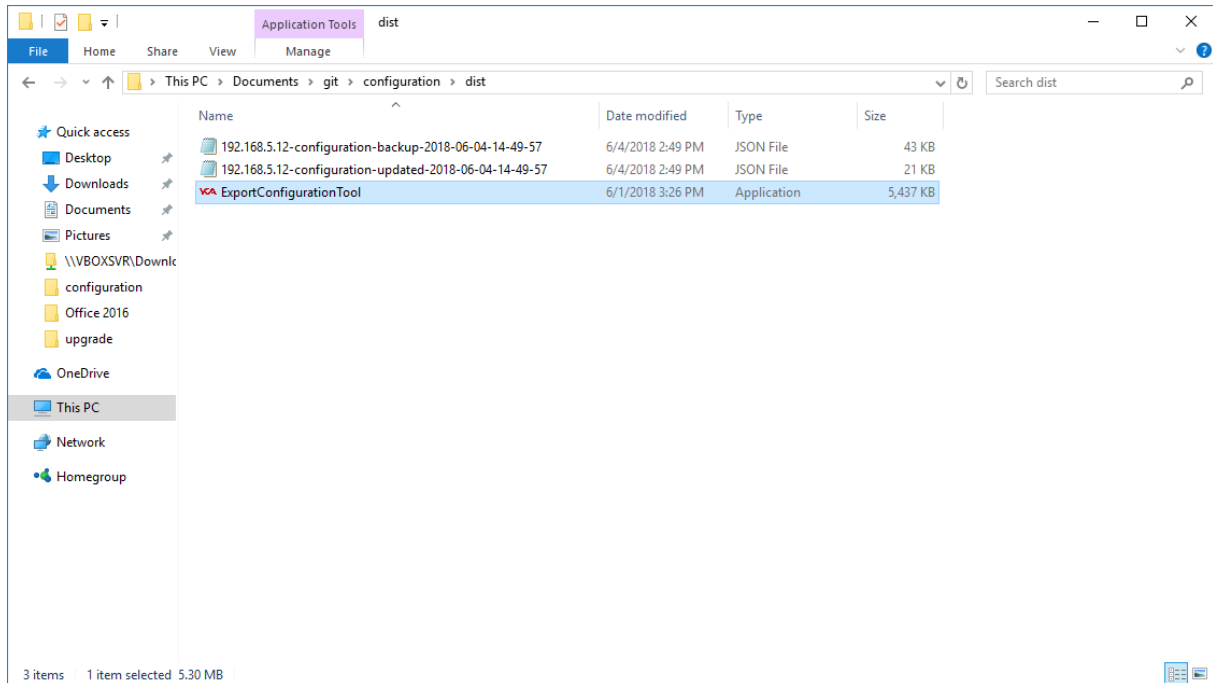
3.3.3.2 Run the ExportConfigurationTool

Run the ExportConfigurationTool and fill in the information requested:



Once the process has successfully completed, two JSON files will be generated in the same folder as the application:

- A backup of the current configuration of the VCA Bridge (the one that contains *backup* in the name)
- The upgraded configuration to be used in the import process (the one that contains *updated* in the name).

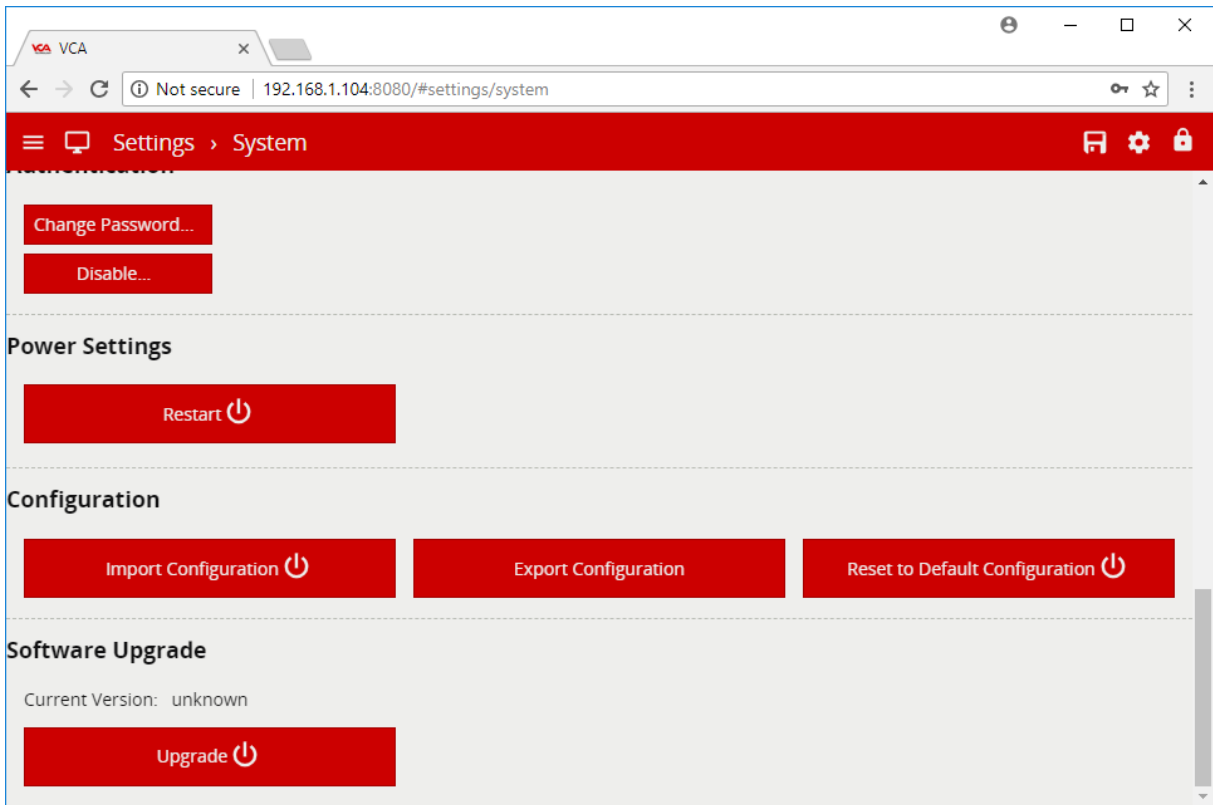


3.3.3.3 Importing the configuration

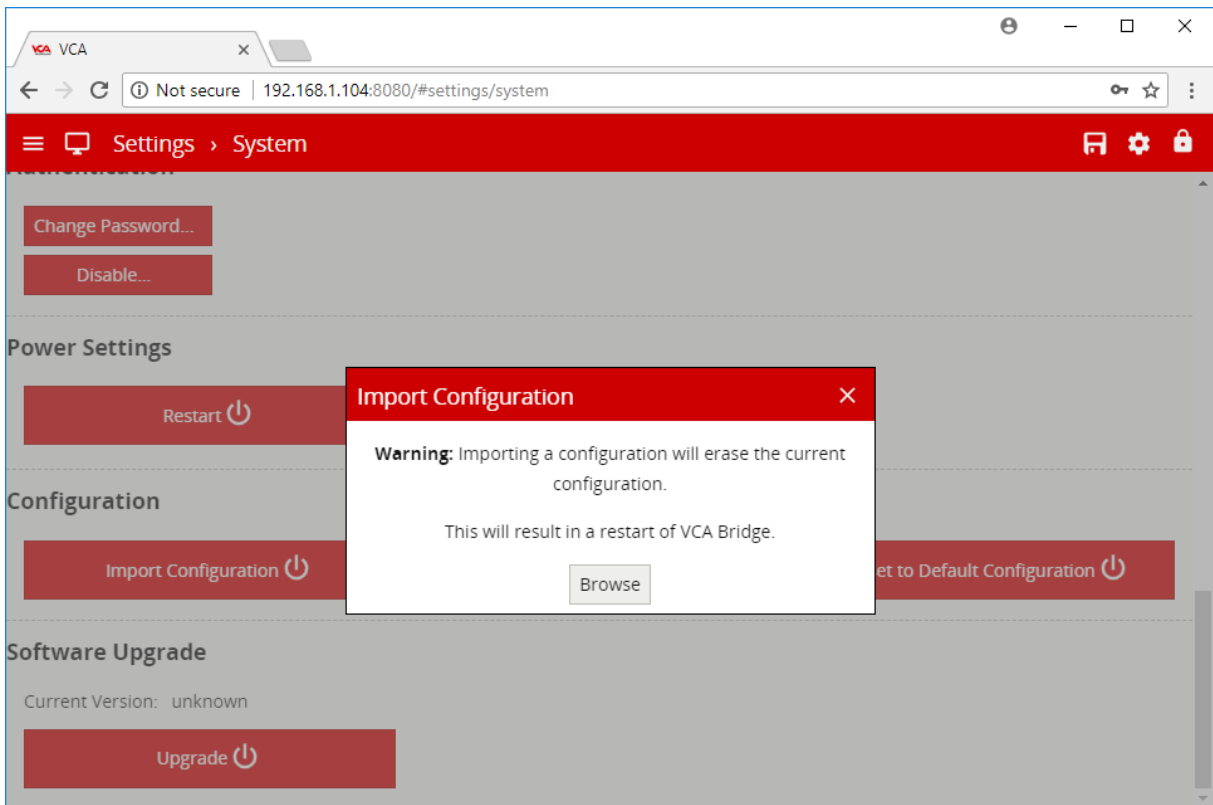
Once the `ExportConfigurationTool` has generated the *updated* version of the JSON file, firmware version 0.4.10 can be **installed** on the VCA Bridge.

3.3.3.4 After installing the new package

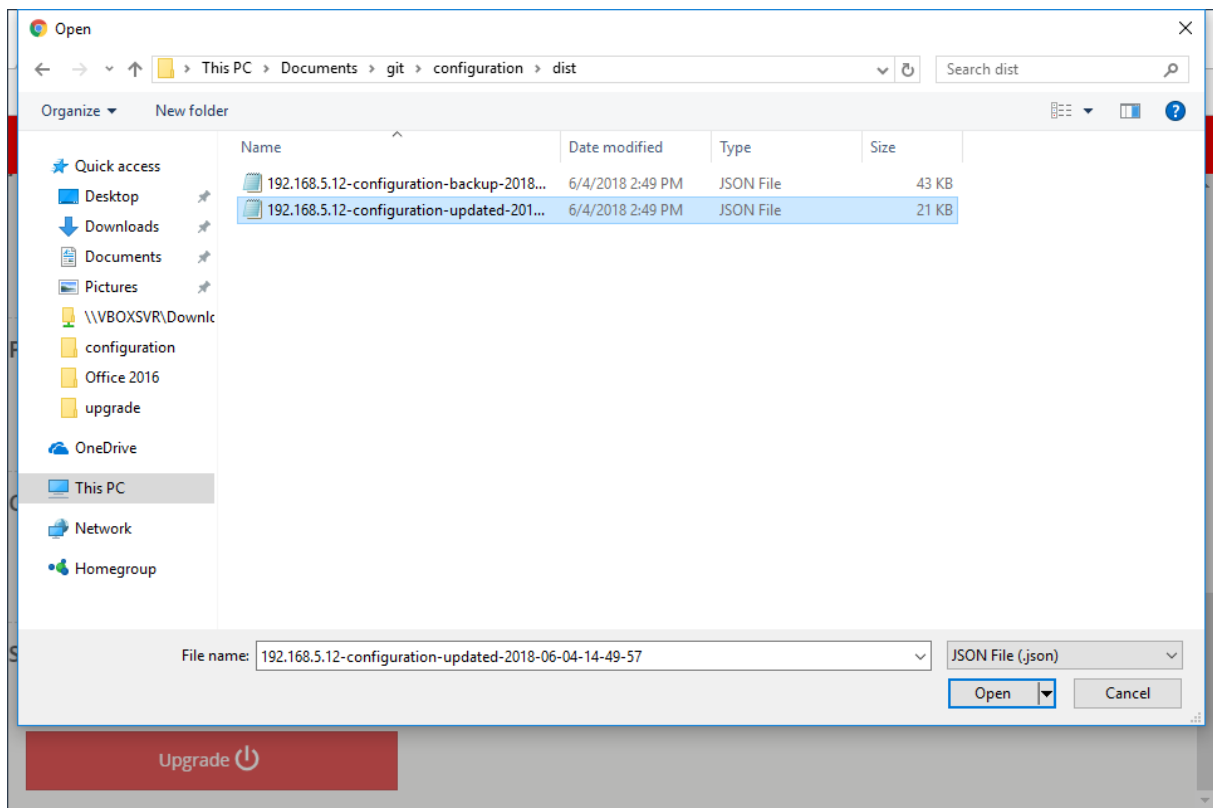
To start the import process go to the **Settings** page in the VCA Bridge. Then find the **Configuration** section and use the **Import Configuration** button to start the import process.



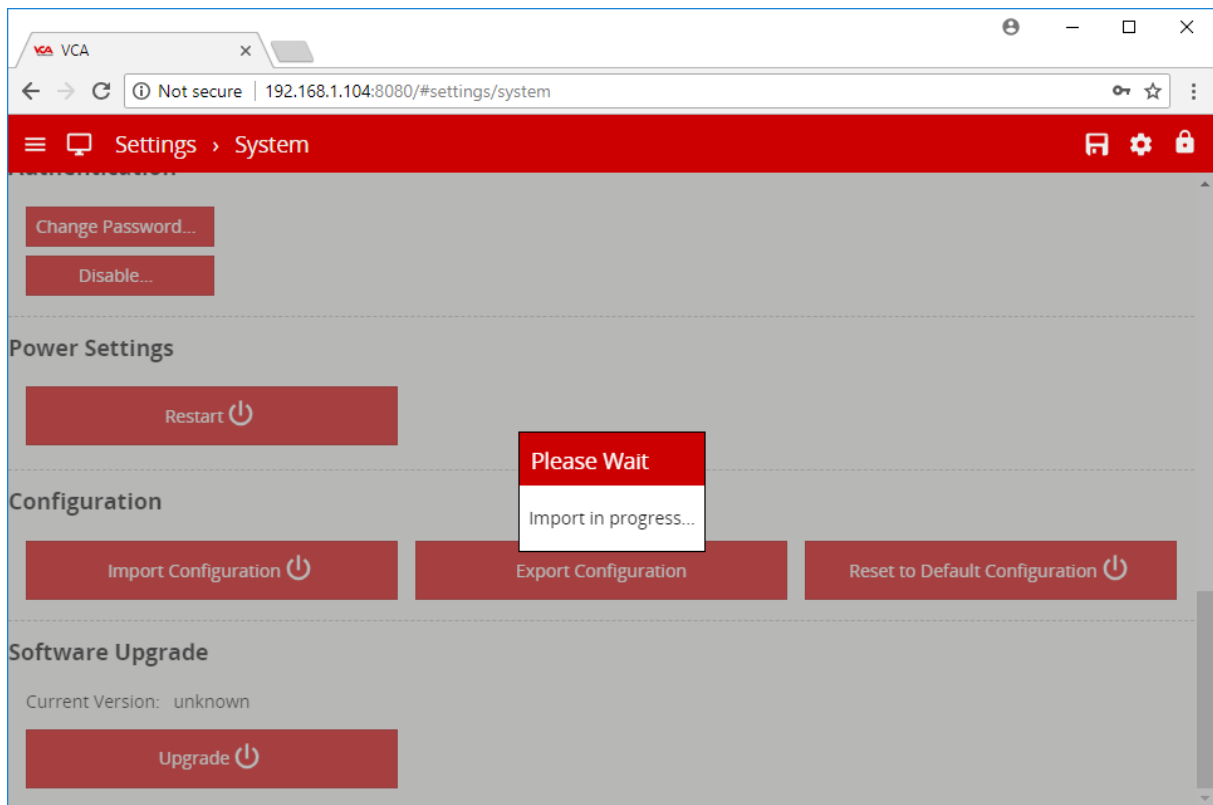
VCA Bridge will show the following dialogue:



Click the *Browse* button and select the *updated* JSON file that was generated by the *ExportConfigurationTool*.



Then, the import process will start. Do not close the window or refresh the page while the following message is shown:



Once this process is complete, version 1.0.x can be installed on the VCA Bridge.

Chapter 4

VCAcore Recovery Service

VCAserver, on both Windows and Ubuntu, and VCAbridge have a recovery service built in. This utility allows control of the VCAserver application via a Web UI to allow simple remote management.

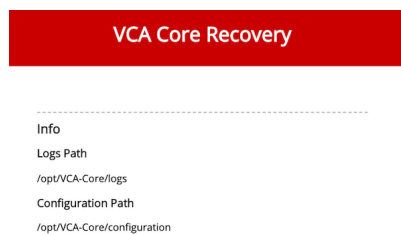
On VCAserver the recovery service is always running and by default is accessible at: `http://[HOST_COMPUTER_IP]` :

On VCAbridge the recovery service is only accessible when VCAcore has stopped working. In such a case the web UI will be accessible on the same port as the UI.

The recovery service provides a range of functionality.

4.1 Info

Details of the logs and configuration for the currently running instance of VCAcore is provided



Additionally, a failure count is provided which will keep track of the number of times the VCAcore application has restarted.

Lastly the Current status of the VCAcore application is also provided.

Failure count 0

Current Status Status: running


4.2 Managing VCAcore Application

The main function of the VCAcore Recovery Service is to manage the VCAcore application which is by default VCAcore is always running. To stop the application, press the Stop button which will allow the recovery service to perform additional management tasks.

Stop 

Once stopped, the VCAcore Recovery Service is able to erase data and settings, resetting the VCAcore application and configuration back to a default state. An option is also available to download the log files.

Lastly to restart the VCAcore application click the Restart button.

Erase Data and Settings 

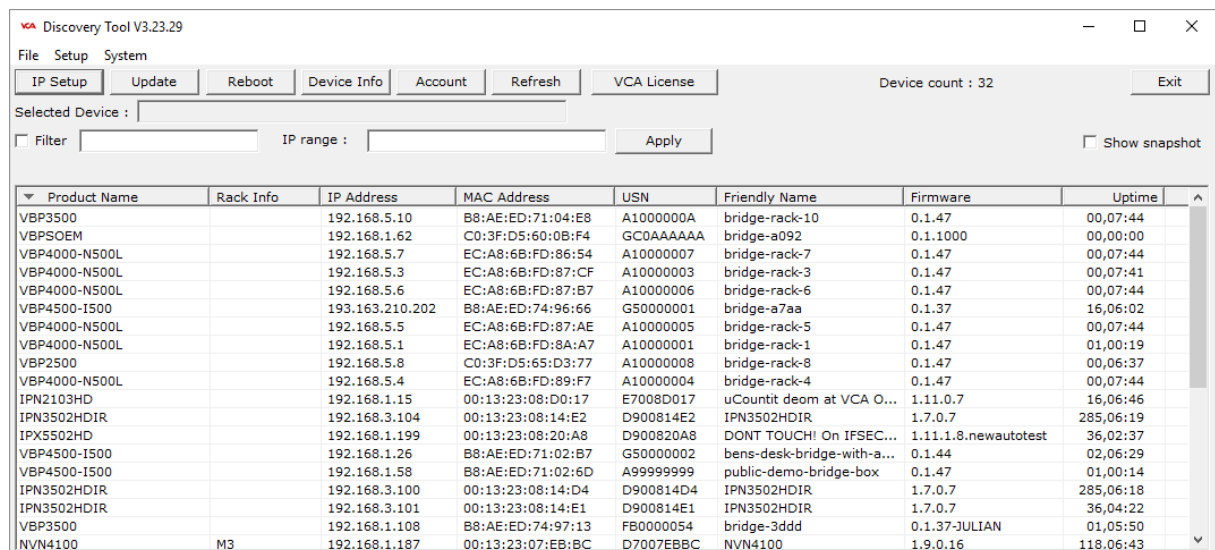
Manually force restart 

Logs 

Chapter 5

Device Discovery

The device discovery tool can be used to locate VCAbridge devices on the network.



Discovery Tool V3.23.29

File Setup System

IP Setup Update Reboot Device Info Account Refresh VCA License Device count : 32 Exit

Selected Device :

Filter IP range : Apply Show snapshot

| Product Name | Rack Info | IP Address | MAC Address | USN | Friendly Name | Firmware | Uptime |
|---------------|-----------|-----------------|-------------------|-----------|----------------------------|----------------------|-----------|
| VBP3500 | | 192.168.5.10 | B8:AE:ED:71:04:E8 | A1000000A | bridge-rack-10 | 0.1.47 | 00,07:44 |
| VBP3500 | | 192.168.1.62 | C0:3F:D5:60:0B:F4 | GC0AAAAAA | bridge-a092 | 0.1.1000 | 00,00:00 |
| VBP4000-N500L | | 192.168.5.7 | EC:A8:6B:FD:86:54 | A10000007 | bridge-rack-7 | 0.1.47 | 00,07:44 |
| VBP4000-N500L | | 192.168.5.3 | EC:A8:6B:FD:87:CF | A10000003 | bridge-rack-3 | 0.1.47 | 00,07:41 |
| VBP4000-N500L | | 192.168.5.6 | EC:A8:6B:FD:87:B7 | A10000006 | bridge-rack-6 | 0.1.47 | 00,07:44 |
| VBP4500-I500 | | 193.163.210.202 | B8:AE:ED:74:96:66 | G50000001 | bridge-a7aa | 0.1.37 | 16,06:02 |
| VBP4000-N500L | | 192.168.5.5 | EC:A8:6B:FD:87:AE | A10000005 | bridge-rack-5 | 0.1.47 | 00,07:44 |
| VBP4000-N500L | | 192.168.5.1 | EC:A8:6B:FD:8A:A7 | A10000001 | bridge-rack-1 | 0.1.47 | 01,00:19 |
| VBP2500 | | 192.168.5.8 | C0:3F:D5:65:D3:77 | A10000008 | bridge-rack-8 | 0.1.47 | 00,06:37 |
| VBP4000-N500L | | 192.168.5.4 | EC:A8:6B:FD:89:F7 | A10000004 | bridge-rack-4 | 0.1.47 | 00,07:44 |
| IPN2103HD | | 192.168.1.15 | 00:13:23:08:D0:17 | E7008D017 | uCountit deom at VCA O... | 1.11.0.7 | 16,06:46 |
| IPN3502HDIR | | 192.168.3.104 | 00:13:23:08:14:E2 | D900814E2 | IPN3502HDIR | 1.7.0.7 | 285,06:19 |
| IPX5502HD | | 192.168.1.199 | 00:13:23:08:20:A8 | D900820A8 | DONT TOUCH! On IFSEC... | 1.11.1.8.newautotest | 36,02:37 |
| VBP4500-I500 | | 192.168.1.26 | B8:AE:ED:71:02:B7 | G50000002 | bens-desk-bridge-with-a... | 0.1.44 | 02,06:29 |
| VBP4500-I500 | | 192.168.1.58 | B8:AE:ED:71:02:6D | A99999999 | public-demo-bridge-box | 0.1.47 | 01,00:14 |
| IPN3502HDIR | | 192.168.3.100 | 00:13:23:08:14:D4 | D900814D4 | IPN3502HDIR | 1.7.0.7 | 285,06:18 |
| IPN3502HDIR | | 192.168.3.101 | 00:13:23:08:14:E1 | D900814E1 | IPN3502HDIR | 1.7.0.7 | 36,04:22 |
| VBP3500 | | 192.168.1.108 | B8:AE:ED:74:97:13 | FB0000054 | bridge-3ddd | 0.1.37-JULIAN | 01,05:50 |
| NVN4100 | M3 | 192.168.1.187 | 00:13:23:07:EB:BC | D7007EBBC | NVN4100 | 1.9.0.16 | 118.06:43 |

Locate the VCAbridge device on the network and select the corresponding entry in the list in the discovery tool. A number of options can then be performed by clicking the appropriate button:

- **IP Setup:** Set the device IP address and host name.
- **Update:** Update the device firmware (not currently supported by VCAbridge devices).
- **Reboot:** Reboot the device.
- **Device Info:** Display all additional device information.
- **Refresh:** Refresh the list of devices

The discovery tool is available from the [VCA website](#)

5.1 Next Steps

Learn more about [Navigation](#) or go back to the [Getting Started](#) guide.

Chapter 6

Navigation








This topic provides a general overview of the VCAcore configuration user interface elements and controls.

6.1 Navigation Bar


The VCA user interface features a persistent navigation bar displayed at the top of the window.

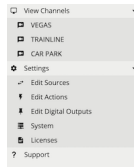



There are a number of elements in this navigation bar, each is described below:

- : The menu icon. Click the menu icon to access the [Side Menu](#) for convenient navigation through the application.
- : The view channels icon. Click the icon to access the [View Channels](#) page.
- : The configuration state icon. Indicates the current state of synchronisation of configuration between the user interface and the actual device. Can be one of two states:
 - : All configuration changes have been successfully synchronised between web interface and the device.
 - : The configuration is currently being synchronised between the web interface and the device.
- : The settings icon. Click to access the [Settings Page](#).
- : The arm/disarm icon. Click to change the [Arm/Disarm State](#) of the device.

6.2 Side Menu

Clicking the  icon displays the side navigation menu:

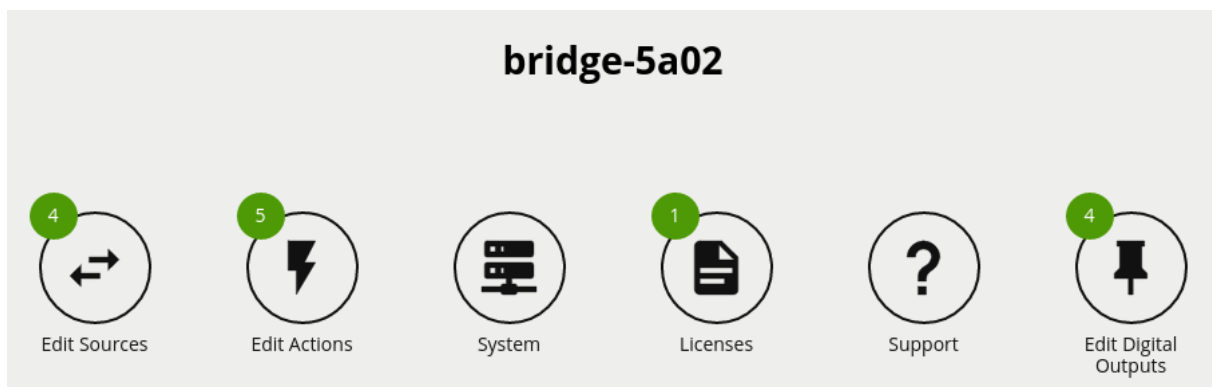


Every page in the VCA user interface is accessible through the side menu. The  icon next to a menu item indicates that the item has sub-items and can be expanded.

Items in the side menu are automatically expanded to reflect the current location within the web application.

6.3 Settings Page

The settings page displays a number of links to various configuration pages:



- **Edit Sources:** Go to the [Sources](#) configuration page.
- **Edit Actions:** Go to the [Actions](#) configuration page.
- **System** Go to the [System Settings](#) page.
- **Licenses:** Go to the [Activation](#) page to add or remove VCA
- **Support:** Go to the [Support](#) page.
- **Edit Digital Outputs** Go to the [Digital Output Device Configuration](#) page.

Chapter 7

Activation

To create sources and take advantage of the VCAcore analytics a licence is required.

In many cases VCAcore on the VCAbridge platform is pre-activated in the factory and further activation is only necessary to enable additional functionality. For VCAserver, an **activation code**, linked to your hardware configuration, will be provided by the reseller.


Additional features can be activated by applying a new **activation code** to the device. Each license is only valid for a specific device and each device is uniquely identified by a **hardware code**.

To manage activation and hardware codes, navigate to the license settings page:














Hardware Code: 907C1DF8004810A3DE5C11159A00FF7B08B7DB6A1130983917A0D937FFB06965






Activation Code:

[Add New License +](#)

Name: 

Number of Channels:

- **Hardware Code:** The unique hardware code for this device. Needed to generate an activation code.
- **Activation Code:** Enter an activation code to enable additional functionality or channels.
- The list of installed licenses and features are displayed underneath.

7.1 Steps to Activate Additional Functionality

- Copy the hardware code and send it to the hardware reseller.

- The reseller sends an activation code by return.
- Apply the activation code to the device and verify the required features are activated.

7.2 More Information


For more information on the complete range of additional features available, please visit [VCA Technology](#)


Chapter 8

Sources

Sources are user configured inputs to the VCAcore system, which include video sources and non-video sources (e.g. digital inputs). The Edit Sources page allows users to add/remove sources and configure existing sources.

Video Sources


Name: < 

Name: < 

[Add Video Source +](#)

Licenses used:
Bridge 16ch - 2 / 16

Other Sources

Name: X < 

[Add Other Source +](#)

Common Properties:

- **Type:** The type of the source, e.g. File, RTSP, Interval etc.
- **Name:** The user configured name for the source.
- **License:** Drop down list of available licence types.

8.1 Video Sources

Video sources are automatically linked with a **channel** when added. The number of video sources which can be added to the system is dependant on the user's **license**. A list of the currently available license types (e.g. Bridge) and the number of those licenses used is provided (e.g. 2 / 16).

Licence selection allows for a specific licence type to be associated with a channel. Licences can be changed on a video source at any time however, once a channel is configured with rules and functions linked to a particular licence type, changing the licence type for that channel is not advised.

8.1.1 File

File sources stream video from a local sample file embedded within the VCAcore firmware.




| | | | |
|----------|----------------|-------|---|
| Name: | My File Source | ▼ |  |
| Type: | File | ----- | |
| File: | las-vegas.mp4 | ▼ | |
| License: | Bridge 16ch | ▼ | |

Properties:

- **File:** The name of the file.

8.1.2 RTSP

RTSP sources stream video from remote RTSP sources such as IP cameras and encoders.

| | | |
|--------------------|--|---|
| Name: | My RTSP Source |   |
| Type: | Rtsp | |
| URI: | Enter URI of source | |
| User ID: | Enter user id/username if authentication is required | |
| Password: | Enter Password if required | |
| Enable Keep-alive: | <input type="checkbox"/> | |
| Use RTP over TCP: | <input type="checkbox"/> | |
| License: | Bridge 16ch |  |

Properties:

- **URI:** The fully qualified URI to the remote RTSP endpoint.
- **User ID:** The username to access the RTSP endpoint (if applicable).
- **Password:** The password to access the RTSP endpoint (if applicable).
- **Enable Keep-alive:** Periodically sends commands to the RTSP source to keep the RTSP connection alive. Most RTSP sources require this option to be enabled. Disable this option only if the RTSP source does not support this behaviour.
- **Use RTP over TCP:** Force the RTP stream to be streamed via TCP (instead of UDP). Wherever possible, RTSP streams should be delivered over TCP and not UDP. This is because UDP transport is not robust against packet loss and dropped packets cause corrupt video which causes VCAcore to generate false positives.

8.1.3 Supported Video Sources

The range of video sources supported by VCAcore is always growing; the current list of supported codes is given below:

- H.264
- MPEG4

When using an RTSP stream as a source please ensure it is encoded with one of the supported compression formats. Likewise, when using a file as a source please note that VCAcore is compatible with many video file containers (.mp4, .avi etc.) but the video file itself must be encoded with one of the above supported compression formats.

8.2 Other Sources

Various non-video sources are available to the user. Once added, these sources can then be assigned to **Actions**.

8.2.1 Interval

Interval sources can be used to generate events periodically, e.g. a heartbeat to check that the device is still running.



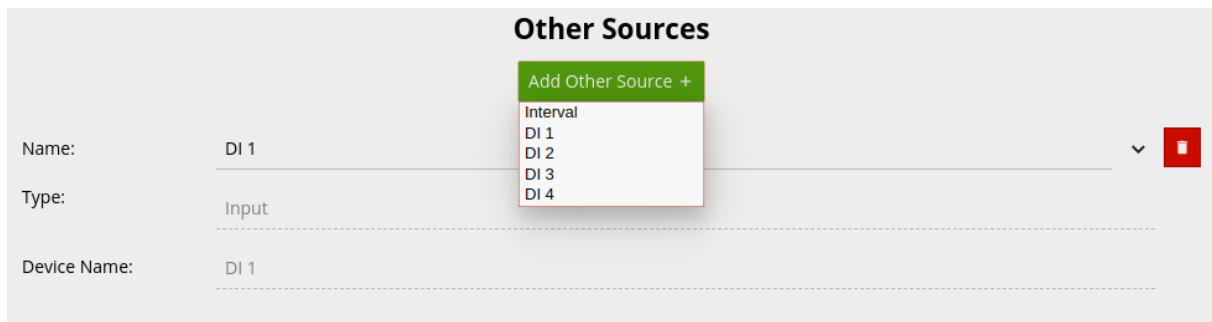
The screenshot shows a configuration form for an Interval source. It has three main fields: 'Name' with the value 'My Interval Source', 'Type' with the value 'Interval', and 'Interval' with the value '1' and the unit 'seconds'. There is a dropdown arrow and a red square icon on the right side of the form.

Properties:

- **Interval:** The interval in seconds between generated events.

8.2.2 Digital Input

If digital input hardware is available, these will show in the list of other sources.



The screenshot shows a configuration form for a Digital Input source. The form has three fields: 'Name' with the value 'DI 1', 'Type' with the value 'Input', and 'Device Name' with the value 'DI 1'. A dropdown menu is open over the 'Name' field, showing options: 'Interval', 'DI 1', 'DI 2', 'DI 3', and 'DI 4'. There is a green button labeled 'Add Other Source +' above the dropdown and a red square icon on the right side of the form.

Properties:

- **Device Name:** The name of the DI device.

8.2.3 Armed

The Armed source generates an event when the system becomes **armed**.

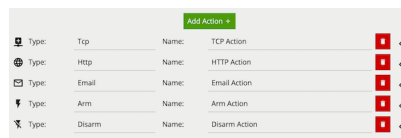
8.2.4 Disarmed

The Disarmed source generates an event when the system becomes **disarmed**. Note that any actions that this source is assigned to must be set to **Always Trigger**, otherwise the action will not be triggered due to the system being disarmed.

Chapter 9

Actions

Actions are user configured outputs which can be triggered by a variety of events that occur within VCAcore.

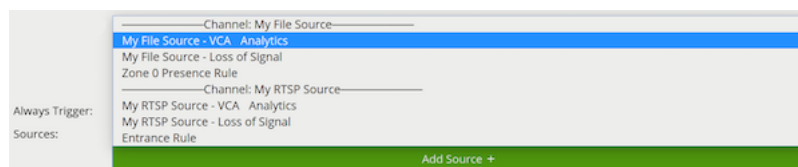


Common Properties:

- **Type:** The type of the action, e.g. TCP, Email, Digital Output etc.
- **Name:** The user configured name for the action.
- **Always Trigger:** If this setting is checked, the action will trigger even if the system is **disarmed**.

9.1 Event Sources


Any action can have multiple event sources assigned to it. Once an event source is assigned to an action, any event of that type will trigger the action. Available event sources are grouped according to **Video Sources** and include either **VCA Analytics**, customer defined **logical rules** (with the 'Can Trigger Action' box checked) or **loss of signal** events and any configured **Digital Input** or **Interval** sources.



9.2 Action Types

9.2.1 TCP

The TCP action sends data to a remote TCP server when triggered. The format of the body is configurable with a mixture of plain text and **Tokens**, which are substituted with event-specific values at the time an event is generated.



The screenshot shows the configuration interface for a TCP action. At the top, there is a header with a plus icon, 'Type: Tcp', 'Name: TCP Alert', and a red stop icon with a dropdown arrow. Below this, the 'URI:' field is set to '192.168.1.100' and the 'Port:' field is set to '9000'. The 'Body:' field is set to 'Custom' and contains a template string: `start-time: {{time.start.iso8601}} end-time: {{time.end.iso8601}} event-id: {{id}} event-name: {{name}}`. Below the body field, there are two dropdown menus: 'Line endings: Unknown' and 'Select a token to add it to the template string'. At the bottom left, there is an 'Always Trigger:' checkbox which is unchecked, and a 'Sources:' section with a green 'Add Source +' button and a green 'Test' button.

- **URI:** The IP address or hostname of the remote TCP server where the event data should be transmitted.
- **Port:** The port on which the remote TCP server is listening for incoming TCP connections.
- **Body:** The body of the TCP message to transmit. Can be a mixture of plain text and any supported **Tokens**, which will be replaced with event-specific data at the time an event is generated. A default template is automatically added when a TCP output is created.

See the **Tokens** topic for full details about the token system and example templates.

9.2.2 Email

The email action sends events in pre- or user-configured formats to remote email servers.

✉ Type: Email
Name: Email Action
✕ ■ ▾

Server:

Port:

Username:

Password:

From:

To:

Cc:

Bcc:

Subject:

Body:

Select a token to add it to the template string ▾

Custom ▾

Event Name: {{name}}
 Event start: {{start.iso8601}}
 Event end: {{end.iso8601}}

Line endings: Unix (LF) ▾

Select a token to add it to the template string ▾

Enable Authentication:

Verify Certificate:

Send Snapshots:

Snapshot Quality: ▾

Interval between snapshots: ms

Number of snapshots before event:

Number of snapshots after event:

Encryption: ▾

Always Trigger:

Sources:

Add Source +

Test

- **Server:** SMTP server address.
- **Port:** SMTP server port.
- **Username:** The username of the email account used to send emails on the SMTP server.
- **Password:** The password of the email account used to send emails on the SMTP server.
- **From:** The email address of the sender.

- **To:** The email address of the recipient.
- **Cc:** Email address/addresses of any carbon-copy recipients.
- **Bcc:** Email address/addresses of any blind carbon-copy recipients.
- **Subject:** The tokenised template of the email subject.
- **Body:** Tokenised template of the email body.
- **Enable Authentication:** Check to enable SMTP authentication.
- **Verify Certificate:** Check to verify the remote SSL certificate.
- **Send Snapshots:** Check to attach annotated snapshots to the email.
- **Snapshot Quality:** Select the quality of the snapshots attached to the email.
- **Interval between snapshots:** Set the snapshot capture rate in 250 milliseconds (ms) increments.
- **Number of Snapshots sent before event:** Set the number of pre-event snapshots to attach to the email.
- **Number of Snapshots sent after event:** Set the number of post-event snapshots to attach to the email.
- **Encryption:** The type of encryption used for SMTP communication. Valid options are None, SSL and STLS.

9.2.3 Http

The HTTP action sends a `text/plain` HTTP request to a remote endpoint when triggered. The URL, HTTP headers and message body are all configurable with a mixture of plain text and **Tokens**, which are substituted with event-specific values at the time an event is generated. Additionally, snapshots from the camera can be sent as a `multipart/form-data` request with the configured snapshots included as `image/jpeg`'s

Type: Http Name: HTTP Action

URI:

Port:

Headers:

Body:

```
Event Name: {{name}}
Event start: {{start.iso8601}}
Event end: {{end.iso8601}}
```

Method:

Enable Authentication:

Username:

Password:

Send Snapshots:

Snapshot Quality:

Interval between snapshots: ms

Number of snapshots before event:

Number of snapshots after event:

Always Trigger:

Sources:

- **URI:** The remote URI to request when executing the HTTP action. As illustrated in the figure, the URI can contain **Tokens**, which will be replaced with event-specific data at the time an event is generated. If specifying user credentials in plain text is undesirable, they can be specified in the Header section encoded as a base 64 string as part of a standard HTTP Authorization header.
- **Port:** The remote server port.

- **Headers:** Specifies any HTTP headers to send in the HTTP request. Examples may include `Authorization` or `Content-Type` headers. Any necessary headers will normally be specified by the remote server API. Each header should be placed on a new line. When the headers are transmitted a CRLF (`\r\n`) is automatically inserted between each header, and between the last header and the message body.
- **Body:** Specifies the body of the HTTP request. Can be a mixture of plain text and any supported **Tokens**, which will be replaced with event-specific data at the time an event is generated. A default template is automatically added when an HTTP output is created.
- **Method:** The HTTP request method (verb). Can be one of `GET`, `POST`, `PUT`, `DELETE`, `HEAD`. This setting will normally be specified by the remote server API.
- **Enable Authentication:** Check to enable authentication (supports both HTTP Basic and HTTP Digest).
- **Username:** The username to use for authentication.
- **Password:** The password to use for authentication.
- **Send Snapshots:** Check to attach annotated snapshots to the HTTP request.
- **Snapshot Quality:** Select the quality of the snapshots attached to the HTTP request.
- **Interval between snapshots:** Set the snapshot capture rate in 250 milliseconds (ms) increments.
- **Number of Snapshots sent before event:** Set the number of pre-event snapshots to attach to the HTTP request.
- **Number of Snapshots sent after event:** Set the number of post-event snapshots to attach to the HTTP request.

See the **Tokens** topic for full details about the token system and example templates.

9.2.4 Digital Output

A digital output is a logical representation of a digital output hardware channel. To configure the properties of a physical digital output channel, such as activation time, refer to the **Digital IO** page.

The screenshot shows a configuration form for a digital output. At the top, there are fields for 'Type' (set to 'Digital Output') and 'Name' (set to 'DO3'). Below these are 'Device' (set to 'DO 3') and 'Always Trigger' (checked with a green checkmark). The 'Sources' section contains a red button labeled 'Gangnam 720 - Analytics' and a green button labeled 'Add Source +'. At the bottom of the form is a green 'Test' button.

- **Device:** The physical digital output channel assigned to the logical digital output.

9.2.5 Arm


The Arm action sets the device state to **armed** when triggered.

9.2.6 Disarm

The Disarm action sets the device state to **disarmed** when triggered.

9.3 Arm/Disarm State

The Arm/Disarm functionality provides a means of disabling/enabling all of the configured actions. For example, users may wish to disable all actions when activity is normal and expected (e.g. during normal working hours) and re-enable the actions at times when activity is not expected.

The Arm/Disarm state can be toggled manually by clicking the  icon in the **Navigation Bar** or by using the Arm or Disarm actions.

Chapter 10

Digital IO

VCAcore supports digital input and output hardware for interfacing with third party systems. Digital inputs can be used as triggers for events in VCAcore, and digital outputs can be triggered by a VCAcore or a system event.

Configuration of the digital inputs and outputs consists of three tasks:

- Configure the physical digital IO channels
- Assign physical digital input channels to logical **Sources**
- Assign physical digital output channels to logical **Actions**

10.1 Digital Output Device Configuration

From the **Settings Page** select **Edit Digital Outputs** to access the digital IO device configuration page.

The screenshot displays a configuration interface for digital output devices. It features three vertically stacked sections, each representing a device. The first two sections are for 'DO 1' and 'DO 2', each with a 'Device Name' field and a right-pointing chevron. The third section is for 'DO 3', with a 'Device Name' field, a 'Default State' dropdown menu (currently showing 'Normally Open'), and a 'Trigger Duration (ms)' input field (set to '3000'). A green 'Test device' button is located at the bottom left of the configuration area.

The digital output device configuration page contains a section for each digital output device. Note that the number of digital output channels available depends on the specific hardware device in use.

10.1.1 Digital Outputs

Digital outputs can be triggered by a range of analytics event sources. Each digital output channel has the following properties:

- **Device Name:** The name of the digital output channel.
- **Default State:** The default state of the digital output when it's not triggered. Can be one of Normally Open or Normally Closed. When configured as Normally Open, the digital output will be open (low) when inactive and closed (high) when activated. When configured as Normally Closed, the behaviour is inverted. Refer to the table for more information.

| Default State | DO Inactive | DO Active |
|-----------------|---------------|---------------|
| Normally Open | Open (Low) | Closed (High) |
| Normally Closed | Closed (High) | Open (Low) |

- **Trigger Duration(ms):** The duration of activation of the digital output in milliseconds. When the digital output is triggered, it will be activated for the specified duration, after which time it will be deactivated. Triggers received while the digital output is already active are ignored.
- **Test Device:** Clicking the button activates the digital output for the specified duration. This is useful to test that external devices are correctly connected to the digital output.

Once the digital output hardware has been configured, digital output hardware channels must be assigned to [Actions](#).

10.2 Digital IO Connections

On a VCAbridge device, a number of built-in digital IO channels are provided. Different models support different numbers of IO channels. Refer to the quick start guide that came with the device for details of the digital IO connector pinout. The quick start guides are also available from the [VCA support portal](#)

10.3 Sources and Actions

In order for digital IO channels to interact with VCAcore and system events, [Sources](#) must be created for digital inputs and [Actions](#) for digital outputs.

10.4 Digital Input Mode

See the [system settings page](#) for more digital input configuration options.

Chapter 11

ONVIF support

VCAcore has inbuilt support for a subset of ONVIF profile S endpoints. To date, these provide the following functions using the ONVIF interface:

- Discovery (Device information, supported services)
- Events (the last 100 actions the device has sent)
- ONVIF User Management (change ONVIF password)

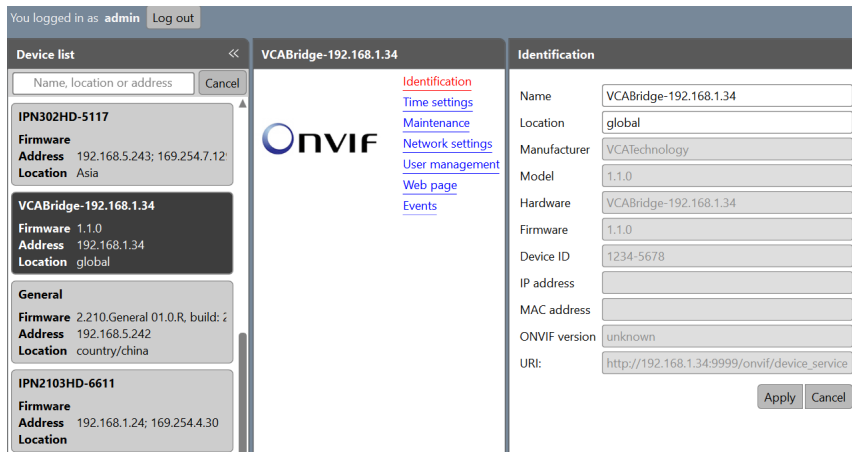
More detail on each ONVIF function is given below, screenshots are provided using the ONVIF Device Manager implementation varies application to application.

Note: ONVIF Device Manager is a third-party, open source windows application available at [ONVIF Device Manager](#)

11.1 Discovery

ONVIF device discovery retrieves information about the ONVIF enabled device including the following data:

- **Name:** Device name comprised of the VCAcore platform and the IP address.
- **Address:** The IP address that the VCAcore platform is currently running on.
- **Location:** Universally set to global.
- **Manufacturer:** VCATechnology
- **Firmware:** Current firmware version of VCAcore.



The above image shows the ONVIF Device Manager's Identification interface with a VCABridge running on 192.168.1.34

11.2 Events

The ONVIF events service allows a third-party application to pull a list of events from the VCAcore platform. When a pull request is made the last 100 events triggered within VCAcore are returned. An event is defined as any logical rule (with **Can Trigger Actions** enabled) or **Other Source** (such as interval or DI) which triggers. Importantly, neither the logical rule nor the Other Source has to be configured with an action to be included within ONVIF event service cache.

The following fields are currently included for each event.

| Property | Description |
|------------|--------------------------------------|
| start_time | The start time of the event |
| end_time | The end time of the event |
| id | The id of the event |
| name | The user-specified name of the event |
| type | The type of the event |
| category | The category of the event |

- The start_time and end_time properties of the events are specified as nanoseconds since the Unix epoch.



The above image shows the ONVIF Device Managers Events interface with a VCABridge running on 192.168.1.34 where the data component of each event is populated with the above properties.

11.3 ONVIF User Management

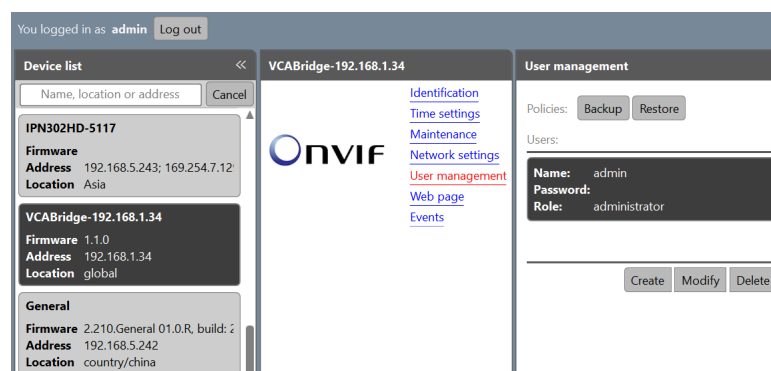
Some ONVIF functions such the events are secured using user credentials.

The default credentials for ONVIF access are:

- **username:** admin
- **password:** admin

Please note that these credentials are separate from the VCAcore platform, changing one has no impact on the other. The ONVIF password can only be changed using the ONVIF user management. The process for this will vary depending on the ONVIF implementation.

Only a single ONVIF user, with username admin is supported within VCAcore.



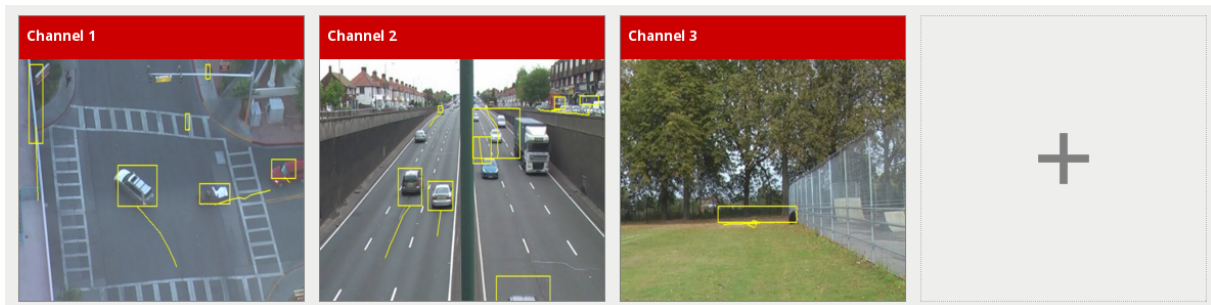
If you require more information on ONVIF profiles please refer to the [ONVIF documentation](#).

Chapter 12

Channels

12.1 View Channels Page

The **View Channels** page displays a preview of each configured channel along with any event messages.




Click a thumbnail to view the channel and configure VCAcore related settings. Click the plus icon to go to the add **video source** page.

12.2 Channel Pages

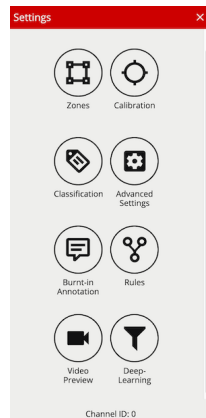
After clicking on a channel, a full view of the channel's video stream is displayed along with any configured **zones**, **counters** and **rules** and the channel settings menu open.



If the settings menu is closed a tab with a  icon is displayed on the right hand side of the page. Click this to reopen the channel settings menu.

12.2.1 Channel Settings Menu

This menu contains various useful links for configuring various aspects of the channel:



- **Zones**
- **Calibration**
- **Classification**
- **Advanced Settings**
- **Burnt-in Annotation**
- **Rules**
- **[Video Preview]**
- **[Deep-Learning]**

Chapter 13


Zones

Zones are the detection areas on which VCAcore **rules** operate. In order to detect a specific behaviour, a zone must be configured to specify the area where a rule applies.



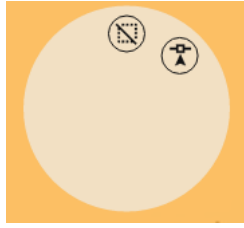
13.1 Adding a Zone

Zones can be added in multiple ways:

- Double-click anywhere on the video display.
- Click the **Create Zone** button in the zone settings menu.
- Right-click or tap-hold to display the context menu and select the add zone icon 

13.2 The Context Menu

Right-clicking or tap-holding (on mobile devices) displays a context menu which contains commands specific to the current context.



The possible actions from the context menu are:

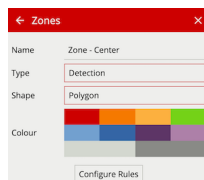
- Adds a new zone.
- Deletes an existing zone.
- Adds a node to a zone.
- Deletes an existing node from a zone.

13.3 Positioning Zones

To change the position of a zone, click and drag the zone to a new position. To change the shape of a zone, drag the nodes to create the required shape. New nodes can be added by double-clicking on the edge of the zone or clicking the add node icon from the context menu.

13.4 Zone Specific Settings


The zone configuration menu contains a range of zone-specific configuration parameters:



- **Name:** The name of the zone, which appears in event notifications.
- **Type:** The type of the zone. Can be one of:
 - **Detection:** A zone which detects tracked objects and to which rules can be applied.
 - **Non-detection:** A zone which specifies an area that should be excluded from VCAcore analysis. Objects are not detected in non-detection zones. Useful for excluding areas of potential nuisance alarms from a scene (e.g. waving trees, flashing lights, etc).
- **Shape:** The shape of the zone. Can be one of:
 - **Polygon:** A polygonal detection area with at least three nodes. Rules apply to the whole area.
 - **Line:** A single- or multi-segment line with at least two nodes. Rules apply to the length of the line.
- **Colour:** The colour of the zone.
- **Configure Rules:** A shortcut button to navigate directly to the **rules** configuration page

13.5 Deleting a Zone

Zones can be deleted in the following ways:

- Select the zone and click the **Delete Zone** button from the zone settings menu.
- Select the zone, display the context menu and select the delete zone icon 

Chapter 14

Rules

VCAcore's rules are used to detect specific events in a video stream. There are three rule types which can be utilised to detect events and trigger actions:

- **Basic Inputs / Rule:** An algorithm that will trigger when a particular behaviour or event has been observed e.g. Presence. Basic inputs can be used to trigger an action.
- **Filters:** A filter that will trigger if the object which has triggered the input rule / logical rule meets the filter requirements e.g. is moving at a specific speed. Filters can be used to trigger an action.
- **Conditional Rule:** A logical link between one or more inputs to allow the detection of more complex behaviours e.g. AND. Conditional rules can be used to trigger an action.

Within VCAcore, rule configurations can be as simple as individual **basic inputs** attached to a zone used to trigger an action. Alternatively rules can be combined into more complex logical rule configurations using **conditional rules** and **filters**. The overarching goal of the rules in VCAcore is to help eliminate erroneous alerts being generated by providing functions to prevent unwanted behaviour from triggering an action.

More detail on the differences between these concepts is outlined below:

14.1 Basic Inputs

A basic input or rule can *only* be used to trigger an action or as an input to another rule type. Basic inputs always require a zone, and potentially some additional parameters. A basic input can be used on its own to trigger an action, although they are often used as an input to other filters or conditional rules.

The complete list of basic inputs are:

- Abandoned
- Appear
- Deep Learning Presence
- Direction
- Disappear
- Dwell
- Enter

- Exit
- Presence
- Stopped
- Tailgating
- Counting Line

14.2 Filters

A filter cannot trigger an action on its own as it *requires* another basic input, filter or conditional rule to trigger. An example of this is the Object rule.

The complete list of filters are:

- Speed Filter
- Object Filter
- Colour Filter
- Deep Learning Filter

Due to the nature of the deep learning algorithm which power the Deep Learning Filter, it can not be used as an input to another filter or logical rule.

14.3 Conditional Rules

A conditional input, like a filter, is one that cannot trigger an action on its own. It *requires* the input of another basic input, conditional rule or filter to be meaningful. An example of this is the AND rule. The AND rule requires two inputs to compare in order to function.

The complete list of conditional rules are:

- And
- Continuously
- Counter
- Or
- Previous

14.4 General Concepts

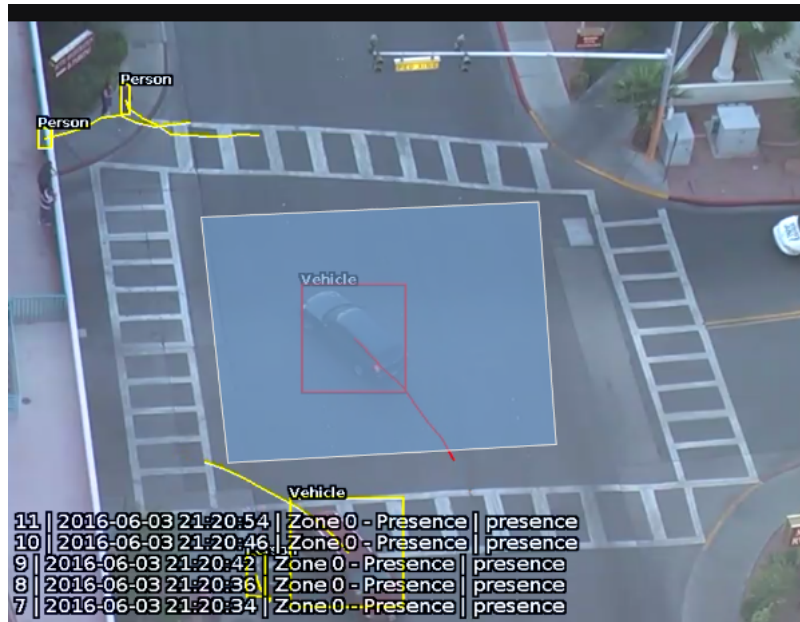
14.4.1 Object Display

As rules are configured they are applied to the channel in real time allowing feedback on how they work. Objects which have triggered a rule are annotated with a **bounding box** and a **trail**. Objects can be rendered in two states:

- **Non-alarmed:** Default rendered in yellow. A detected object which does not meet any criteria to trigger a rule and raise an event.

- **Alarmed:** Default rendered in red. A detected object which has triggered one or more rules. Causes an event to be raised.

As seen below, when an event is raised, the default settings render details of the event in the lower half of the video stream. Object class annotations in this example are generated through **calibrated**

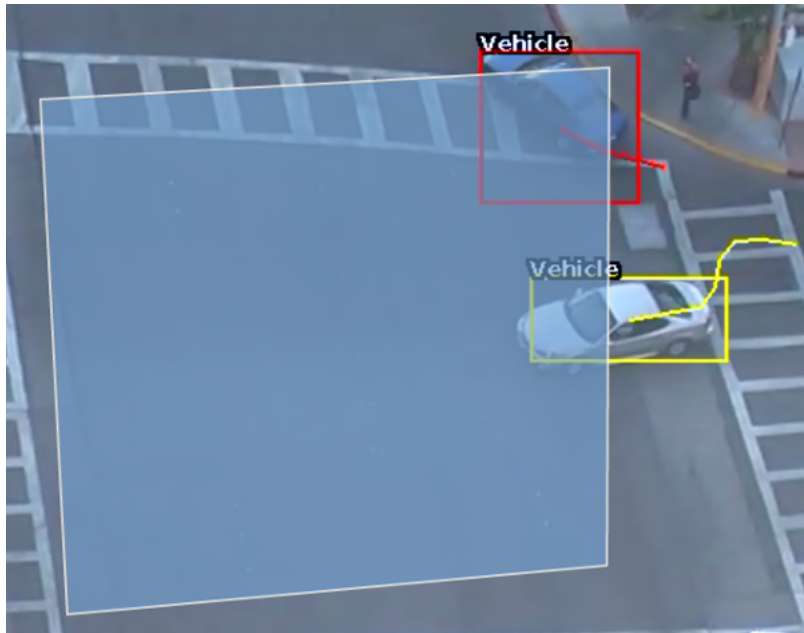


14.4.2 Object Trails

The **trail** shows the history of where the object has been. Depending on the **calibration** the trail can be drawn from the **centroid** or the **mid-bottom** point of the object. (See **Advanced Settings** for more information).

14.4.3 Trail Importance

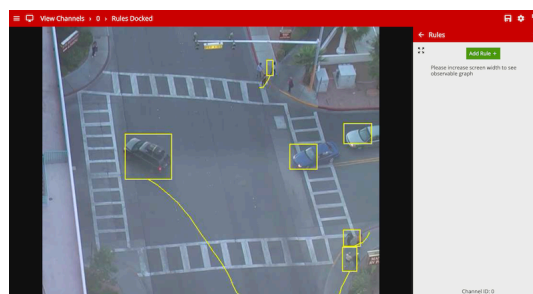
The trail is important for determining how a rule is triggered. The intersection of the trail point with a zone or line determines whether a rule is triggered or not. The following image illustrates this point: the blue vehicle's trail intersects with the detection zone and is rendered in red. Conversely, while the white vehicle intersects the detection zone, its trail does not (yet) intersect and hence it has not triggered the rule and is rendered in yellow.



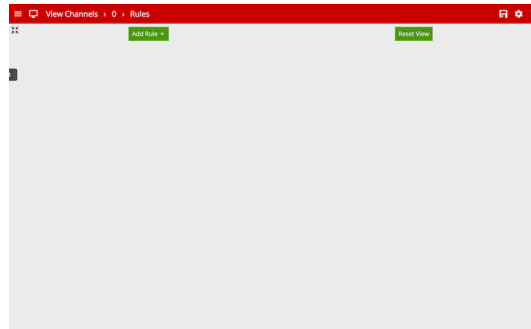
14.5 Rules Configuration

Rules are configured on a per channel basis by opening the rules menu when viewing the channel. Configuration is possible in two forms: the docked mode, in which both the rules and the video stream are visible or expanded view in which a graph representation is provided to visualise the way the rules are connected.

The rules page opens in the 'docked' mode, alongside the live video stream.





The user may click on the expand button (next to the **Add a Rule +**) button to switch to the expanded view. Please note that the rules graph is only visible in the expanded view.



In the expanded view, the user can add rules, and use the Rules Editor to connect the rules to one another. The graph on the right hand side updates in real time to reflect the user's changes.

14.5.1 Adding Rules

The first steps to defining a rule configuration is to add the basic inputs, configure the respective parameters and link to a zone. Click the  button and select the desired rule from the drop menu.

To delete a rule click the corresponding delete icon . Please note rules of any type cannot be deleted if they serve as an input to another rule. In this case the other rule must be deleted first.

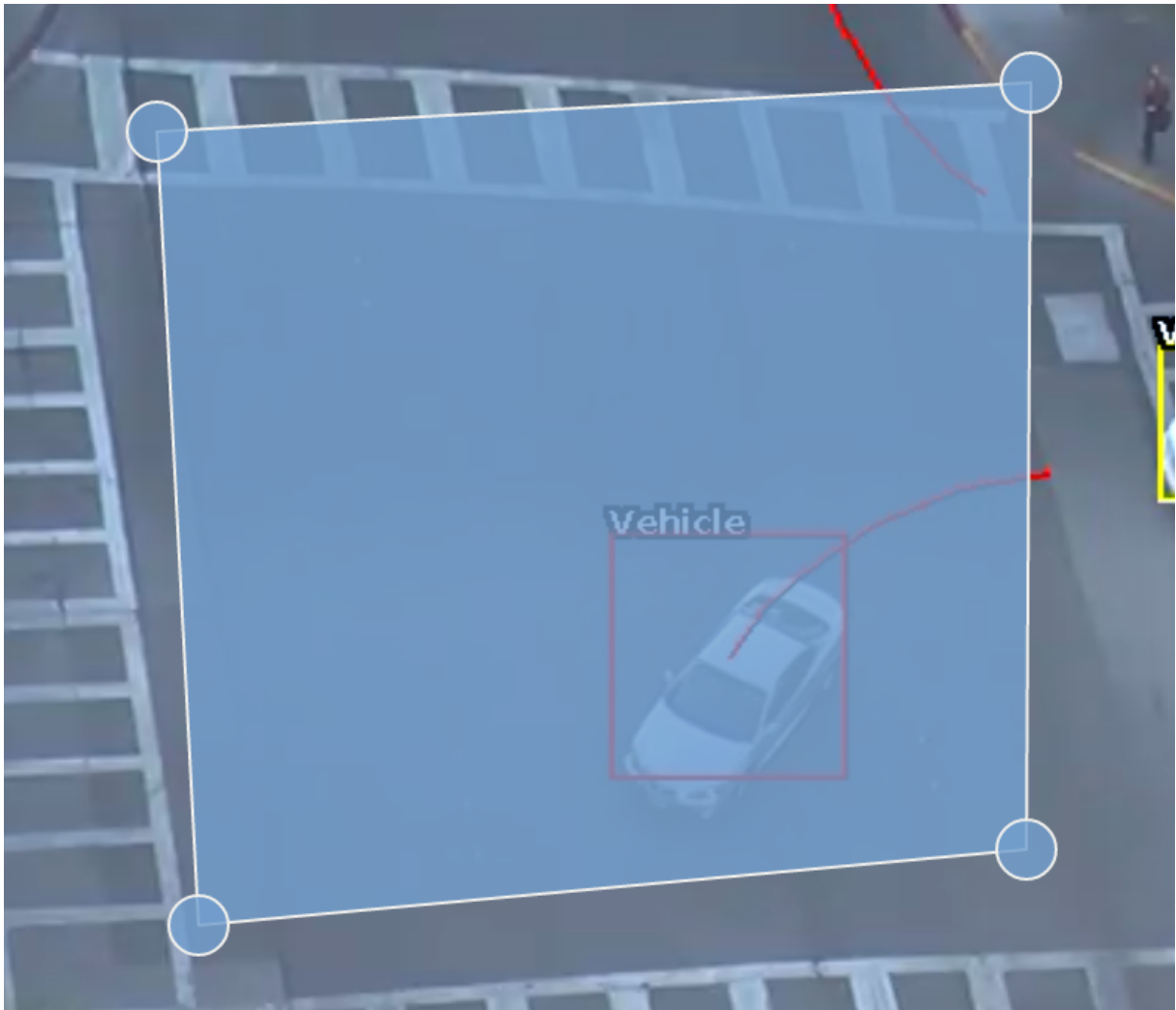
14.6 Basic Inputs

Below are the currently supported basic inputs, along with a detailed description of each.

14.6.1 Presence

A rule which fires an event when an object is first detected in a particular zone.


Note: The Presence rule encapsulates a variety of different behaviour, for example the Presence rule will trigger in the same circumstances as an Enter and Appear rule. The choice of which rule is most appropriate will be dependant on the scenario.



14.6.1.1 Graph View

Type: Presence
Name: Presence 5
Zone: None

14.6.1.2 Form View

| | | | |
|---------------------|-------------------------------------|---|---|
| Type: | Presence | ▼ |  |
| Name: | Presence 5 | | |
| Can Trigger Actions | <input checked="" type="checkbox"/> | | |
| Zone: | None | | |

14.6.1.3 Configuration

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Presence #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |

14.6.2 Deep Learning Presence

A rule which fires an event when an object is first detected in a particular zone and is classified as a certain class by the deep learning filter model.

Classification settings are configured in the Deep Learning page. See [Deep Learning Filter](#) for an in depth description on how the filter works.

Note: The Deep Learning Presence rule encapsulates a variety of different behaviour, for example the rule will try to trigger in the same circumstances as an Enter and Appear rule. The choice of which rule is most appropriate will be dependant on the scenario. Additionally, the deep learning presence rule cannot be used as an input to any other rule type. As such it must work in isolation.



14.6.2.1 Graph View



14.6.2.2 Form View



14.6.2.3 Configuration

| Property | Description | Default Value |
|---------------------|---|----------------------------|
| Name | A user-specified name for this rule | "Deep Learning Presence #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |

14.6.3 Direction

The direction rule detects objects moving in a specific direction. Configure the direction and acceptance angle by moving the arrows on the direction control widget. The primary direction is indicated by the large central arrow. The acceptance angle is the angle between the two smaller arrows.

Objects that travel in the configured direction (within the limits of the acceptance angle), through a zone or over a line, trigger the rule and raise an event.

The following image illustrates how the white car moving in the configured direction triggers the rule whereas the other objects do not.



14.6.3.1 Graph View

Type: Direction
Name: Direction 3
Zone: Centre
Angle: 358
Angle Threshold: 27
Can trigger actions: true

14.6.3.2 Form View

The screenshot shows a configuration window for a 'Direction' rule. The 'Name' field is 'Direction'. The 'Can Trigger Actions' checkbox is checked. The 'Zone' dropdown is set to 'Center'. The 'Angle' slider is at 0 Degrees, and the 'Acceptance' slider is at 90 Degrees.

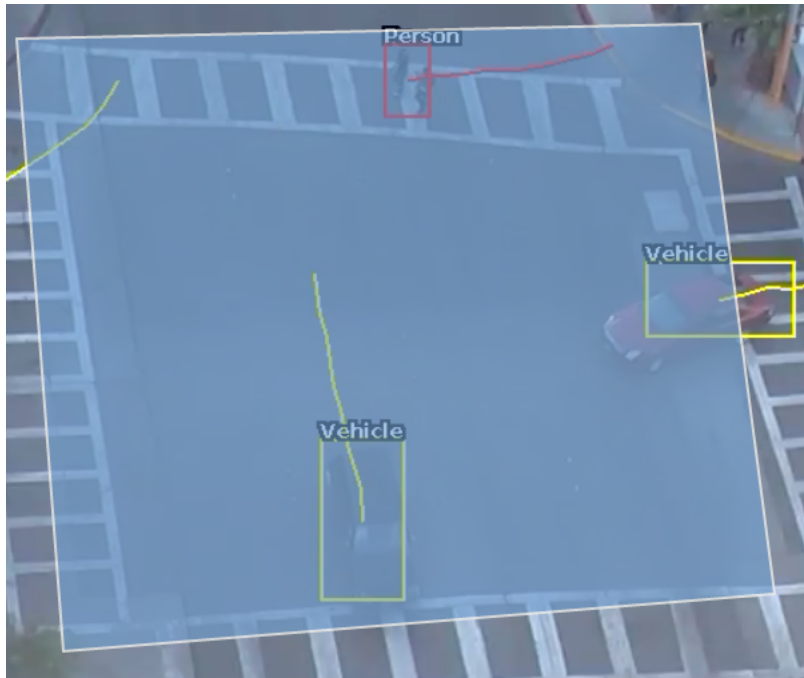
14.6.3.3 Configuration

| Property | Description | Default Value |
|---------------------|--|---------------|
| Name | A user-specified name for this rule | "Direction #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |
| Angle | Primary direction angle, 0 - 359. 0 references up. | 0 |
| Acceptance | Allowed variance each side of primary direction that will still trigger rule | 0 |

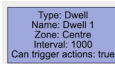
14.6.4 Dwell

A dwell rule triggers when an object has remained in a zone for a specified amount of time. The interval parameter the time the object has to remain in the zone before an event is triggered.

The following image illustrates how the person detected in the zone is highlighted red as they have dwelt in the zone for the desired period of time. The two vehicles have not been present in the zone for long enough yet to trigger the dwell rule.



14.6.4.1 Graph View



14.6.4.2 Form View

Type: Dwell
 Name: Dwell 1 ▼
 Can Trigger
 Actions
 Zone: Centre ▼
 Interval: 1 seconds

14.6.4.3 Configuration

| Property | Description | Default Value |
|-------------|---|---------------|
| Name | A user-specified name for this rule | "Direction #" |
| Can Trigger | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |
| Interval | Period of time in seconds) | 1 |

14.6.5 Stopped


The stopped rule detects objects which are stationary inside a zone for longer than the specified amount of time. The stopped rule requires a zone to be selected before being able to configure an amount of time.

Note: The stopped rule does not detect abandoned objects. It only detects objects which have moved at some point and then become stationary.

14.6.5.1 Graph View

```
Type: Stopped
Name: Stopped 3
Zone: Centre
Time: 1
Can trigger actions: true
```

14.6.5.2 Form View

| | | |
|---------------------|-------------------------------------|---|
| Type: | Stopped | |
| Name: | Stopped 4 | ▼  |
| Zone: | Centre ▼ | |
| Time | 1 | ↕ Secs |
| Can Trigger Actions | <input checked="" type="checkbox"/> | |

14.6.5.3 Configuration

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Stopped #" |
| Zone | The zone this rule is associated with | None |
| Time | Period of time before a stopped object triggers the rule | 0 |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |

14.6.6 Enter and Exit

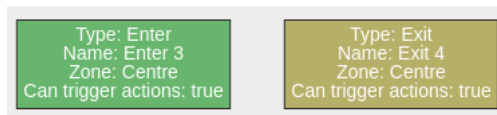
The enter rule detects when objects enter a zone. In other words, when objects cross from the outside of a zone to the inside of a zone.

Conversely, the exit rule detects when an object leaves a zone: when it crosses the border of a zone from the inside to the outside.

Note: Enter and exit rules differ from appear and disappear rules, as follows:

- Whereas the enter rule detects already-tracked objects crossing the zone border from outside to inside, the appear rule detects objects which start being tracked within a zone (e.g. appear in the scene through a door).
- Whereas the exit rule detects already-tracked objects crossing the zone border from inside to outside, the disappear rule detects objects which stop being tracked within the zone (e.g. leave the scene through a door).

14.6.6.1 Graph View



14.6.6.2 Form View

| | | |
|---------------------|-------------------------------------|--------------------------------|
| Type: | Enter | ▼ 🗑️ |
| Name: | Enter 3 | ▼ 🗑️ |
| Can Trigger Actions | <input checked="" type="checkbox"/> | |
| Zone: | Centre | ▼ |
| ----- | | |
| Type: | Exit | ▼ 🗑️ |
| Name: | Exit 4 | ▼ 🗑️ |
| Can Trigger Actions | <input checked="" type="checkbox"/> | |
| Zone: | Centre | ▼ |

14.6.6.3 Configuration Enter

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Enter #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |

| Property | Description | Default Value |
|----------|---------------------------------------|---------------|
| Zone | The zone this rule is associated with | None |

14.6.6.4 Configuration Exit

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Exit #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |

14.6.7 Appear and Disappear

The appear rule detects objects that start being tracked within a zone, e.g. a person who appears in the scene from a doorway.

Conversely, the disappear rule detects objects that stop being tracked within a zone, e.g. a person who exits the scene through a doorway.

Note: The appear and disappear rules differ from the enter and exit rules as detailed in the enter and exit rule descriptions.

14.6.7.1 Graph View



14.6.7.2 Form View

The screenshot shows two rule configuration panels. The top panel is for an 'Appear' rule named 'Appear 3'. It has a checked 'Can Trigger Actions' checkbox and is set to the 'Centre' zone. The bottom panel is for a 'Disappear' rule named 'Disappear 4'. It also has a checked 'Can Trigger Actions' checkbox and is set to the 'Centre' zone. Both panels include a red square icon with a white square inside, likely a delete button.

14.6.7.3 Configuration Appear

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Appear #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |

14.6.7.4 Configuration Disappear

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Disappear #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Zone | The zone this rule is associated with | None |

14.6.8 Abandoned and Removed Object

The abandoned and removed object rule triggers when an object has been either left within a defined zone, e.g. a person leaving a bag on a train platform, or when an object is removed from a defined zone. The abandoned rule has a duration property which defines the amount of time an object must have been abandoned for or removed for, to trigger the rule.

Below is a sample scenario where a bag is left in a defined zone resulting in the rule triggering.

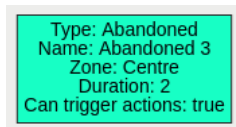


Below is a similar example scenario where the bag is removed from the defined zone resulting in the rule triggering.



Note: The algorithm used for abandoned and removed object detection is the same in each case, and therefore cannot differentiate between objects which have been abandoned or removed. This arises because the algorithm only analyses how blocks of pixels change with respect to a background model which is constructed over time.

14.6.8.1 Graph View



14.6.8.2 Form View

| | | |
|---------------------|-------------------------------------|--------------------------|
| Type: | Abandoned | <input type="checkbox"/> |
| Name: | Abandoned 3 | <input type="checkbox"/> |
| Zone: | Centre | |
| Duration | 2 | Secs |
| Can Trigger Actions | <input checked="" type="checkbox"/> | |

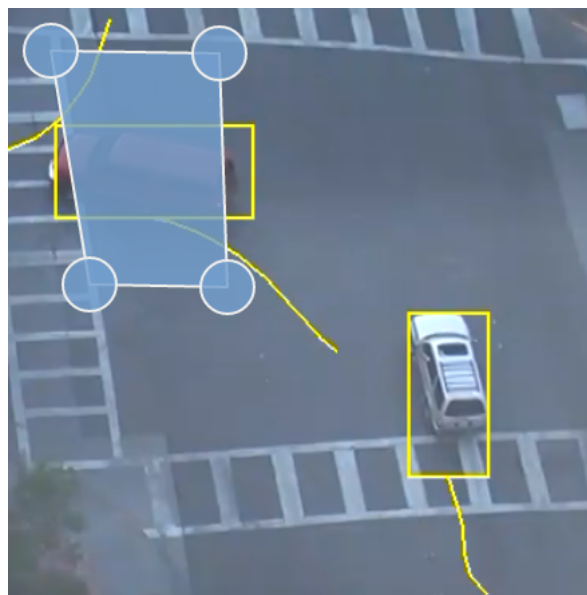
14.6.8.3 Configuration

| Property | Description | Default Value |
|---------------------|--|---------------|
| Name | A user-specified name for this rule | "Abandoned #" |
| Zone | The zone this rule is associated with | None |
| Duration | Period of time a object must have been abandoned or removed before the rule triggers | 0 |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |

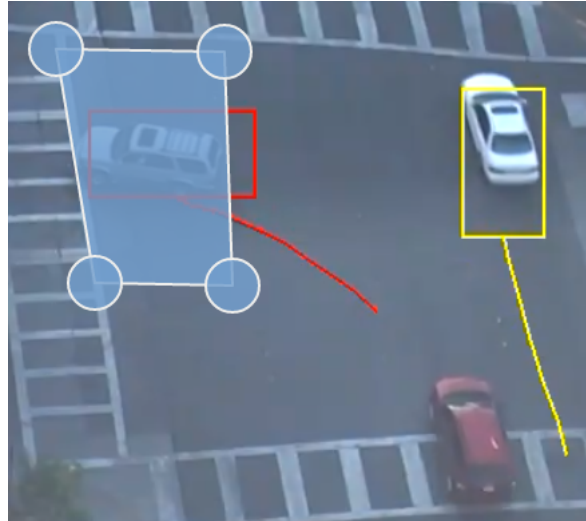
14.6.9 Tailgating

The tailgating rule detects objects which cross through a zone or over a line within quick succession of each other.

In this example, object 1 is about to cross a detection line. Another object (object 2) is following closely behind. The tailgating detection threshold is set to 5 seconds. That is, any object crossing the line within 5 seconds of an object having already crossed the line will trigger the object tailgating rule.



Object 2 crosses the line within 5 seconds of object 1. This triggers the tailgating filter and raises an event.



14.6.9.1 Graph View

Type: Tailgating
 Name: Tailgating 3
 Zone: Centre
 Duration: 5
 Can trigger actions: true

14.6.9.2 Form View

Type: Tailgating

Name: Tailgating 3

Zone: Centre

Duration: 5 Secs

Can Trigger Actions

14.6.9.3 Configuration

| Property | Description | Default Value |
|----------|--|----------------|
| Name | A user-specified name for this rule | "Tailgating #" |
| Zone | The zone this rule is associated with | None |
| Duration | Maximum amount of time between first and second object entering a zone to trigger the rule | 0 |

| Property | Description | Default Value |
|---------------------|---|---------------|
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |

14.6.10 Counting Line

A counting line is a detection filter optimized for directional object counting (e.g. people or vehicles) in busier detection scenarios. Examples of such applications may include:

- People counting with overhead cameras in a retail environment.
- Vehicle counting with overhead cameras on public highways.

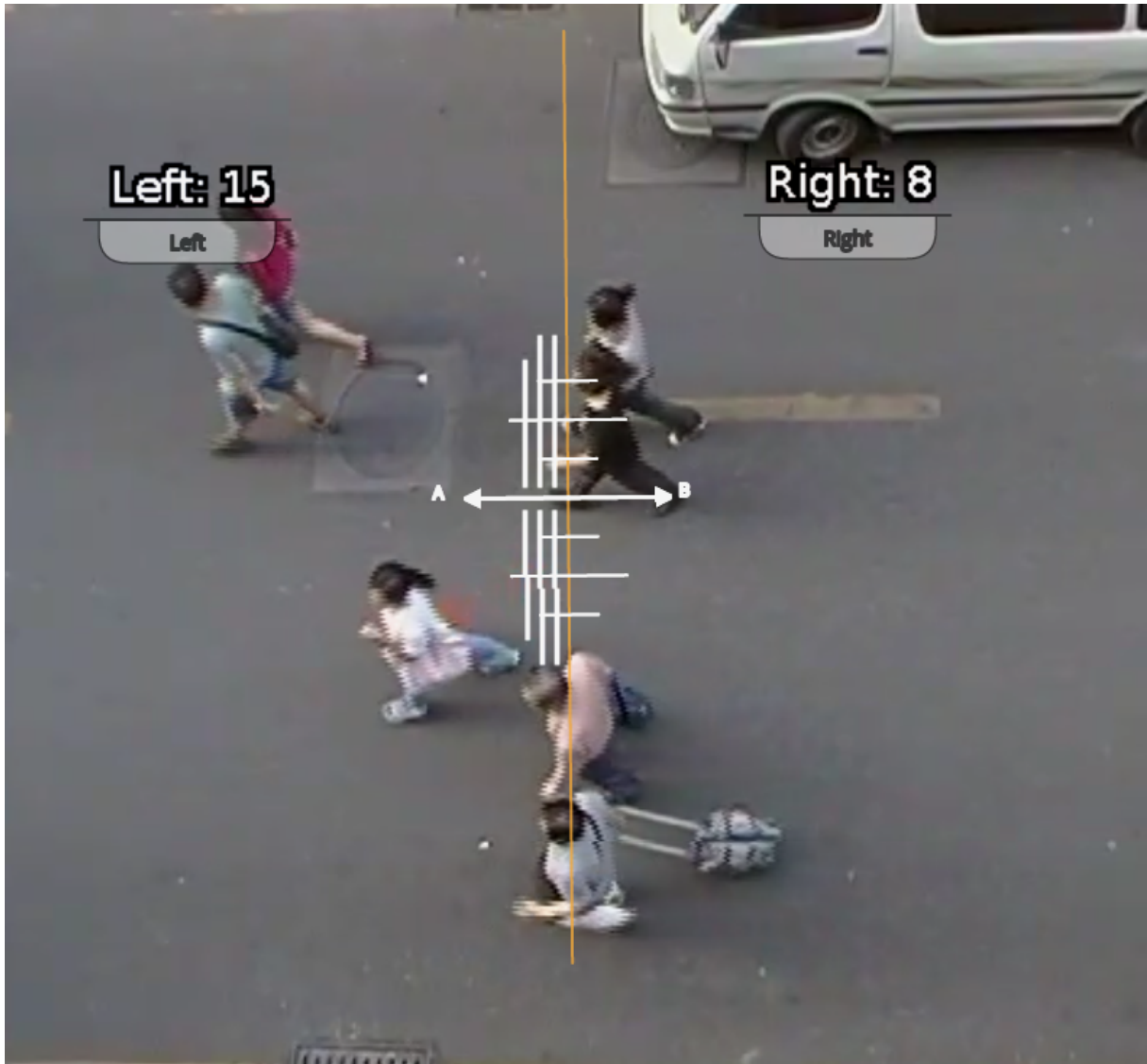
In some scenes, such as entrances with camera installed overhead, the counting line typically will generate a higher accuracy count than using the aforementioned counters connected to a presence rule.

An event is generated every time an object crosses the line in the configured direction. If multiple objects cross the line together, multiple corresponding events are generated. These events can be directly used to trigger actions if the **Can Trigger Actions** property is checked.

Counting lines are attached to zones configured with a **Line** shape. See [Zones](#) for more information. If a counting line is configured with a zone not defined with a **Line** shape, the zone property will be automatically changed (it will not be possible to change the zone shape back until the counting line stops referencing the zone in question).

Counting lines have a specified direction indicated by the arrow in the UI (direction **A** or **B**), the direction of this arrow is governed by the configured zone. Each instance of the rule counts in a single direction. To count in both directions a second counting line rule must be added to the same zone with the opposite direction selected. An example rule graph of a two way counting line configured with a counter is provided to illustrate this below.

NOTE: The maximum number of counting line filters that can be applied per video channel is 5.



14.6.10.1 Calibrating the Counting Line

In order to generate accurate counts, the counting line requires calibration. Unlike the object tracking function engine, this cannot be performed at a general level for the whole scene using the 3D **Calibration** tool. This is because the counting line is not always placed on the ground plane; it may be placed at any orientation at any location in the scene. For example, a counting line could be configured vertically with a side-on camera view.

Instead of the 3D calibration tool, the counting line has its own calibration setting. Two bars equidistant from the centre of the line represent the width of the expected object. This allows the counting line to reject noise and also count multiple objects.



To calibrate the counting line:

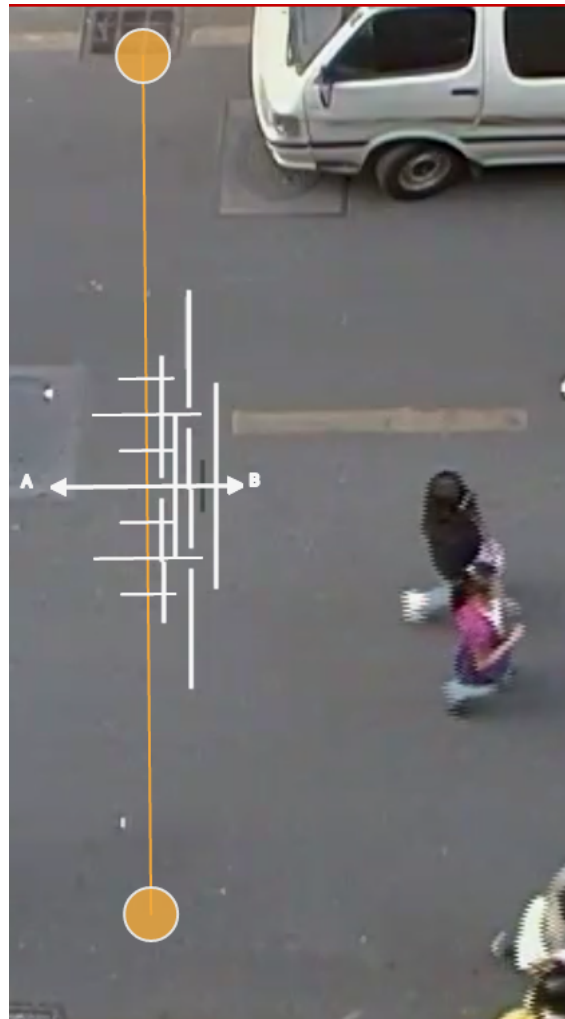
- Select the counting line rule.
- Check the **Enable width calibration** option.
- Drag the calibration markers to adjust the distance between the calibration markers until the distance is approximately the size of the objects to be counted. Alternatively, move the **Width** slider to achieve the same result.
- The calibration width is displayed within the counting line rule and can be edited directly to change the calibration width.
- The small markers on either side of the big markers indicate the minimum and maximum width which is counted as a single object.

NOTE: if the **Width** slider is set to zero then the **Enable width calibration** checkbox is automatically disabled.

14.6.10.2 Counting Line Calibration Feedback

To enable the user to more accurately configure the calibration for the counting line, the widths of detected objects are displayed as an overlay next to the counting line when objects pass over it. By default this display option is enabled. However, if it does not appear, ensure that the option is enabled on the [Burnt-in Annotation](#) settings.

The calibration feedback is rendered as black and white lines on either side of the counting line on the [Zones](#) configurations page. Each line represents an object detected by the counting algorithm. The width of the line shows the width of the object detected by the line. The last few detections are displayed for each direction with the latest one appearing closest to the counting line.



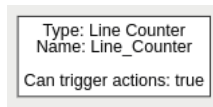
Each detection is counted as a number of objects based on the current width calibration. This is displayed as follows:

- Black line: Event not counted
- Solid white line: Event counted as one object
- Broken white line: Event counted as multiple objects indicated by the number of line segments.

Using the feedback from the calibration feedback annotation, the width calibration can be fine tuned to count the correct sized objects and filter out spurious detections.

14.6.10.2.1 Shadow Filter The counting line features a shadow filter which is designed to remove the effects of object shadows affecting the counting algorithm. Shadows can cause inaccurate counting results by making an object appear larger than its true size or by joining two or more objects together. If shadows are causing inaccurate counting, the shadow filter should be enabled by selecting the **Shadow Filter** check box for the line. It is recommended that the shadow filter only be enabled when shadows are present because the algorithm can mistake certain parts of an object for shadows and this may lead to worse counting results. This is especially the case for objects that have little contrast compared to the background (e.g. people wearing black coats against a black carpet).

14.6.10.3 Graph View



14.6.10.4 Form View

14.6.10.5 Configuration

| Property | Description | Default Value |
|--------------------------|---|----------------|
| Name | A user-specified name for this rule | Line_Counter # |
| Zone | The zone this rule is associated with | None |
| Direction | Enable counting in the 'A' or 'B' direction (one direction per counting line) | None |
| Enable Width Calibration | Width calibration to allow more accurate counting | None |
| Width | Width calibration value | 0 |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |

14.6.10.6 Typical Logical Rule Combination

The below example has two line counters, **Line_Counter A** and **Line_Counter B** attached to the zone **Center Line** each with differing directions selected. **Line_Counter A** is configured to increment the counter, whilst **Line_Counter B** is configured to decrement the counter value.

Only the counter rule **Counter** is set to **Can Trigger Actions**, meaning only this com-

ponent of the logical rule will be available as a source for actions. In this case an action using this rule as a source will trigger every time the counter changes.

The screenshot displays a configuration interface for three sensors:

- Line_Counter A:** Type: Line Counter, Name: Line_Counter A, Zone: Centre Line, Direction: Direction A, Enable width calibration: checked, Width: 0.146, Can Trigger Actions: unchecked.
- Line_Counter B:** Type: Line Counter, Name: Line_Counter B, Zone: Centre Line, Direction: Direction B, Enable width calibration: checked, Width: 0.237, Can Trigger Actions: unchecked.
- Counter:** Type: Counter, Name: Counter, Can Trigger Actions: checked. Increment: Line_Counter A, Decrement: Line_Counter B. It includes buttons for "Add Increment Input +", "Add Decrement Input +", "Add Occupancy Input +", and "Reset Counter".

A diagram on the right illustrates the configuration logic:

- Two boxes represent the Line Counters: "Type: Line Counter Name: Line_Counter A Can trigger actions: false" and "Type: Line Counter Name: Line_Counter B Can trigger actions: false".
- Arrows point from these two boxes to a central black box representing the Counter: "Type: Counter Name: Counter Increment Inputs: Line_Counter A Decrement Inputs: Line_Counter B Occupancy Inputs: Can trigger actions: true".

14.7 Filters

Below is a list of the currently supported filters, along with a detailed description of each.

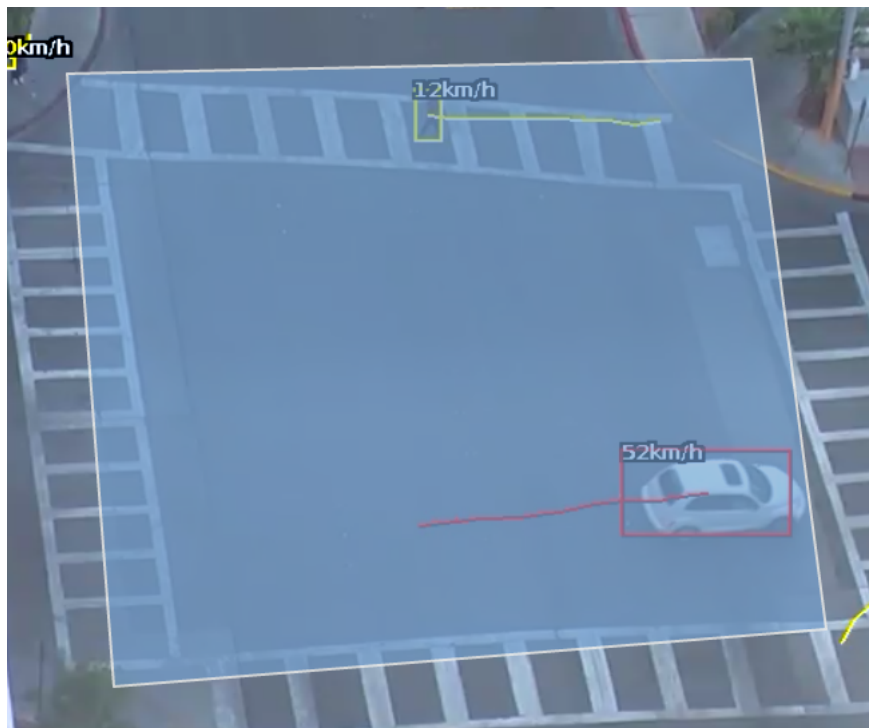
When filters are used to trigger an action the rule type property is propagated from the filter input. For example if the input to the speed filter is a *presence* rule, then actions generated as a result of the speed filter will have a *presence* event type.

14.7.1 Speed Filter

The speed filter provides a way to check if the speed of an object which has triggered an input is moving within the range of speeds defined by a lower and upper boundary.

Note: The channel must be **calibrated** in order for the speed filter to be available.

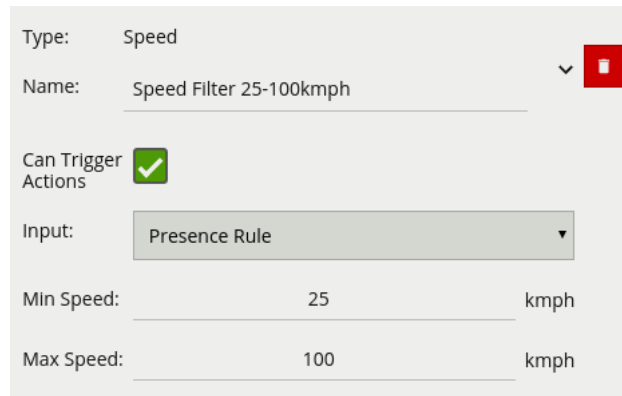
Commonly this rule is combined with a presence rule, an example rule graph is provided to illustrate this below. The following image illustrates how such a rule combination triggers on the car moving at 52 km/h but the person moving at 12 km/h falls outside the configured range (25-100 km/h) and thus does not trigger the rule.



14.7.1.1 Graph View

```
Type: Speed
Name: Speed 3
Min Speed: 50
Max Speed: 200
Can trigger actions: true
```

14.7.1.2 Form View



Type: Speed

Name: Speed Filter 25-100kmph

Can Trigger Actions:

Input: Presence Rule

Min Speed: 25 kmph

Max Speed: 100 kmph

14.7.1.3 Configuration

| Property | Description | Default Value |
|---------------------|--|---------------|
| Name | A user-specified name for this rule | "Speed #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input | The input rule | None |
| Min Speed | The minimum speed (km/h) an object must be going to trigger the rule | 0 |
| Max Speed | The maximum speed (km/h) an object can be going to trigger the rule | 0 |

14.7.1.4 Typical Logical Rule Combination

The below example logical rule checks if an object triggering the presence rule **Presence Rule** attached to zone **Centre**, is also travelling between 25 and 100 km/h as specified by the speed rule **Speed Filter 25-100 km/h**.

Only the Speed Filter is set to **Can Trigger Actions**, meaning only this component of the logical rule will be available as a source for actions. Additionally, any action generated by the speed filter will have the event type Presence.

The screenshot displays two rule configurations in a list:

- Presence Rule:** Type: Presence, Name: Presence Rule, Can Trigger Actions: , Zone: Center.
- Speed Filter 25-100kmph:** Type: Speed, Name: Speed Filter 25-100kmph, Can Trigger Actions: , Input: Presence Rule, Min Speed: 25 kmph, Max Speed: 100 kmph.

To the right, a flow diagram illustrates the relationship between these rules:

- A blue box represents the Presence Rule: Type: Presence, Name: Presence Rule, Zone: Center, Can trigger actions: false.
- An arrow points from this box to a green box representing the Speed Filter rule: Type: Speed, Name: Speed Filter 25-100kmph, Min Speed: 25, Max Speed: 100, Can trigger actions: true.

14.7.2 Object Filter

The object classification filter provides the ability to filter out objects, which trigger a rule, if they are not classified as a certain class (e.g. person, vehicle).

The object classification filter must be combined with another rule(s) to prevent unwanted objects from triggering an alert, an example rule graph is provided to illustrate this below.



The previous image illustrates how object classification filter configured with **Vehicle** class, includes only Vehicle objects. The person in the zone is filtered out since the **Person** class is not selected in the filter list.

Note: the channel must be **calibrated** for the object classification filter to be available.

14.7.2.1 Graph View

```
Type: Object Filter
Name: Vehicle Filter
Filters:
  Vehicle
Can trigger actions: true
```

14.7.2.2 Form View

The screenshot shows a configuration form for an 'Object Filter'. The 'Type' is set to 'Object Filter'. The 'Name' is 'Vehicle Filter'. The 'Can Trigger Actions' checkbox is checked. The 'Input' is set to 'Presence Rule'. Under 'Classes', the 'Vehicle' checkbox is checked, while 'Person', 'Clutter', and 'Group Of People' are unchecked.

14.7.2.3 Configuration

| Property | Description | Default Value |
|---------------------|---|-------------------|
| Name | A user-specified name for this rule | "Object Filter #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input | The input rule | None |
| Classes | The object classes allowed to trigger an alert | None |

14.7.2.4 Typical Logical Rule Combination

The below example logical rule checks if the object triggering the presence rule **Presence Rule** attached to zone **Centre**, is also classified as a **Vehicle** as specified by the Object Filter **Vehicle Filter**.

Only the Object filter is set to **Can Trigger Actions**, meaning only this component of the logical rule will be available as a source for actions. Additionally, any action generated by the speed filter will have the event type Presence.

The image shows a configuration interface for two rules. The top rule is a **Presence Rule** with the following settings:

- Type: Presence
- Name: Presence Rule
- Can Trigger Actions:
- Zone: Center

The bottom rule is an **Object Filter** with the following settings:

- Type: Object Filter
- Name: Vehicle Filter
- Can Trigger Actions:
- Input: Presence Rule
- Classes:
 - Person
 - Vehicle
 - Clutter
 - Group Of People

To the right, a flow diagram illustrates the logic: a blue box representing the Presence Rule (Type: Presence, Name: Presence Rule, Zone: Center, Can trigger actions: false) has an arrow pointing to a dark grey box representing the Object Filter (Type: Object Filter, Name: Vehicle Filter, Filters: Vehicle, Can trigger actions: true).

14.7.3 Colour Filter

The colour filter utilises the **Colour Signature** algorithm and provides the ability to filter out objects based on whether that object contains a certain colour component.

The colour signature algorithm is responsible for grouping every pixel from a detected object into one of 10 colour bins. The colour filter allows you to select one or more of these colour bins and will trigger if the subject object is made up of one or more of those selected colours.

The below image shows an example tracked object with the colour signature annotations enabled. Here the top four colours which make up more than 5% of the object are represented by the colour swatch attached to the object. In this case a person being tracked in the scene with high visibility safety clothing. Here the colour filter is set to trigger on Yellow, detecting the person but ignoring the shadow.

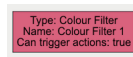
Typically the colour classification filter would be combined with another rule(s) to prevent unwanted objects from triggering an alert, an example rule graph is provided to illustrate this below.



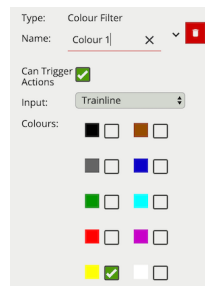
The previous image illustrates how object classification filter configured with **Vehicle** class, includes only Vehicle objects. The person in the zone is filtered out since the **Person** class is not selected in the filter list.

Note: the channel must have the **Colour Signature** enabled for the colour filter to work.

14.7.3.1 Graph View



14.7.3.2 Form View



14.7.3.3 Configuration

| Property | Description | Default Value |
|---------------------|---|-------------------|
| Name | A user-specified name for this rule | "Object Filter #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input | The input rule | None |
| Colours | The colours allowed to trigger an alert | All Unchecked |

14.7.3.4 Typical Logical Rule Combination

The below example logical rule checks if the object triggering the presence rule **Train line** attached to zone **Centre**, also contains the colour **Yellow** as one of the top four colours by percentage.

Only the Colour filter is set to **Can Trigger Actions**, meaning only this component of the logical rule will be available as a source for actions. Additionally, any action generated by the speed filter will have the event type Presence.

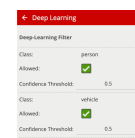
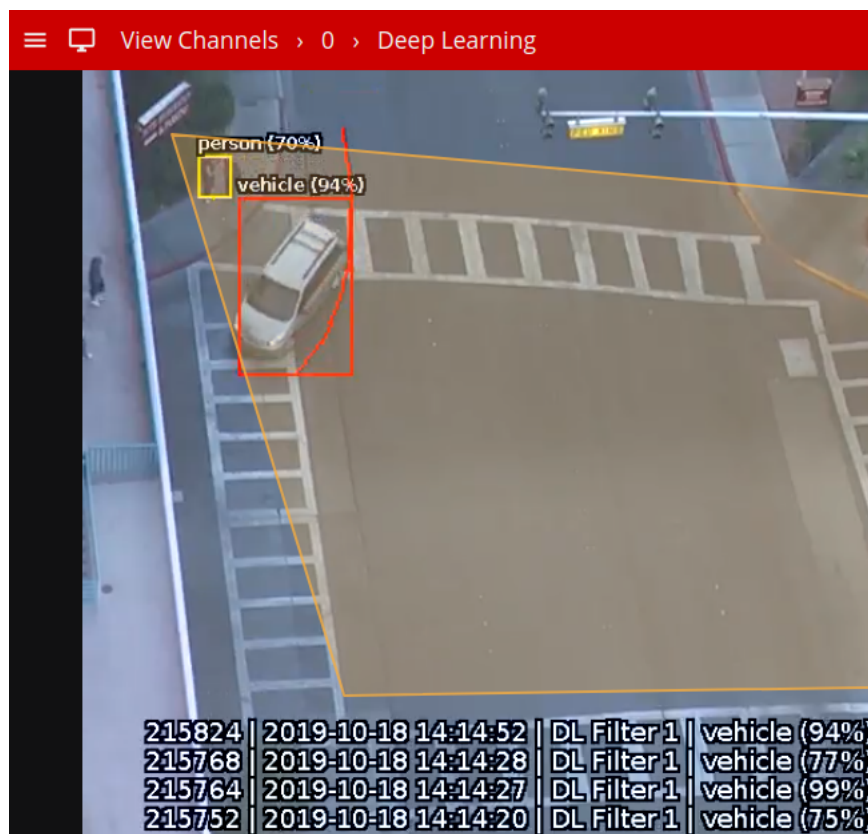


14.7.4 Deep Learning Filter

The deep learning filter provides the ability to filter out objects, which trigger a rule, if they are not classified as a certain class by the deep learning model.

The deep learning filter settings are configured in the Deep Learning page. See [Deep Learning Filter](#) for an in depth description on how the filter works.

Typically the deep learning filter would be combined with another rule(s) to prevent unwanted objects from triggering an alert, an example rule graph is provided to illustrate this below. Please note that the deep learning filter cannot be used as an input to any other rule type. As such it must be the last rule in a graph.



The previous image illustrates how the deep learning filter configured with just **vehicle** class (Confidence Threshold **0.5**), only triggers on the vehicle object. The person in the zone is filtered out since the **person** class Allowed setting is not **enabled** in the Deep Learning configuration page.

14.7.4.1 Graph View



14.7.4.2 Form View

A configuration form for a Deep Learning Filter. It includes the following fields:

- Type: DeepLearningFilter
- Name: DL Filter 1 (with a red underline, a close button 'x', and a dropdown arrow)
- Can Trigger Actions: (with a green checkmark icon)
- Input: None (with a dropdown arrow)

14.7.4.3 Configuration

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "DL Filter #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input | The input rule | None |

14.7.4.4 Typical Logical Rule Combination

The below example logical rule checks if the object triggering the presence rule **Presence Rule** attached to zone **Centre**, is one of the classes of interest defined in the Deep Learning settings page (see above settings page image).

Only the deep learning filter is set to **Can Trigger Actions**, meaning only this component of the logical rule will be available as a source for actions. Additionally, any action generated by the speed filter will have the event type Presence.

The screenshot displays two rule configuration panels. The top panel is for a 'Presence' rule named 'Presence Rule', with 'Center' as the zone and 'Can Trigger Actions' set to false. The bottom panel is for a 'DeepLearningFilter' rule named 'DL Filter 1', with 'Presence Rule' as the input and 'Can Trigger Actions' set to true. To the right, a diagram shows a blue box for the 'Presence Rule' (Zone: Center, Can trigger actions: false) with an arrow pointing to another blue box for the 'Deep Learning Filter' (Name: DL Filter 1, Can trigger actions: true).

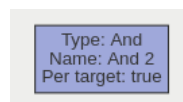
14.8 Conditional Rule Types

Below is a list of the currently supported conditional rules, along with a detailed description of each.

14.8.1 And

A logical operator that combines two rules and only fires events if both inputs are true.

14.8.1.1 Graph View



14.8.1.2 Form View

The form view shows the configuration for an 'And' rule named 'And 2'. The 'Can Trigger Actions' and 'Per Target' checkboxes are checked. Both 'Input A' and 'Input B' are set to 'None'. A red square icon is visible in the top right corner of the configuration area.

14.8.1.3 Configuration

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "And #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input A | The first input | None |
| Input B | The second input | None |
| Per Target | Fire one event per tracked object | Active |

If we consider a scene with two presence rules, connected to two separate zones, connected by an AND rule, the table below explains the behaviour of the **Per Target** property. Note that object here refers to a tracked object, as detected by the VCA tracking engine.

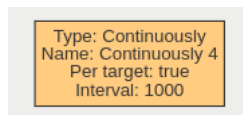
| State | Per Target | Outcome |
|--|------------|---|
| Object A in Input A, Object B in input B | On | Two events generated, one for each object |
| Object A in Input A, Object B in input B | Off | Only one event generated |

Additionally, it is important to note that if the rule fires when **Per Target** is switched off, it will not fire again until it is 'reset', i.e. until the AND condition is no longer true.



14.8.2 Continuously

A logical operator that fires events when its input has occurred continuously for a user-specified time.

14.8.2.1 Graph View



14.8.2.2 Form View

| | | | |
|---------------------|-------------------------------------|---|---|
| Type: | Continuously |  |  |
| Name: | Continuously 4 | | |
| Can Trigger Actions | <input checked="" type="checkbox"/> | | |
| Input: | None | | |
| Per Target | <input checked="" type="checkbox"/> | | |
| Interval | 1000 | | ms |

14.8.2.3 Configuration

| Property | Description | Default Value |
|---------------------|---|------------------|
| Name | A user-specified name for this rule | "Continuously #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input | The input rule | None |
| Per Target | Fire one event per tracked object. See description below for more details | Active |
| Interval | The time in milliseconds | 1000 ms |

Considering a scene with one zone, a presence rule associated with that zone, and a Continuously rule attached to that presence rule, when the **Per Target** property is on, the rule will generate an event for each tracked object that is continuously present in the zone. When it is off, only one event will be generated by the rule, even if there are multiple tracked objects within the zone. Additionally, when **Per Target** is off, the rule will only generate events when there is change of state - i.e. the rule condition changes from true to false or vice versa. When **Per Target** is off, the state will change when:

- Any number of objects enter the zone in question and remain in the zone
- **All** objects leave the zone in question

14.8.3 Counter

Counters can be configured to count the number of times a rule is triggered, for example the number of people crossing a line. The counter rule is designed to be utilised in two ways:

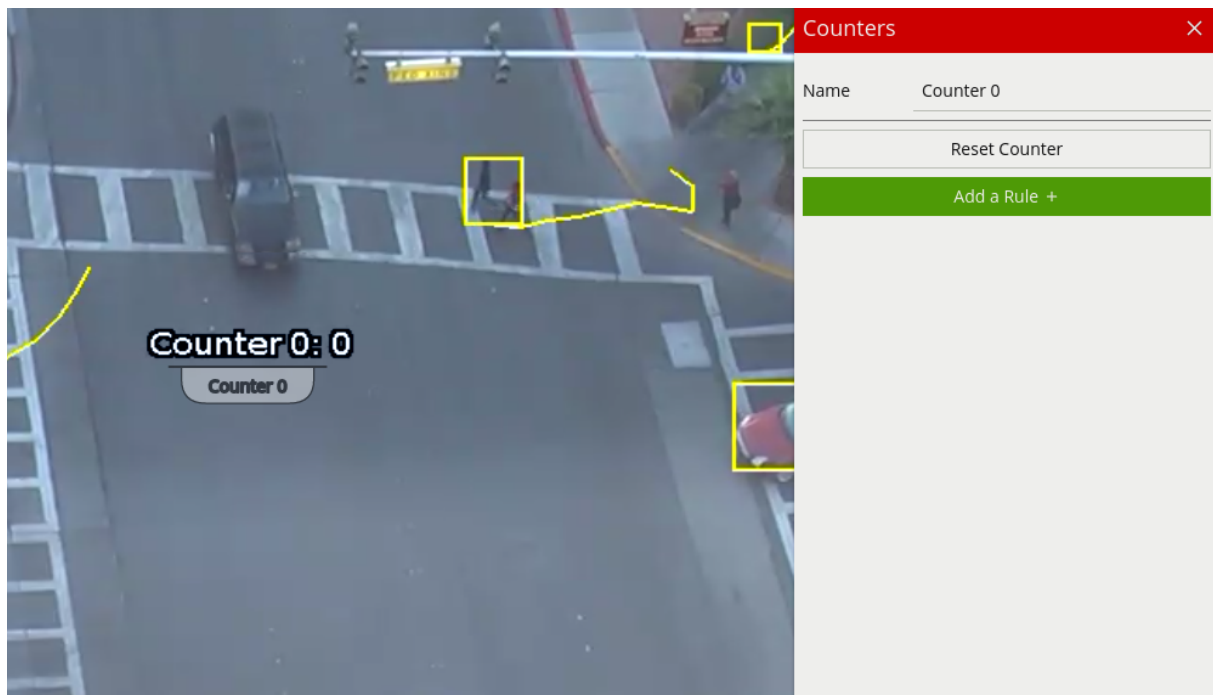
- **Increment / Decrement:** whereby a counter is incremented by the attached rule(s) (+1 for each rule trigger) and decremented by another attached rule(s) (-1 for each rule trigger).

- **Occupancy:** whereby the counter reflects the number of objects that are currently triggering the attached rule(s).

More than one rule can be assigned to any of a counter's three inputs. This allows, for example, the occupancy of two presence rules to be reflected in a single counter or more than one entrance / exit gate to reflect in a single counter, an example rule graph is provided to illustrate this below.

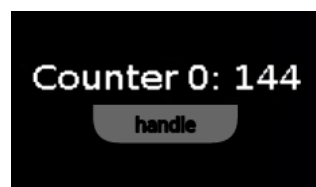
Broadly speaking a single counter should not be used for both purposes occupancy and increment / decrement.

Note: events created by a counter will not trigger the **Deep-Learning Filter**, even if enabled on the channel.

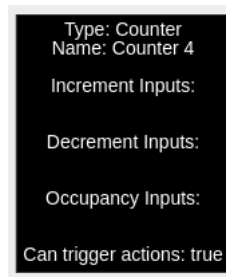


14.8.3.1 Positioning Counters

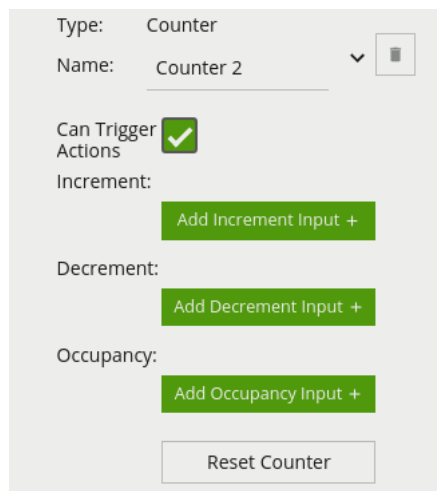
When added, a counter object is visualised on the video stream as seen below. The counter can be repositioned by grabbing the 'handle' beneath the counter name and moving the counter to the desired location.



14.8.3.2 Graph View



14.8.3.3 Form View



14.8.3.4 Configuration

| Property | Description | Default Value |
|---------------------|--|---------------|
| Name | A user-specified name for this rule | "Counter #" |
| Increment | The rule which, when triggered, will add one to the counter | None |
| Decrement | The rule which, when triggered, will subtract one from the counter | None |
| Occupancy | Sets counter to current number of the rule's active triggers* | None |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Reset Counter | A button allowing the counter value to be reset to 0 | None |

* E.g. if a presence rule is set as the occupancy target and two objects are currently triggering that presence rule, the counter will show the value of '2'.

14.8.3.5 Typical Logical Rule Combination

The below counter example increments a counter based on two enter rules **Enter Centre** and **Enter Top** attached to the zones **Centre** and **Top** respectively, this means that when either of these enter rules triggers the counter will be incremented by + 1. The counter also decrements based on the exit rule **Exit** which will subtract 1 from the counter each time an object exits the zone **Centre**.

Only the counter rule **Counter** is set to **Can Trigger Actions**, meaning only this component of the logical rule will be available as a source for actions. In this case an action using this rule as a source will trigger every time the counter changes.

The image shows a configuration interface for a Counter rule and its associated Enter and Exit rules. The Counter rule is configured with the following settings:

- Type: Counter
- Name: Counter
- Can Trigger Actions:
- Increment: Enter Centre, Enter Top
- Decrement: Exit
- Occupancy: (Add Occupancy Input +)
- Reset Counter: (Reset Counter)

The Enter rules are configured as follows:

- Type: Enter, Name: Enter Centre, Zone: Centre, Can trigger actions: false
- Type: Enter, Name: Enter Top, Zone: Top, Can trigger actions: false

The Exit rule is configured as follows:

- Type: Exit, Name: Exit, Zone: Centre, Can trigger actions: false

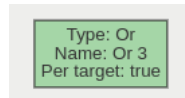
The dependency diagram shows the Counter rule (Type: Counter, Name: Counter) receiving input from the Enter Centre rule (Type: Enter, Name: Enter Centre, Zone: Centre, Can trigger actions: false) and the Enter Top rule (Type: Enter, Name: Enter Top, Zone: Top, Can trigger actions: false). The Counter rule also receives input from the Exit rule (Type: Exit, Name: Exit, Zone: Centre, Can trigger actions: false). The Counter rule's configuration is shown as follows:

- Type: Counter
- Name: Counter
- Increment Inputs: Enter Centre, Enter Top
- Decrement Inputs: Exit
- Occupancy Inputs: (empty)
- Can trigger actions: true




14.8.4 Or

A logical operator that combines two rules and fires events if either input is true.

14.8.4.1 Graph View



14.8.4.2 Form View

| | | |
|---------------------|-------------------------------------|---|
| Type: | Or | |
| Name: | Or 3 |  |
| Can Trigger Actions | <input checked="" type="checkbox"/> | |
| Input A: | None |  |
| Input B: | None |  |
| Per Target | <input checked="" type="checkbox"/> | |

14.8.4.3 Configuration

| Property | Description | Default Value |
|---------------------|---|---------------|
| Name | A user-specified name for this rule | "Or #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input A | The first input | None |
| Input B | The second input | None |
| Per Target | Fire one event per tracked object | Active |

If we consider a scene with two presence rules, connected to two separate zones, connected by an OR rule, the table below explains the behaviour of the **Per Target** property.

| State | Per Target | Outcome |
|---|------------|---|
| Object A in Input A, No object in input B | On | Two events generated, one for each object |

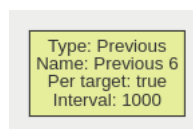
| State | Per Target | Outcome |
|---|------------|---|
| No object in Input A, Object B in input B | On | Only one event generated (for Object B) |
| Object A in Input A, No object in input B | On | Only one event generated (for Object A) |
| Object A in Input A, No object in input B | Off | Only one event generated |
| No object in Input A, Object B in input B | Off | Only one event generated |
| Object A in Input A, No object in input B | Off | Only one event generated |

Additionally, it is important to note that if the rule fires when **Per Target** is switched off, it will not fire again until it is 'reset', i.e. until the OR condition is no longer true.


14.8.5 Previous

A logical operator that triggers for input events which were active at some point in a past window of time. This window is defined by between the current time and the period before the current time (specified by the interval parameter value).

14.8.5.1 Graph View



14.8.5.2 Form View

| | | |
|---------------------|-------------------------------------|---|
| Type: | Previous | |
| Name: | Previous 6 | ▼  |
| Can Trigger Actions | <input checked="" type="checkbox"/> | |
| Input: | None | ▼ |
| Per Target | <input checked="" type="checkbox"/> | |
| Interval | 1000 | ms |

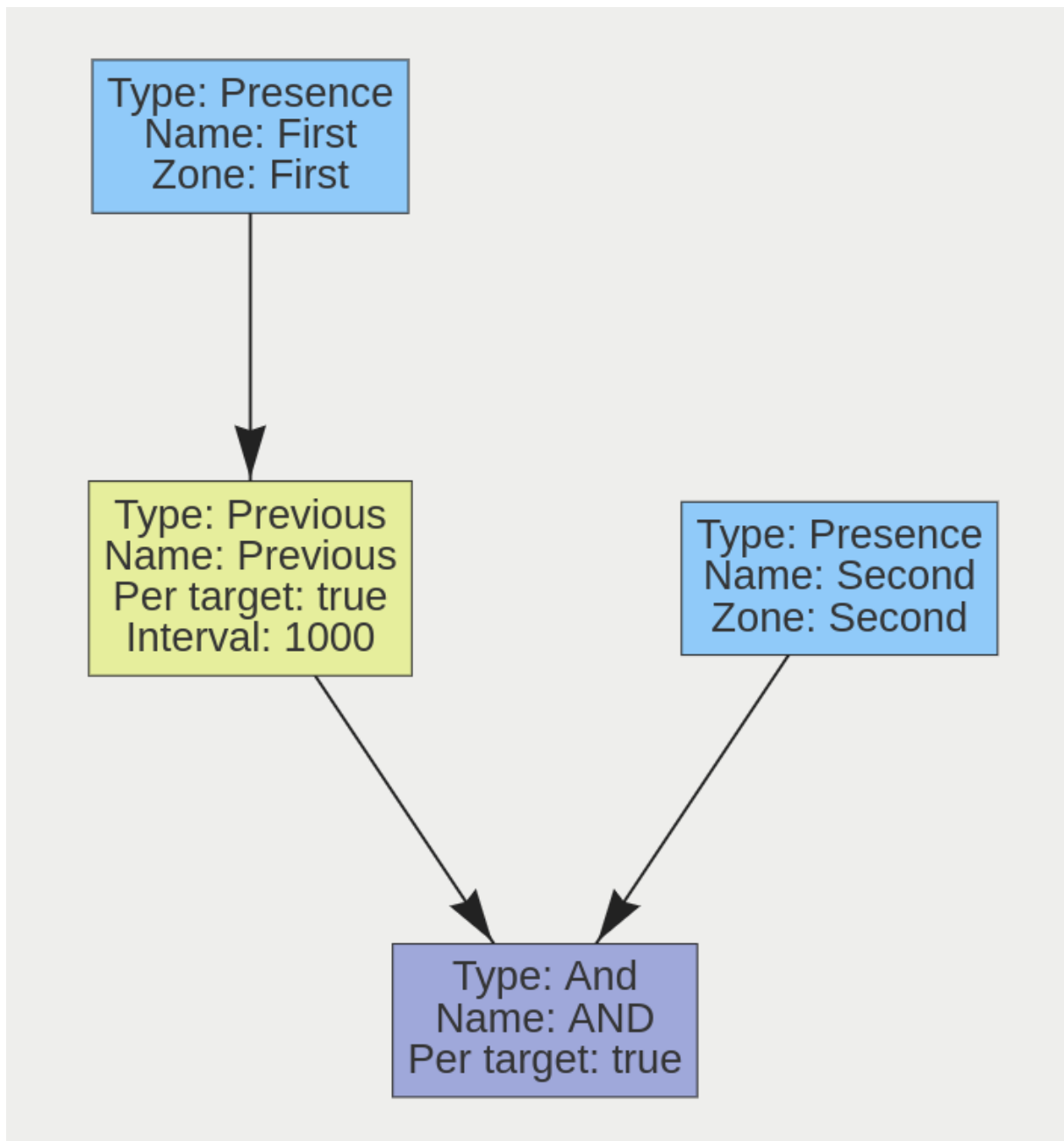
14.8.5.3 Configuration

| Property | Description | Default Value |
|---------------------|---|----------------------|
| Name | A user-specified name for this rule | "Previous #" |
| Can Trigger Actions | Specifies whether events generated by this rule trigger actions | Active |
| Input | The input rule | None |
| Per Target | Fire one event per tracked object | Active |
| Interval | The time in milliseconds | 1000 ms |

14.9 Combined Rule Examples

14.9.1 Double-knock Rule

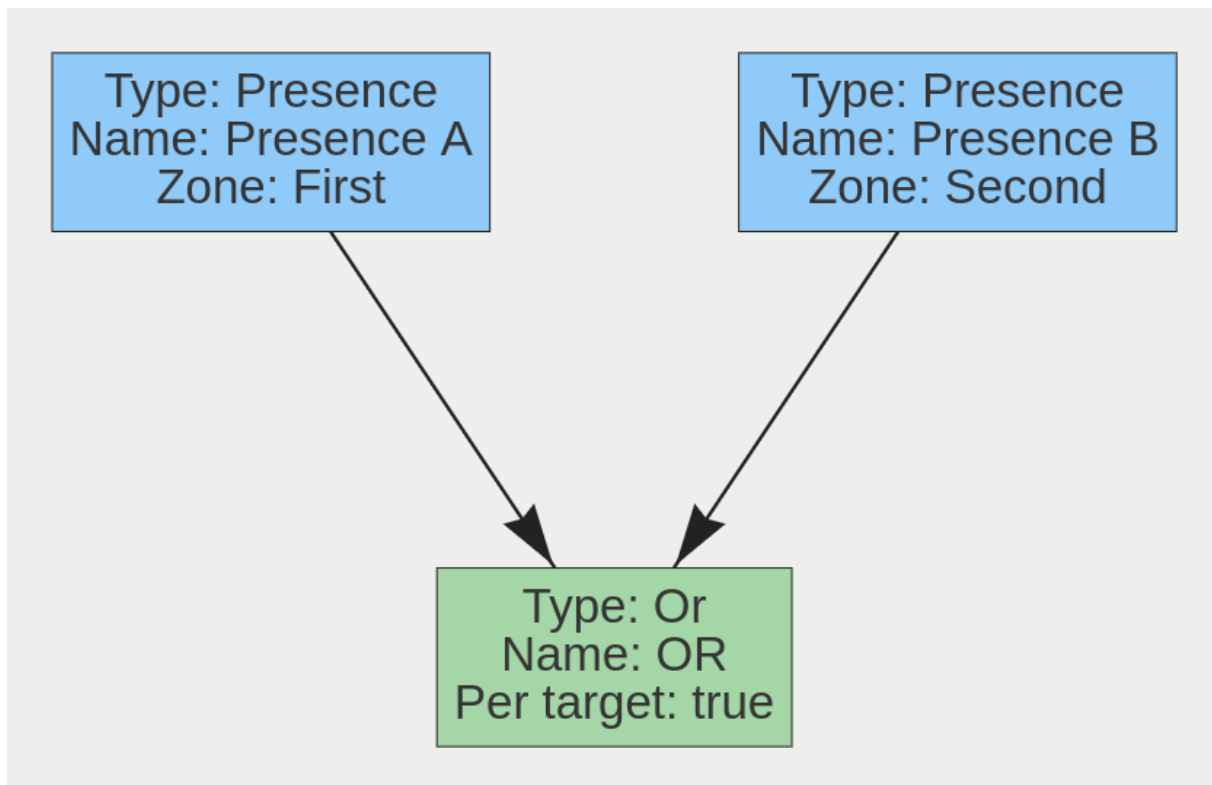
The 'double-knock' logical rule triggers when an object enters a zone which had previously entered another defined, zone within a set period of time. The time interval on the 'Previous' rule in the graph decides how much time can elapse between the object entering the first and then second zone. The graph for a double-knock logical rule is as follows:



The rule may be interpreted as follows: 'An object is in Zone 2, and was previously in Zone 1 in the last 1000 milliseconds'. This rule can be used as a robust way to detect entry into an area. Since the object has to enter two zones in a specific order, it has the ability to eliminate false positives that may arise from a simple Presence rule.

14.9.2 Presence in A or B

This rule triggers when an object is present in either Zone A or Zone B. Its graph is as follows:



A typical use case for this rule is having multiple areas where access is prohibited, but the areas cannot be easily covered by a single zone. Two zones can be created, associated with two separate presence rules, and they can then be combined using an Or rule.

14.10 Usage notes

- Use the expanded view to build the Logical Rules graph, checking the graph view for correctness.
- Use the docked view to evaluate and tweak the graph once its overall structure is correct.
- The **Per Target** property on a rule will affect all rules below it.
- The Logical Rules Editor prevents the deletion of logical rules that have rules depending on them.

Chapter 15

Calibration

Camera calibration is required in order for VCAcore to classify objects into different object classes. Once a channel has been calibrated, VCAcore can infer real-world object properties such as speed, height and area and classify objects accordingly.

Camera calibration is split into the following sub-topics:

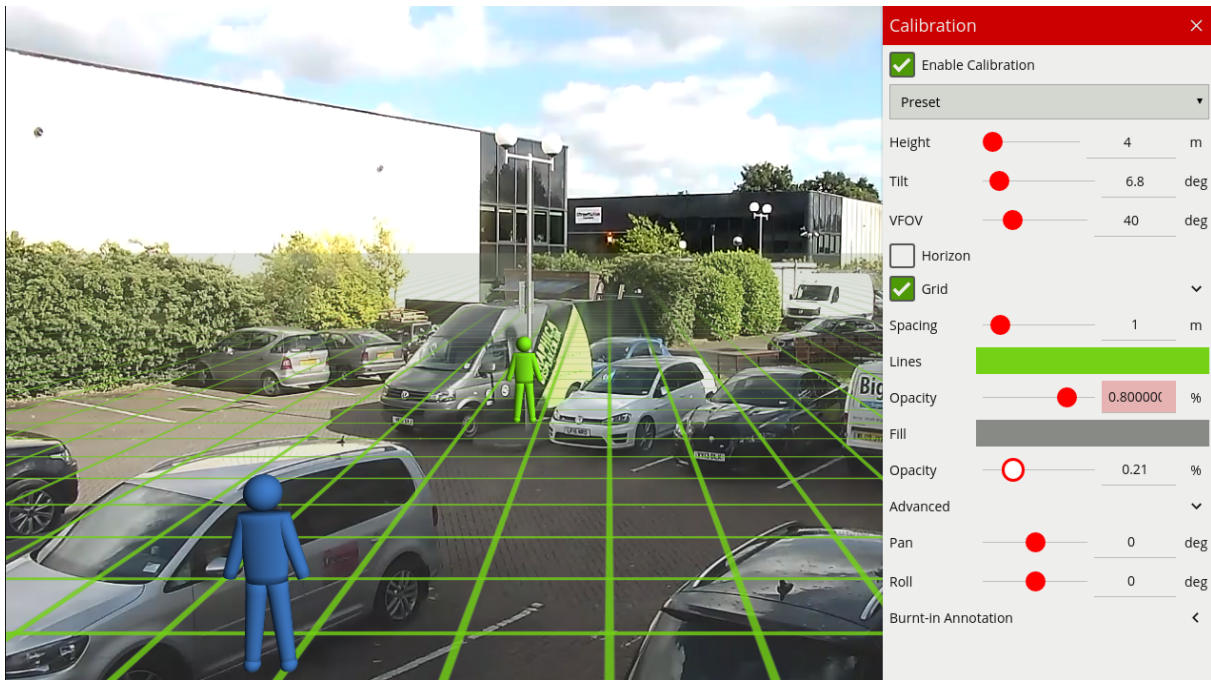
- Enabling Calibration
- Calibration Controls
- Calibrating a Channel
- Advanced Calibration Parameters

15.1 Enabling Calibration

By default calibration is disabled. To enable calibration on a channel, check the **Enable Calibration** checkbox.

15.2 Calibration Controls

The calibration page contains a number of elements to assist with calibrating a channel as easily as possible. Each is described below.



15.2.1 3D Graphics Overlay

During the calibration process, the features in the video image need to be matched with a 3D graphics overlay. The 3D graphics overlay consists of a green grid that represents the ground plane. Placed on the ground plane are a number of 3D mimics (people-shaped figures) that represent the dimensions of a person with the current calibration parameters. The calibration mimics are used for verifying the size of a person in the scene and are 1.8 metres tall.

The mimics can be moved around the scene to line up with people (or objects which are of a known, comparable height) to a person.

15.2.2 Mouse Controls

The calibration parameters can be adjusted with the mouse as follows: - Click and drag the ground plane to change the camera tilt angle. - Use the mouse wheel to adjust the camera height. - Drag the slider to change the vertical field of view.

Note: The sliders in the control panel can also be used to adjust the camera tilt angle and height.

15.2.3 Control Panel Items

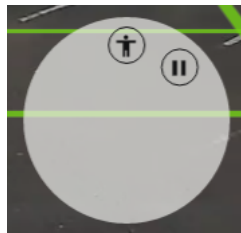
The control panel (shown on the right hand side in the image above) contains the following controls:

- **Height:** Adjusts the height of the camera
- **Tilt:** Adjusts the tilt angle of the camera
- **VFOV:** Adjusts the *vertical* field of view of the camera. **Note:** A correct value for the camera vertical field of view is important for accurate calibration and classification.

- **Horizon:** Enables/disables the horizon display. Useful to line up against a horizon in a deep scene.
- **Grid:** Enables/disables the ground plane grid display. The expand/collapse control (<) exposes additional settings to vary the colour, opacity and size of the ground plane grid.
- **Advanced:** Exposes advanced settings for controlling the pan and roll of the camera.
- **Burnt-in Annotation:** Exposes the **Burnt-in Annotation** controls for convenience.

15.2.4 Context Menu Items

Right-clicking the mouse (or tap-and-hold on a tablet) on the grid displays the context menu:



Performing the same action on a mimic displays the mimic context menu:



The possible actions from the context menu are:

- **||** Pause the video. Pausing the video can make it easier to align mimics up with objects in the scene.
- **▶** Re-starts playing the video after it was previously paused.
- **⊕** Adds an extra mimic to the ground plane.
- **⊖** Removes the currently selected mimic from the ground plane.

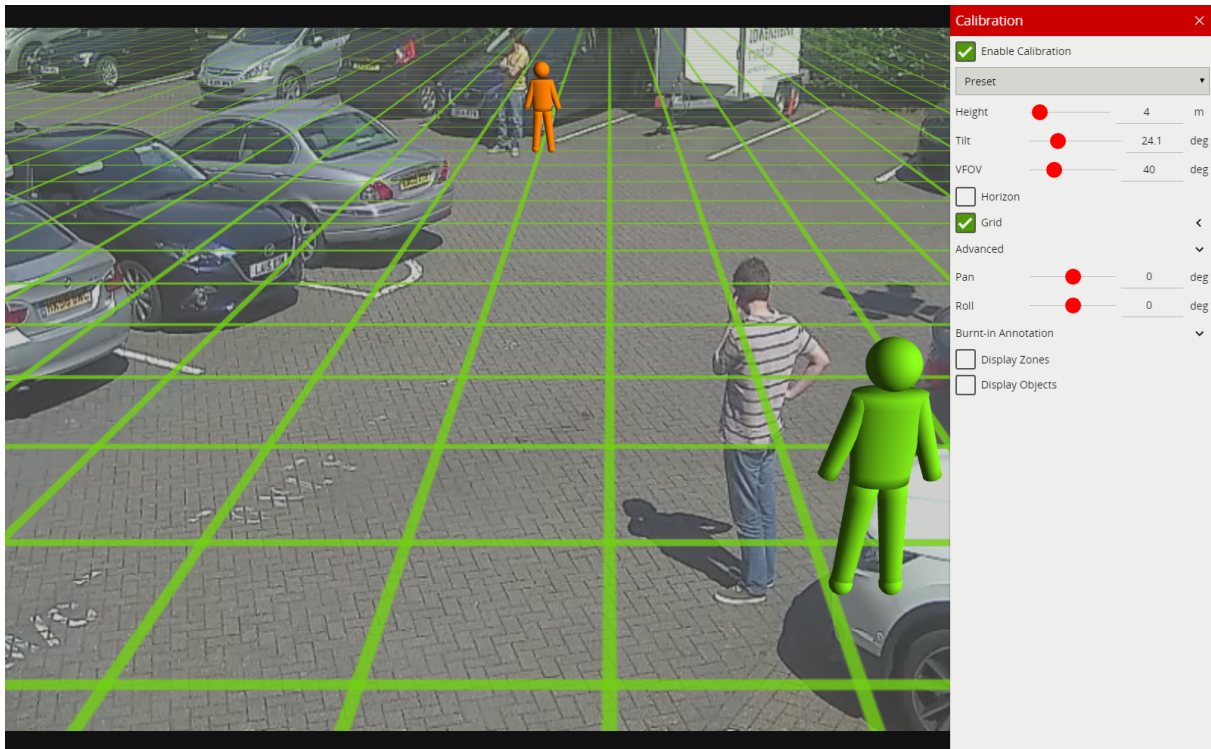
15.3 Calibrating a Channel

Calibrating a channel is necessary in order to estimate object parameters such as height, area, speed and classification. If the height, tilt angle and vertical field of view corresponding to the installation are known, these can simply be entered as parameters in the appropriate fields in the control panel.

If however, these parameters are not explicitly known this section provides a step-by-step guide to calibrating a channel.

15.3.1 Step 1: Find People in the Scene

Find some people, or some people-sized objects in the scene. Try to find a person near the camera, and a person further away from the camera. It is useful to use the play/pause control to pause the video so that the mimics can be accurately placed. Place the mimics on top of or near the people:



15.3.2 Step 2: Enter the Camera Vertical Field of View

Determining the correct vertical field of view is important for an accurate calibration. The following table shows pre-calculated values for vertical field of view for different sensor sizes.

| | | Focal Length(mm) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 30 | 40 | 50 |
|---------------|----------------|------------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| CCD Size (in) | CCD Height(mm) | | | | | | | | | | | | | | | | |
| 1/6" | 1.73 | 82 | 47 | 32 | 24 | 20 | 16 | 14 | 12 | 11 | 10 | 7 | | | | | |
| 1/4" | 2.40 | 100 | 62 | 44 | 33 | 27 | 23 | 19 | 17 | 15 | 14 | 9 | 7 | | | | |
| 1/3.6" | 3.00 | 113 | 74 | 53 | 41 | 33 | 28 | 24 | 21 | 19 | 12 | 11 | 9 | 6 | | | |
| 1/3.2" | 3.42 | 119 | 81 | 59 | 46 | 38 | 32 | 27 | 24 | 21 | 16 | 13 | 10 | 7 | | | |
| 1/3" | 3.60 | 122 | 84 | 62 | 48 | 40 | 33 | 29 | 25 | 23 | 20 | 14 | 10 | 7 | 5 | | |
| 1/2.7" | 3.96 | 126 | 89 | 67 | 53 | 43 | 37 | 32 | 28 | 25 | 22 | 15 | 11 | 8 | 6 | | |
| 1/2" | 4.80 | 135 | 100 | 77 | 62 | 51 | 44 | 38 | 33 | 30 | 27 | 18 | 14 | 9 | 7 | 5 | |
| 1/1.8" | 5.32 | 139 | 106 | 83 | 67 | 56 | 48 | 42 | 37 | 33 | 30 | 20 | 15 | 10 | 8 | 6 | |

| | Focal Length(mm) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 15 | 20 | 30 | 40 | 50 |
|------|------------------|---|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| 2/3" | 6.60 | | 118 | 95 | 79 | 67 | 58 | 50 | 45 | 40 | 37 | 25 | 19 | 13 | 9 | 8 |
| 1" | 9.60 | | 135 | 116 | 100 | 88 | 77 | 69 | 62 | 56 | 51 | 35 | 27 | 18 | 14 | 11 |
| 4/3" | 13.50 | | | 132 | 119 | 107 | 97 | 88 | 80 | 74 | 68 | 48 | 37 | 25 | 19 | 15 |

If the table does not contain the relevant parameters, the vertical FOV can be estimated by viewing the extremes of the image at the top and bottom. Note that without the correct vertical FOV, it may not be possible to get the mimics to match people at different positions in the scene.

15.3.3 Step 3: Enter the Camera Height

If the camera height is known, type it in directly. If the height is not known, estimate it as far as possible and type it in directly.

15.3.4 Step 4: Adjust the Tilt Angle and Camera Height

Adjust the camera tilt angle (and height if necessary) until both mimics are approximately the same size as a real person at that position in the scene. Click and drag the ground plane to change the tilt angle and use the mouse wheel or control panel to adjust the camera height.

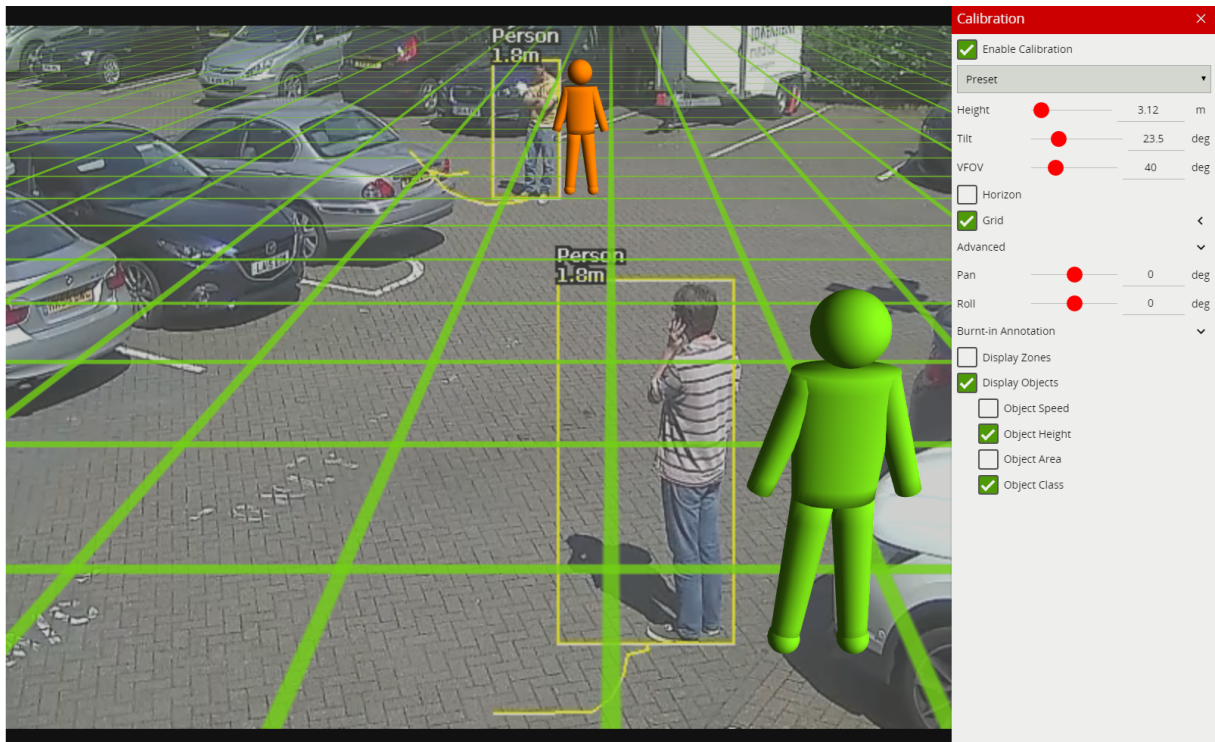
The objective is to ensure that mimics placed at various locations on the grid line up with people or people-sized- objects in the scene.

Once the parameters have been adjusted, the object annotation will reflect the changes and classify the objects accordingly.

15.3.5 Step 5: Verify the Setup

Once the scene is calibrated, drag or add mimics to different locations in the scene and verify they appear at the same size/height as a real person would. Validate that the height and area reported by the VCAcore annotation looks approximately correct. Note that the burnt-in -annotation settings in the control panel can be used to enable and disable the different types of annotation.

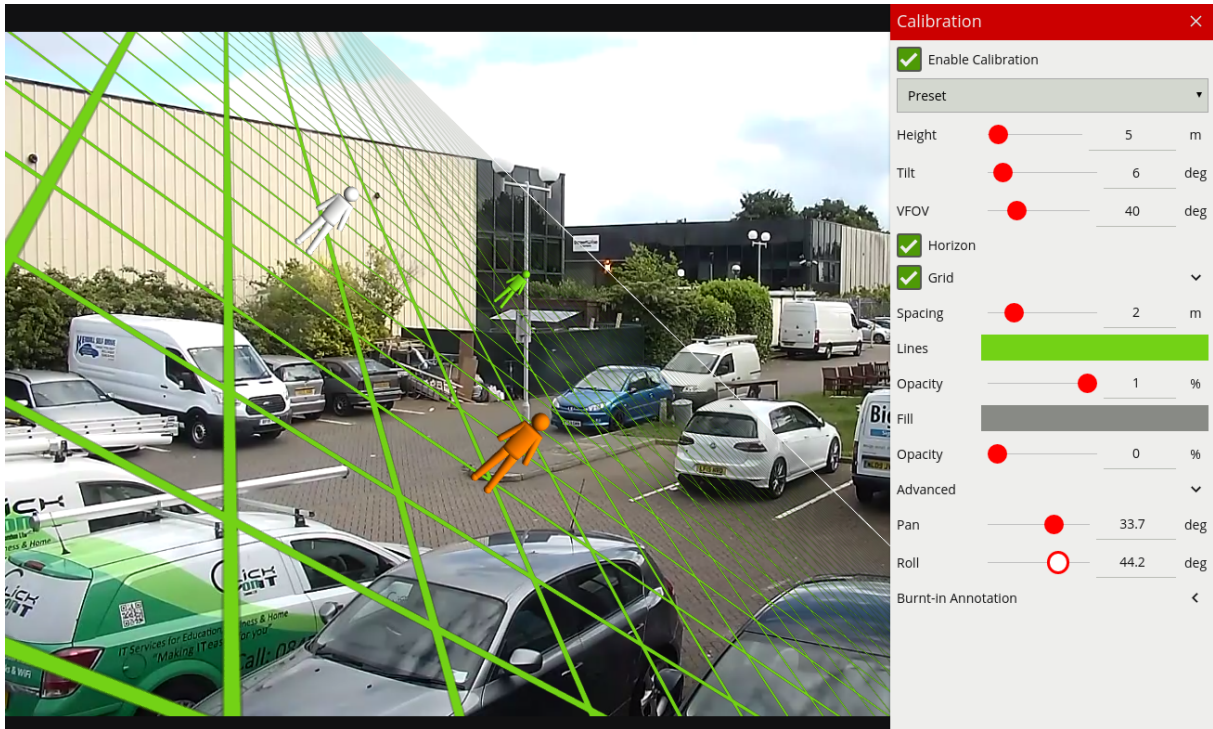
Repeat step 4 until the calibration is acceptable.



Tip: If it all goes wrong and the mimics disappear or get lost due to an odd configuration, select one of the preset configurations to restore the configuration to normality.

15.4 Advanced Calibration Parameters

The advanced calibration parameters allow the ground plane to be panned and rolled without affecting the camera calibration parameters. This can be useful to visualize the calibration setup if the scene has pan or roll with respect to the camera.



Note: the pan and roll advanced parameters only affect the orientation of the 3D ground plane so that it can be more conveniently aligned with the video scene, and does not actually affect the calibration parameters.

15.5 Next Steps

Once the channel has been calibrated, the **Classification Settings** can be configured.

Chapter 16

Classification

VCAcore can define a moving objects class using either it's Deep Learning models or by using properties extracted from an object in a **calibrated** scene.

Both methods of classification are applied through the use of filters in the **rules** interface. Classification filters allow an object, which has triggered a rule, to be evaluated against it's predicted class and filtered out if needed.

16.1 Object Classification

Once a camera view has been **calibrated**, each detected object in that view will have a number of properties extracted including object area and speed.

VCAcore's object classification performs classification by comparing these properties to a set of configurable object classifiers. VCAcore comes pre-loaded with the most common object classifiers, and in most cases these will not need to be modified.

16.1.1 Configuration

In some situations it might be desirable to change the classifier parameters, or add new object classifiers. The classification menu can be used to make these changes.

Add Classifier +

| | | | | | | | | | | | | | |
|---|-------|-----------------|--------|---|----|-----|------|-------|-----|----|-----|----------------|---|
| ⋮ | Name: | Person | Speed: | 0 | to | 20 | km/h | Area: | 0.5 | to | 2 | m ² | ✖ |
| ⋮ | Name: | Vehicle | Speed: | 0 | to | 200 | km/h | Area: | 4 | to | 100 | m ² | ✖ |
| ⋮ | Name: | Clutter | Speed: | 0 | to | 50 | km/h | Area: | 0 | to | 0.4 | m ² | ✖ |
| ⋮ | Name: | Group Of People | Speed: | 0 | to | 20 | km/h | Area: | 2.1 | to | 3.9 | m ² | ✖ |

Each of the UI elements are described below:

- **⋮** : Click and drag to rearrange the order of the classification groups.
- **Name:** Specifies the name of the classification group.
- **Speed:** Sets the speed range for the classification group. Objects which fall within the speed and area ranges will be classified with this group.
- **Area:** Sets the area range for the classification group. Objects which fall within the speed and area ranges will be classified with this group.
- **✖** : Deletes the classification group.

To add a new classifier click the **Add Classifier** button .

Calibration must be **enabled** on each channel object classification is to be used on. If not enabled, any rules that include an object filter will not trigger.

16.1.2 Classification (Object)

Objects are classified according to how their calibrated properties match the classifiers. Each classifier specifies a speed range and an area range. Objects with properties which fall within both ranges of speed and area will be classified as being an object of the corresponding class.

Note: If multiple classes contain overlapping speed and area ranges then object classification may be ambiguous (since an object will match more than one class). In this case the actual classification is not specified and may be any one of the overlapping classes.

The classification data from object classification can be accessed via **template tokens**.

16.2 Deep Learning Filter

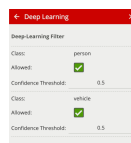
VCAcore also supports classification through the use of the deep learning filter. In this case an object, which has triggered a rule, can be analysed using the deep learning filter and a predicted class and confidence level returned. The available object classes are defined by the model.

On VCAserver the deep learning filter can use GPU acceleration. GPU acceleration requires a NVIDIA GPU with CUDA Compute Capability 3.5 or higher and CUDA 10.0 to be installed.

Without GPU acceleration the deep learning filter will use the CPU, enabling the filter on multiple channels which are generating a high volume of events (more than 1 per second) may result in poor performance of the system and is not advised.

16.2.1 Configuration

The Deep Learning page allows the user to configure the deep learning filter in VCAcore.



Each of the possible object classes has additional parameters:

- **Allowed:** Whether this object type will be allowed to pass through the filter. If this is unchecked, any objects classified as this type will not trigger any actions.
- **Confidence Threshold:** A value between 0.0 and 1.0 representing the minimum confidence level required in order for the object to pass through the filter. Any objects with a lower classification score than this minimum value will be filtered out and will not trigger any actions.

16.2.2 Classification (DL)

When an object triggers the deep learning filter, the analysed object will either be defined as one of the detectable object classes or as background. While an object is triggering a rule (i.e. triggering a presence rule) the deep learning filter will continue to evaluate and update its prediction until the deep learning filter returns an object of interest as defined by the configuration.

If the filter classifies an object which generated an event as background, the event will be filtered out and any attached actions will not be triggered.

The classification data from the deep learning filter can also be accessed via [template tokens](#).

16.3 Analytics Pipeline for Classification

VCAcore supports two forms of object classification as described above. The deep learning filter neither requires the source input to have been [calibrated](#) or the [object classifier](#) to be configured. Likewise the settings of the deep learning filter are entirely independent from object classification.

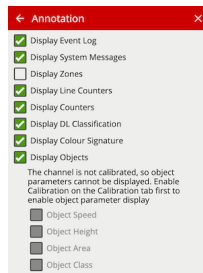
Either classification method can be used independently or together, defined by how a rule graph is constructed. However, when using both together care should be taken. For example, as the deep learning filter is trained to detect specific objects, if custom object classes have been configured in the

object classifier, e.g. small animal, the deep learning filter may erroneously filter those alerts out as small animal is not a class it is trained to recognise. In these cases, use of the deep learning filter is not recommended.

Chapter 17

Burnt-in Annotation

Burnt-in Annotations allow VCAcore annotations to be burnt into the raw video stream. The burnt-in annotation settings control which portions of the VCAcore metadata (objects, events, etc) are rendered into the video stream.

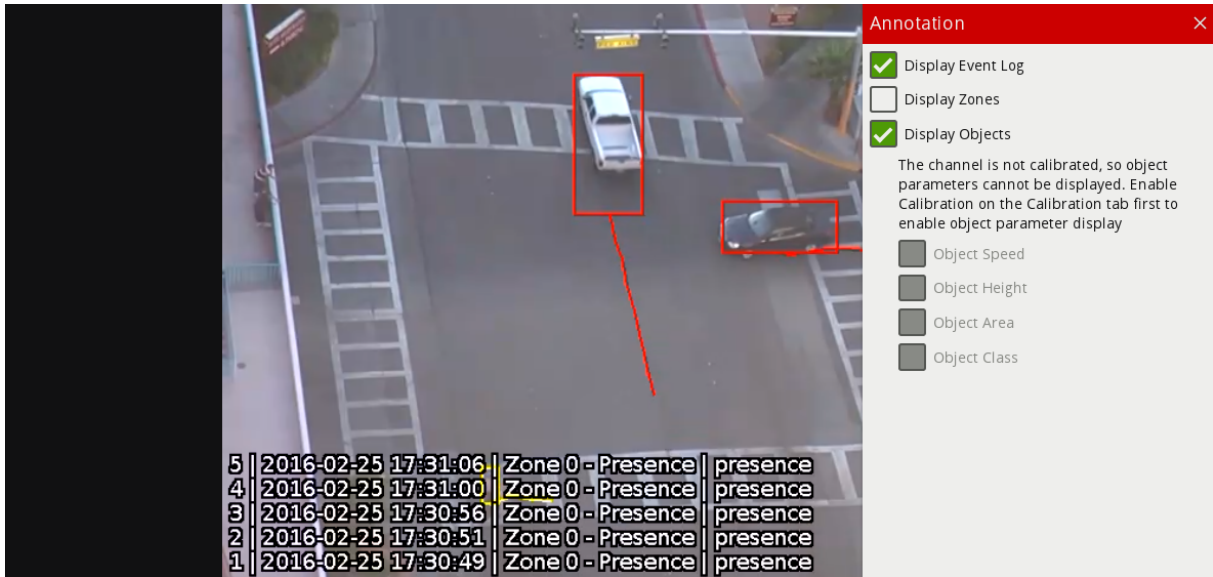


Note:

- To display object parameters such as speed, height, area and classifications, the channel must first be **calibrated**.
- To display DL Classification data, the channel must have an active Deep Learning Filter rule configured.
- To display colour signature annotations, the Colour Signature algorithm must be enabled under the **advanced settings**.

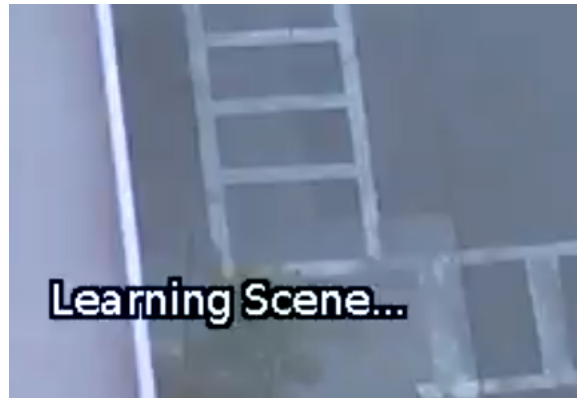
17.1 Display Event Log

Check the **Display Event Log** option to show the event log in the lower portion of the image.



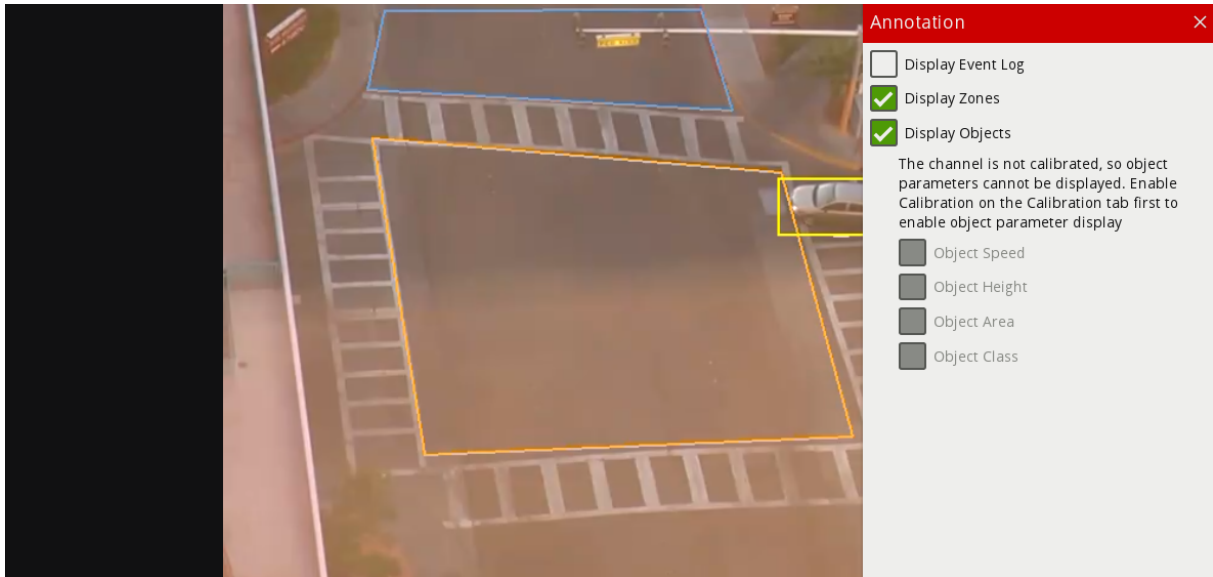
17.2 Display System Messages

Check the **Display System Messages** option to show the system messages associated with Learning Scene and Tamper.



17.3 Display Zones

Check the **Display Zones** option to show the outline of any configured zones.



17.4 Display Line counters

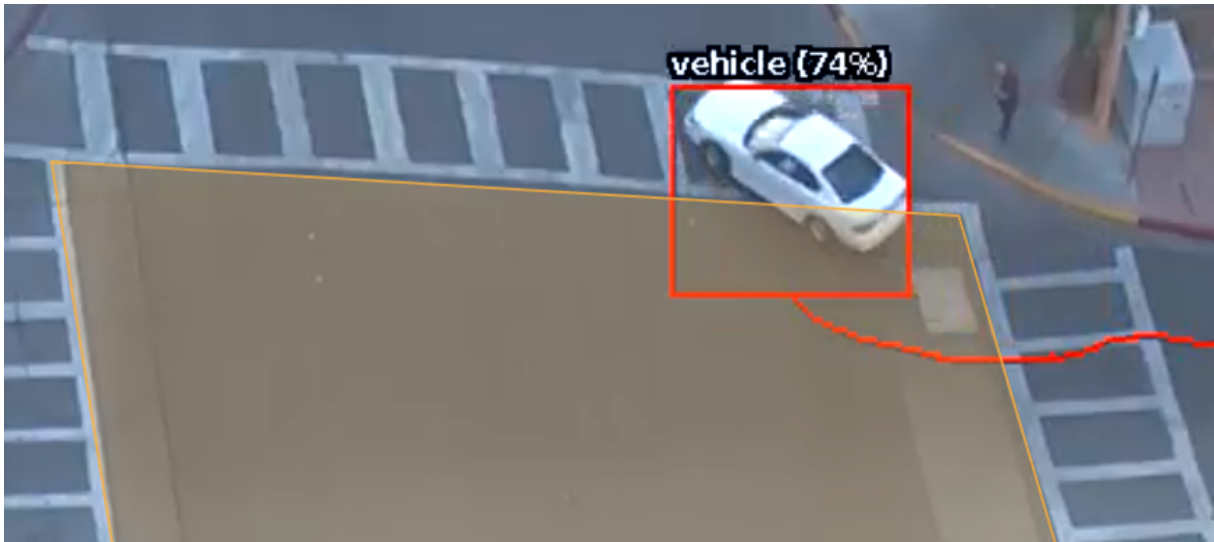
Check the **Display Line Counters** option to display the line counter calibration feedback information. See the Rules for more information.

17.5 Display Counters

Check the **Display Counters** option to display the counter names and values. See the [Counters](#) topic for more information.

17.6 Display Deep Learning Classification

Check the **Display DL Classification** option to show the class and confidence of objects which have triggered the deep learning filter. Only objects which have triggered the deep learning filter will have these annotations.



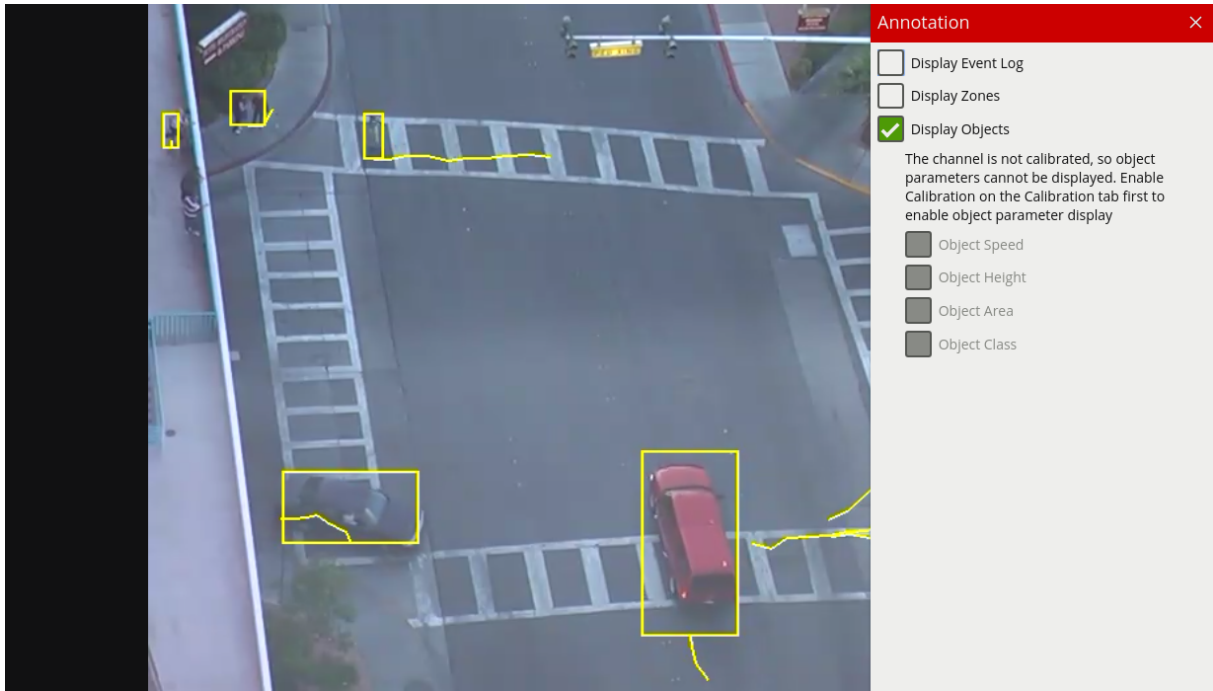
17.7 Display Colour Signature

Check the **Display Colour Signature** option to show the current top four colours (of a possible ten) found in a given bounding box.



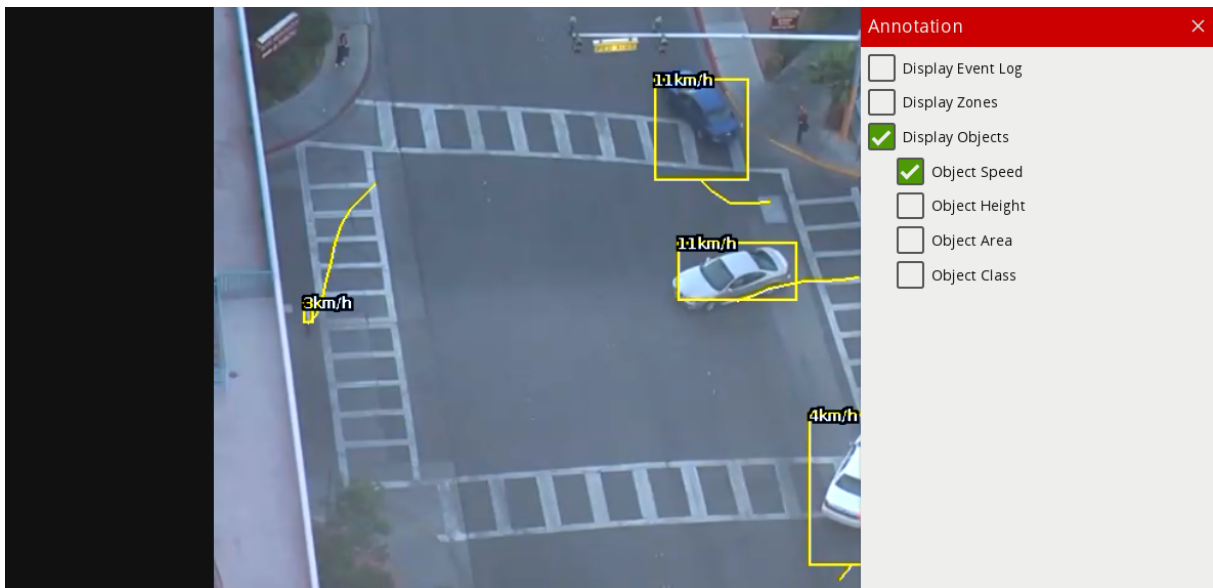
17.8 Display Objects

Check the **Display Objects** option to show the bounding boxes of tracked objects. Objects which are not in an alarmed state are rendered in yellow. Objects rendered in red are in an alarmed state (i.e. they have triggered a rule).



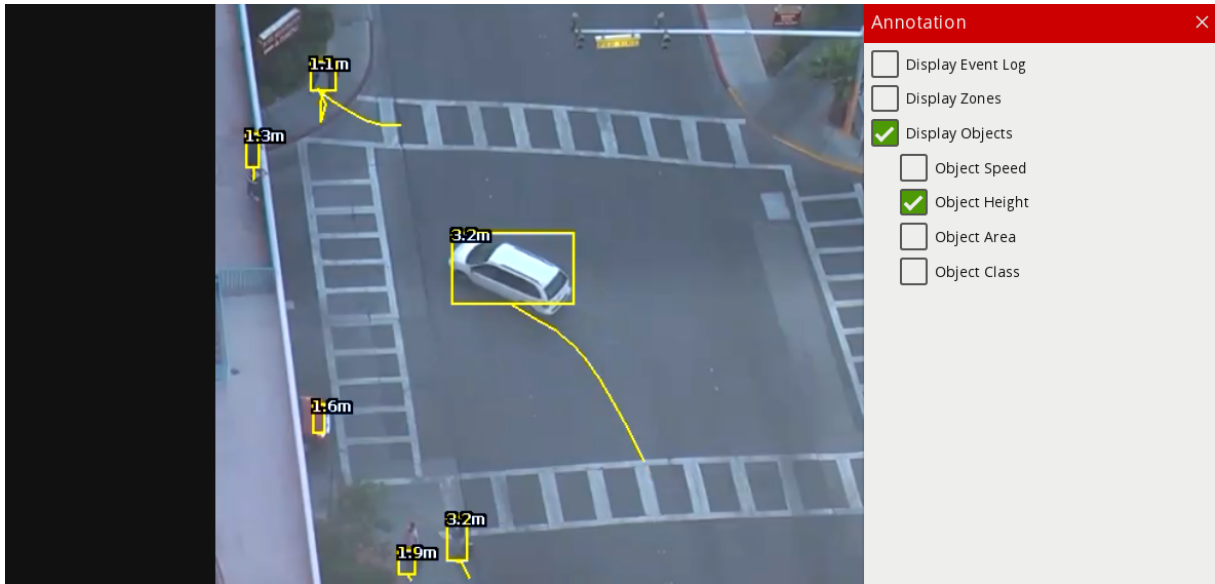
17.8.1 Object Speed

Check the **Object Speed** option to show the object speed.



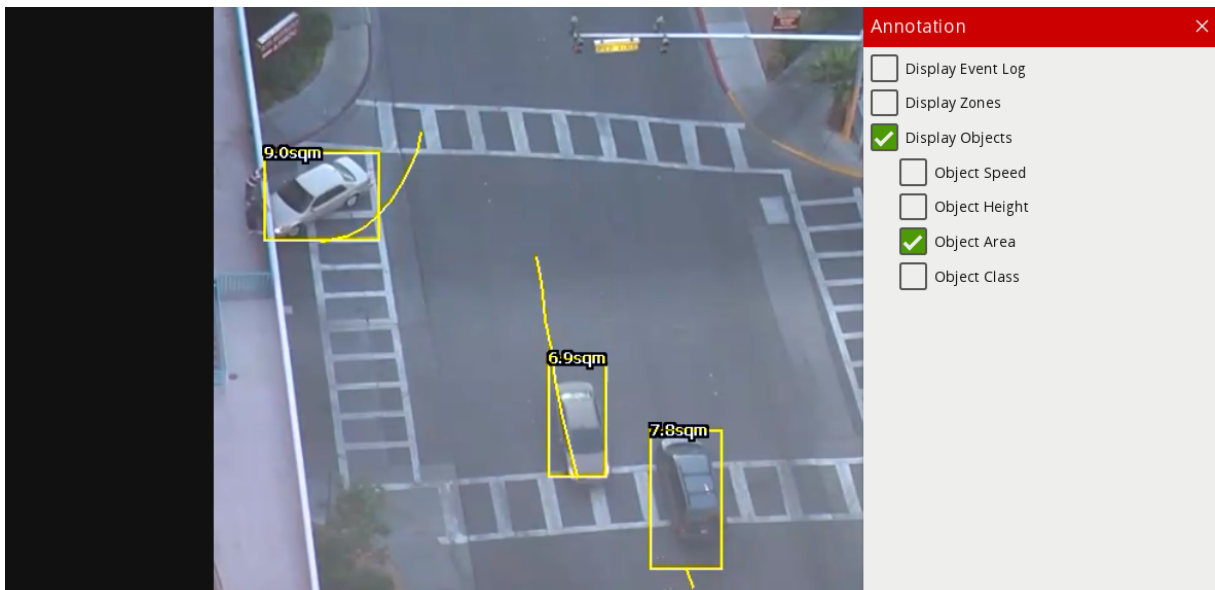
17.8.2 Object Height

Check the **Object Height** option to show the object height.



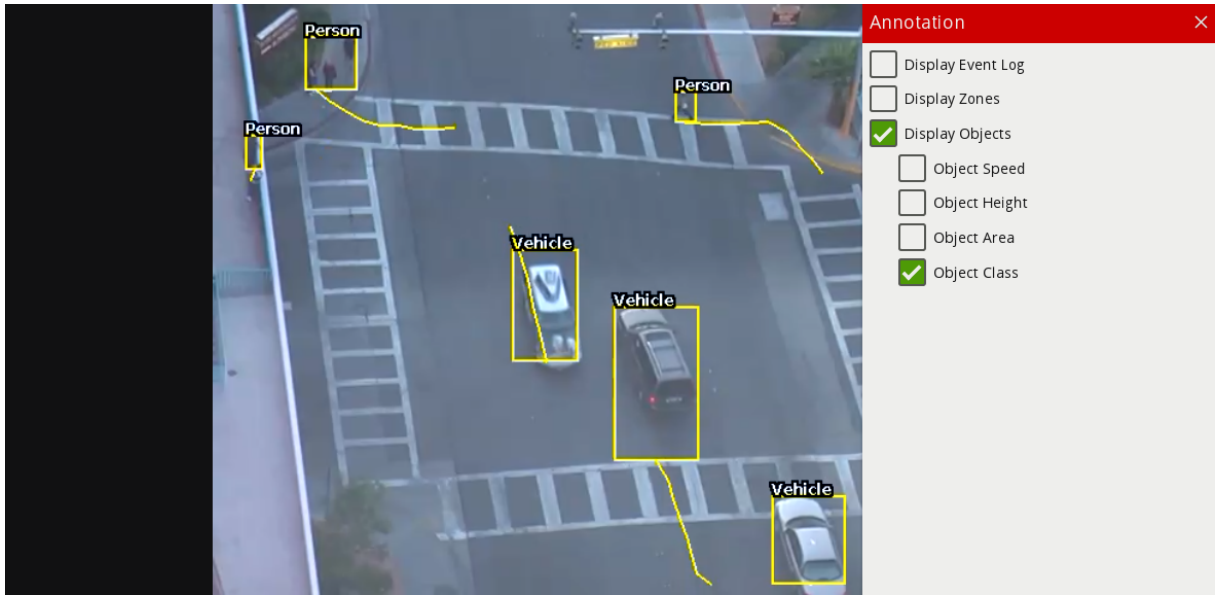
17.8.3 Object Area

Check the **Object Area** option to show object area.



17.8.4 Object Classification

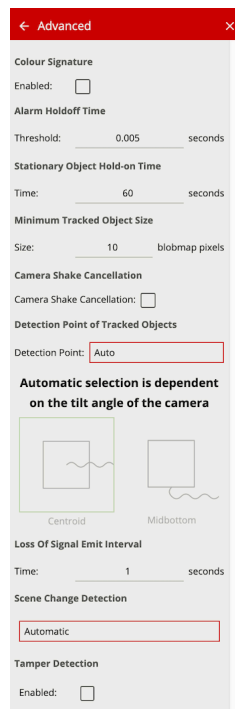
Check the **Object Class** to show the object **Classification**.



Chapter 18

Advanced Settings

In most installations, the default VCAcore configuration will suffice. However, in some cases, better performance and additional features can be configured with modified parameters. The Advanced settings page allows configuration of the advanced VCAcore parameters.



18.1 Parameters

18.1.1 Colour Signature

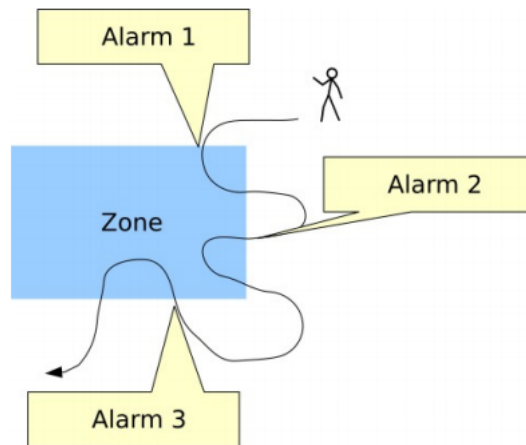
Colour Signature is an algorithm for grouping the pixel colours of an object. When enabled, any object that is tracked by VCAcore will also have its pixels grouped into 10 colours. By default this information

is added to VCAcore's metadata, available as tokens, via the SSE metadata service or that channel's RTSP metadata stream.

Additionally, to use the Colour Filter rule, Colour Signature must be enabled for that channel.

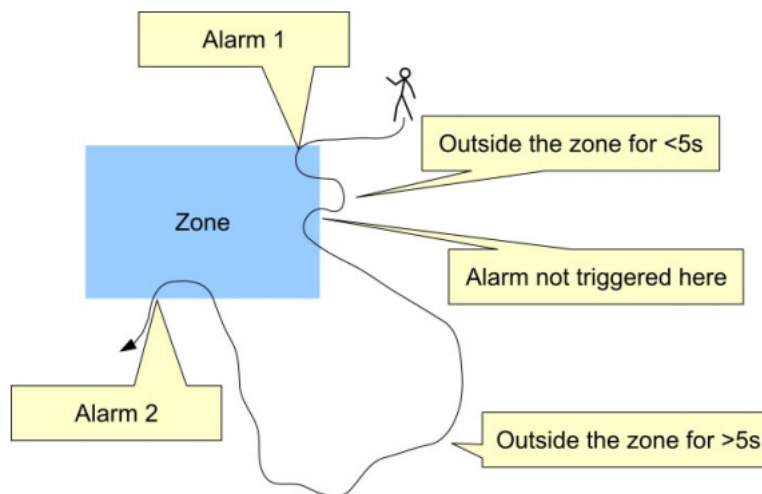
18.1.2 Alarm Hold off Time

The Alarm Hold-off Time defines the time between the successive re-triggering of an alarm generated by the same object triggering the same rule. To explain this concept, consider the following diagram where no Alarm Hold-off Time is configured:



In this detection scenario, the person enters the zone 3 times. At each point an alarm is raised, resulting in a total of 3 alarms. With the Alarm Hold-off Time configured, it's possible to prevent re-triggering of the same rule for the same object within the configured time period.

Consider the same scenario, but with an Alarm Hold-off Time of 5 seconds configured:



In this case, an alarm is not raised when the person enters the zone for the second time, because the time between the occurrence of the last alarm of the same type for the object is less than the Alarm Hold-off Time. When the person re-enters the zone for a third time, the elapsed time since the previous alarm of the same type for that object is greater than the Alarm Hold-off time and a new alarm is generated. In essence, the Alarm Hold-off Time can be configured to prevent multiple alarms being generated because an object is loitering on the edge of a zone. Without Alarm Hold-off Time configured, this scenario would cause so called “Alarm chatter”.

The default setting for Alarm Hold-off Time is 5 seconds

18.1.3 Stationary Object Hold-on Time

The Stationary Object Hold-on Time defines the amount of time that an object will be tracked by the engine once it becomes stationary. Since objects which become stationary must be “merged” into the scene after some finite time, the tracking engine will forget about objects that have become stationary after the Stationary Object Hold-on Time.

The default setting is 60 seconds.

18.1.4 Minimum Tracked Object Size

The Minimum Tracked Object Size defines the size of the smallest object that will be considered for tracking.

For most applications the default setting of 10 is recommended. In some situations, where extra sensitivity is required, the value can be manually specified. While lower values allow the engine to track smaller objects, it may increase the susceptibility to false detections.



18.1.5 Camera Shake Cancellation

Enabling Camera Shake Cancellation stabilises the video stream before the analytics process runs. This can be useful where the camera is installed on a pole or unstable platform and subject to sway or shake.

It's recommended to only enable this option when camera shake is expected in the installation scenario.

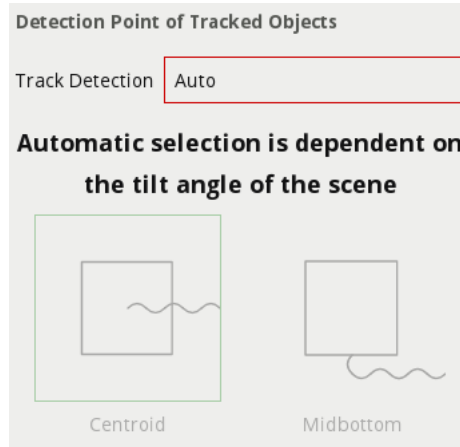
18.1.6 Detection Point of Tracked Objects

For every tracked object, a point is used to determine the object's position, and evaluate whether it intersects a zone and triggers a rule. This point is called the **detection point**.

There are 3 modes that define the detection point relative to the object:

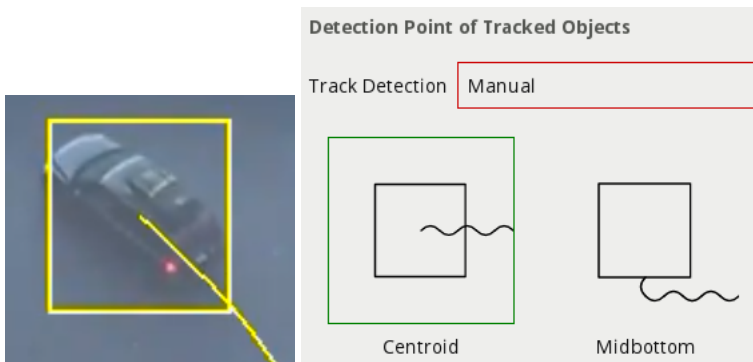
18.1.6.1 Automatic

In automatic mode, the detection point is automatically set based on how the channel is configured. It selects 'Centroid' if the camera is calibrated overhead, or 'Mid-bottom' if the camera is calibrated side-on or not calibrated.



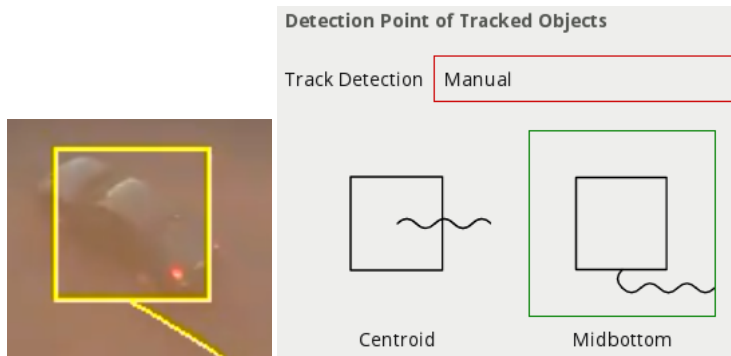
18.1.6.2 Centroid

In this mode, the detection point is forced to be the centroid of the object.



18.1.6.3 Mid-bottom

In this mode, the detection point is forced to be the middle of the bottom edge of the tracked object. Normally this is the ground contact point of the object (where the object intersects the ground plane).



18.1.7 Loss Of Signal Emit Interval

The Loss Of Signal Emit Interval defines the amount of time between emissions when a channel loses signal to it's source.

The default setting is 1 second.



18.1.8 Scene Change Detection

Learn more about [Scene Change Detection](#).

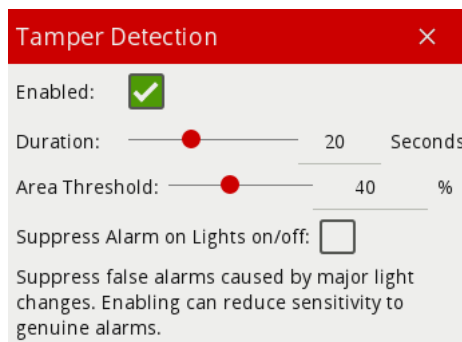
18.1.9 Tamper Detection

Learn more about [Tamper Detection](#).

Chapter 19

Tamper Detection

The Tamper Detection module is intended to detect camera tampering events such as bagging, de-focusing and moving the camera. This is achieved by detecting large persistent changes in the image.



19.1 Enabling Tamper Detection

To enable tamper detection click the **Enabled** checkbox.



19.2 Advanced Tamper Detection Settings

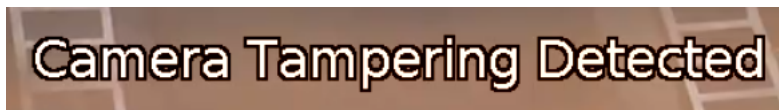
In the advanced tamper detection settings it is possible to change the thresholds for the area of the image which must be changed and the length of time it must be changed for before the tamper event is triggered.

- **Duration:** the length of time that the image must be persistently changed before the alarm is triggered.
- **Area Threshold:** the percentage area of the image which must be changed for tampering to be triggered.
- **Suppress Alarm on Lights on/off:** Large fast changes to the image lighting such as switching on/off indoor lighting can cause false tamper events. Enable this option if this is likely to be a problem in the area where the camera is installed. However, this option will reduce sensitivity to genuine alarms so it is not recommended to be used if rapid light changes are not likely to be a problem

If false alarms are a problem the duration and/or area should be increased so that large transient changes such as close objects temporarily obscuring the camera do not cause false alarms.

19.3 Notification

When a tamper event is detected, a tamper event is generated. This event is transmitted through any output elements as well as being displayed in the video stream:



Chapter 20

Scene Change Detection

The scene change detection module resets the tracking algorithm when it detects a large persistent change in the image. This prevents the tracking engine from detecting image changes as tracked objects which could be potential sources of false alarms.

The kinds of changes the scene change detection module detects are as follows:

- Sudden movement of a camera (e.g. due to repositioning or the use of a pan-tilt camera).
- Sudden obscuration of a camera (e.g. a vehicle parks in front of a camera obscuring most of its view).
- Gross illumination changes (e.g. lights being switched on/off, dazzling from car headlights).
- Day/night transitions (e.g. when a camera switches from colour to black/white during a night-day transition)

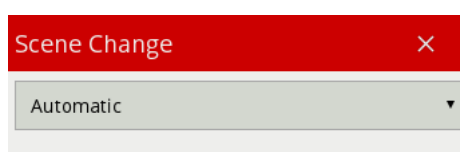
20.1 Scene Change Settings

There are 3 options for the scene change detection mode:

- **Automatic:** Detects scene changes automatically. This is the recommended setting unless the automatic mode is causing difficulties (e.g. re-learning the scene when unnecessary).
- **Manual:** Allows the user to adjust the parameters used by the scene change detection algorithm.
- **Disabled:** Disables the scene change detection.

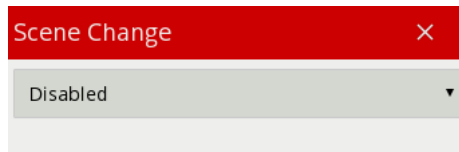
20.1.1 Automatic

This is the default setting and will automatically use the recommended settings. It is recommended to use the automatic setting unless the scene change detection is causing difficulties.



20.1.2 Disabled

Scene change detection is disabled.



Note that when the scene change detection is disabled, gross changes in the image will not be detected. For example, if a truck parks in front of the camera the scene change will not be detected and false events may occur as a result.

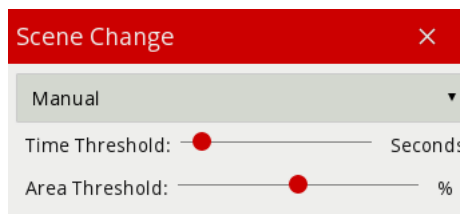
20.1.3 Manual

Allows user configuration of the scene change detection algorithm parameters.

If automatic mode is triggering in situations where it's not desired (e.g. it's too sensitive, or not sensitive enough) then the parameters can be adjusted to manually control the behaviour.

In the manual mode the following settings are available:

- **Time Threshold:** the length of time that the image must be persistently changed before the scene change is triggered and the tracking algorithm is reset.
- **Area Threshold:** the percentage area of the image which must be changed for the scene change to be triggered and the tracking algorithm to be reset.



When both the time and area thresholds are exceeded the scene is considered to have changed and will be reset.

If false scene change detections are a problem, the time and/or area should be increased so that large transient changes such as a close object temporarily obscuring the camera do not cause false scene change detections.

20.2 Notification

When a scene change is detected, the scene is re-learned and a message is displayed in the event log and annotated on the video

Learning Scene

Chapter 21

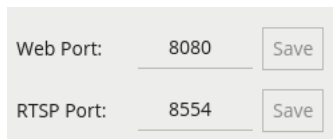
System Settings

The system settings page facilitates administration of system level settings such as network configuration, and authentication.

On the VCAbridge platform, additional network configuration settings, system time and other platform specific settings are also provided.

21.1 Network Settings

The network configuration of the device can be changed in the network settings configuration section:



| | | |
|------------|------|------|
| Web Port: | 8080 | Save |
| RTSP Port: | 8554 | Save |

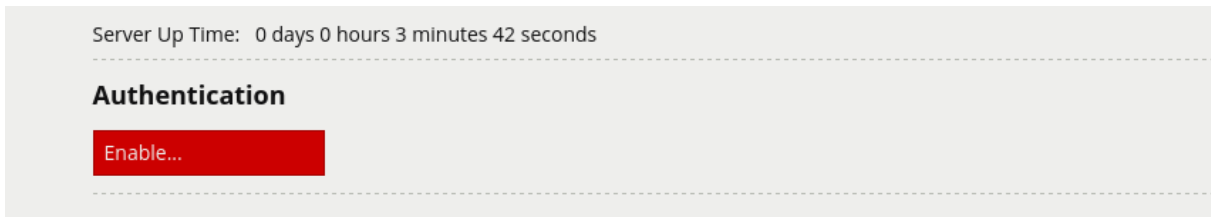
- **Web Port:** Sets the port that the device's web server will listen on. The **Save** button must be clicked to apply the change.
- **RTSP Port:** Sets the port that the device's RTSP server will listen on. The **Save** button must be clicked to apply the change.

21.2 Authentication Settings

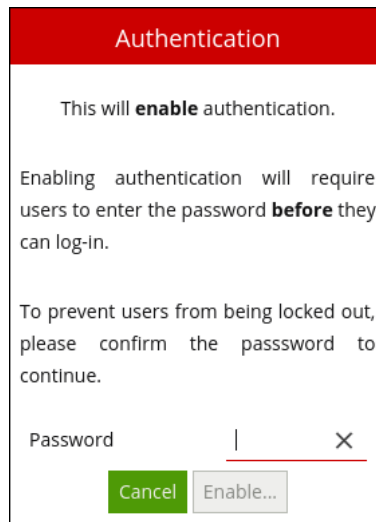
The VCA system can be protected against unauthorised access by enabling authentication. By default, authentication is enabled and the default credentials must be entered when accessing the device for the first time. Authentication applies to all functions including the web interface and API, RTSP server and discovery interfaces.

21.2.1 Enabling Authentication

Click the **Enable** button to enable authentication.

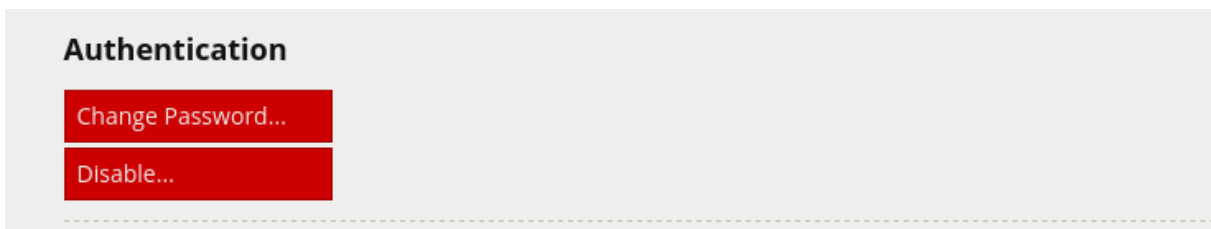


The password must be confirmed before authentication can be enabled in order to prevent the user being locked out of the device.

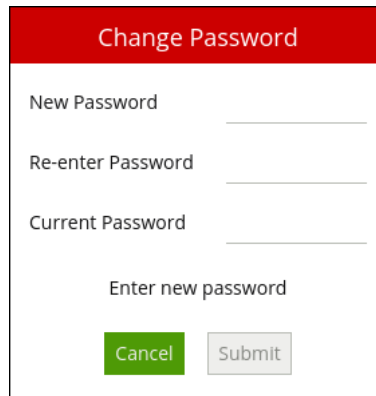


21.2.2 Changing the Password

Click the **Change Password** button to change the password.



Enter the new password, and confirm the current password in order to apply the changes.

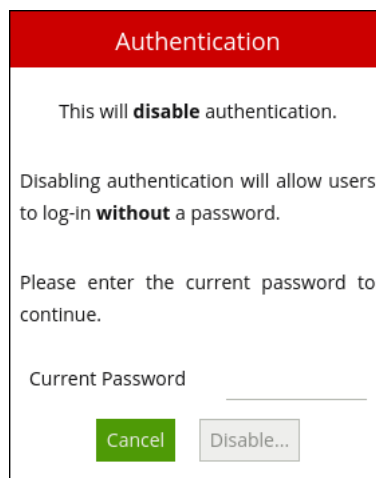


A dialog box titled "Change Password" with a red header. It contains three input fields: "New Password", "Re-enter Password", and "Current Password". Below the fields is the text "Enter new password". At the bottom are two buttons: "Cancel" (green) and "Submit" (grey).

WARNING: If the password is forgotten, the device will not be accessible. The only way to recover access to a device without a valid password is to perform a physical reset as described in the Forgotten Password section.

21.2.3 Disabling Authentication

Click the **Disable** button to disable authentication and allow users to access the device without entering a password. The password is required to disable authentication.



A dialog box titled "Authentication" with a red header. It contains the following text: "This will **disable** authentication.", "Disabling authentication will allow users to log-in **without** a password.", and "Please enter the current password to continue." Below the text is a "Current Password" input field. At the bottom are two buttons: "Cancel" (green) and "Disable..." (grey).

21.2.4 Default Credentials

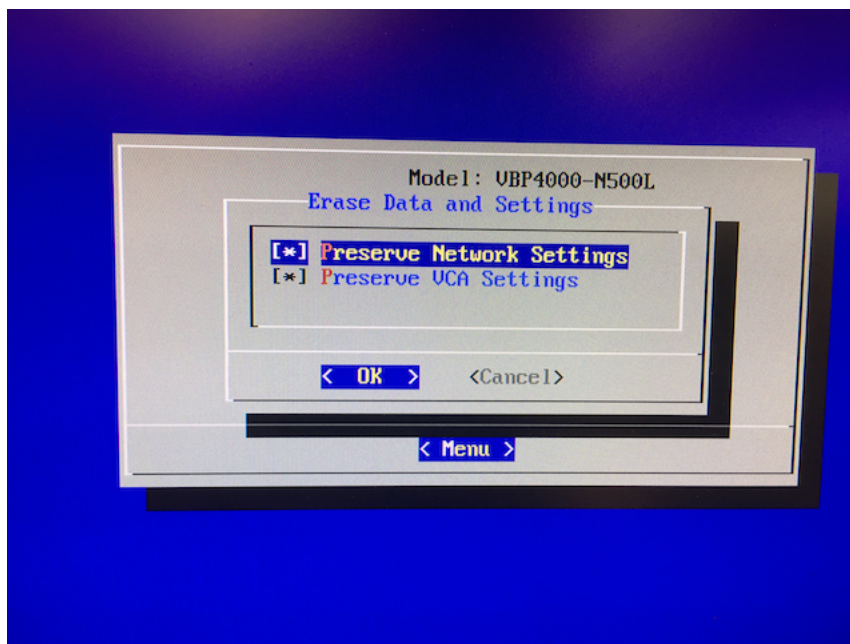
The default credentials are as follows:

- **Username:** admin
- **Password:** admin

21.2.5 Forgotten Password

If a system becomes inaccessible due to a lost password, the only way to recover access to the device is to delete the configuration file VCAcore is using. This process differs between platforms:

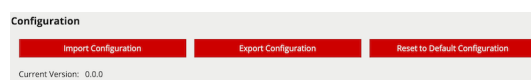
- VCAserver: Navigate to configuration folder using the the filesystem browser and delete the entire configuration folder. The configuration file will be stored in the one of the following places:
 1. Windows: when run as a service: C:\VCACore\configuration
 2. Linux: /var/opt/VCA-Core/
- VCAbridge: Performing a hard reset will remove the configuration file and restore the default credentials. To perform a hard reset:
 1. Connect a monitor and keyboard to the device to access the kiosk mode.
 2. Select the **Menu** option, then **Erase Data and Settings**.
 3. Select **OK** and reboot the device.



21.2.6 Configuration

Under configuration, buttons to allow the management of VCAcore's configuration are provided:

- **Import Configuration:** Allows the import of a previously saved VCAcore configuration file.
- **Export Configuration:** Exports the current VCAcore configuration to a file config.json
- **Reset to Default Configuration:** removes all configured channels, rules, actions etc, resetting VCAcore to the default state



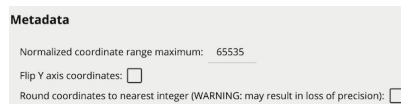
Current version information is also provided.

21.2.7 Metadata

VCAcore produces metadata accessible through various APIs but also through the action's token system. One aspect of that metadata is the **X** and **Y** coordinates for objects in a camera view.

Under the metadata section, the definition of aspects of this metadata can be specified:

- **Normalised coordinate range maximum:** The value representing the right hand side of the screen. For example can be set to 100 to signify location as a percentage the field of view
- **Flip Y axis coordinates:** The ability specify the meaning of 0 in the **Y** axis, changing it from the top of the field of view to be the bottom.
- **Round coordinates to nearest integer:** The ability to round a given coordinate to the nearest whole number. This should be used with care especially in cases where the normalised coordinate range maximum has been set to a low value.



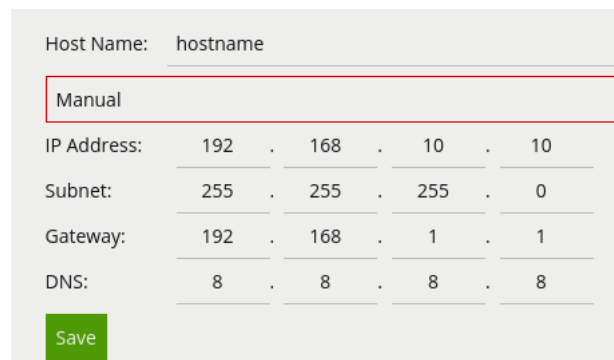
The screenshot shows a 'Metadata' configuration panel with three settings:

- Normalized coordinate range maximum: 65535
- Flip Y axis coordinates:
- Round coordinates to nearest integer (WARNING: may result in loss of precision):

21.3 VCAbridge Specific Settings

The following settings are specific to the VCAbridge platform.

21.3.1 Network Settings (cont.)

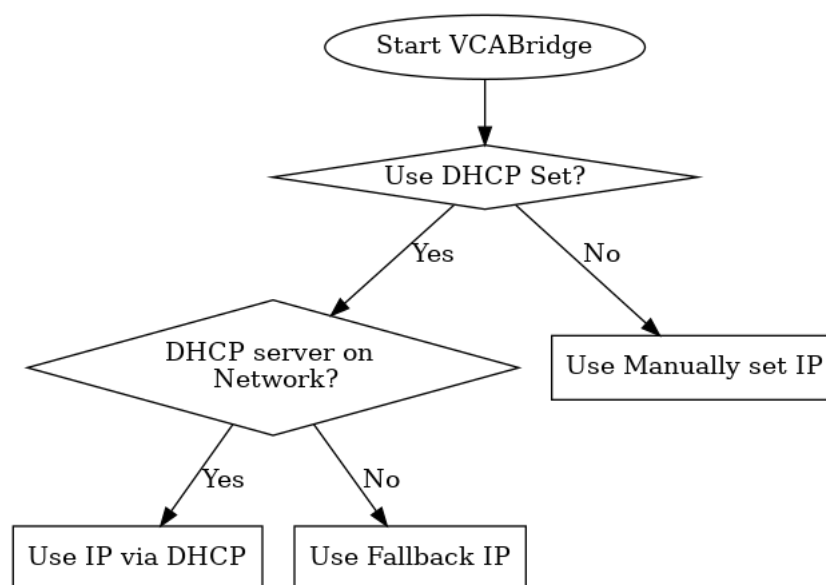


The screenshot shows a 'Network Settings' form with the following fields:

- Host Name: hostname
- Manual (selected)
- IP Address: 192 . 168 . 10 . 10
- Subnet: 255 . 255 . 255 . 0
- Gateway: 192 . 168 . 1 . 1
- DNS: 8 . 8 . 8 . 8
- Save button

- **Host Name:** Sets the hostname of the bridge device. This is a unique identifier by which the device can be located on the network, and with the **discovery tool**.

- **DHCP/Manual:** Determines whether an IP address is obtained automatically via DHCP or specified manually. If DHCP is selected but there is no DHCP server on the network the device will revert to the default static IP address 192.168.10.10 with subnet mask 255.255.0.0. For manual configuration, the **subnet mask, default gateway** and **DNS server(s)** must also be specified.
- In order to apply the configuration, click the **Save** button. This is different from the rest of the interface which automatically applies changes immediately but is necessary to ensure the IP address is only changed in a single step.
- If the IP address is changed, the interface will redirect to the new IP address if possible. In some cases (e.g. when changing from manual to DHCP) the new IP address may not be known and should be re-entered in the address bar.
- The flow diagram below describes the behaviour of the VCABridge under different network conditions and configurations:



21.3.2 Time Settings

The system time settings of the VCABridge device can be changed in the time settings configuration section:

Time Settings

Device Time: 22/12/2016 07:49:58pm

DST:

24 hours:

Time Zone: (UTC+05:30) Asia/Calcutta ▼

Format: DD-MM-YYYY ▼

NTP Server: Enabled

Server: 0.pool.ntp.org

Server: 1.pool.ntp.org

Server: 2.pool.ntp.org

Server: 3.pool.ntp.org

Set Time: Date: 22/12/2016

Time (HH/MM/SS): 11:50:43

- **Device Time:** The current system time according to the device.
- **DST:** Checked if daylight savings is currently in effect for the selected time zone.
- **24 Hours:** Check to enable 24 hour time format. Uncheck to enable 12 hour AM/PM time format.
- **Time Zone:** The time zone configuration of the device. Select to change the current time zone.
- **Format:** The time format to use on the device.
- **NTP Server:** Toggle this option to enable/disable automatic time configuration with Network Time Protocol (NTP). When NTP is enabled, the NTP servers can be specified in the **Server** options below.
- **Set Time:** Manual time configuration (only available when NTP is disabled). Specify the time manually and apply it by clicking the **Submit** button.

21.3.3 Digital Input

If digital inputs are available, the input sensors can be configured in two different modes:

- **Relay:** Enables the pull-up resistor, for use when inputs are connected to switches.
- **Voltage:** Disables the pull-up resistor.

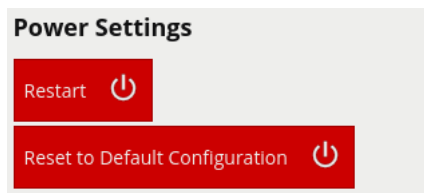
21.3.4 System Information

The system information section shows the Uptime of VCABridge (how long the application has been running without restarting) as well as the device CPU and Memory usage:

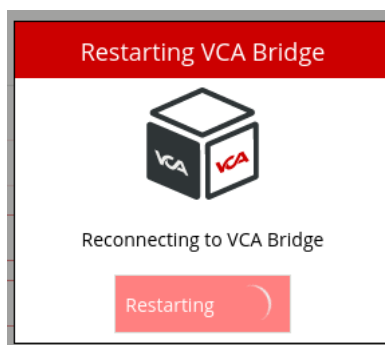
| System Information | |
|--------------------|------------------------------------|
| Uptime: | 0 days 0 hours 7 minutes 6 seconds |
| CPU: | 11% |
| Memory: | 619MB/4038MB |

21.3.5 Power Settings

The power settings section supports device maintenance functions:

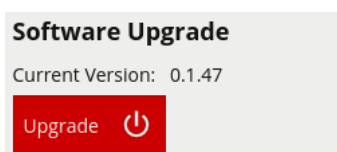


- **Restart:** Restarts the device. The interface will wait for the device to come back on-line and reconnect automatically:



- **Reset to Default Configuration:** Resets the device to its default configuration. Note that network settings and any installed licenses are not affected.

21.3.6 Software Upgrade



- **Current Version:** Illustrates the version number of the currently installed firmware.

- **Upgrade:** Upgrades the device firmware. Select a VCA package file (.vcapkg) to upload to the device. Following a successful upgrade the interface will wait for the device to come back on-line and reconnect automatically.

Chapter 22

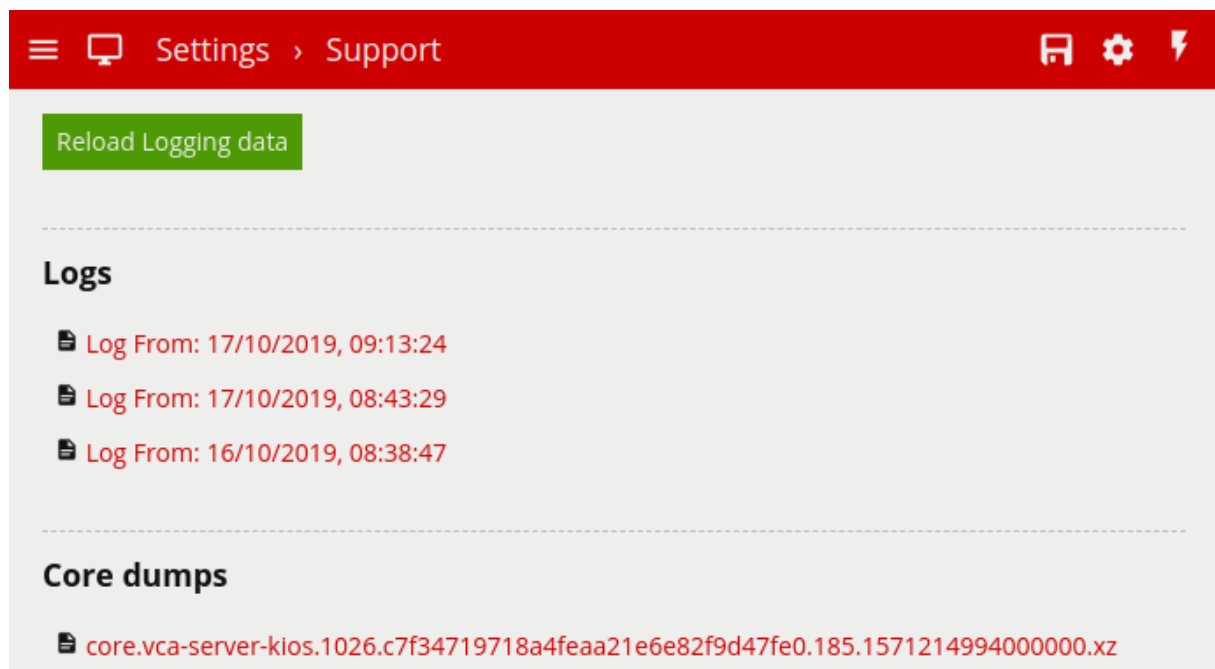
Support

The support page provides a repository for tools which can be utilised to help debug issues.

22.1 Logs

The Logs section provides a list of download links to the currently available logs. Logs are user-readable text files which log VCAcore messages. These logs can be submitted to the VCA Technology support staff to help resolve issues. New log files are created when VCAcore is started. If a log file reaches a certain size then it will be split into separate files.

The list of log files can be reloaded using the **Reload Logging data** button. Only a limited number of files can be stored with the oldest being replaced if that storage limit is met.



22.2 Core Dumps

The Core Dumps section provides a list of download links to the currently available core dumps. This additional debugging file is available for the VCAbridge only. Core dumps can be uploaded to the VCA Technology support staff to provide more in depth system state information.

The list of core dump files can be reloaded using the **Reload Logging data** button. Only a limited number of files can be stored, with the oldest being replaced if that storage limit is met.

Chapter 23

Template Tokens

VCAcore can be set up to perform a specific action when an analytic event occurs. Examples include sending an email, TCP or HTTP message to a server.

VCAcore allows templated messages to be written for email, TCP and HTTP actions which are automatically filled in with the metadata for the event. This allows the details of the event to be specified in the message that the action sends, e.g. the location of the object, type of event, etc.

23.1 Syntax

The templating system uses `mustache`, which is widely used and [well-documented online](#).

A brief overview of the templating syntax will be provided here.

Templated messages can be written by using tokens in the message body. For example:

```
Hello {{name}}!
```

is a template with a `name` token. When the template is processed, the event metadata is checked to see if it has a `name` entry. If it does, the `{{name}}` token is replaced with the name of the event. If it isn't present, the token will be replaced with blank space.

If an event with the name `Presence` occurs, the processed template will be `Hello Presence!` but if it doesn't have a `name`, it will be `Hello !`

Some tokens may also have sub-properties which can be accessed as follows:

```
It happened at {{start.hours}}!
```

23.1.1 Conditionals

Tokens can also be evaluated as boolean values, allowing simple conditional statements to be written:

```
{{#some_property}}Hello, world!{{/some_property}}
```

In this example, if `some_property` is present in the event metadata, then "Hello, world!" will appear in the message. Otherwise, nothing will be added to the message.

If `some_property` is a boolean, then its value will determine whether or not the conditional is entered. If `some_property` is an array property, it will only evaluate as true if the array is not empty.

23.1.2 Arrays

Finally, tokens can also be arrays which can be iterated over. For example:

```
{{#object_array}}
{{name}} is here!
{/object_array}}
```

This template will iterate through each item in `object_array` and print its name, if it has a `name` property. For example, the array `[{"name": "Bob"}, {"name": "Alice"}, {"name": "Charlie"}]` will result in the following output:

```
Bob is here!
Alice is here!
Charlie is here!
```

23.2 List of tokens

Lower case names represent tokens that can be used with the `{{token}}` syntax. Upper case names represent boolean or array properties that should be used with the `{{#token}}...{/token}}` syntax.

23.2.1 `{{name}}`

The name of the event

23.2.2 `{{id}}`

The unique id of the event

23.2.3 `{{type.string}}`

The type of the event. This is usually the type of rule that triggered the event

23.2.4 `{{type.name}}`

This is a boolean property that allows conditionals to be performed on the given type *name*.

For example, to print something only for events of type "presence":

```
{{#type.presence}}My text{/type.presence}}
```

23.2.5 `start`

The start time of the event. It has the following sub-properties:

- `start.iso8601`
- `start.year`
- `start.month`
- `start.day`
- `start.hours`
- `start.minutes`
- `start.seconds`
- `start.milliseconds`
- `start.microseconds`
- `start.nanoseconds`
- `start.epoch`
- `start.offset.sign`
- `start.offset.hours`
- `start.offset.minutes`

The `iso8601` property is a date string in the ISO 8601 format.

The `offset` property is the time zone offset.

23.2.6 `end`

The end time of the event. Same properties as `start`

23.2.7 `host`

The hostname of the device that generated the event

23.2.8 `ip`

The IP address of the device that generated the event

23.2.9 `#Channel{id}/Channel`

The id of the channel that the event occurred on

23.2.10 `#Zone`

An array of the zones associated with the event. It has the following sub-properties:

- `id`: The id of the zone
- `name`: The name of the zone
- `channel`: The id of the channel the zone is attached to

- colour: The RGBA colour of the zone
- detection: 0 if the zone is non-detection zone, 1 otherwise
- type: 0 for a closed polygon, 1 for a line
- outline: The outline of the object (see the outline token for more details)

Example:

```

{{#Zone}}
id: {{id}}
name: {{name}}
channel:{{channel}}
colour: ({{colour.r}}, {{colour.g}}, {{colour.b}}, {{colour.a}})
{/Zone}

```

23.2.11 {{#Rule}}

An array of the rules associated with the event. It has the following sub-properties:

- id: The id of the rule that triggered the event
- name: The name of the rule that triggered the event
- type: The type of the rule that triggered the event

Example:

```

{{#Rule}}
id: {{id}}
name: {{name}}
type:{{type}}
{/Rule}

```

23.2.12 {{#Object}}

An array of the objects that triggered the event. It has the following sub-properties:

- id: The id of the object
- outline: The outline of the object (see the outline token for more details)
- width: The width of the bounding box based on the outline
- height: The height of the bounding box based on the outline

Example:

```

{{#Object}}
id: {{id}}
width: {{width}}
height: {{height}}
Top left corner: ({{outline.rect.top_left.x}}, {{outline.rect.top_left.y}})
{/Object}

```

23.2.13 `{{outline}}`

The bounding box outline of an object or zone. It has the following sub-properties:

- `outline.rect.top_left.x`: x-coordinate of the top left corner
- `outline.rect.top_left.y`: y-coordinate of the top left corner
- `outline.rect.bottom_right.x`: x-coordinate of the bottom right corner
- `outline.rect.bottom_right.y`: y-coordinate of the bottom right corner

Using a combination of these four coordinates, any corner of an object's bounding box can be obtained.

23.2.14 `{{#CountingLine}}`

An array of line counter counts. It has the following sub-properties:

- `rule_id`: The id of the line counter rule
- `width`: The calibration width of the line counter
- `position`: The position at which the object crossed the line
- `count`: The number of objects that crossed the line
- `direction`: The direction in which the object(s) crossed the line. 0 for A, 1 for B

Example:

```
{{#CountingLine}}
rule_id: {{rule_id}}
calibration width: {{width}}
position: {{position}}
count: {{count}}
direction: {{direction}}
{{/CountingLine}}
```

23.2.15 `{{#Counter}}`

An array of counter counts. It has the following sub-properties:

- `id`: The id of the counter
- `name`: The name of the counter
- `value`: The number of counts

Example:

```
{{#Counter}}
id: {{id}}
name: {{name}}
count: {{value}}
{{/Counter}}
```

23.2.16 `{{#Tamper}}`

A boolean that is true if a camera tamper has been detected

Example:

```
{{#Tamper}}The camera has been tampered with!{/Tamper}}
```

23.2.17 **{{#Area}}**

The estimated area of the object. This token is a property of the object token. It is only produced if calibration is enabled. It has the following sub-properties:

- value: The estimated area of the object

Example:

```
{{#Object}}{{#Area}}{{value}}{/Area}}{/Object}}
```

23.2.18 **{{#Height}}**

The estimated height of the object. This token is a property of the object token. It is only produced if calibration is enabled. It has the following sub-properties:

- value: The estimated area of the object

Example:

```
{{#Object}}{{#Height}}{{value}}{/Height}}{/Object}}
```

23.2.19 **{{#GroundPoint}}**

The estimated position of the object. This token is a property of the object token. It is only produced if calibration is enabled. It has the following sub-properties:

- value.x: The estimated normalised x-axis position of the object
- value.y: The estimated normalised y-axis position of the object

Example:

```
{{#Object}}{{#GroundPoint}}Position: ({{value.x}}, {{value.y}}){/GroundPoint}}{/Object}}
```

23.2.20 **{{#Speed}}**

The estimated speed of the object. This token is a property of the object token. It is only produced if calibration is enabled. It has the following sub-properties:

- value: The estimated speed of the object

Example:

```
{{#Object}}{{#Speed}}{{value}}{/Speed}}{/Object}}
```

23.2.21 `{{#Classification}}`

The classification of the object. This token is a property of the object token. It is only produced if calibration is enabled. It has the following sub-properties:

- value: The classification of the object

Example:

```
{{#Object}}{{#Classification}}{{value}}{/Classification}}{/Object}}
```

23.2.22 `{{#DLClassification}}`

The classification generated by the [Deep-Learning Filter]. The filter must be enabled in order to produce this token, but calibration is not required. It has the following sub-properties:

- class: What the object has been classified as (person, vehicle)
- confidence: A value between 0.0 and 1.0 representing the confidence of the classification (0.0 least confident, 1.0 most confident)

Example:

```
{{#Object}}{{#DLClassification}}  
Class: {{class}}  
Confidence: {{confidence}}  
{/DLClassification}}{/Object}}
```

23.3 Examples

The following is an example of a template using most of the available tokens:

```
Event #{{id}}: {{name}}  
Event type: {{type}}  
Start time (ISO 8601 format): {{start.iso8601}}  
End time:  
day: {{end.day}}  
time: {{end.hour}}:{{end.minutes}}:{{end.seconds}}.{{end.microseconds}}  
Device: {{host}}  
Channel: {{#Channel}}{{id}}{/Channel}}  
{{#type.presence}}  
{{#Object}}  
Object ID: {{id}}  
{{#Classification}}Object Classification: {{value}}{/Classification}}  
{{#Height}}Object Height: {{value}}m{/Height}}  
Object bounding box: [  
  ({{outline.rect.top_left.x}}, {{outline.rect.top_left.y}}),  
  ({{outline.rect.bottom_right.x}}, {{outline.rect.top_left.y}}),  
  ({{outline.rect.bottom_right.x}}, {{outline.rect.bottom_right.y}}),  
  ({{outline.rect.top_left.x}}, {{outline.rect.bottom_right.y}})]
```

```

]
{{/Object}}
{{/type.presence}}

{{#Counter}}
Counter triggered.
id: {{id}}
name: {{name}}
count: {{count}}
{{/Counter}}

{{#LineCounter}}
rule_id: {{rule_id}}
calibration width: {{width}}
position: {{position}}
count: {{count}}
direction: {{direction}}
{{/LineCounter}}

```

In this example, the object information is only printed for events of type “presence”.

This template might result in the following message:

```

Event #350: My Bad Event
Event type: presence
Start time (ISO 8601 format): 2017-04-21T10:09:42+00:00
End time:
day: 21
time: 10:09:42.123456
Device: mysecretdevice
Channel: 0

```

```

Object ID: 1
Object Classification: Person
Object Height: 1.8m
Object bounding box: [
  (16000, 30000),
  (32000, 30000),
  (32000, 0),
  (16000, 0)
]

```

```

Counter triggered.
id: 10
name: My Counter
count: 1

```

```

rule_id: 350
calibration width: 1
position: 1

```


count: 1
direction: 0

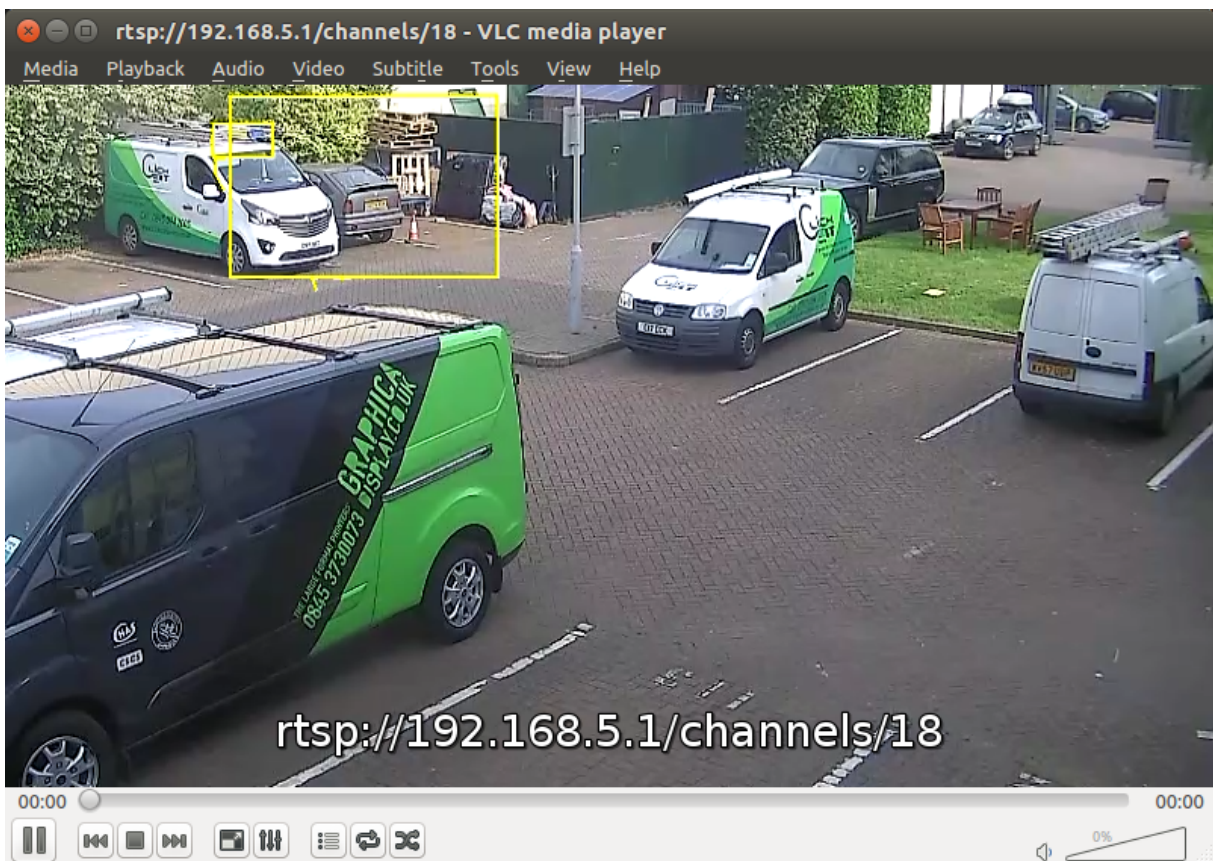
Chapter 24

RTSP Server

VCAcore supports an RTSP server that streams annotated video in RTSP format.

The RTSP URL for channels on a VCA device is as follows:

```
rtsp://\<device ip>:554/channels/\<channel id>
```



Chapter 25

Sureview Immix



VCAcore supports the notification of events with annotated snapshots and streaming of real-time annotated video to Sureview Immix.

25.1 Prerequisites

The following ports need to be accessible on the VCA device (i.e. a VCABridge or an instance of VCAserver) from the Immix server:

- 80: TCP web requests
- 554: TCP/UDP annotated RTSP video stream

25.2 Limitations

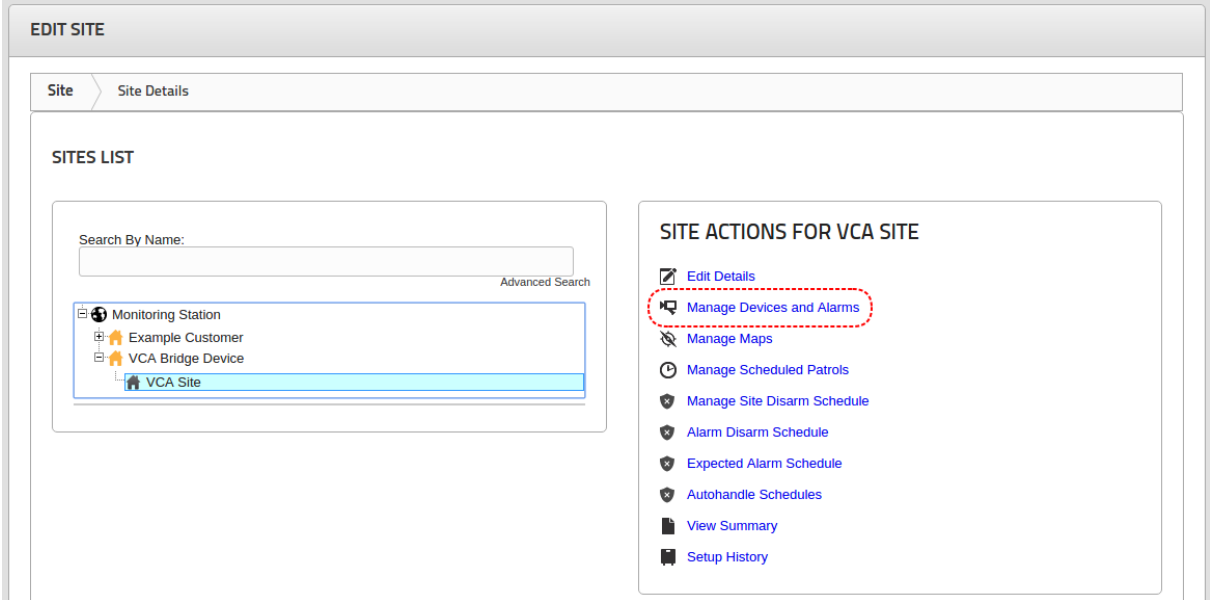
- Only one camera is supported per VCA device. This means that a device has to be configured in Immix for each channel on an instance of VCAcore. E.g. if a VCABridge has 8 channels, the Immix configuration must consist of 8 devices with one channel each.

25.3 Immix Configuration

25.3.1 Add VCA Device

The first step is to add the VCA device.

In the Immix site configuration tab, click **Manage Devices and Alarms**, then **Add Device**:



On the Add Device page, set the following options:

Devices > Cameras > Multiviews > Splits > Tours > Audios > Relays > Alarms > Summary

DEVICE DETAILS

Device Type Filter

- Video Devices
- Alarm Panel
- Access Control
- Show All

Device Type *

VCA Bridge

Title *

VCA Bridge

CONNECTION DETAILS

Used to connect to the device for monitoring. Obtain these details from the person who installed the device.

IP/Host

www.vcabox.com

Port

9555

Ports must only contain numeric values.

Username

Password

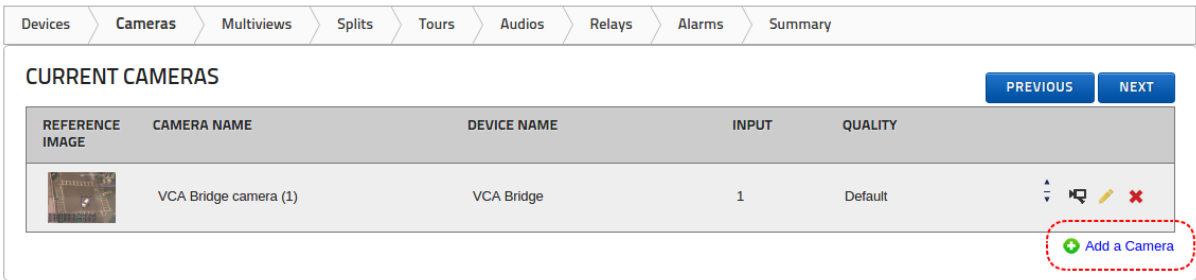
- **Device Type Filter:** Select **Video Devices**
- **Device Type:** Select **VCA Bridge**
- **Title:** Give the device a suitable name
- **IP/Host:** Enter the IP address or hostname of the VCA device
- **Port:** Enter the RTSP port of the VCA device. In this case the device is behind a firewall and port 9555 on www.vcabox.com is forwarded to the standard RTSP port (554) on the VCA device. The RTSP server on the VCA device runs on the standard RTSP port (554).

25.3.2 Add Camera

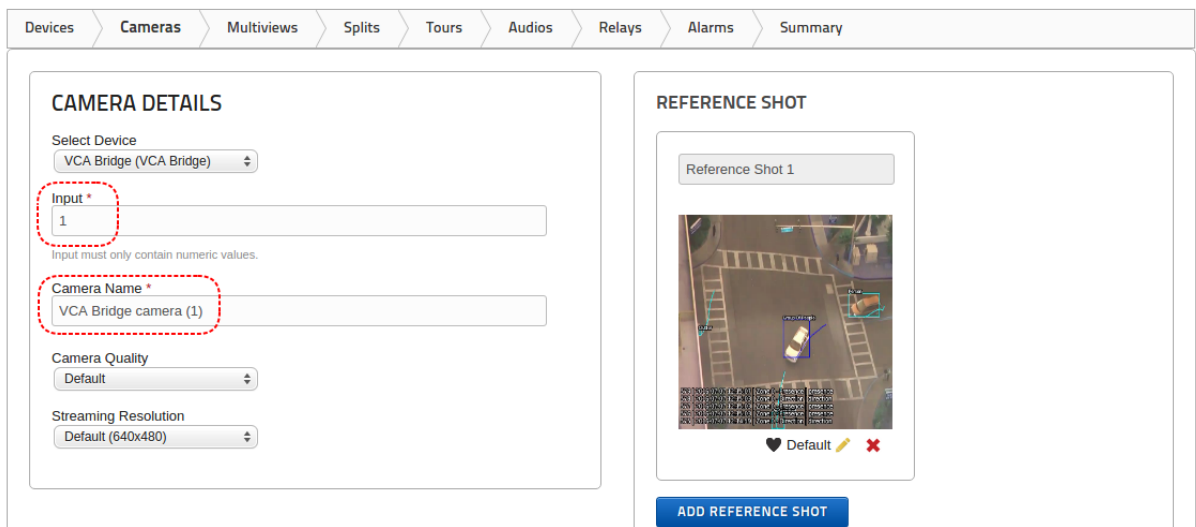
Once the device has been added, channels from the VCA device can be added.

Note: Immix currently supports only one VCA channel per device. To support more channels, simply add more devices.

Click the **Cameras** tab and **Add a Camera** to add a new channel:



On the **Camera Details** page set the following options:



- **Input:** Enter the VCA channel Id + 1 (see below for more details)
- **Camera Name:** Enter a suitable name for the channel
- Leave the other settings with default values

25.3.3 Setting the Input in Immix

In order to set the Input value correctly in Immix, the following steps should be followed:

- Find the channel Id in VCA. The channel Id is displayed at the bottom of the **Channel Settings Menu** on the **Channel Page**:

CHANNEL-ID

- Set the value of the **Input** field in Immix to the channel Id in VCA + 1, i.e. as illustrated in the table below:

| Channel Id in VCA | Input in Immix |
|-------------------|----------------|
| 0 | 1 |
| 1 | 2 |

| Channel Id in VCA | Input in Immix |
|-------------------|----------------|
| 2 | 3 |
| 5 | 6 |
| 100 | 101 |

The reason that the Immix Input is 1 higher than the VCA channel Id is that Immix uses one-based inputs but VCA uses zero-based channel Ids.

25.3.4 Retrieve a Summary

Generating a summary provides a single document with all of the details necessary to configure the VCA device. Click the **Summary** tab and a PDF report is created:

Setup Report for VCA Site

VCA Bridge Channel 1 (VCA Bridge)

Identifier: 22
 SMTP Server Address: S22@ImmixAlarms.com
 IP Address: www.vcabox.com
 Port: 9555
 Cameras:
 Input: 1, Name: VCA Bridge Channel 1 camera (1)

VCA Bridge Channel 2 (VCA Bridge)

Identifier: 23
 SMTP Server Address: S23@ImmixAlarms.com
 IP Address: www.vcabox.com
 Port: 9555
 Cameras:
 Input: 1, Name: VCA Bridge Channel 2 camera (1)

Make a note of the email addresses highlighted in red. These email addresses need to be entered in the VCA device configuration (see next section).

25.4 VCAcore Configuration

Once a device and camera are configured in Immix, the email addresses generated as part of the summary need to be added to the VCAcore configuration.

VCAcore notifies Immix of events via email, so each channel configured for Immix needs to have an email action configured. For more details on how to configure **Actions** or **Sources** see the corresponding topics.

25.4.1 Add an Email Action

Add an **Email** action with the following configuration:

- **Body Format:** Set to Sureview Immix
- **Server:** Enter the IP address or hostname of the Immix server
- **Port:** Enter the port of the Immix server (Default 25)
- **To:** Enter the email address generated in the Immix summary report. Here S22@ImmixAlarms.com corresponds to Immix Input 1 (which is VCA channel Id 0).

Once this is done, add the correct source to the email action.

25.4.2 Event Type Mappings

The event types reported in the VCAcore interface are slightly different to the event types reported in the Immix client. The events are mapped as follows:

| Event in VCA | Event in Immix |
|--------------|--------------------|
| Presence | Object Detected |
| Enter | Object Entered |
| Exit | Object Exited |
| Appear | Object Appeared |
| Disappear | Object Disappeared |
| Stopped | Object Stopped |
| Dwell | Object Dwell |
| Direction | Object Direction |
| Speed | Object Speed |
| Tailgating | Tailgating |
| Tamper | Tamper Alarm |

Chapter 26

Verifier

VCAcore supports the notification of events with annotated snapshots to Verifier.

26.1 Prerequisites

A Verifier account, please contact your VCA sales representative for details.

26.2 VCAcore Configuration

Once you have a Verifier account setup, an email action using the Verifier template must be configured for VCAcore to send data to Verifier. See below (or [Actions](#)) for more details on how to configure a Verifier email action within VCAcore.

26.2.1 Add an Email Action

Add an **Email** action with the following configuration:

- **Body Format:** Set to Verifier
- **Server:** Enter the IP address or hostname provided by Verifier
- **Port:** Enter the port of the server provided by Verifier (Default 25)
- **To:** Enter the email address generated on the Verifier dashboard

Once this is done, add the correct source to the email action.

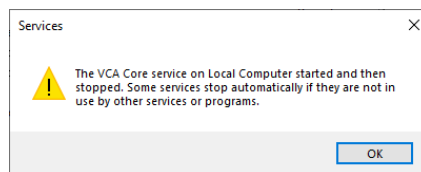
Chapter 27

Troubleshooting

27.1 Error when starting the VCAcore service on Windows 10

27.1.1 Issue

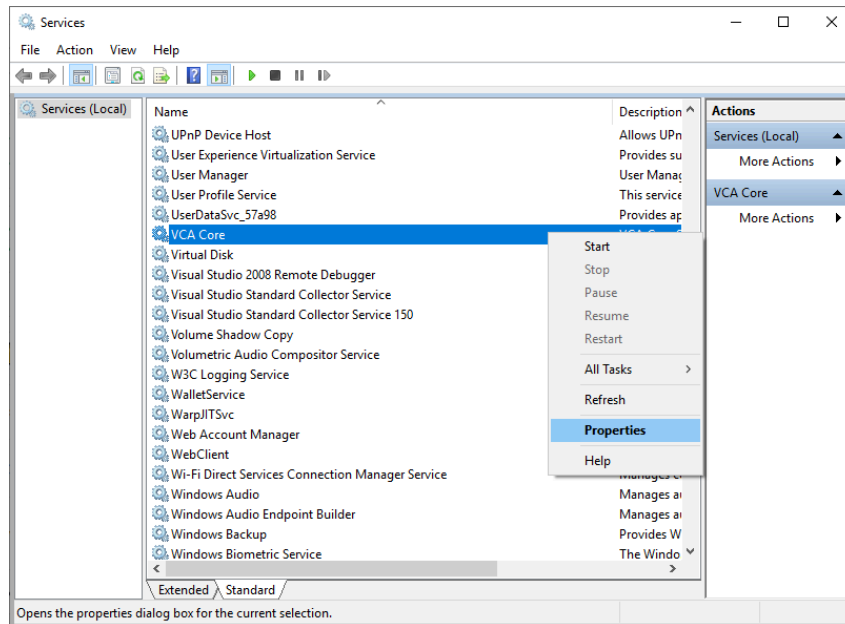
When starting core as a service you get an error similar to this:



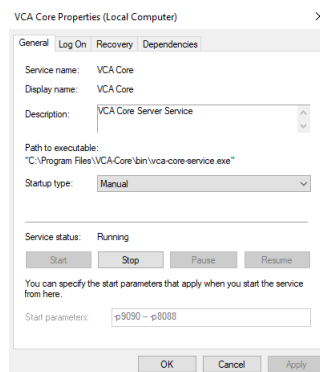
27.1.2 Solution

The most common cause of this error is one of the ports VCAcore is trying to bind to is already in use by another service or application. To fix this you can manually specify different ports:

1. Open the services window
2. Find the VCA Core service listing, right click and click properties



3. In the Start Parameters field insert `-p 9090 -- -p8080` where 9090 is the recovery port and 8080 is the web port you want VCAcore to bind to. Once defined, click the Start button to start the service with these settings.



After doing this once, the service will use these ports going forward.

Another useful Start Parameter to be aware of allows the definition of the port for VCAcore's RTSP server. In this case insert `--rtsp-port 1234` in the the Start Parameters field, where 1234 is the desired port for VCAcore's RTSP server. This can be done at the same time as the web server port.

27.2 Error when starting vca-cored application on Ubuntu

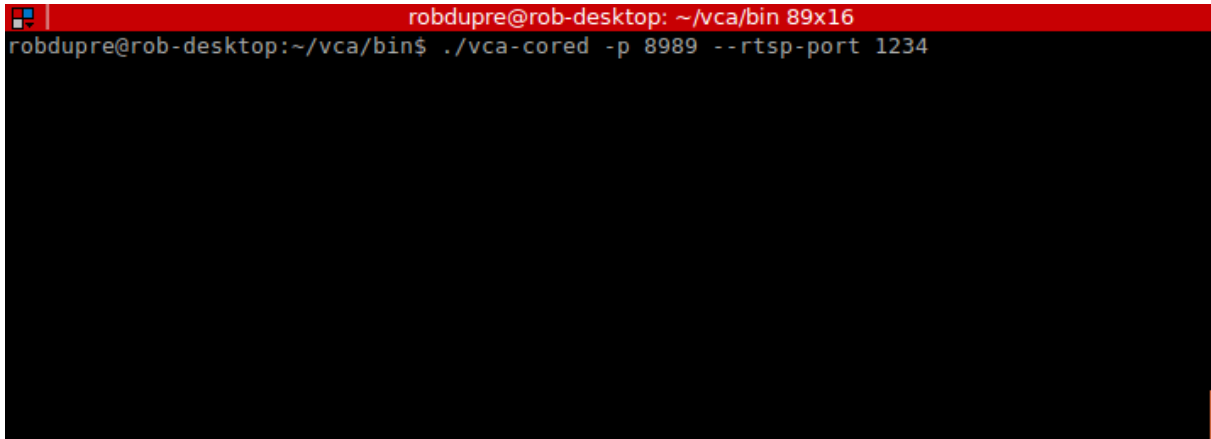
27.2.1 Issue

When starting VCAcore the following message is displayed Error attaching rtsp server

27.2.2 Solution

Typically if the VCAserver application is not starting it is due to a port conflict where both VCAcore and another application are trying to bind to the same port. This can be either the web service serving the VCAcore UI or the RTSP Server. To fix this you can specify different ports manually when starting the application. (-p for the web server, --rtsp-port for the RTSP server). Once VCAcore successfully starts with these parameters the configuration file will persist these changes, negating the need to specify the parameters each time VCAcore is started.

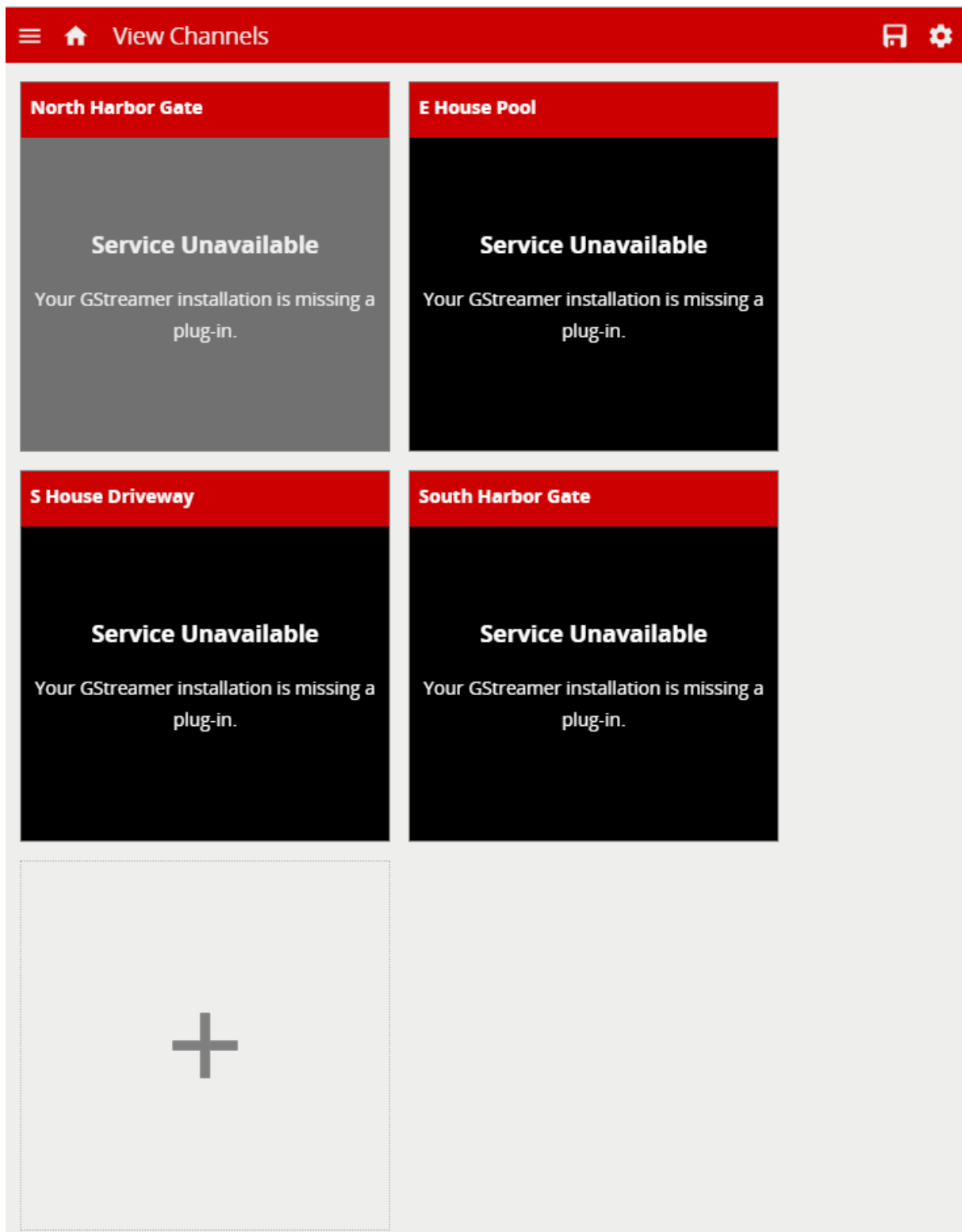
```
./vca-cored -p 8989 --rtsp-port 1234
```

A terminal window screenshot with a red title bar. The title bar text is "robdupre@rob-desktop: ~/vca/bin 89x16". The terminal content shows the command "robdupre@rob-desktop:~/vca/bin\$./vca-cored -p 8989 --rtsp-port 1234" followed by a blank line. The terminal background is black, and the text is white.

27.3 Service Unavailable, Your GStreamer installation is missing a plug-in

27.3.1 Issue

When adding a source to VCAcore you are presented with the following message in the View Sources page:



27.3.2 Solution

This error will be presented when the source input into VCAcore is encoded with an unsupported codec. Please ensure that the source being added is encoded with one of VCAcore's [Supported Video Sources](#)

27.4 No Option to Backup a VCAserver Configuration File (Windows or Linux)

27.4.1 Issue

Within VCAserver the UI option to backup or restore a configuration file is not provided.

27.4.2 Solution

As VCAserver is designed to run on open platforms, access to the VCAcore configuration file is readily available. The locations of the configuration files are provided in the Installing VCAcore section of the manual. These files can be copied in and out of these default locations, allowing for the backup and restoring of configurations where required.

Please note that configuration files are not currently compatible between different installs of VCAcore.