Luxriot EVO Video Analytics Administration Guide

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1   Introduction

Luxriot VCA is a real-time video analytics engine that utilizes advanced image processing algorithms to turn video into actionable intelligence. At the core of the product there is an advanced object tracking engine that continually tracks moving and stationary targets. The tracking engine features built-in robustness to environmental nuisance conditions such as changing illumination, moving foliage, rippling water, etc. Luxriot VCA is a generic name for a suite of analytics products that include:

- **VCApresence**: continually tracks moving and stationary targets and generates real-time alerts of object presence in multiple overlapping detection zones.

- **VCAsurveillance**: continually tracks and classifies moving and stationary targets and features a full suite of rule-based filters including: enter, exit, appear, disappear, stopped objects, directionality constraints, object counting, loitering, object type and object speed. Multiple filters are supported on any combination of multiple overlapping detection zones.

- A full range of packages optimized for specific scenarios. See the *VCA Feature Packages* topic for detailed information about the available packages.

Using the intuitive configuration, it's possible to quickly and easily define rules that generate real-time alerts when triggered. This user guide will help you get Luxriot Analytics quickly configured, as well as lead you through some of the advanced features provided by the product.

Luxriot VCA module is a part of Luxriot EVO core, this resulting in the following arguments:

- VCA is installed together with Luxriot EVO and no additional installation is required
- VCA cannot operate on its own without Luxriot EVO channels
- triggered rules can be used in the Event & Action scenarios in Luxriot EVO S and Luxriot EVO Global to create complex and flexible automated behaviour patterns
- VCA metadata overlay is present in Luxriot EVO Monitor for the user to see tracked objects and triggered rules both in live view and in playback

2   Getting Started

Luxriot VCA operates as a part of Luxriot EVO core so no extra installation is required.

In order to get up and running as fast as possible, the following steps should be executed:

- ensure that you have installed and activated your Luxriot EVO server (any bit version) with a license key that allows VCA usage (all licenses except for the free one),
- for VCA activation and calibration, install 32-bit Luxriot EVO Console separately (if your server is 32-bit, just use Luxriot EVO Console on the server machine),
- obtain an activation token for the feature set required (the features are described in the *VCA Feature Packages* topic),
- activate Analytics,
- calibrate Analytics,
- configure detection rules.

> 💡 VCA is enabled, calibrated and configured via Luxriot EVO Console. After you set VCA up, it is possible to add Event & Action scenarios based on the VCA rules in Luxriot EVO Console, and see the VCA metadata overlaying the live video in Luxriot EVO Monitor.

Once you finish with these steps, you should be perfectly able to use Luxriot VCA rules in the Event&Action Configurator in Luxriot EVO Console, as well as see VCA metadata overlaying the video stream in Luxriot EVO Monitor.

3   VCA Feature Packages

Luxriot VCA functionality is available in a range of different packages. The license types are listed in the table below.

	No. detection zones	Tamper detect	Camera shake elimination	Sur-veillance tracker	Presence filter	Enter/Exit, Appear/Di-sappear + Stopped filters	Class and speed filters + calibration	Direction & dwell filters	Tail-gating filter	Abandoned object filter	On-screen counters	Object Meta data	Counting Line	Comment
Lower cost special function licenses														
VCAcountPCopen	40										✓		✓	Bi-directional counting in busy areas
Full licenses														
VCAadvancedPCopen	40	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	VCAsurveillance + Counting Line

4 System Requirements

This section defines the minimal system requirements for VCA operation. These recommendations refer both to VCA as a part of the Luxriot EVO product and to the VCA configuration tool.

Hardware

- CPU: Pentium Celeron or higher
- Video: Any graphics card with at least 512 MB RAM per display and obligatory support of **DirectDraw** acceleration

OS and Software

- Microsoft Windows 7, 8, 8.1, 10
- DirectX 8.0 or newer
- MS XML 4.0 or higher
- Luxriot EVO Console 32-bit edition or VCA configuration tool for configuration and calibration

> 💡 VCA configuration in Luxriot EVO Console and standalone utility, as well as VCA overlay in Luxriot EVO Monitor will not work over RDP (Windows Remote Desktop) and via similar tools. The reason is that they use their own basic video drivers with no DirectDraw support. In order to set up VCA on a remote system, install 32-bit Luxriot EVO Console to access the remote server.

5 Activation

VCA must be activated before its features can be used. VCA activation procedure consists of the following two major steps:

- obtaining an activation token from your distributor,
- applying the activation key in the software.

If you are employing **failover** servers in your Luxriot EVO system and you wish them to cover VCA functionality as well, you need to apply a separate VCA license to the failover server as well.

> ⚠️ Do NOT change ANY video analytics settings (e.g., advanced engine settings) while there is no valid VCA license.

> 💡 You can apply **multiple** VCA licenses to a single server to increase the total number of channels running video contents analysis. Always make sure that server hardware is capable of handling the load as running VCA is resource-consuming.

Obtaining the activation key

Before Luxriot VCA can be used, it must be activated. Full activation process:

- purchase a VCA token from your distributor,
- visit http://www.activationmanager.com in a web browser,
- enter the token ID and system hardware ID* on the webpage,
- an activation key will be generated,
- apply the activation key to the target system.

***Hardware ID** is a unique identifier of your system and it is generated by Luxriot EVO (see picture below). Please go to the *Engines and Licenses* tab of the VCA configuration dialog box and click on the *Add/Remove licenses* link from the bottom panel to open the license manager dialog box. Note that you can use **any channel** to access the VCA configuration dialog box in order to apply the license. Alternatively, you can access the same dialog box from the *Edit server* window, *Details* tab.

> ⚠️ **Token** is a short alphanumeric code you receive from the software distributor. **Do not enter the token into the software directly**; follow the procedure described above instead: you will get the **license** text string, which looks much longer than the token and also consists of numbers and letters.

> 💡 **Hardware ID** should be obtained from the software via VCA configuration dialog box. This identifier depends on your server hardware configuration and may change if certain components are replaced. Therefore, we recommend that you activate VCA on the final server configuration, and contact support@luxriot.com in case of license failures.
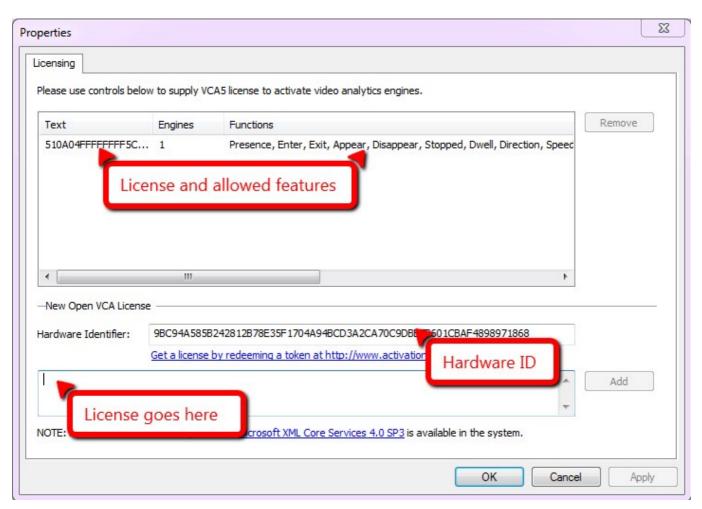
Applying the activation key

Once the activation key has been generated, it is necessary to apply it to the Luxriot EVO server.

Method one: follow the steps described under *Applying the activation key to a failover server* further in this topic. Note, however, that the VCA license will be inactive until you enable VCA at least for one channel; until that, you will be unable to see the license properties.

Method two: choose a channel that you intend to use for VCA processing, open it for editing, switch to the *Channel configuration* tab and then open channel properties. Choose the *Video Analytics* tab and enable Open VCA, then click *Properties* to bring up the VCA configuration interface.

Here, you need to enter the code in the *Engines and Licenses* tab of the VCA configuration dialog box. Click the *Add/Remove licenses* link from the bottom panel to open the necessary dialog box.

Enter the activation key into the text field under *New Open VCA License* section and click the *Add* button on the right, the hit *Apply*. If the activation code is valid, the license will be added to the list and after service restart the activated features will be displayed in the *Functions* column.

> 💡 Please note that your Luxriot EVO server must be **restarted** after the license activation in order to enable analytics processing.
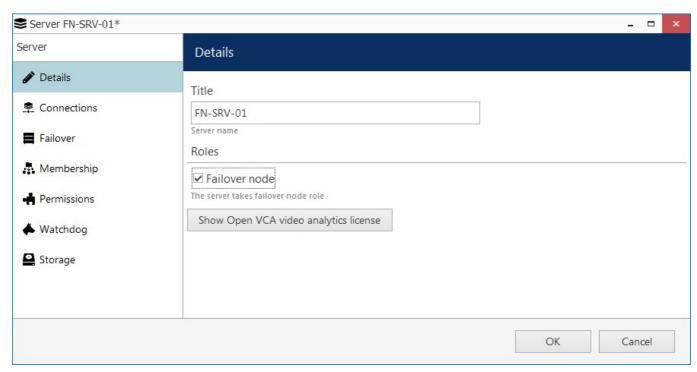
After applying the license and restarting the Luxriot EVO server, go to the VCA settings and open the *Classification* tab: if the license has been applied correctly, you should be able to see the default object classification. This is a very basic and simple method to make sure the license has been applied correctly. If everything is fine here, you can proceed with VCA configuration.

Applying the activation key to a failover server

If you need a failover server to be capable of running VCA on the channels assigned to it after the main recording server failure, it is necessary to apply a VCA license to the failover server as well. If there are multiple failover servers in a cluster and you need each of them to be VCA capable, each failover node has to carry its own VCA license.

In Luxriot EVO Console, go to the *Servers* section under *Configuration*; double-click the target server to open it for editing and stay on the *Details* tab.

Click the *Show Open VCA video analytics license* button to access the VCA license management. Here, enter the license into the text field and hit the *Add* button: the newly added license will appear in the list above. Do not worry that available engines and functions are not shown: the license will get active when the failover server accepts channel configuration.

Click *OK* to save and close the VCA management dialog box, then click *OK* to close the server properties dialog box. Now, **restart** your failover server for the VCA license to get applied.

💡 Please note that your Luxriot EVO server must be **restarted** after applying the license in order to enable analytics processing.
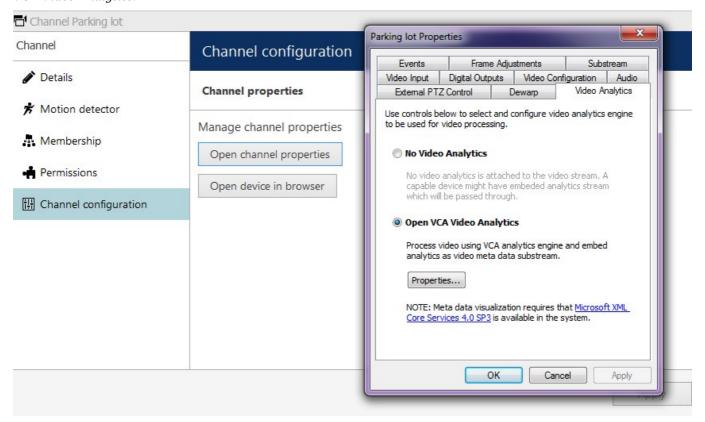
6   Enabling VCA

Switching VCA On and Off

After you have applied the license, you can enable VCA for as many channels as the license allows. By default, VCA is disabled for all channels (except for the one you used to apply the license). If VCA has not been activated, you will still be able to enable it in the channel properties but no functionality will be available.

> 💡 After applying the license and restarting the Luxriot EVO server, go to the VCA settings and open the *Classification* tab: if the license has been applied correctly, you should be able to see the default **object classification**. This is a very basic and simple method to make sure the license has been applied correctly. If everything is fine here, you can proceed with VCA configuration.

In Luxriot EVO Console, open target channel settings, go to the *Channel configuration* tab and open channel properties, then click the Open channel properties button and switch to the Video Analytics tab. Here, select *Open VCA Video Analytics*.

To disable VCA functionality for the selected channel, simply choose *No Video Analytics*. Note that all your existing VCA settings including calibration, classification, zones, counters and rules, will be removed once you disable VCA and close the channel properties dialog box by clicking *OK*.

> ⚠️ Important: **disabling VCA** for a channel **drops ALL settings**.

Once VCA engine has been activated and enabled, you can proceed with its configuration, i.e., calibrate VCA for each channel, create object classification, then create zones, counters and rules. Once you do that, VCA elements will be available in Luxriot EVO Monitor (overlaying live video, instant playback and playback) and VCA rules will be also available in the *Event & Action Configurator* in Luxriot EVO Console as event basis.

> 💡 VCA metadata overlay is displayed in Luxriot EVO Monitor in **live**, **instant playback** and **playback** modes. Other modes (e.g., *Sequence* playback) and video export **do not support** VCA overlay at this point.

Enabling Metadata Overlay

VCA metadata is enabled by default on the Luxriot EVO Monitor application side and it is possible to enable/disable separate overlay elements via application settings. Further details on this can be found in the Luxriot EVO Monitor application user guide.

⚠ Metadata visualization requires that Microsoft XML Core Services 4.0 SP3 is available in the system.

7 Camera Calibration

Camera calibration is required in order for the VCA engine to classify objects into different object classes. Once the camera has been calibrated, the engine can infer real-world object properties such as speed, height and area and classify objects accordingly. Therefore, classification accuracy and some detection rule (e.g., speed detection) accuracy directly depend on the calibration precision.

> 💡 VCA is calibrated separately for every channel.

Calibration Elements

3D Graphics Overlay

During the calibration process, the features in the scene need to be matched against the 3D graphics overlay controls - these are used to teach the VCA engine about the scene. The overlay consists of a green **grid**, which represents the ground plane, and two **mimics**, which are on the grid and 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.

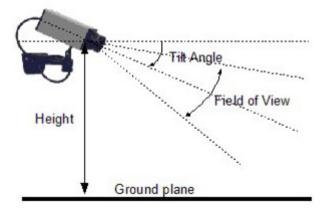> 💡 Each grid cell corresponds to a 2x2 meters square and mimic height is 1.8 meters.

Mouse Controls

The calibration parameters can be adjusted as follows:

- click and drag the ground plane up or down to change the tilt angle,
- use the mouse wheel to adjust the camera height.

Calibrating the Camera

Camera calibration is necessary in order to estimate object parameters such as height, area, speed and classification. If you know the height, tilt angle and vertical field of view corresponding to your installation, you can simply type the parameters into the appropriate boxes and apply the changes - but do not forget to verify the accuracy of your calibration against mimics and grid.

If however, you do not know, or are unable to find out the camera parameters, this topic provides a step-by-step guide to camera calibration.

Step 1: find some people in the scene

Find some people, or some people-sized objects in the scene. Try to find a person near the camera position, and a person further away from the camera. Place the mimics on top of or near the people - there are two mimics so you can better estimate the accuracy of calibration by making sure that mimics correctly represent the height of people in different parts of the scene. Enter in the known height or estimated height of the camera position.
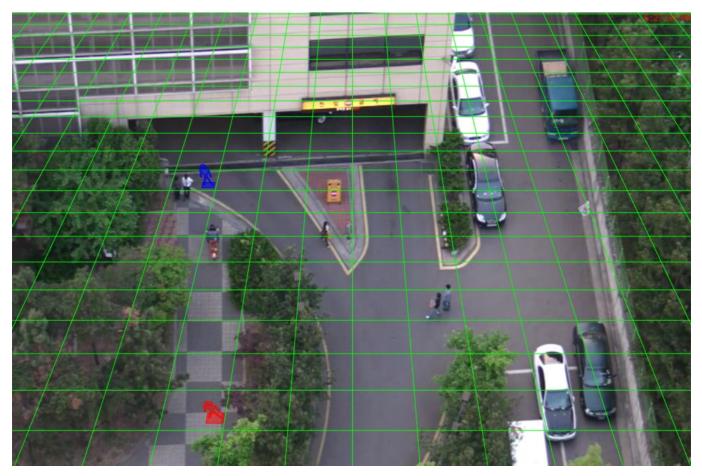
To reset the mimics to their default position, double-click the calibration scene.

Step 2: adjust tilt angle and camera height

Now, adjust the camera tilt angle and vertical field of view until both mimics are approximately the same size as a real person at that position in the scene. If a height estimation is already entered, adjust this along with the other two parameters.

Click and drag the ground plane to change the tilt angle, use the mouse wheel to adjust the camera height and enter the value in *Vertical Field of View* edit box to change the vertical field of view: the necessary value can be obtained either from your device documentation or from the table further in this topic.
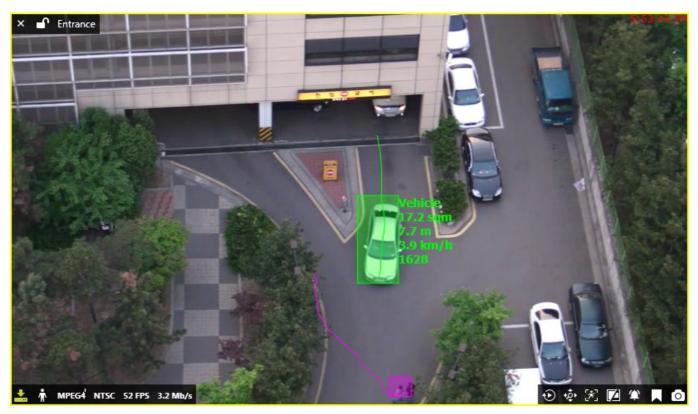
Your aim at this step is to align the calibration grid with the ground plane, the further end of the grid being the horizon, and verify the calibration using the mimics.

Use the settings below the scene to enter the values manually and also to switch between metric and imperial unit systems.

Step 3: verify the setup

Once you are happy with how the scene calibration looks, verify the settings by dragging the mimics around and comparing them to other people or people-sized objects in the scene. The more locations you verify the calibration against, the more accurate the calibration will be. The three calibration parameters can be fine-tuned in the same way as detailed in Step 2.

Once the settings have been successfully applied, objects in the scene are annotated with height, area, speed and classification. To change the measurement units between metric and imperial, please refer to the *Measurement Units* topic.

Vertical Field Of View

The vertical field of view is required when calibrating a camera. If you know the vertical field of view of the camera, it can be entered directly. If, however, you do not know the vertical field of view parameter, it can be determined from the following table, given the vertical image dimension and camera focal length:

Image Format (in)	Vertical Image Dimension (mm)	Focal length (mm)																		
		1	1.2	1.4	1.6	1.8	2	2.2	2.4	2.6	2.8	3	4	6	10	15	20	30	40	50
1/4"	2.4	100.39	90.00	81.20	73.74	67.38	61.93	57.22	53.13	49.55	46.40	43.60	33.40	22.62	13.69	9.15	6.87	4.58	3.44	2.75
1/3"	3.6	121.89	112.62	104.25	96.73	90.00	83.97	78.58	73.74	69.39	65.47	61.93	48.46	33.40	20.41	13.69	10.29	6.87	5.15	4.12
1/1.8"	5.32	138.79	131.44	124.48	117.95	111.83	106.12	100.81	95.88	91.31	87.06	83.12	67.25	47.82	29.79	20.11	15.15	10.13	7.61	6.09

If you are unable to determine the vertical field of view for your camera from the table above, leave the field of view with a setting of 40 degrees.
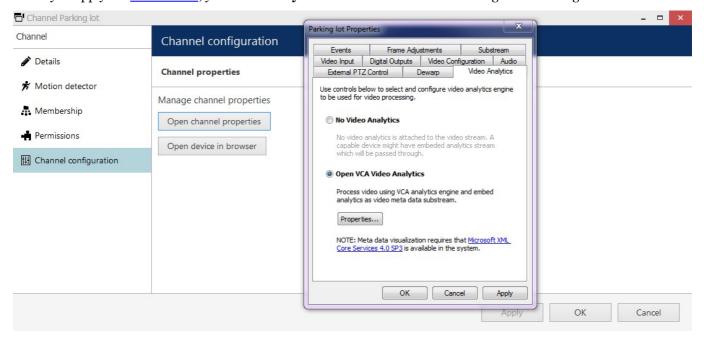
Measurement Units

The height, area and speed annotation can be displayed in metric or imperial units. By default, the system displays metric units. To change the measurement units, go to the *Calibration* tab and select the desired measurement system from the *Units* drop-down list, then apply the changes.

8   Configuring Zones And Counting Lines

All configuration of VCA engine is performed via Luxriot EVO Console by accessing the *Video Analytics* tab in the channel properties. VCA can be applied to any video channel, regardless of its source.
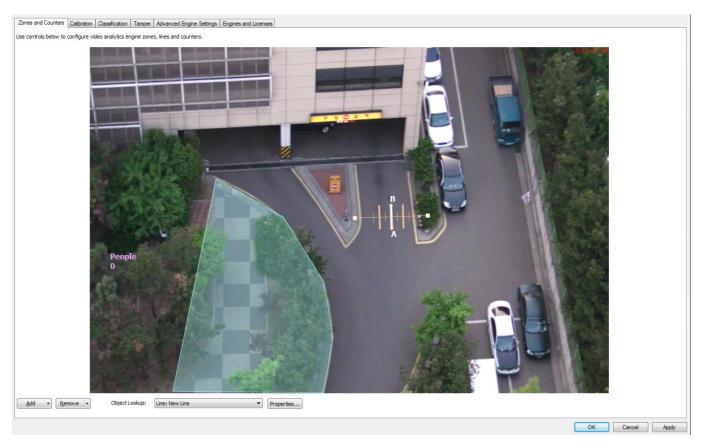
When you apply the VCA license, you can use **any channel** to access the VCA configuration dialog box.

Scene Management

In order to create some useful output from VCA, it is necessary to configure detection zones/lines and counters. The detection zones and counters are configured for each channel separately by opening VCA *Properties* and then choosing the *Zones and Counters* tab.

This topic covers the configuration of **zones** and also **lines**. Configuration and management of **counters** is explained in further sections of this document.

This screen has the following functionalities:

- **Buttons:**
  - **Add zone**: create a zone
  - **Add line**: create a line
  - **Add counter**: create a counter that will be associated with a zone or a line
  - **Remove**: delete the selected zone/line/counter or all objects
  - **Object lookup**: select a specific object to remove or to open its properties
  - **Properties**: open object properties and rules
- **Clicking**:
  - **Single-clicking** an object on the scene will highlight it on the screen, allowing you to move it and displaying additional controls:
    - For a **zone**, zone points will be shown
    - For a **counting line**, line calibration will appear (if enabled)
  - **Double-clicking** any object on the scene will bring up the object properties dialog box
  - **Right-clicking** a zone point will allow you to remove it or add a new point; right-clicking near zone contour will also offer adding a new node

To **save** the changes, click *Apply* or *OK*: the VCA configuration dialog box will close and all your changes will be saved.

Double-click any object to bring up the zone/line/counter **properties dialog box**: its tabs are briefly explained below. You will find more details on each tab in the next chapters.

General Tab

Here, you can set up general detection component properties. This tab is available for all object types but the properties will differ for zones/lines and counters.

Analysis Tab

The *Analysis* tab is available for zones/lines and allows you to assign detection rules to the created zones and lines. Available rules will depend on the features available and settings applied.

Rule Tab

This tab is only available for counters and is intended for defining counter behaviour based on existing rules.

Creating Detection Zones and Lines

In order to detect events of interest, you need to create detection zones and lines.

A **zone** is a closed area of interest that has borders (boundaries) and objects trigger rules associated with an area by crossing its borders or being inside the area and matching the rule criteria with their behaviour.

A **line** is similar to the detection zone but it defines a perimeter instead of a closed region. Polylines can be created by adding multiple nodes.

A **counting line** is a particular case of a line, when the line has *Object Crossing Line* filter enabled; there is a special VCA license type that allows counting lines only. Counting lines have their own calibration controls that are not related to the camera calibration.

Creating Zones and Lines

To create a zone or line, click the *Add* button and select *Add Zone* or *Add Line*. The newly created item will appear on the scene in its default shape.

To remove an item, choose it on the scene or use the *Object Lookup* drop-down list to select it, then use the *Remove* button: simply clicking the button will delete the selected item only, and you can also use the small arrow on the *Remove* button to remove a single (selected) item (default action) or delete all detection elements.
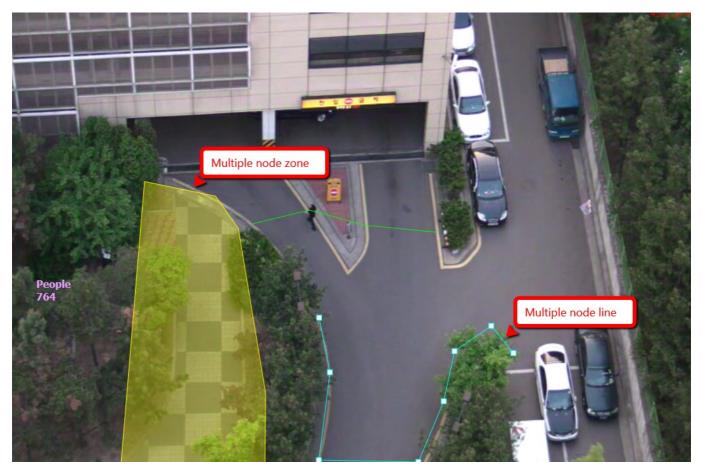
> 💡 If you have accidentally removed all VCA detection items, simply click *Cancel* to close to dialog box and exit without changes: VCA configuration will be then rolled back to its state before you opened the configuration screen and all changes made since that time will be discarded.

Editing Zones and Lines

Zones and lines can be edited to become of any shape and/or size. They are controlled by manipulating "nodes" that represent the zone/line vertices. To **change the shape** of a zone or a line, simply grab a node with your left mouse button and drag it to the desired location.

Zones and lines can be tailored to fit any scenario by simply adding more nodes to define the required shape. To **add a node**, simply right-click on the zone/line at the point where the new node should be added and select Ad*d new zone point*. Nodes can be deleted by right-clicking on the node and selecting *Remove zone point*.
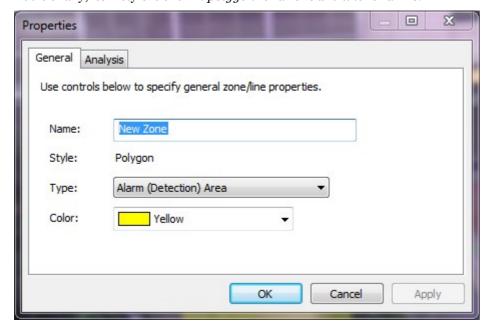
Double-click a zone/line or select it and click the *Properties* button on the bottom panel to bring up the **object properties** dialog box.

On the *General* tab, you can define:

- zone/line custom **name**, as it will appear in the rules
- **type** (detection or non detection area)
- **colour** (choose one from the palette)

Additionally, item style is shown: *polygon* for a zone and *line* for a line.

On the *Analysis* tab, detection rules are listed; exact rule list will depend on the detection component type and

features allowed by your VCA license. Generally, the following functionality is supported:

- Object presence
- Object entered/exited
- Object appeared/disappeared
- Object stopped
- Object dwell
- Object direction
- Object speed
- Object tailgating
- Counting line
- Abandoned/removed object

On the right side of the *Analysis* tab, you can select specific object types to be (not) tracked, and rule-specific properties, which are explained in more details below.
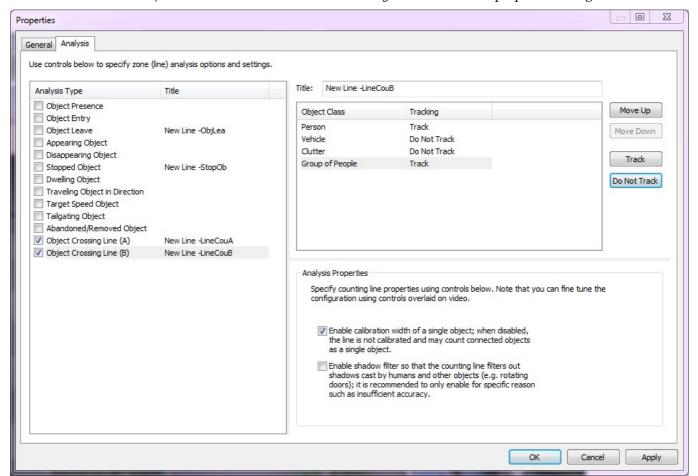
Non Detection Zones

In some situations, especially where the scene is busy, objects tracked in some areas can interfere with detection zones in other areas. For example, on a windy day, moving foliage can generate false alarms that in some situations could be tracked through a detection zone. In order to minimize such issues, it is possible to configure so called **non-detection** zones, where nothing should be detected or tracked.

To do this, go to the zone/line properties, *General* tab, and set its type to *Non Detection Area*, then save. Zone colour fill will then change from solid to grid, visually helping you identify a non detection item.

Detection Rules

Once some detection zones and/or lines have been configured, it is possible to define some detection rules that are associated with the zones/lines. The rules are defined in the *Analysis* tab of the item properties dialog box.

The *Analysis* tab is context-sensitive to the zone selected. As different zones/lines are selected, the *Analysis* tab changes to reflect the rules that are currently configured on that zone. Defining a rule is a simple matter of checking the box next to the rule required. In all cases, the rules are configured with sensible default values, which, however, can be customised to suit a specific detection scenario.

Object Classes

Once the camera has been calibrated and object classification has been set up (either default or customised), it is possible to include or exclude specific object types in the detection rules by selecting which objects should or should not be tracked. For example, if a zone should only register vehicles, you can exclude people and other object types from being detected in this particular zone.

To do so, simply click the object type in the list and use the *Track* and *Do not track* buttons on the right. By default, all object types are tracked.
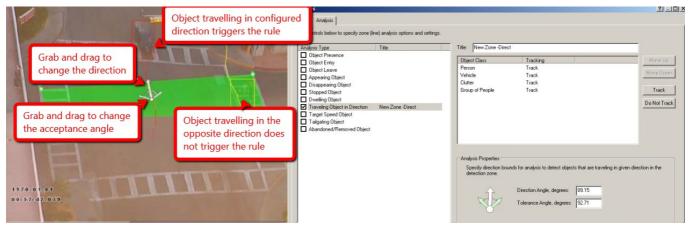
Object Presence

Enable the *Object Presence* rule in the *Analysis* tab and click *Apply* to save the changes. Note that this rule has no additional settings and is similar to regular motion detection within a zone.

Objects that are simply present inside a zone or pass through a line will trigger this rule and raise an alarm.
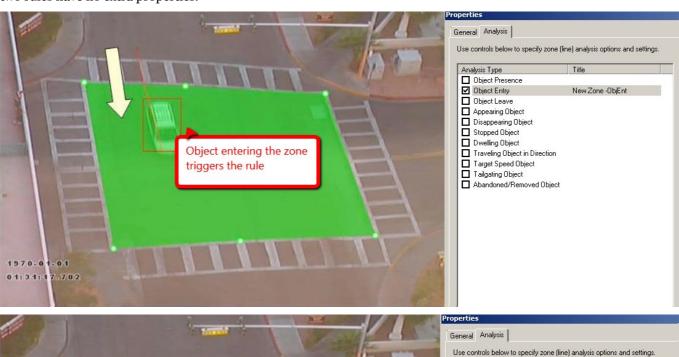
Object Direction

Enable the object direction detection rule for the selected zone by marking the *Traveling Object in Direction* box in the *Analysis* tab. You can adjust the direction and tolerance angle to suit the detection scenario: the values can be changed manually in the *Analysis Properties* section on the right side, or, alternatively, you can save the rule and then change them by manipulating the visual control (arrow) on the zone/line.

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

Object Enter and Exit

Enable the object entry and leave detection by marking the corresponding check boxes in the *Analysis* tab. These two rules have no extra properties.
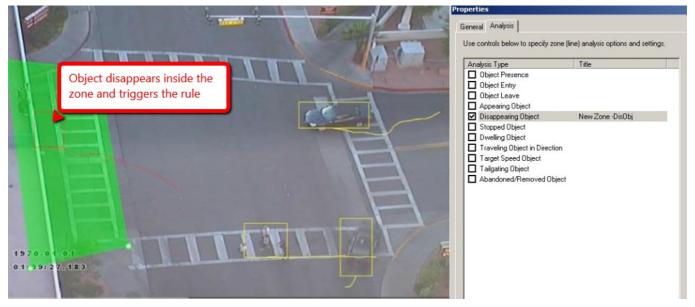

An entering object alarm is raised when an object crosses the detection zone border from the outside to the inside. Conversely, a leaving object alarm is raised when an object crosses the zone border from the inside to the outside.

Object Appear or Disappear

Enable the object appearance and disappearance detection by marking the corresponding check boxes in the *Analysis* tab and click *Apply* to save the changes. *Appearing Object* and *Disappearing Object* rules have no special attributes.
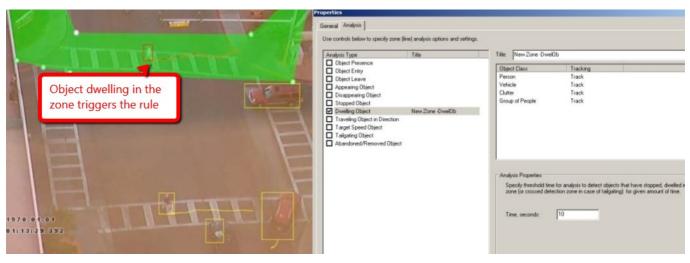
An appearing object alarm is raised when an object emerges inside a detection zone. Note that this is different from object entrance detection since the object is be initially detected inside the zone without entering, i.e., without crossing the zone's border: for example, people appearing in a doorway or cars appearing from an underground car park.

Conversely, a disappearing object alarm is raised when an object vanishes inside a detection zone. Again, this is different from the leaving object detection since the object is tracked inside the zone and then disappears without exiting the zone (without crossing its border).
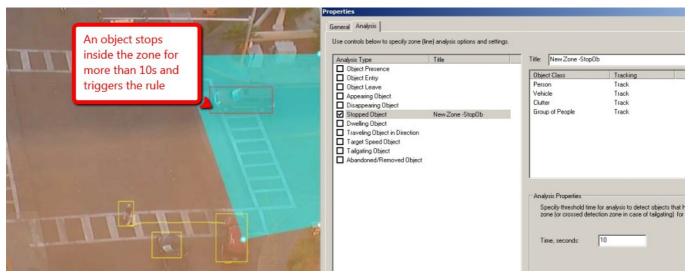
Object Dwell

Enable the object dwelling detection rule for the selected zone by marking the *Dwelling Object* box in the *Analysis* tab, then click *Apply* to save. Under *Analysis Properties* on the right side, you can define the desired amount of time from the moment when object entered the zone and until when you want the rule to be triggered. By default, the rule is triggered after 10s (ten seconds). If, during this time, the object leaves the zone, the timer is reset and will count from the beginning if the same object enters the zone again.

Objects that dwell inside a zone for longer than the defined amount of time will trigger the rule and raise an alarm.

Object Stopped

Enable the stopped object detection for the selected zone by marking the *Stopped Object* box in the *Analysis* tab. Alike the *Dwelling Object* rule, this rule has a timeout setting, which can be defined in the *Analysis Properties* section, and the default time for the object to be considered stopped is ten seconds.
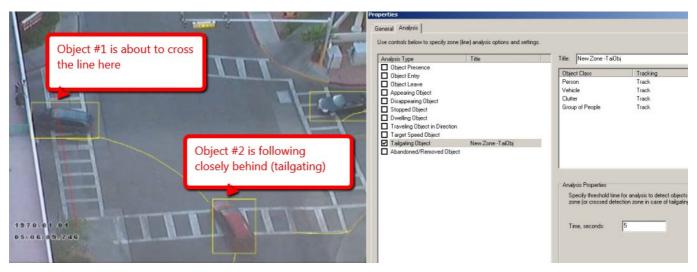

Objects that are stopped inside a zone for longer than the defined amount of time will trigger the rule and raise an alarm. A good usage example for this rule could be a car parked/stopped in an inappropriate place.

Object Tailgating

Object tailgating is defined as an object crossing a line or a zone boundary within a certain time after another object has already crossed this line or zone. If an object crosses a line or zone, and then a second (different) object crosses the same line or zone within the specified time window, the *Object Tailgating* filter will be triggered.

Enable the object tailgating detection for the selected zone by marking the *Tailgating Object* box in the *Analysis* tab. Use the time threshold setting to set the minimum allowable time between successive object detections, default time is 5s (five seconds).

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 (default) - that is, any object crossing the line within 5s of an object having already crossed the line will trigger the Object Tailgating filter.

Object #2 crosses the line within five seconds after Object #1 and this triggers the *Object Tailgating* rule.

Abandoned or Removed Object

VCA can be configured to generate an alert highlighting an abandoned or removed object. Suspicious objects can be detected when carried into the scene and planted by a person as well as when dropped or thrown into the scene.
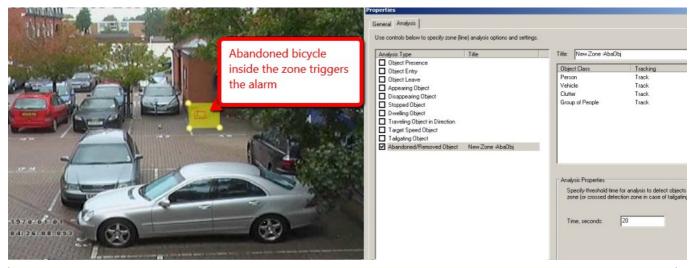
> ⚠️ Ensure that abandoned/removed object engine is enabled by choosing the necessary option in the *Abandoned/Removed Object Engine* drop-down list in the *Advanced Engine Settings* tab.

> 💡 **Important:** The algorithm used here is the same for both for abandoned and removed object detection: it **cannot differentiate** between objects taken away from and added to the scene. This is a fundamental limitation of the algorithm and arises because it just analyses how blocks of pixels change with respect to a background model that is constructed over time. When an object is inserted into the background (abandoned) it looks the same to the algorithm as when an object is removed from the background.

Enable the abandoned/removed object filter for the selected zone by marking the *Abandoned/Removed Object* box in the *Analysis* tab. An object that is left inside a zone for longer than the configured time period (twenty seconds by default) will trigger the rule and raise an alarm.
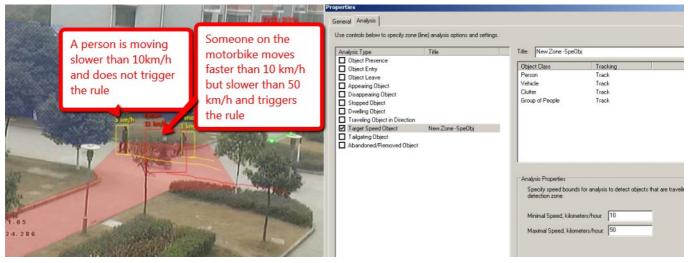
Abandoned bicycle inside the zone triggers the alarm

💡 *Advanced Engine Settings* tab has one more item related to the *Abandoned/Removed Object* filter: **stationary object hold-on time**. It is the amount of time for the VCA engine to keep an eye on the object once it has been detected as removed/abandoned; after that time, the engine will stop tracking that object. Stationery object hold-on time is 30s (thirty seconds) by default and you can change this on the *Advanced Engine Settings* tab of the VCA configuration dialog box.

Object Speed

Enable object speed detection for the selected zone by marking the *Target Speed Object* filter box in the *Analysis* tab. Adjust the minimal and maximal speed limits to suit the detection scenario.

A person is moving slower than 10km/h and does not trigger the rule

Someone on the motorbike moves faster than 10 km/h but slower than 50 km/h and triggers the rule

Objects that travel within the bounds of the configured speeds through a zone or over a line trigger the rule and raise an alarm.

⚠ The camera must be **calibrated** properly for this rule to operate correctly.

Note that speed detection filter highly depends on the calibration accuracy, but even with that, this rule cannot be as accurate as hardware speed detection techniques and therefore cannot be used as an official speed data (e.g., police evidence etc.). Please use VCA speed detection as a general reference only.

Counting Lines

A **counting line** (Object Crossing Line A/B rule) is a detection filter optimized for bi-directional object counting (e.g. people or vehicles) in busier detection scenarios. Examples of such applications may include:
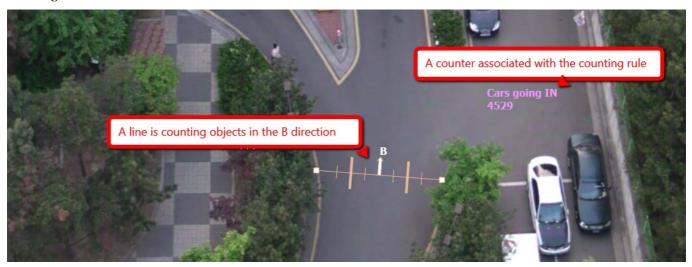
- People counting with overhead cameras in a retail environment.
- Vehicle counting with overhead cameras on public highways.

In some scenes, such as entrances with cameras installed overhead, the counting line will typically provide higher accuracy counting than the ordinary counters and lines with other rules.
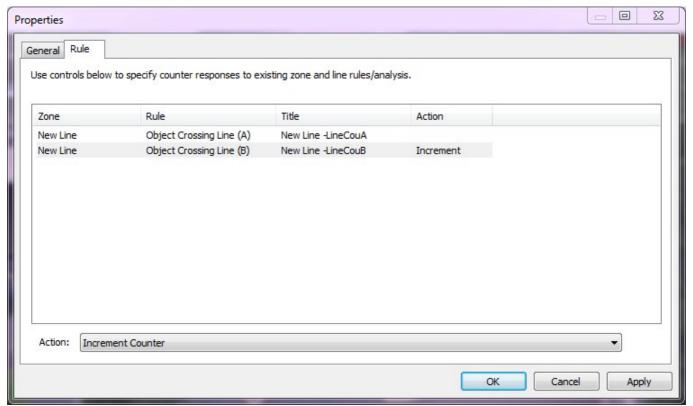
Enabling Counting Lines

Enable the counting line filter on a **detection line** in the desired direction(s) by marking the *Object Crossing Line A/B* box in the *Analysis* tab. An event is generated every time an object crosses the line in the selected direction. If multiple objects cross the line together, multiple corresponding events are generated. The events generated by the counting line can be tied to counters in the usual manner.

Assigning Counters to Counting Lines

A counting line itself simply generates events when an object to be counted is detected, that is, when it crosses the line in the required direction. In order to output the counting information, **counters** (one for each direction) should be created and configured to react the events generated by the counting line. Please see the *Counters* topic of this document for details on counter setup.
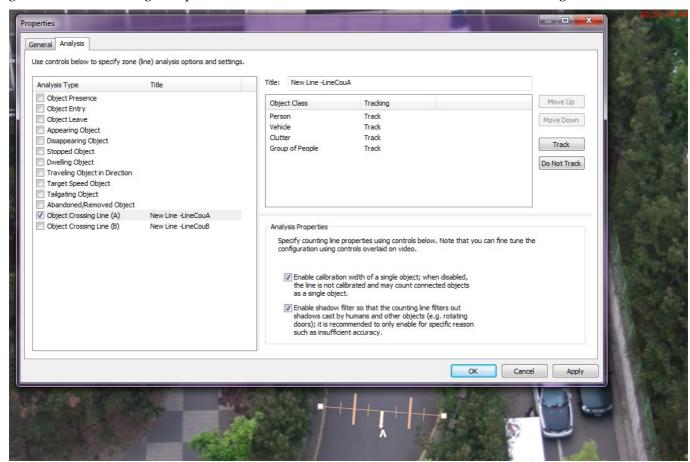

To make the counter react to the counting line rules, open counter properties by double-clicking it, switch to the the

Rule tab and set how the counter reacts to each rule.

Calibrating Counting Lines

In order to generate accurate counts, the counting line requires calibration. This cannot be performed at a general level for the whole scene using the 3D calibration tool (*Calibration* tab). 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. In other words, counting lines ignore the global calibration settings and provide their own mean of calibration for each individual counting line.

Instead of the 3D calibration tool, the **counting line has its own calibration settings**. Two bars equidistant from the centre of the line represent the average width of the expected object. This allows the counting line to reject noise and also count multiple objects. Additionally, each of these bars has two thinner bard on its sides, which represent possible deviation from the average object size and are regulated automatically depending on the base object size.

To **calibrate** the counting line:

- double-click the counting line to open its *Properties* dialog box,
- mark the *Enable Calibration* box under the *Object Crossing Line A/B* rule in the *Analysis Properties* section,
- use the mouse to drag the calibration markers to adjust the distance between the calibration bars until the distance is approximately the size of the objects to be counted,
- the small bars on either side of the main markers indicate the minimum and maximum width of a single object (deviation),
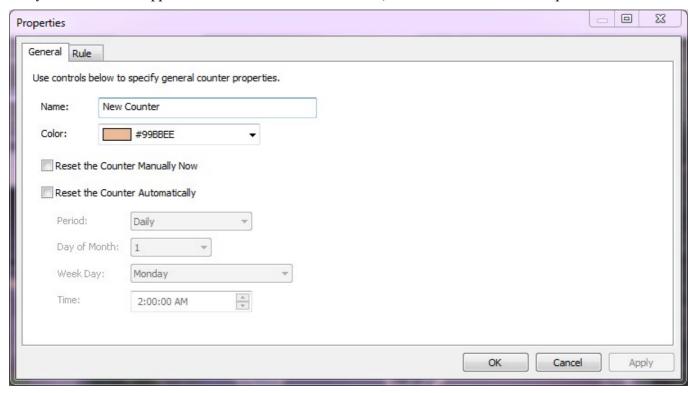- apply the settings.

Shadow Filter

The counting line features a shadow filter that 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 marking the *Enable Shadow Filter* check box for the counting line. It is recommended that the shadow filter is only enabled when shadows are **actually present** because the algorithm can take certain parts of an object for shadows and this may lead to lower accuracy and results will be worse than you expect.

9   Counters

Luxriot VCA also supports object counting. Any combination of detection zones or lines can be assigned to a counter. Counters can be configured to perform any combination of incremental, decremental or occupancy counting. Counter configuration is managed similarly to the zone configuration.
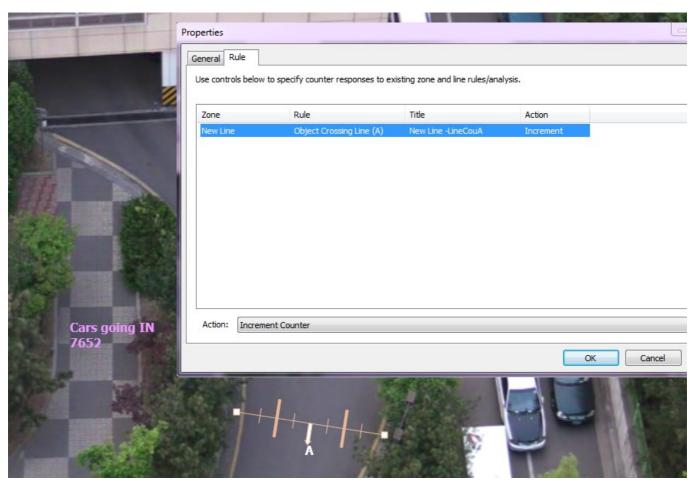
Creating Counters

To create a new counter, simply use the *Add* button in the *Zones and Counters* tab and select *Add Counter*. The newly created item will appear on the scene with its default name, random colour and a value equal to zero.

The counter name and colour can be changed in the counter *Properties* dialog box, in the *General* tab: double-click any counter to open this dialog box and access the counter configuration.

Assigning Rules to Counters

Counters count triggers generated by rule violations. For example, if it is required to count the number of objects entering a zone, a zone should be configured to raise an alarm every time an object enters it, i.e., have the *Object Enter* rule enabled. The zone rules can then be assigned to a counter and the counter will sum the objects according to the selected counting type (increment, decrement, or update value).

In this example, a counting line is configured to produce an event when an object crosses it while travelling in the north direction. The counter is configured to increment its value each time the line rule is triggered.

Counter actions:

- **increment**: when a counter is set to increment based on a rule, its value will be increased by 1 every time the rule is triggered
- **decrement**: when a counter is set to decrement based on a rule, its value will be decreased by 1 every time the rule is triggered
- **update value**: the counter displays the current number of active triggers in the zone

For the *Update Counter Value* action, the counter is updated as follows: for example, if there are two objects in the zone that triggered the detection rule, then the counter value will display 2.

Counter Reset

To reset the counter **immediately**, mark the *Reset the Counter Manually Now* checkbox in the counter *Properties* dialog box (*General* tab), then hit *OK* to close the counter Properties, then hit *OK* to save VCA configuration. The counter will be reset after you close the VCA *Properties* dialog box by clicking *OK*; if you choose to cancel when closing VCA *Properties*, your changes, including counter reset, will be discarded.

To reset counter **automatically** based on a schedule, mark the *Reset the Counter Automatically* checkbox and specify the period and time for the resets, then save your settings.
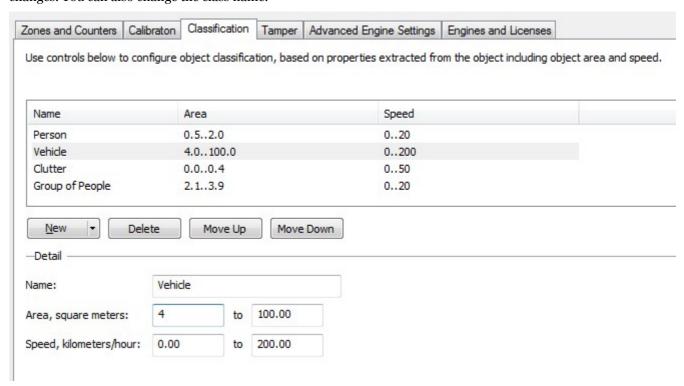
10   Object Classification

Luxriot VCA can perform object classification once the camera has been calibrated. The object classification is based on the properties extracted from the object, including object area and speed. VCA comes pre-loaded with the most common object classes, and in most cases these will not need to be modified.

> 💡 Each channel has its own set of classes and their properties.

In some situations it might be desirable to change the classification parameters, or add new object classes.

To adjust the object class settings, select the *Classification* tab in the *VCA Properties* dialog box and then choose an object class to be modified: adjust the minimum and the maximum object speed and area, and apply the changes. You can also change the class name.

To add a new class, use the *New* button below the class list: you will need to define area and speed range for each class. Remove any class using the *Delete* button. If you wish to load classification defaults at any time, click the arrow next to the New button and select *Reset to default items*.

> ⚠️ When creating new or re-defining existing classes, make sure that each one has unique properties, otherwise the classification will be inaccurate.
>
> Example of good classification: default.
>
> Example of not-so-good classification - some object classification may be ambiguous:
> - Person: area 1..3 square meters, speed 0..20 km/h.
> - Animal: area 0.5..2 square meters, speed 0..30 km/h.

Objects that do not fit into any class will be labelled as *Unclassified* when they appear in Luxriot EVO Monitor.

11   Tamper Detection

The Tamper Detection module is intended to detect camera tampering events such as bagging, de-focusing, moving the camera, etc. This is achieved by detecting large persistent changes in the image. Once enough of the image has changed and remained so for a certain length of time, a tamper alarm is triggered.

Tamper Detection Settings

In the 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 for the the alarm to be triggered.

- **Timeout before triggering alarm**: time duration in seconds for which the image must be persistently changed before the alarm is triggered.
- **Area change to trigger alarm**: percentage of the image which must be changed for tampering alarm to be triggered.
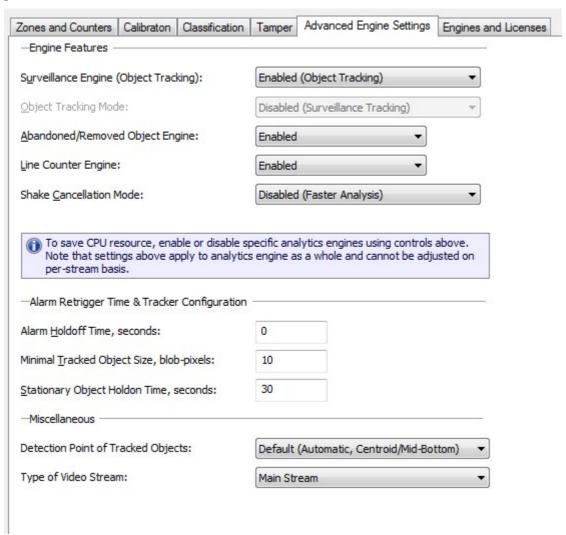
If false alarms are causing trouble, the duration and/or area should be increased so that large transient changes such as a close object temporarily obscuring the camera do not cause false alarms.

Detect Lightness Changes

Large fast changes to the image lighting such as switching on/off indoor lighting can cause false tamper alarms. 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 for genuine alarms so it is not recommended if fast light changes are not likely to be present.

12   Advanced Settings

In most installations, the default VCA configuration will suffice. However, in some cases, better performance can be achieved with modified parameters. The *Advanced Engine Settings* tab allows configuration of the advanced VCA parameters.

Object Tracking

Enable/disable the object tracking engine. When enabled, there is the *Surveillance Tracking* mode of object tracking available.

Surveillance Tracking

Optimized for intrusion detection and general purpose outdoor object detection and tracking. When objects are in close proximity to each other, they are more likely to be tracked as a single object rather than separate entities.

⚠ Currently, Luxriot VCA **only supports** *Surveillance Tracking* mode, and it is enabled by default (with the option itself grayed out). When VCA **license is absent** in the system, it is possible to change this setting - DO NOT do this, as it will cause VCA to fail.

Abandoned and Removed Object Engine

Enable/disable abandoned/removed object detection. When turned ON, the background process of detecting abandoned and removed objects is enabled.

Line Counter Engine

Enable/disable the counting line functionality.

Shake Cancellation Mode

The camera shake cancellation function is used to improve the VCA performance with cameras that are prone to shake. By default, camera shake cancellation is disabled. If your installation suffers from camera shake problems (e.g., camera installed on a pole), enable this function to improve the VCA performance. If camera shake is not an issue in your installation, best performance will be achieved with this setting disabled.
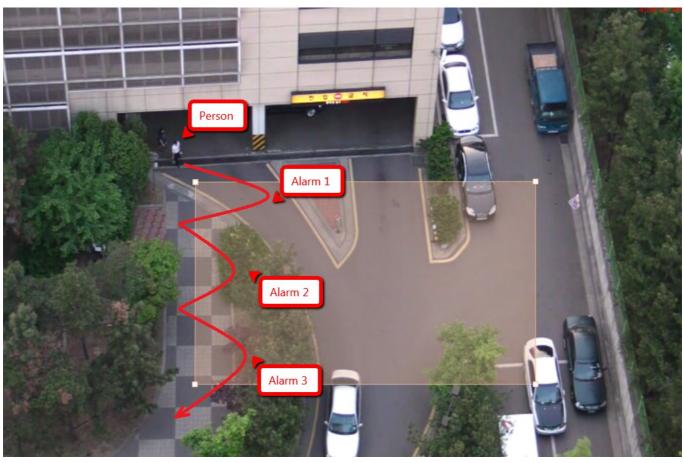
> 💡 Only enable the features that are necessary for the deployment scenario, since each feature consumes a portion of system resources and enabling features that are not required may degrade the overall system performance.
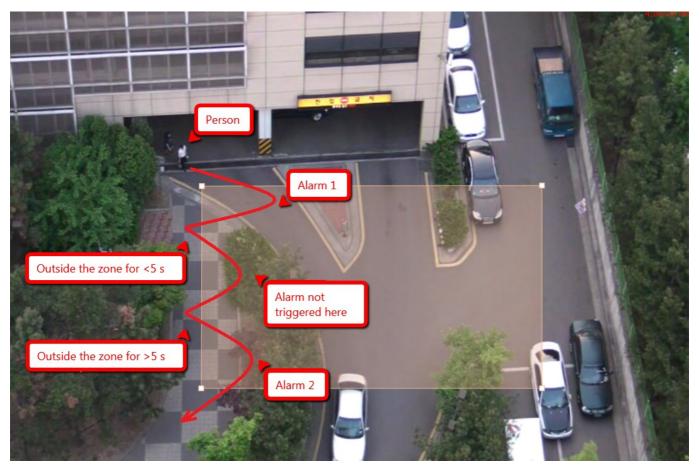
Alarm Holdoff Time

The alarm holdoff 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, let us consider the following diagram where no alarm holdoff time is configured.

In this detection scenario, the person enters the zone three times: each time an alarm is raised, resulting in a total of 3 (three) alarms.

With the alarm holdoff time configured, it is possible to prevent re-triggering of the same rule for the same object within the configured time period. Consider the same scenario, but with the alarm holdoff time set to 5 seconds.

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 configured alarm holdoff period. When the person re-enters the zone for the third time, the time elapsed since the previous alarm of the same type for that object is greater than the alarm holdoff time and a new alarm is generated.

In essence, this setting can be configured to prevent multiple alarms from being generated when an object is loitering on the edge of a zone. Without the alarm holdoff time configured, this scenario would cause so-called *alarm chatter*.

Minimal tracked object size

The minimum tracked object size defines the size of the smallest object that will be considered for tracking, in pixels. Normally, there is no need to modify this value. Decreasing it will allow the engine to track smaller objects at the expense of noise immunity.

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 that 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 defined timeout. The default setting is 30 (thirty) seconds.

Detection Point of Tracked Objects

For every tracked object, there is a point that we use to determine this object's position, and decide whether this object triggers a rule. We call this point as detection point. There are 3 modes to define the detection point relative to the object: Default, Centroid and Mid-bottom.

- **Default**: when user chooses this mode, VCA will automatically set the position of detection point; it chooses centroid if the camera is calibrated overhead, or mid-bottom if the camera is calibrated side-on or is not calibrated.
- **Centroid**: if user chooses this mode, VCA will force the centre of the object to the the detection point.

- **Mid-bottom**: if user chooses this mode, VCA will force the detection point to be mid-bottom - this setting is recommended when camera position is side-on.
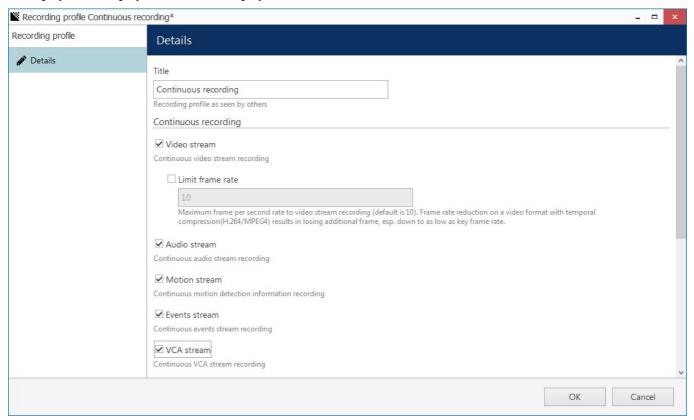

The first picture shows the centroid mode, and the second shows the mid-bottom mode.

13   Handling VCA Events

All configured VCA rules can be used as **event sources** in Luxriot EVO and are available in the configurable event list in Luxriot EVO Console for each channel that has VCA filters attached to it. Thus, VCA events can be used for triggering one or multiple standard actions, such as: start or stop recording, send an email, pop up camera in Luxriot EVO Monitor, run a third-party application and others. Also, VCA metadata can be recorded alongside with the video stream.
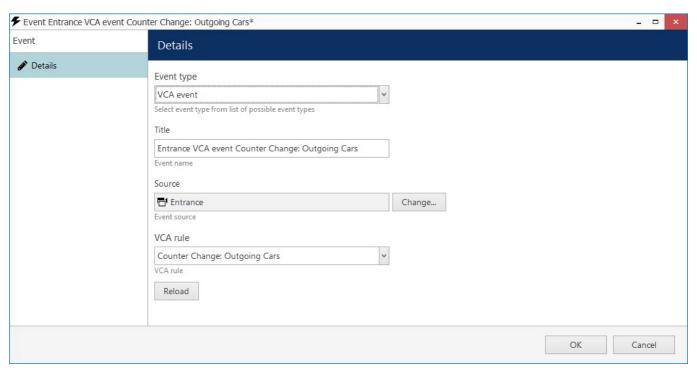
Enable Recording

VCA metadata recording is enabled by default for the built-in recording profile *Continuous Recording*. If you are creating a new recording profile in Luxriot EVO Console and you wish to save the VCA metadata with the video archive, make sure to mark the *VCA stream* option in the recording profile properties. If enabled, VCA metadata will be displayed in the playback and instant playback modes in Luxriot EVO Monitor.

Add Events

In order to set up system reaction based on VCA events, go to Luxriot EVO Console, choose the *Events & Actions* section in the bottom left corner and then select the *Events* component from the menu on the left. Click the + *New event* button on the upper panel and select the *VCA event* item from the drop-down list.

The settings available here will be as follows:

- **event source**: the channel that has VCA enabled,
- **VCA rule**: one of the VCA filters available for the selected channel,
- **event title** will be composed automatically and you can change it to anything you want.

VCA rules will include:

- **filters** associated with zones and lines, e.g., *Zone - ObjEnt* will refer to the *Object Entry* rule trigger for the target zone,
- **counter change** events - when the target counter value is changed based on the configured rule (either incremented or decremented),
- **tamper detection** event - present by default for all channels.

> 💡 If the target channel has device-side VCA enabled and configured, the VCA rule list will include both Luxriot VCA (software-side) and device VCA (hardware-side).

When ready with the event settings, click *OK* to save: your newly created event will appear in the list and will be ready to be used in the E&A scenarios.
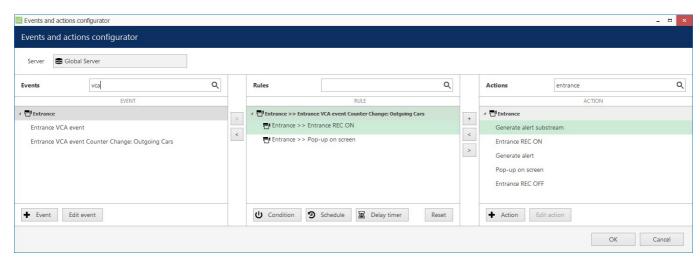
Create Rules

Switch to the *Rules* section, choose the target server from the upper panel and click the *Configurator* button to open the *Event & Action Configurator* dialog box.

> 💡 Events and actions are associated with servers. Target server is the server where the VCA-enabled channel resides; other servers will not see any events or actions related to this channel.
>
> To pass the events from server to server in Luxriot EVO Global, use global events: you will find more information on these under the corresponding section of your Luxriot EVO Global management manual.

You can add new events and actions and edit existing ones from the configurator window as well, without going to these sections separately.
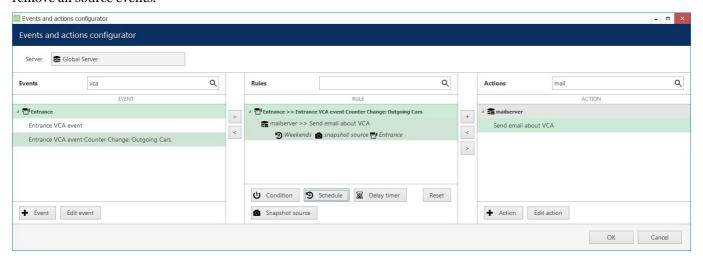
When you have all the necessary events and actions, you can combine them to create rules - automated scenarios that will be executed as long as the Luxriot EVO server is running. The example on the picture here shows how a counter change triggers channel popup on the Luxriot EVO Monitor screen and also initiates recording for the target channel.

Start with **adding events**: select one or more events from the column on the left (use CTRL+click to select multiple items) and move them to the central column (rule map): single items can be moved with a mouse double-click, single/multiple items - by clicking the > arrow button between the columns.

Similarly, **attach actions** to the target events by selecting the desired actions in the column on the right and using the < arrow or + plus button between the central and the right columns. The + plus button should be used when you wish to attach more than one action to the same source event. To replace an action, use the > arrow to remove the selected action from the *Rules* column and select a new action instead.

To **delete the rules** one by one, remove the source events from the *Rules* column using the < arrow between the central and the left columns; to clear the *Rules* section, use CTRL+A to select all items and then use the < arrow to remove all source events.

Each VCA-based rule, just as any other rule, can have extra items controlling the rule behaviour. These are: conditions, schedules, delay timers and snapshot source (the latter is only applicable to the *Send Email* action). You will find more details on these items in the corresponding section of the Luxriot EVO management manual.

In the example above, the source VCA event triggers sending of an email with a snapshot from the VCA source channel attached, and this rule works based on the *Weekends* schedule.

⚠ Note that here, once created with *VCA Event* type source, *E&A Configurator* objects may not be automatically updated when VCA object properties are changed. This means, if zone/line/counter settings are modified, corresponding old events in the *Event & Action Configurator* should be tested and new events should be created if the old ones do not work, in order to maintain event/action map operability. Therefore, it is recommended that rules are created after you have finished configuring all VCA objects and rules.
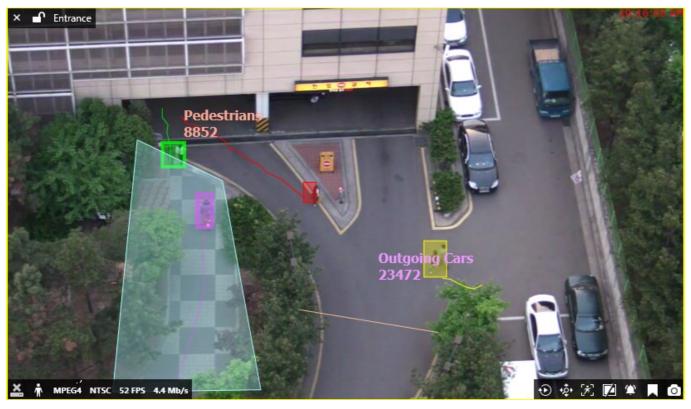
Once you have created the desired rules, click *OK* to save and exit the *E&A Configurator*.

Rule List

All the created rules will appear under the corresponding section in Luxriot EVO Console. Using the upper panel, you can **disable** any rule and **enable** it back; also, any enabled rule can be **tested** so that you do not have to wait until the event is triggered to check if the rule is operational.

14   VCA Metadata Overlay

VCA elements are displayed in the Luxriot EVO Monitor application for user reference: VCA metadata overlays video feeds, allowing the user to see configured elements and tracked objects.

The following items are displayed in the live, instant playback and regular playback modes:

- configured **zones and lines** - static
- configured **counters** - static
- **tracked objects** - moving blobs with trails
- **alarmed objects** that trigger configured rules for the zones - objects with blinking frames
- object **classification and parameters** (these items are not displayed for very small objects)
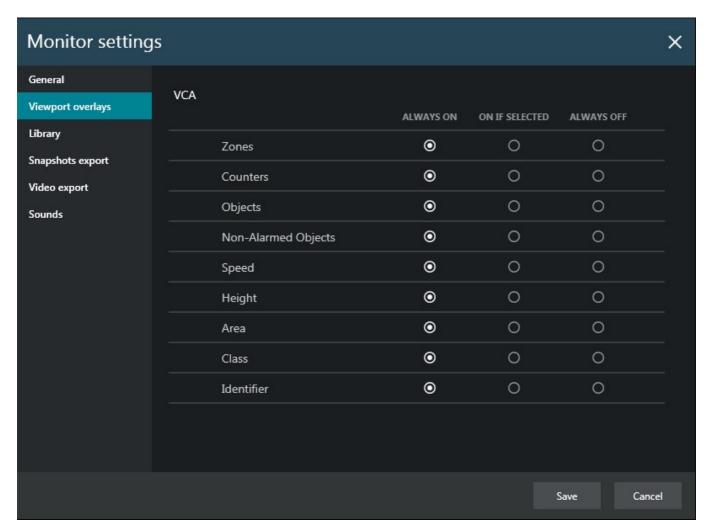
> 💡 VCA metadata overlay is displayed in Luxriot EVO Monitor in **live**, **instant playback** and **playback** modes. Other modes (e.g., *Sequence* playback) and video export **do not support** VCA overlay at this point.
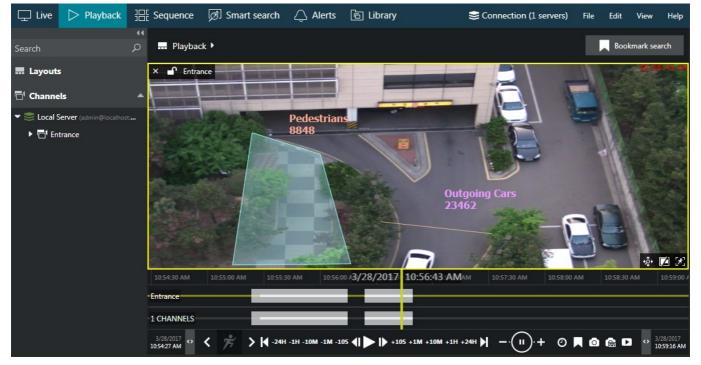
> ⚠️ Please check your system against VCA system requirements to ensure that VCA overlay is operable on the target workstation.

Item presentation can be selectively turned ON or OFF via Luxriot EVO Monitor application settings via main menu *Edit -> Settings -> Viewport Overlays* tab -> *VCA* section.

Each element can be set to be displayed always or only when the viewport is selected, or turned OFF at all. Note that display settings are applied to live, instant playback and playback modes at once.

Note that VCA is sensitive to the scene changes because it remembers the scene state to be able to discern the

moving objects from the static background. If the scene is altered - e.g., with a PTZ camera or because the device is replaced - VCA required a moment to re-calibrate itself and adjust to the new scene. At such moments, many non-existent objects may appear on the screen chaotically: this behaviour is expected and VCA will stabilize after it has learnt the new scene, which normally takes a minute or two.

15   Manual Reports

Luxriot EVO Monitor application provides an opportunity to make **reports** based on the VCA counters, which data has been recorded with the video stream(s). Reports can be built manually, for any period, provided that data from the counters is available. Automatic reports can be configured in a similar manner; see the next chapter for details.

There are three report types: **bar**, **line** and **pie** diagram. Regardless of the chosen type, all reports are based on the **counters** and have configurable report interval and days and times of interest. Counter values are compared for the given period and with the specified scale, and the results are then reflected in the chart of the selected type. Any report can be also exported as **PDF**.

Create Reports

In your Luxriot EVO Monitor application, switch to the *Reports* tab: this functionality will be available when at least one of the connected servers has Open VCA operating or software counters configured for at least one of its channels, and the used user account has sufficient privileges to access the recorded counter metadata.

You do not need to set VCA channels manually: all the available counters are listed automatically in the right-hand panel, under *Counters*, with the channel title displayed in brackets next to the counter name.

Specify the **reporting criteria** in the right-hand panel, which is divided into three sections:

- **Counters**:
  - Select desired one or more Open VCA **counters** to be included in the report (none are selected by default)
  - All the counters present in the system are listed, with their source channels specified in brackets
- **Report time interval**:
  - Choose the **start and end** date and time for the target report
- **Report filters**:
  - **Week days**: select **days of the week** that you want to be included in the report (e.g., ignore weekends) (all days are selected by default, marked blue)
  - **Day time interval**: choose the target **audit interval** to be analysed for each of the selected days

- **Report visualisation** settings:
  - Select the **diagram type** by toggling the icons: from left to right, these are bar, line and pie type; the currently selected mode is marked blue
  - **Aggregation**: specify the **scale factor** for the target diagram - results can be presented for months, weeks, days, hours or minutes (also, the data can be aggregated by counters if the selected chart type is pie diagram)
  - The **counter value** setting lets you choose, what value is taken for each report time interval on the X axis (day etc.):
    - **Absolute**: actual counter value
    - **Relative**: difference compared to the previous interval
    - **Average**: arithmetic mean of the given interval
    - **Minimum**: minimal value during the given interval
    - **Maximum**: maximal value during the given interval
  - Choose whether you want each counter to be represented **separately** or all counters are to be **added up**

> 💡 **Report interval** defines the whole period to be reflected in the report. **Report filters** specify which exact time period should be analysed for each of the selected days of the time window specified as the report time interval.
>
> For example, if you wish to examine customer flow during working hours for the past two months, you need to set:
>
> - two months' period in the *Report interval* section
> - only mark working days in the *Report filters* section (unmark the weekend as all the days are pre-selected by default)
> - set the time interval under *Time filter* in the *Report filters* section to your target working hours

> 💡 Choose the **diagram type** by toggling the icons in the bottom of the right-hand panel in the *Report visualisation* section: from left to right, these are bar, line and pie type. The currently selected mode is marked blue.
>
>

When ready, hit the *Make report* button in the bottom of the right-hand panel to display the report diagram based on your selected criteria. Note that the chart will be built step-by-step and you will see how the newer data appears on it: if the requested report interval is large, the total time required for the chart construction may increase to several minutes. You will see the *Loading...* status in the right-hand panel indicating that reporting is in progress. You can modify the report criteria and restart the reporting process without having to wait until the current diagram is finished.

Interpret Reports

On each diagram, the **horizontal axis** (X) represents time in the specified scale, and the **vertical axis** (Y) reflects counter values. The counter values for each time interval are calculated based on the selected setting and can reflect absolute, relative, average, minimum or maximum counter value for the given interval. In the **pie diagram** type, each sector can represent either a time interval or a counter, depending on the aggregation setting parameter.

Each chart also contains a **legend** that provides information about colours used in the diagram:

- if you have selected to analyse every counter separately, each counter will be represented with its own colour and the legend will reflect counter titles
- if you have chosen to sum the counter values:
  - bar diagram will have just one column for each interval, every column consisting of specified counters and its total height reflecting the total
  - line diagram will contain graphs for each individual counter and the total
- pie chart will reflect the counter sum for each time interval if aggregation by time intervals is chosen, so the legend will contain timestamps; if aggregation by counters is selected, the pie will reflect the proportion of the counter values for the whole selected audit interval

Any report can be also **saved in PDF format**. To do so, click the *Export report* button above the diagram and specify the file name and path for the report to be exported to in the dialog box that appears; then, click the *Export report* button in the dialog box to create the file.

16   Automatic Reports

Data received from **VCA counters** can be used to **build and send automatic reports** from Luxriot EVO servers.

Reports can have different periods and are configured using Luxriot EVO Console. Depending on the collected information context, these reports can be used, for example, to estimate the average number of customers during specific hours, compare the number of passing cars to the number of trucks etc.

The report creation process is similar to the manual procedure of reporting in the Luxriot EVO Monitor application, with the difference that here the settings are defined once and then are used by the Luxriot EVO servers for automatic report generation.

General

There are three report types: **bar**, **line** and **pie** diagram. Regardless of the chosen type, all reports are based on the **counters** and have configurable report interval and days and times of interest. Counter values are compared for the given period and with the specified scale, and the results are then reflected in the chart of the selected type. Reports can be configured to be created **automatically** on a **daily**, **weekly** or **monthly** basis and then **emailed** to the specified email address.

> ⚠ Regardless of the report settings, the report will be emailed after the selected report interval has ended.
>
> Example 1: the report interval is previous day with time filter set to 8AM to 6PM. The report will be emailed next day 12:01AM.
>
> Example 2: the report interval is previous week with only working days selected (weekends deselected). The report will be emailed 12:01AM next Monday, i.e., when the week is over.
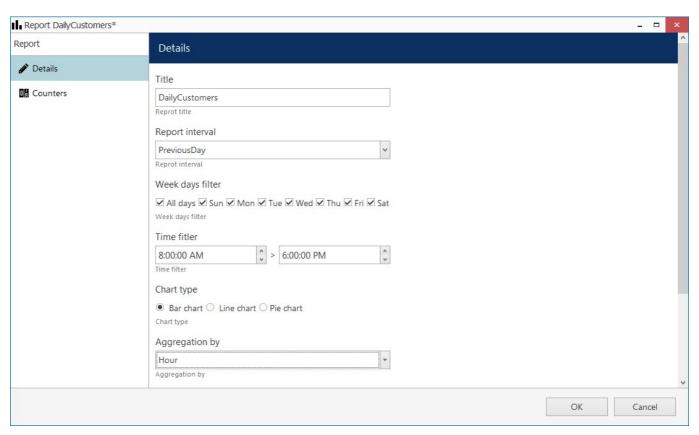
Prerequisites

Reporting in Luxriot EVO Console is primarily aimed at automatic report sending via email. In order to achieve this, you need to configure a mail server in Luxriot EVO Console for the emails to be sent through, according to the steps explained in the corresponding section of this document. You can do this prior or after the report setup. If you need a one-time report for a custom time interval, you are welcome to use the reporting function in the Luxriot EVO Monitor application.

For a report to be created successfully, there must be some counter data present in the database, so make sure to collect some data from the counters before scheduling the reports.

Report Configuration

In order to start report setup, go to the *Configuration* section of Luxriot EVO Console and choose *Reports* from the menu on the left. Press the + *New report* button on the top panel to bring up the report configuration dialog box.
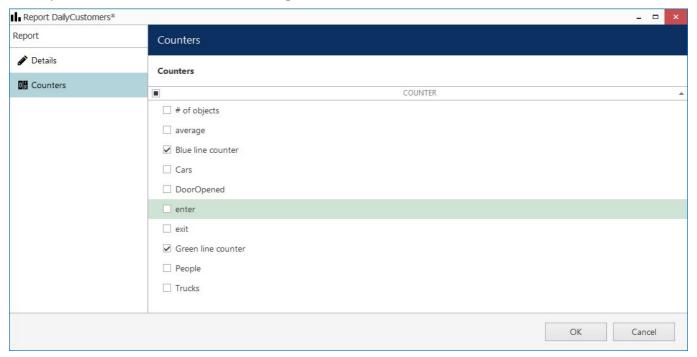
Specify the **reporting criteria** in the *Details* tab; the following settings are available:

Setting	Description	Default Value
Title	User defined title for the report	[empty]
Report interval	Time interval to be represented in the report; can be previous day, week or month	Previous day
Week days filter	Days of the week to be included in the report (e.g., ignore weekends)	All days
Time filter	Target audit interval to be analysed for each of the selected days	12AM > 12AM (whole day)
Chart type	Diagram type: bar, line or pie	Line chart
Aggregation by	Scale factor for the target diagram - results can be presented for months, weeks, days, hours or minutes (also, the data can be aggregated by counters if the selected chart type is pie diagram)	Day
Value	Counter value to be taken for each report time interval on the X axis (day etc.): • Absolute: actual counter value • Relative: difference compared to the previous interval • Average: arithmetic mean of the given interval • Minimum: minimal value during the given interval • Maximum: maximal value during the given interval	Absolute
Sum counters	Choose whether you want each counter to be represented separately or all counters are to be added up (for bar and line type diagrams only)	Disabled
Automatic	Generate the report and send it automatically to the specified email	Disabled
Mail server	A pre-configured SMTP server to be used for email sending (the setting is revealed when automatic report sending is enabled)	[none]

| To | Email recipient the report to be emailed to; enter exactly one valid email address here (the setting is revealed when automatic report sending is enabled) | [empty] |

Next, switch to the *Counters* tab: here, you can select the required counters from the list. All the counters available in the system are listed here in case their data is present in the database.
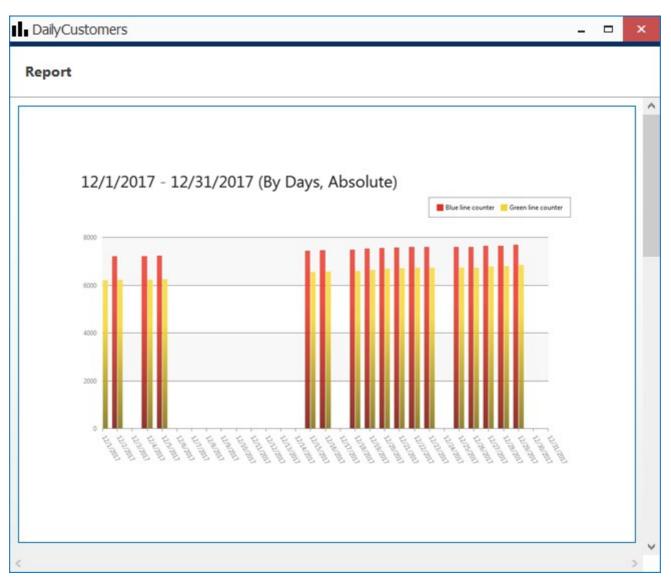

When ready, hit the *OK* button in the bottom to save the report configuration based on your selected criteria. To edit and remove reports, use the corresponding buttons on the upper panel.

Report Preview

After you have created a report, you can check how it will look like by using the *Preview* and *Test* buttons on the upper panel. The **preview** button will generate a report and display it on your screen; the **test** option will create a report and email it to the specified address in PDF format immediately. In either case, the report preview will be based on its configured time interval, so, if you get an empty report, make sure that counter data are present for the previous day, week or month, whichever specified.

> 💡 When you have created a **new report** and wish to test it, please wait about 10-30 seconds before pressing the *Test* button: this time is required to retrieve the counter information from the database.

On each diagram, the **horizontal axis** (X) represents time in the specified scale, and the **vertical axis** (Y) reflects counter values. The counter values for each time interval are calculated based on the selected setting and can reflect absolute, relative, average, minimum or maximum counter value for the given interval. In the **pie diagram** type, each sector can represent either a time interval or a counter, depending on the aggregation setting parameter.
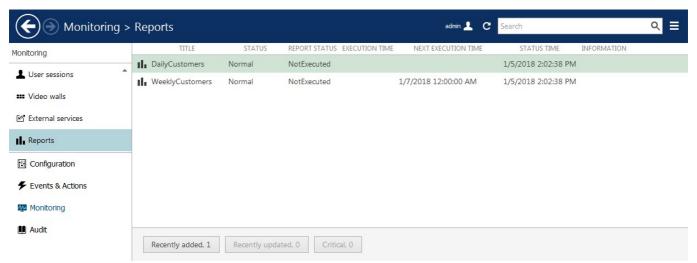
Each chart also contains a **legend** that provides information about colours used in the diagram:

- if you have selected to analyse every counter separately, each counter will be represented with its own colour and the legend will reflect counter titles
- if you have chosen to sum the counter values:
  - bar diagram will have just one column for each interval, every column consisting of specified counters and its total height reflecting the total
  - line diagram will contain graphs for each individual counter and the total
- pie chart will reflect the counter sum for each time interval if aggregation by time intervals is chosen, so the legend will contain timestamps; if aggregation by counters is selected, the pie will reflect the proportion of the counter values for the whole selected audit interval

Apart from the diagram itself, each report in PDF format will also contain a table with the reference counter values.

Report Status Monitoring

Report execution status can be tracked from the *Monitoring* section of Luxriot EVO Console, by choosing *Reports* in the menu on the left.

If a report has been sent at least once (by schedule, not as a test), the last execution time is shown here. For the reports that are currently set to be emailed automatically, the next (scheduled) execution time is also displayed.

17   Configuration Tool

Starting from Luxriot EVO version 1.11.1, Luxriot provides a separate tool for VCA configuration. The tool comes as a standalone executable file; it can be installed on a machine that has 64-bit version of Luxriot EVO or does not have any Luxriot EVO components installed at all.

Functionality:

- enable and disable VCA for selected channels
- view the list of channels from one Luxriot EVO server with their VCA status
- activate, calibrate and configure VCA (identical to the VCA dialog box in Luxriot EVO Console)

⚠ Major **version** of the VCA configuration tool **must match** the Luxriot EVO version. For example, tool v.1.11.1 can work with server versions 1.11.x, e.g., 1.11.0 and 1.11.1, but is not compatible with server v.1.9.x.

⚠ The VCA configuration utility is meant as an auxiliary tool for VCA configuration in case a 32-bit Luxriot EVO Console is not available. Therefore, this tool should NOT be installed and used on a machine that already has a 32-bit Luxriot EVO or Luxriot EVO Console running.

Requirements

System requirements are the same as for Luxriot EVO Monitor installation.

Hardware

- CPU: Pentium Celeron or higher
- Video: Any graphics card with at least 512 MB RAM per display and obligatory support of **DirectDraw** acceleration
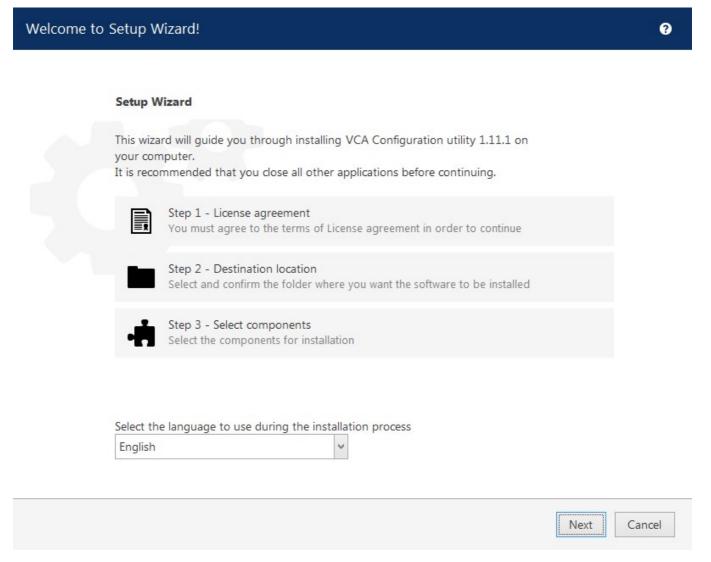
OS and Software

- Microsoft Windows 7, 8, 8.1, 10
- DirectX 8.0 or newer
- [MS XML 4.0 or higher](#) for metadata visualization

64-bit version of the Luxriot EVO server or Luxriot EVO Console application can be installed on the same machine. 32-bit versions are not compatible with this tool!

Installation

Run the *VCAConf.exe* provided by Luxriot representative and follow the steps.

Permissions

If you are going to log in using a non-administrative account, the following **user permissions** must be granted:

- resource access: receive channel live video
- administrative: manage device channels

Connection from the VCA configuration utility will be displayed in Luxriot EVO Console >> *Monitoring* section under *User sessions*, as *Console* type.

Enabling VCA

After completing the wizard, launch the VCA configuration utility. You can log into a local or a remote server. Similarly to Luxriot EVO Console, this tool uses the server TCP port, which is 60554 by default.

The controls here are as follows:

- select the target channel and click the *Enable VCA* button to turn ON video content analysis for it
- similarly, use the *Disable VCA* button to turn it OFF
- click the *Edit* button to change VCA settings (opens the VCA configuration dialog box that appears in Luxriot EVO Console)

⚠️ The tool does not check for the VCA license. Before enabling VCA and configuring it for a channel, make sure you have applied a license with sufficient number of channels.
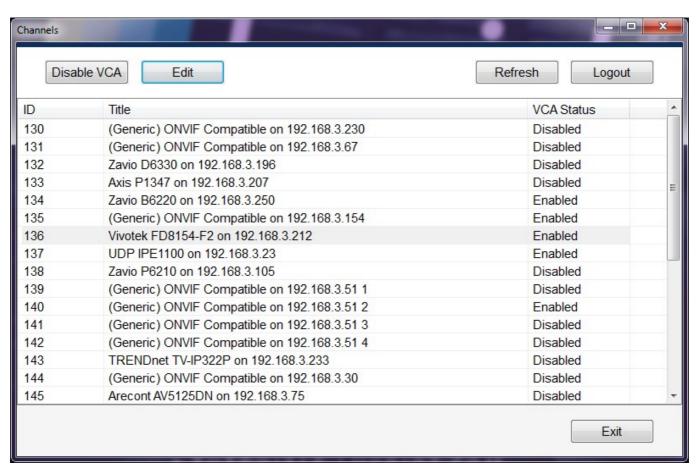
💡 The easiest way to **verify** that the VCA **license** has been applied correctly is to open the VCA classification tab: it must have the **default object classes** listed.

If they are not there:

- see if you have entered the correct license details and the license is not expired
- restart the Luxriot EVO server
- check the *Audit >> Servers* section of Luxriot EVO Console for related errors

VCA Configuration

Once you have enabled VCA for a channel, the *Edit* button will appear on the top panel. Click it to bring up the VCA configuration dialog box. The controls here are identical to those in Luxriot EVO Console; the changes you make are immediately saved into the database so Luxriot EVO Console will reflect them at once, too.

The rest of the configuration process is identical to that using the Luxriot EVO Console application; please see the corresponding sections of this document for the details.

💡 Before you create the analytics configuration for any channel, make sure to calibrate VCA according to the scene. Otherwise, the detections will be inaccurate.