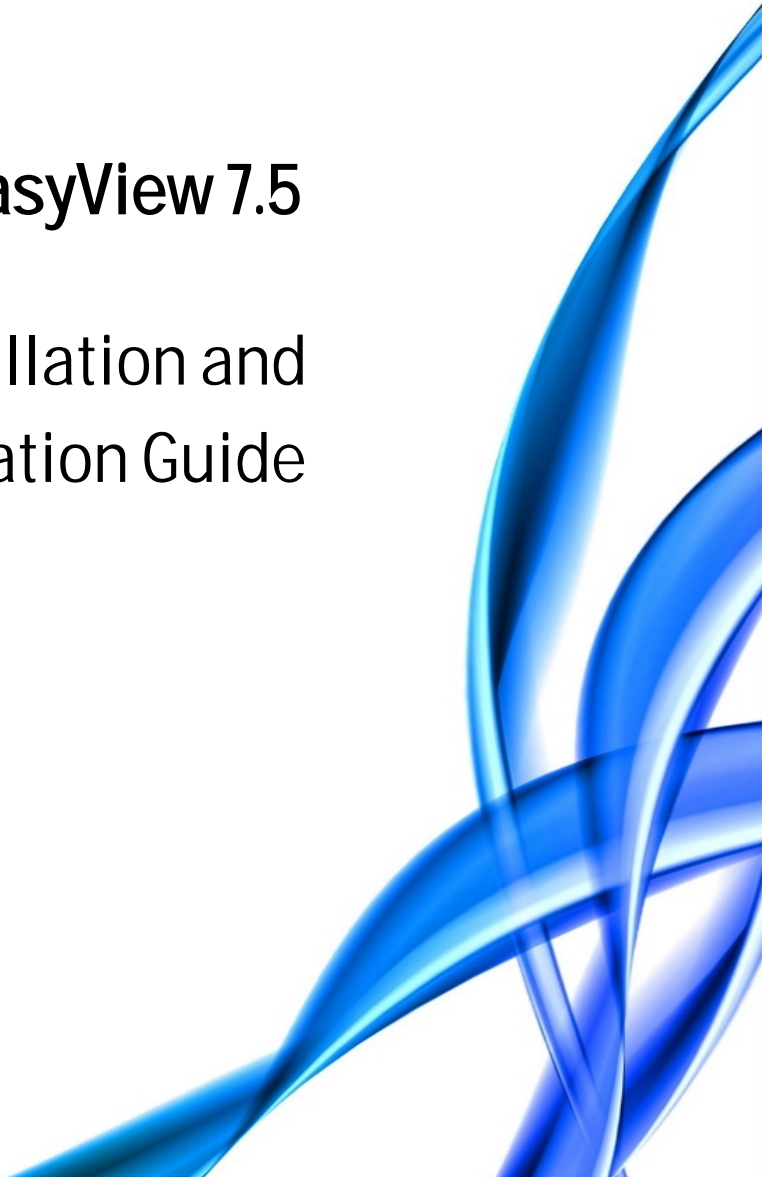


Ernitec EasyView 7.5

VCA Installation and Configuration Guide



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1. INTRODUCTION

Ernitec VCA (Video Content Analytics) comprises a set of real-time video analytics solutions that utilizes advanced image processing algorithms to turn video into actionable intelligence. At the core of the product is an advanced object recognition and 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.

Ernitec VCA is a generic name for a suite of Enterprise analytics add-on product options that include functionality such as:

- **Motion object tracking:** Motion-data based object highlighting and tracking, auto-zoom functionality. The motion-data is produced by server-based, hermeneutic motion detection.
- **Tripwire counting:** In addition to motion object tracking functionality, line counting for over-head installed cameras, and EasyView client-based counter visualization.
- **Object behaviour/attributes detection:** In addition to the aforementioned functionality, to continually track and classify moving and stationary targets and features a full suite of rule-based filters including such as: 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. In addition to an advanced people tracking engine optimized for tracking people in cluttered indoor scenes such as retail scenarios. Includes specific high-accuracy counting functions optimized for use in busy scenes.
- **Related analytics options:** Available as separate applications, products or through project-based integrations:
 - **Ernitec ANPR+:** Separate Enterprise option (application) for automatic number (license) plate recognition and management.
 - **Ernitec Reporting:** Separate Enterprise option (application) for Reporting brings the numerical information and statistics to an easily readable form, from where you can, for example, track trends over time or look for abnormalities from a big amount of data. You can define the events that shall be reported, freely select time frame and compare different time frame activities in graphs.

- Camera-based (built-in, edge) analytics support for selected camera manufacturers and their functionality through manufacturer-specific integration connectors.
- Audio analytics technologies, which refers to software for extraction of information and meaning from audio signals, such as detecting sounds of breaking glass, etc.
- Facial recognition technologies, which refers to software for automatically identifying or verifying the identity, age, gender, etc., of a person from video footage.

This guide will help you get Ernitec VCA configured, as well as lead you through some of the advanced features provided by the Ernitec VCA solutions.

2. GETTING STARTED PROCESS

In order to get started, the following steps should be executed for each server:

1. Decide upon the VCA functionality that meets your requirements. Please see, e.g., the *“Ernitec Analytics and Reporting White Paper”* for guidance, or consult your Ernitec representative.
2. Acquire and install a Ernitec EASYVIEW Enterprise system and the related software license key with the required number of VCA channels and other features enabled. (See the *“Ernitec EASYVIEW Installation Guide”* and the *“Ernitec EASYVIEW Administration Guide”* for details.)
3. Add and configure the video cameras you intend to use for VCA. If VCA functionality requires only Ernitec VCA motion object tracking features, for each video channel optionally enable the hermeneutic motion detection (if continuous recording mode is not sufficient for your needs) using the System Manager application, and jump to step 9. (See the *“Ernitec EASYVIEW Administrator Guide”* for details regarding enabling hermeneutic motion detection.)
4. Obtain the VCA activation license codes for the feature set required. (See section *“3. Obtaining Ernitec VCA Activation Licenses”*.)
5. Activate the Ernitec VCA using the VCA Configuration Tool. (See section *“4. Activating Ernitec VCA”*.)
6. Calibrate each camera using the VCA Configuration Tool. (See section *“5. Camera Calibration”*.)
7. Configure the detection rules for each camera using the VCA Configurator tool. (See section *“6. Configuring Detection Rules”*. Verify that the rule is triggered as expected in the History window in the tool.)
8. Exit the VCA Configuration Tool (the DVRServer service – the recoding service component of Ernitec EASYVIEW - will restart. See the end of section *“6. Configuring Detection Rules”*.)
9. Verify VCA functionality visualization using the EasyView for Windows application. (See section *“7. Ernitec VCA Visualization”*.)
10. Create VCA alarms using the System Manager application. (See section *“8. Using VCA to Trigger Alarms”*.)

3. OBTAINING ERNITEC VCA ACTIVATION LICENSES

VCA ACTIVATION

Most features of the Ernitec VCA must be activated before they can be used.

Activating Ernitec VCA consists of the following steps:

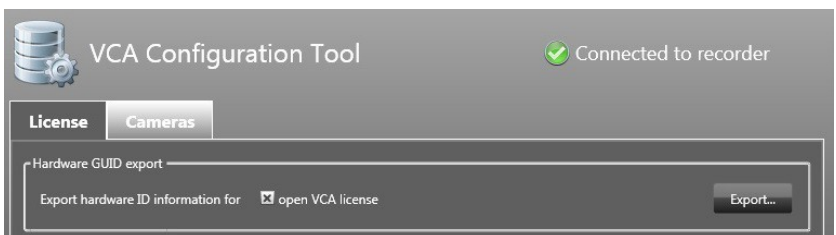
- Obtaining VCA license activation codes.
- Applying the VCA license activation codes to the system. (See section “4. Activating Ernitec VCA”.)

OBTAINING ACTIVATION CODE

Before Ernitec VCA can be enabled, it must be activated. Typically, a VCA license activation code is supplied by Ernitec directly, or by your Ernitec representative, upon receipt of a valid hardware globally unique identifier (HWGUID) code generated on the server on which Ernitec VCA is to be activated.

The VCA license activation process is outlined below:

1. On the server where VCA license activation is required, export the HWGUID.txt file from VCA Configuration Tool using “Hardware GUID export”.



2. Send the created HWGUID.txt file via email to the address **orders@Ernitec.com**. Ernitec will then provide the VCA activation code for the required evaluation or production licenses.

The VCA activation code is created based on factors such as:

- Server main board
- Hard drive
- Processor
- Network MAC address
- Graphics adapter
- Operating system version

If there is an operating system change, then an existing activation is not valid any longer. For hardware changes, if three factors still match, then the existing activation code can be used, but a new HWGUID would be different, if regenerated.

The actual VCA license files are stored by default in the C:\Program Files (x86)\EASYVIEW\DVR\ folder using the naming convention "License_n.lic", where 'n' is a number differentiating between different licenses (e.g., evaluation licenses vs. production licenses, or different types of licenses).

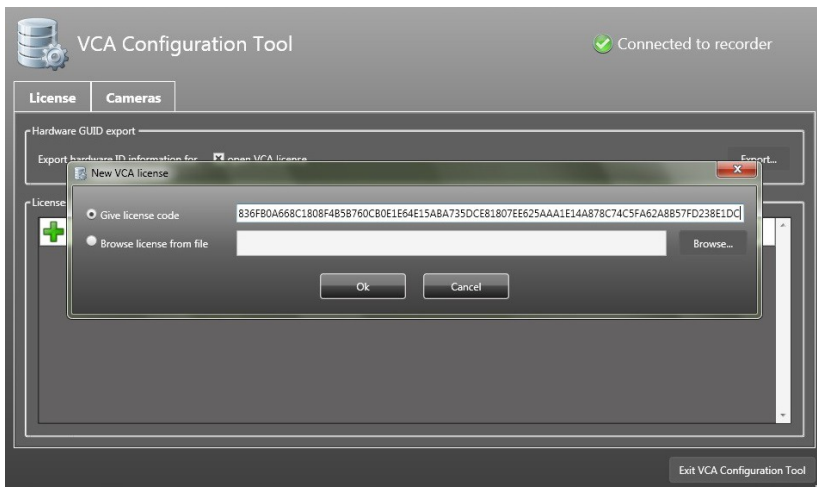
4. ACTIVATING ERNITEC VCA

ACTIVATE LICENSE

In order to use the VCA beyond the motion object tracking functionality, the VCA license codes need to be activated in the VCA Configuration Tool.

- 1) Open the VCA Configuration Tool, select the license tab and add your licenses.
- 2) To add a license select the “Give license code” or the “Browse license from file” option.
- 3) When license is accepted it appears in the license list.

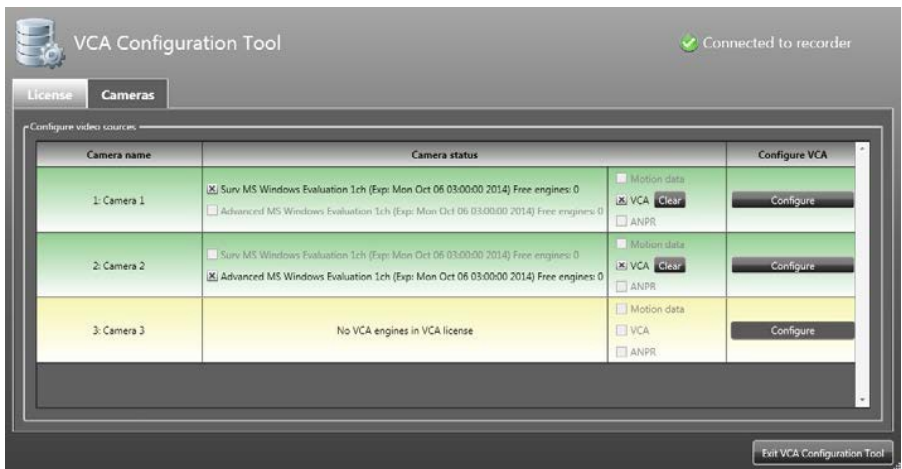
It is possible to add up to 8 licenses per server. All licenses can be of different type and they can have different amounts of channels.



TAKE LICENSE IN USE

To take a VCA license in use, select the cameras tab in the VCA Configuration Tool. One or several licenses can be selected for one camera.

- 1) Select the VCA checkbox. Now the licenses that were activated in the License tab are visible.
- 2) You must select which license you want to use for each camera. It is also possible to use more than one license for the selected camera. This way different features can be selected for one camera.
- 3) Depending on the VCA license, several cameras can be configured (with different license combinations). Available cameras are marked with green highlight. If there are no VCA engines left, the camera is highlighted in yellow.
- 4) After licenses are selected select “Configure” to configure cameras and set events.



5. CAMERA CALIBRATION

Camera calibration is required in order for the Ernitec VCA engine to provide the three-dimensional aspects of the scene for classifying detected objects into different object classes, such as people or vehicles. Once the camera has been calibrated, the engine can infer real-world object properties such as speed, height and area and classify the objects accordingly.

NOTE: Use of PTZ cameras or cameras with automatic zoom lenses are discouraged from being used for server-based VCA, as the camera calibration, rules and counters will be invalidated by camera/lens movement, resulting in false alarms and incorrect calculations.

CAMERA CALIBRATION TOPICS

- Calibration Page Elements
- Calibrating a Camera
- Advanced Calibration Parameters
- Vertical Field of View (FoV)
- Measurement Units

CALIBRATION PAGE ELEMENTS

The following describes the purpose of each element of the calibration page. To get started calibrating straight away, see the *Calibrating a Camera* topic below.

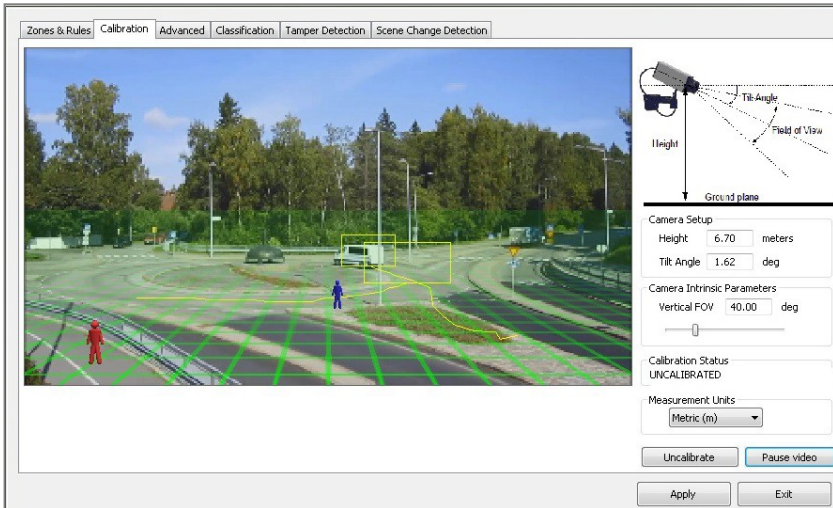
3D GRAPHICS OVERLAY

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 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.

MOUSE CONTROLS

The calibration parameters can be adjusted as follows:

- Click and drag the ground plane to change the tilt angle.
- Use the mouse wheel to adjust the camera height.
- Drag the slider to change the vertical field of view.



OTHER GRAPHICAL TOOLS

There are a number of other graphical tools that can be used to make the calibration process simpler and more accurate.

Horizon Display

The horizon can be displayed by right clicking and checking the menu option. If the horizon is visible in the video, it is possible to use this to set the tilt angle. Drag the grid until the horizon in the video matches the graphical horizon.

Additional Mimics

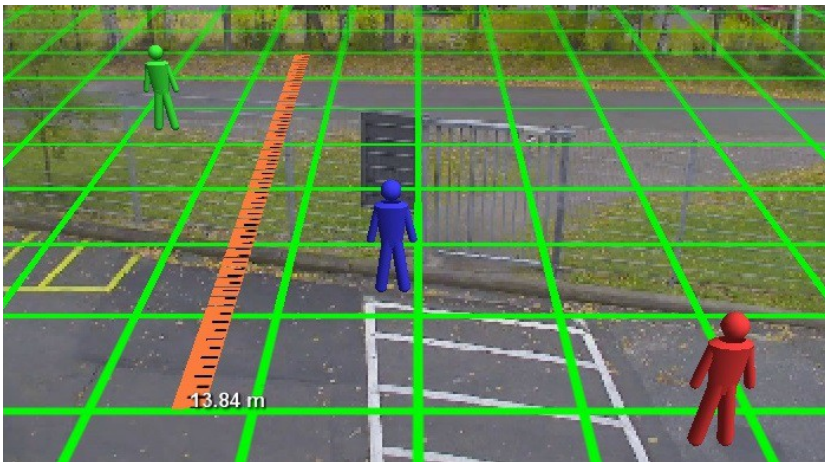
Additional mimics can be added to verify the calibration configuration. Select the Add Mimic option from the menu.

Grid Transparency

By default the ground plane is displayed in transparent mode such that the video is clearer. The transparent grid can be toggled by selecting the corresponding menu option.

Virtual Ruler

The calibration configuration control supports a virtual ruler. This can be useful for measuring distances along the ground plane to objects of known size such as road lane widths, car park space widths, etc. The virtual ruler is effectively a "measurement stick" that measures the distance between two points along the ground plane (not heights).

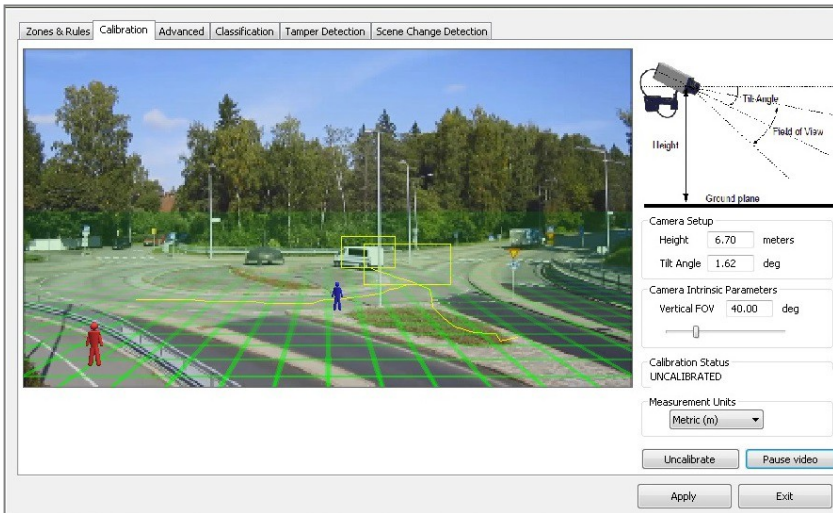


To use the virtual ruler, simply right click anywhere a point on the ground plane to anchor one end of the ruler and select the option from the menu. It is then possible to move the other end of the ruler around the ground plane to measure the distance between the anchor point and the current mouse position.

To exit from the virtual ruler mode, click the right button. The ruler disappears.

CALIBRATING A CAMERA

Calibrating a camera 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 in the appropriate boxes and apply the changes.

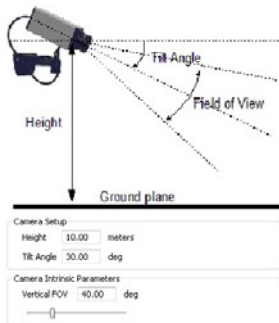


If however, you do not know, or are unable to find out the camera parameters, this topic provides a step-by-step guide to calibrating a camera.

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, and a person further away from the camera. It is useful to use the Video Control button to pause the video so that the mimics can be accurately placed. Place the mimics on top of or near the people. Enter in the known height or estimated height. Enter in the known height or estimated height.

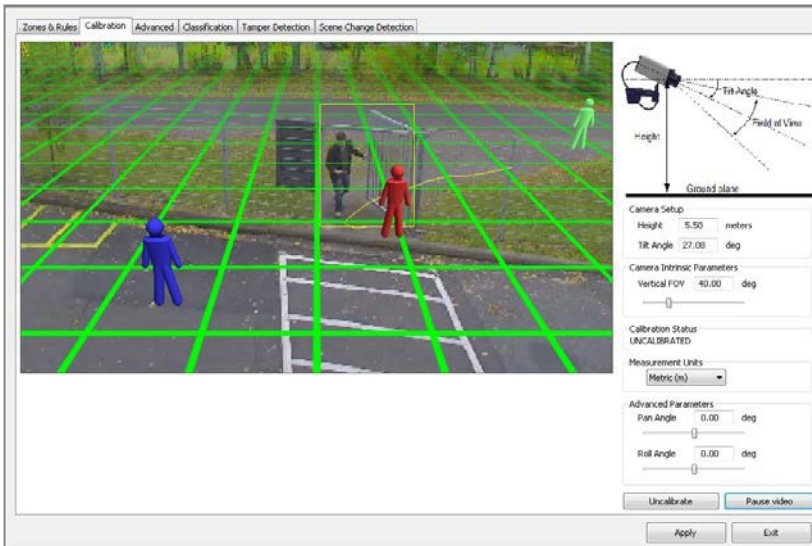
Step 2: Adjust tilt angle and camera height



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 an estimated height is entered then 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 drag the slider to change the vertical field of view.

The calibration parameters will be reflected in the edit boxes in the Camera Setup section of the web page. Then Apply the changes.



Once the changes have been applied, the Calibration Status reflects whether the operation was successful, and if so, in which mode the camera is calibrated.

Step 3: Verify the setup

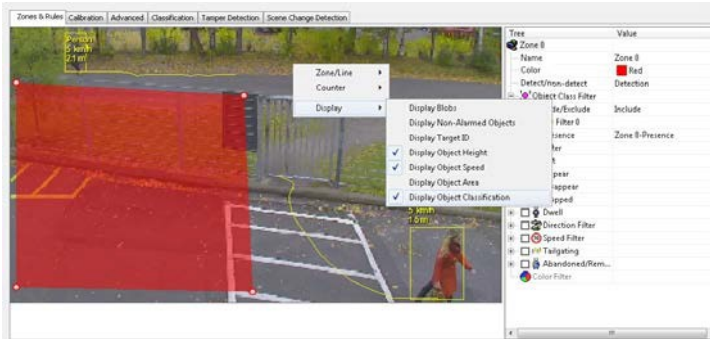
Once you are happy that the scene is correctly calibrated, verify the settings by dragging the mimics around and comparing them to other people or people-sized objects in the scene.

The more locations in the scene where the calibration is verified, the more accurate the calibration will be.

The 3 calibration parameters can be fine-tuned in the same way as detailed in Step 2.

Refer to the Camera Page Elements Topic for information regarding additional calibration tools that can help improve the accuracy of the calibration.

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.



Tip: If it all goes wrong

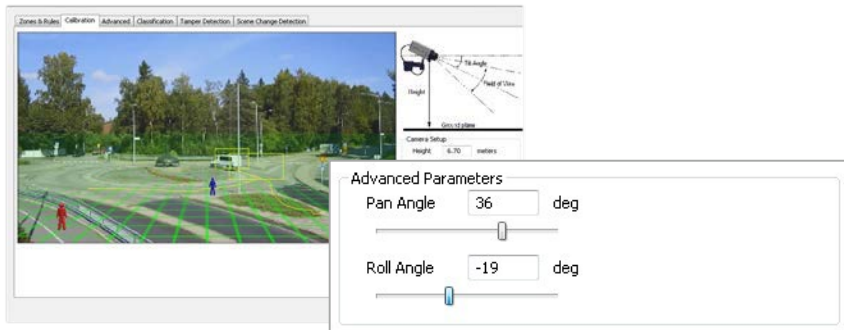
If you find that the mimics get lost or disappear due to an odd calibration configuration, the process can be restarted by clicking the "Restore Defaults" button.

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 that 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.

To use the advanced parameters click on the advanced parameters button. Drag the pan and roll slider controls to change the pan and roll of the ground plane.



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 don't know the vertical field of view, it can be determined from the following table, given the vertical image dimension and its focal length:

Focal length (mm)						
Image format	Vertical image dimension (mm)	1	1.2	1.4	1.6	1.8
1/4"	2.4	100.39	90.00	81.20	73.74	67.38
1/3"	3.6	121.89	112.62	104.25	96.73	90.00
1/1.8"	5.32	138.79	131.44	124.48	117.95	111.83

Focal length (mm)						
Image format	Vertical image dimension (mm)	2	2.2	2.4	2.6	2.8
1/4"	2.4	61.93	57.22	53.13	49.55	46.40
1/3"	3.6	83.97	78.58	73.74	69.39	65.47
1/1.8"	5.32	106.12	100.81	95.88	91.31	87.06

Focal length (mm)						
Image format	Vertical image dimension (mm)	3	4	6	10	15
1/4"	2.4	43.60	33.40	22.62	13.69	9.15
1/3"	3.6	61.93	48.46	33.40	20.41	13.69
1/1.8"	5.32	83.12	67.25	47.82	29.79	20.11

Focal length (mm)					
Image format	Vertical image dimension (mm)	20	30	40	50
1/4"	2.4	6.87	4.58	3.44	2.75
1/3"	3.6	10.29	6.87	5.15	4.12
1/1.8"	5.32	15.15	10.13	7.61	6.09

If you are unable to determine the vertical field of view for your camera from the above tables, leave the field of view at its default setting, 40°.

MEASUREMENT UNITS

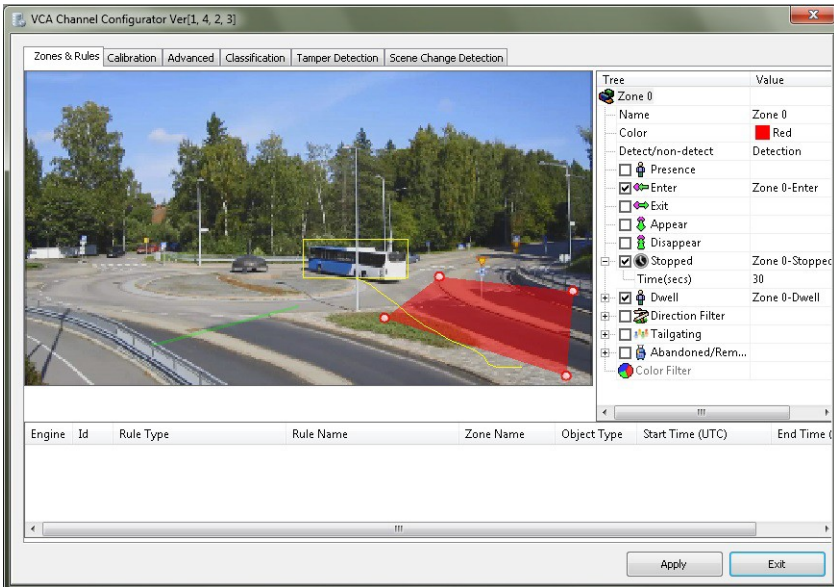
The height, area and speed annotation can be displayed in metric or imperial units. By default the system displays metric units. To change the measurement units, select the Advanced settings page and change the Measurement Units option. Apply the changes.



6. CONFIGURING DETECTION RULES

ZONES AND RULES

In order to create VCA triggered alarms, it is necessary to configure detection zones and detection rules. The detection zones and rules are configured by selecting the *Zones and Rules* sub menu in the Ernitec VCA Configuration Tool:



TRACKING DISPLAY

The tracking display window shows all moving and stationary targets that are currently being tracked by the engine. Objects that have triggered a rule are displayed in red. Conversely, objects that have not triggered a rule are displayed in yellow.

This snapshot shows a detection zone, in red and a detection line, in green.

The tracking display window is useful for predicting how the rules will operate. By examining how the trails of the objects intersect the detection zones and lines, it is possible to determine how the rule can be optimally configured.

PROPERTIES INSPECTOR

The properties inspector allows the user to assign detection rules to detection zones and detection lines. Available rules will depend on the features available and settings applied, and may include the following:

- Object presence
- Object entered
- Object exited
- Object appeared
- Object disappeared
- Object stopped
- Object dwell
- Object direction
- Object speed
- Object Tailgating
- Abandoned Object
- Removed Object

EVENT HISTORY

The event history control shows the history of objects that have triggered rules and generated alarms.

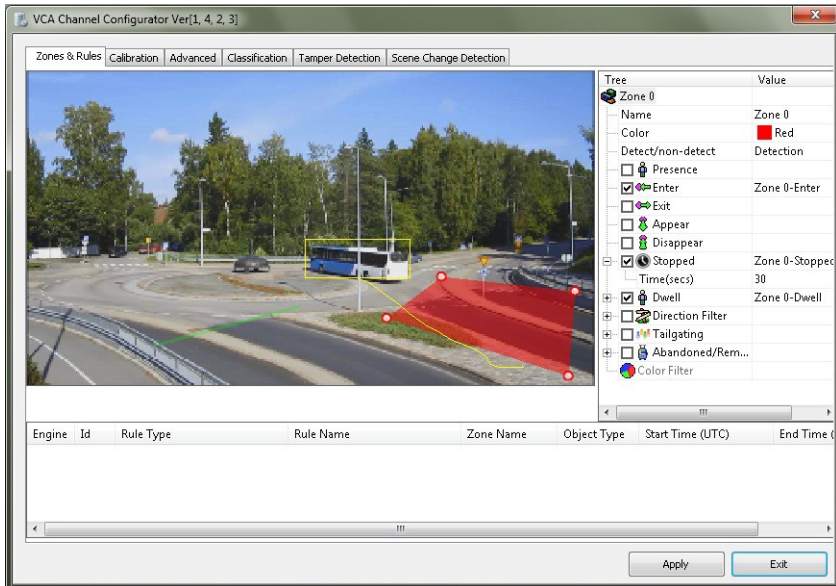
CREATING DETECTION ZONES AND LINES

In order to detect events of interest, detection zones and lines must be defined. Detection zones define an area of interest. Detection lines are similar to detection zones but they define a perimeter instead of a region.

Creating a Zone or Line

To create a zone or line, either double click the left mouse button or right click and select Zone/Line.

Sample configuration screen with specific VCA license type (available options and appearance depend on license):

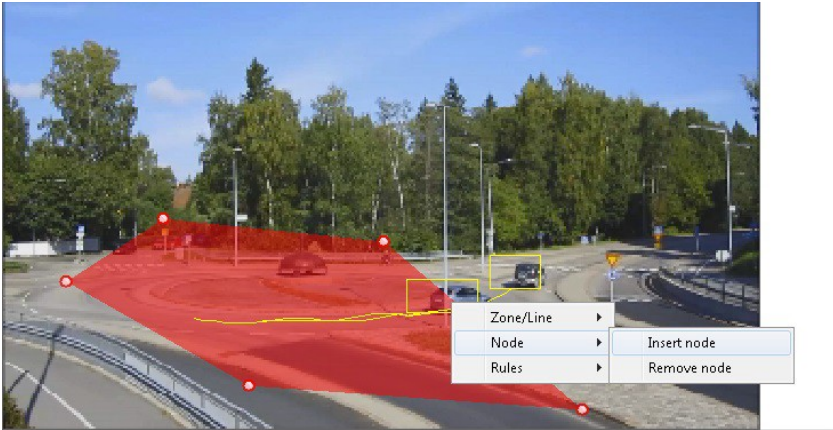


Editing Zones and Lines

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

Adding and Removing Nodes

Zones and lines can be tailored to any scenario by simply adding more nodes (corner points of a zone) to define the shape required. To add a node, simply double click on the zone or line at the point where the new node should be added. Nodes can be deleted by right clicking on the node and selecting Node... Remove node:



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 "non-detection" zones, where nothing is detected or tracked.



DETECTION RULES

Once some detection zones and/or lines have been configured, it's possible to define some detection rules that apply to the zones/lines. By default, zones and lines are automatically configured to detect object presence.

The rules are defined in the Properties Inspector of the VCA Configurator (available options and appearance depend on license):

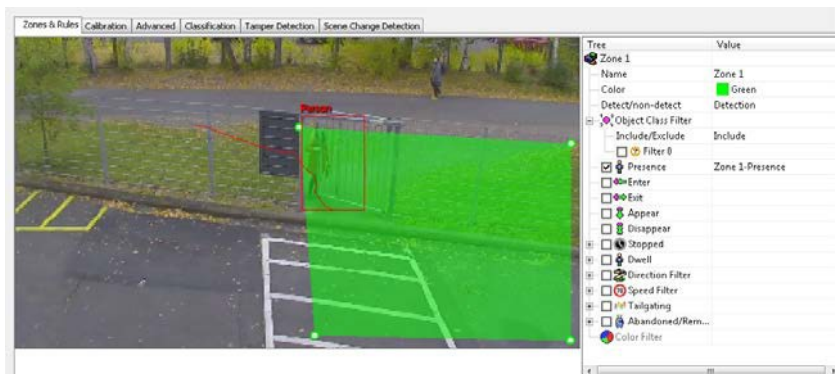
Tree	Value
Zone 1	
Name	Zone 1
Color	Green
Object Class Filter	
Include/Exclude	Include
Filter 0	
<input checked="" type="checkbox"/> Presence	Zone 1-Presence
<input type="checkbox"/> Enter	
<input type="checkbox"/> Exit	
<input type="checkbox"/> Appear	
<input type="checkbox"/> Disappear	
<input type="checkbox"/> Stopped	
<input type="checkbox"/> Dwell	
<input type="checkbox"/> Direction Filter	
<input type="checkbox"/> Speed Filter	
<input type="checkbox"/> Tailgating	
<input type="checkbox"/> Counting Line	
<input type="checkbox"/> Abandoned Obj...	
<input type="checkbox"/> Removed Object	

The properties inspector is context-sensitive to the zone selected. As different zones/lines are selected, so the properties inspector changes to reflect the rules 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. Of course, these can be customized to suit the detection scenario. The selection of multiple rules on a detection zone is supported.

OBJECT PRESENCE

Enable the object presence rule on the selected zone by checking the Presence box in the properties inspector and click apply.

Objects that are present inside a zone or pass through a line will trigger the rule and raise an alarm.



OBJECT DIRECTION

Enable the object direction rule on the selected zone by checking the Direction Filter box in the properties inspector. Adjust the direction and acceptance angle to suit the detection scenario.

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 alarm.



OBJECT ENTER AND EXIT

Enable the object enter and exit detection by checking the corresponding check boxes in the properties inspector and click apply.

An object entered alarm is raised when an object crosses from the outside to the inside of a detection zone. Conversely, an object exited alarm is raised when an object crosses from the inside to the outside of a detection zone:





OBJECT APPEAR AND DISAPPEAR

Enable the object appear and disappear detection by checking the corresponding check boxes in the properties inspector and click apply.

An object appear alarm is raised when an object appears inside a detection zone. Note that this is different from object entered detection since the object must be initially detected inside the zone without entering, e.g. people appearing in a doorway, or cars appearing from an underground car park.

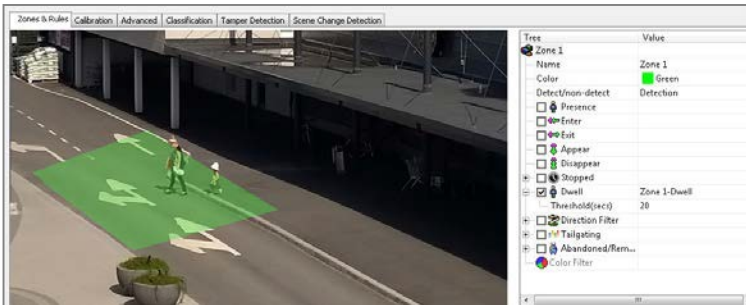
Conversely an object disappear alarm is raised when an object disappears inside a detection zone. Again, this is different from object exit detection since the object must be tracked into the zone and then disappear without exiting the zone.



OBJECT DWELL

Enable the object dwell rule on the selected zone by checking the Dwell box in the properties inspector and click apply.

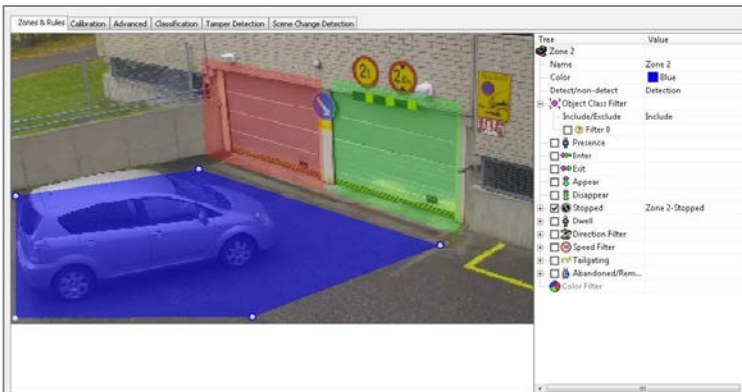
Objects that dwell inside a zone for longer than the defined amount of time will trigger the rule and raise an alarm.



OBJECT STOPPED

Enable the object stopped rule on the selected zone by checking the Stopped box in the properties inspector and click apply.

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



The stopped time can be configured by simply clicking in the Time box on the rule control and editing the value in-place.

OBJECT CLASS FILTER

Once the camera has been calibrated and rules have been defined, it's possible to include or exclude specific object classes in the detection rules.



Select and enable an Object Filter by checking the box. Select whether the rule should include or exclude the object type. Select the object type to include or exclude. Apply the changes.

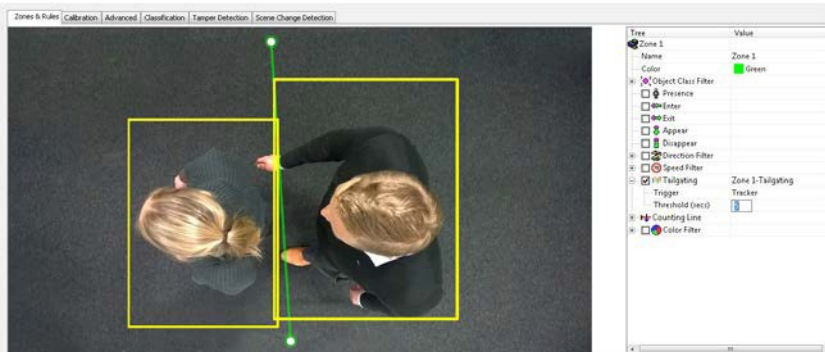
In this example, the rule has been configured to include detection of people only. As illustrated, the person generates an alarm, but the vehicle is filtered out and does not trigger the alarm. Multiple filters may be applied to one zone/line.

OBJECT TAILGATING

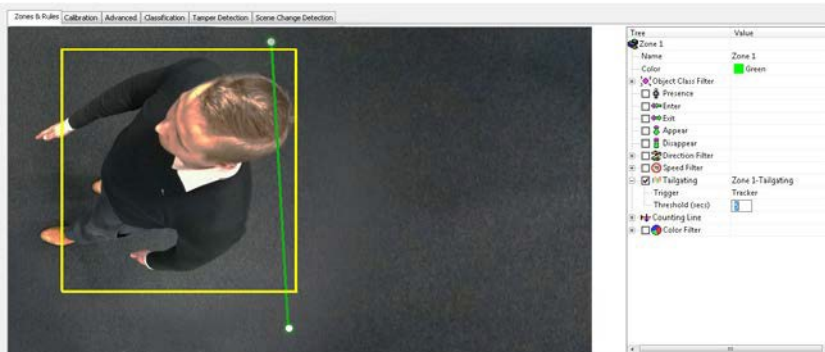
Enable the object tailgating rule on the selected zone by checking the Object Tailgating box in the properties inspector. Adjust the time threshold to set the minimum allowable time between successive object detections.

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

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 5s of an object having already crossed the line will trigger the Object Tailgating filter.



Object 2 crosses the line within 5 seconds of Object 1. This triggers the Object Tailgating filter.



Object Tailgating Trigger

The tailgating filter can use either the tracking engine or the counting line as trigger sources for tailgating detection. Since the counting line exhibits higher performance when detecting multiple objects crossing a line, best performance will be obtained when the trigger is set to "Counting Line". If a counting line filter is already configured on the line, then the trigger is automatically set to "Counting Line".

Note that a Ernitec VCA Pro, Ernitec VCA Access or Ernitec VCA Count license is required to enable the counting line.

Tree	Value
Zone 1	
Name	Zone 1
Color	Green
Object Class Filter	
Include/Exclude	Include
Filter 0	
Presence	
Enter	
Exit	
Appear	
Disappear	
Stopped	
Dwell	
Direction Filter	
Speed Filter	
<input checked="" type="checkbox"/> Tailgating	Zone 1-Tailgating
Trigger	Counting Line
Threshold (secs)	
<input checked="" type="checkbox"/> Counting Line	Tracker
<input checked="" type="checkbox"/> Direction A	Zone 1-Cnt Line - Dir A
Direction B	
Width Calibrati...	6.10
Abandoned Obj...	
Removed Object	

Enable Tailgating filter

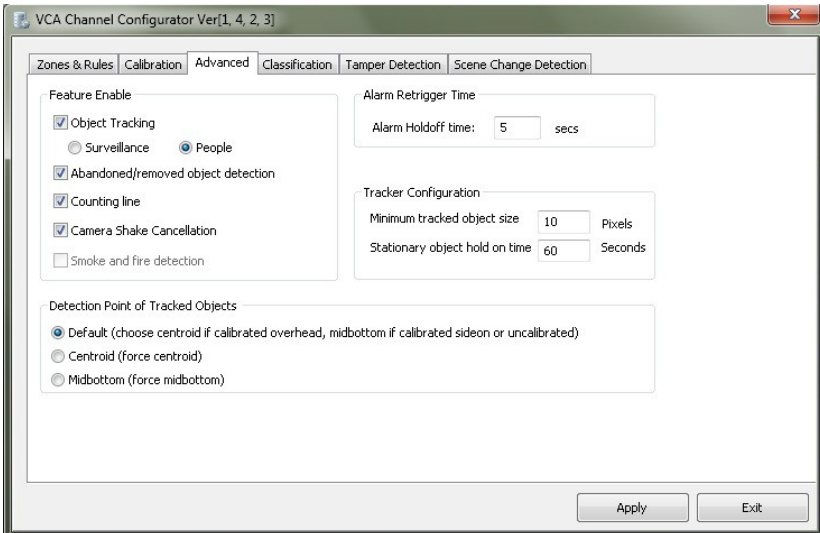
Best performance with Counting Line enabled

Select between the Tracker or Counting Line as the trigger for Tailgating detection

ABANDONED AND REMOVED OBJECT

Ernitec 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 detection is enabled by checking the "Abandoned/removed object detection" box on the VCA Channel configurator Advanced page.

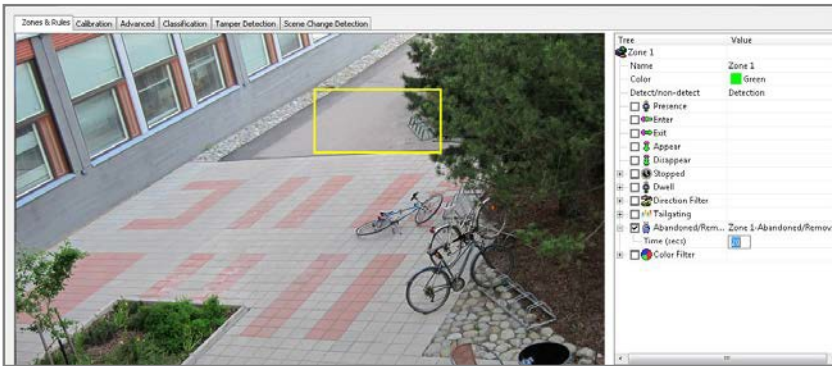


NOTE: The algorithm used for abandoned and removed object detection is the same in each case: it cannot differentiate between abandoned or removed objects. This is a fundamental limitation of the algorithm and arises because it just analyses how blocks of pixels change with respect to a background model 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 rule on the selected zone by checking the Abandoned/Removed Object box in the properties inspector. An object that is left inside a zone for longer than the configured time period will trigger the rule and raise an alarm.



The following figure illustrates the abandoned/removed object detection rule detecting a removed bicycle.



Stationary Object Hold-on Time

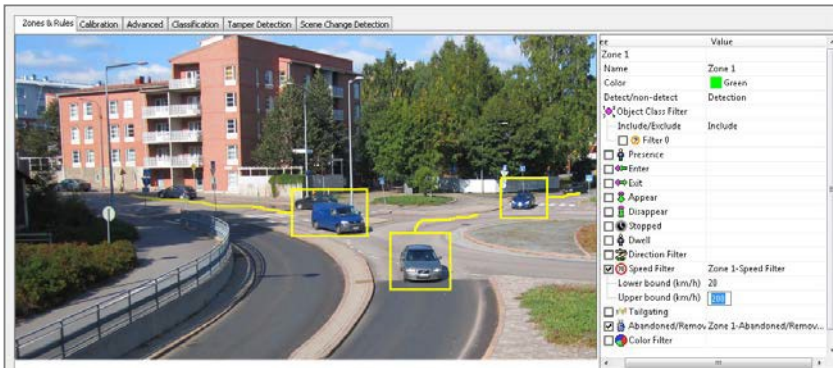
The stationary object hold-on time is the time which the tracker will keep tracking an object once it has been detected as stationary or abandoned/removed. After an abandoned/removed object has been detected, the object will continue to be tracked for the time configured by the stationary object hold-on time. The default value is 60 seconds, but this can be changed on the advanced settings page.

OBJECT SPEED

Enable the object speed rule on the selected zone by checking the Speed Filter box in the properties inspector. Adjust the lower and upper speed limits to suit the detection scenario.

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

Note that the camera must be calibrated for this function to be available.



COUNTING LINE

A counting line 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:

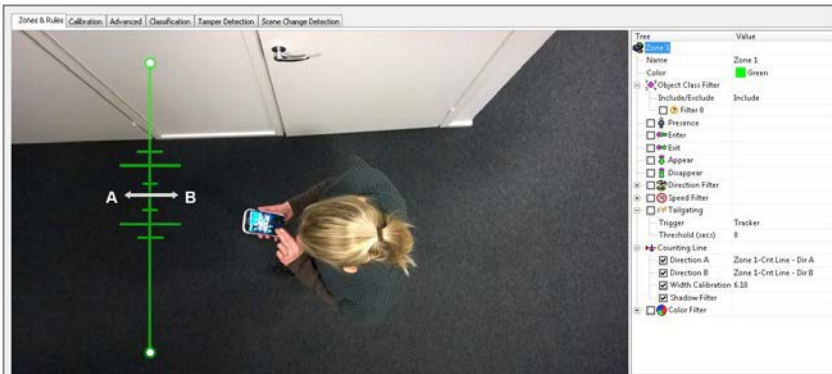
- People counting with overhead cameras in a retail environment.
- Vehicle counting with overhead cameras on public highways.

The counting line filter is only enabled when the unit has been configured with a Ernitec VCA Retail license, and typically will generate a higher accuracy count than using the counters provided as part of Ernitec VCA Surveillance.

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

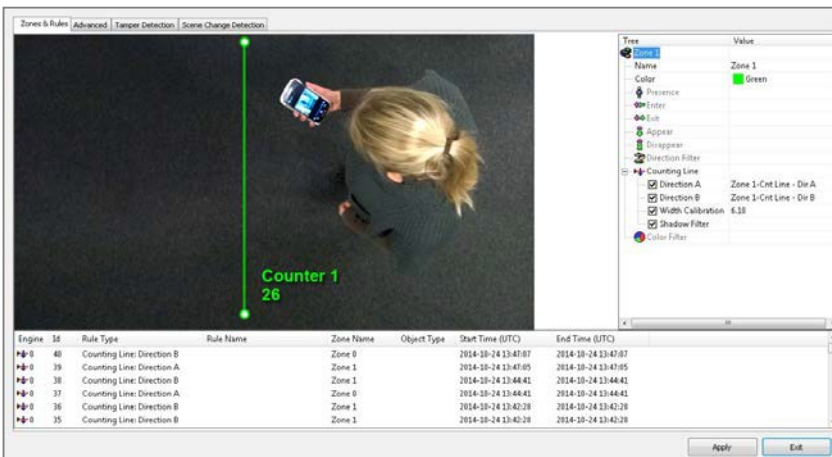
Enabling the Counting Line

Enable the counting line filter on a detection line in the desired direction(s) by checking the appropriate box in the properties inspector. 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 normal manner.



Assigning Counters to Counting Lines

A counting line by itself simply generates events when an object to be counted is detected. In order to actually count the events, counters (one for each direction) can be created and configured to count the events generated by the line. To create counters, see the Counters topic.



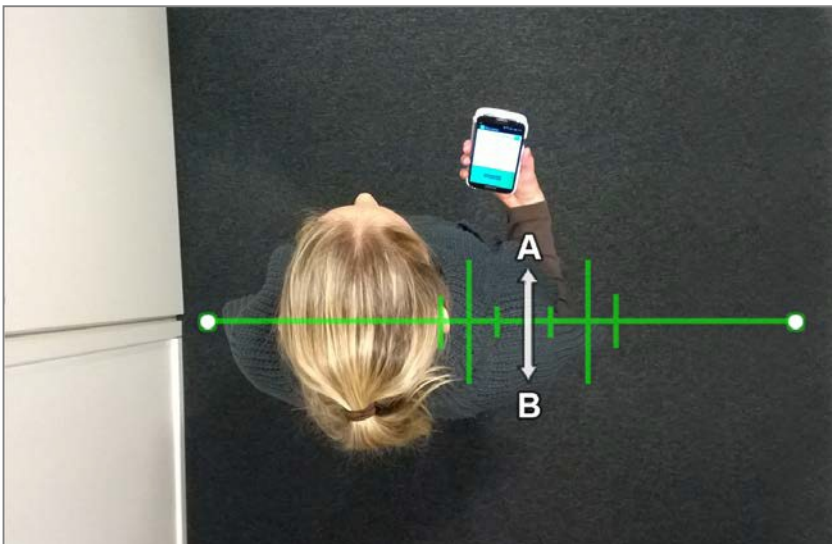
Calibrating the Counting Line

In order to generate accurate counts, the counting line requires calibration. Unlike Ernitec VCA Surveillance, 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:

1. Select the counting line with the mouse.
2. Check the "Width Calibration" box under the Counting Line rule in the property inspector.
3. Use the mouse wheel or 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.
4. The calibration width is displayed on the property inspector under the counting line rule. The figure which is displayed is the calibration width expressed as a percentage of the image width. This figure can also be edited to change the calibration width.
5. The small markers on either side of the big markers indicate the minimum and maximum width which is counted as a single object. E.g., as the head and shoulder lines for counting people.
6. Apply the settings.



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.

Calibration Diagnostics Mode

To enable the user to more accurately configure the calibration for the counting line, there is a diagnostics feature which can be enabled to provide feedback of the counting results. To enable this mode, select the "Metadata Format" -> "Counting Line Diagnostics" on the VCA Advanced Settings page.

The screenshot shows the 'Calibration' tab of the VCA Advanced Settings interface. It contains several configuration sections:

- Feature Enable:**
 - Object Tracking
 - Surveillance People
 - Abandoned/removed object detection
 - Counting line
 - Camera Shake Cancellation
 - Smoke and fire detection
- Alarm Retrigger Time:**
 - Alarm Holdoff time: secs
- Tracker Configuration:**
 - Minimum tracked object size: Pixels
 - Stationary object hold on time: Seconds
- Detection Point of Tracked Objects:**
 - Default (choose centroid if calibrated overhead, midbottom if calibrated sideon or uncalibrated)
 - Centroid (force centroid)
 - Midbottom (force midbottom)

Buttons for 'Apply' and 'Exit' are located at the bottom right of the window.

When the diagnostics metadata is enabled, the diagnostics will appear as black and white lines on either side of the counting line on the Zones and Rules page.

Each line represents an object which was detected by the counting algorithm. The width of the line shows the width of the object detected by the line. The last 5 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 shown 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 diagnostics, the width calibration can be fine-tuned to count the correct sized objects and filter out spurious detections.



OBJECT COLOR FILTER

NOTE: The object color filter requires a Ernitec VCA Pro license, and the Tracking mode must be set to People Tracking on the VCA Enable/Disable page.

Enable the object color filter by checking the corresponding box in the properties inspector and click apply.

Specify the color and threshold (amount of color within an object) detection properties.

An object color filter alarm is raised when an object that contains more than the specified threshold of the specified color is tracked inside the zone.

The screenshot displays the 'Zones & Rules' configuration window. The main view shows a road scene with several red detection zones overlaid. A table below the scene lists the configured rules:

Engine	Id	Rule Type	Rule Name	Zone Name	Object Type	Start Time (UTC)	End Time (UTC)
0	70	Color Filter		Zone 0	Vehicle	2014-08-22 11:52:07	2014-08-22 11:52:07
0	65	Object Presence		Zone 0	Vehicle	2014-08-22 11:52:04	2014-08-22 11:52:05
0	64	Color Filter		Zone 0	Vehicle	2014-08-22 11:52:02	2014-08-22 11:52:05
0	63	Object Presence		Zone 0	Unclassified	2014-08-22 11:52:01	2014-08-22 11:52:02

The right-hand pane shows a 'Tree' view of the configuration options, including 'Exit', 'Appear', 'Disappear', 'Stopped', 'Dwell', 'Direction Filter', 'Speed Filter', 'Tailgating', 'Abandoned/Remo..Zone 0-Abanc', 'Time (secs)' (set to 20), 'Color Filter', 'Zone 0-Color' (set to Yellow), and 'Threshold' (set to 30%).

COUNTERS

Ernitec 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, decrementing or occupancy counting. Counter configuration is managed through the properties inspector in a similar way to the zone configuration.

Topics in this section:

- Creating Counters
- Assigning Rules to Counters

CREATING COUNTERS

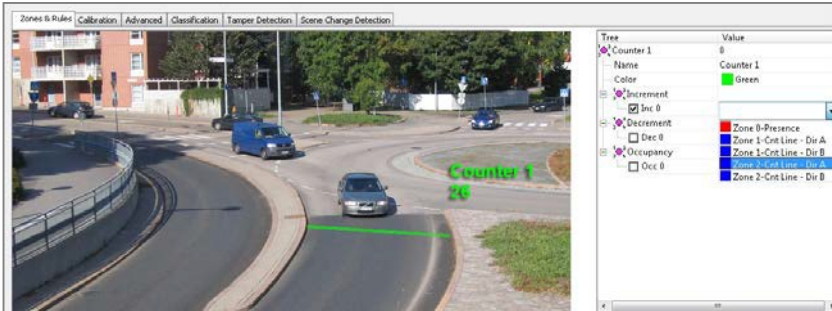
To create a counter simply click the right mouse button and select Counters, Add Counter.



The counter name can be changed by clicking in the Name box on the rules control.

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 must initially be configured to raise an alarm every time an object enters it. The zone can then be assigned to a counter and the counter will count the objects according to the type of counting required (increment, decrement, occupancy).



In this example the red zone is configured to trigger when object travelling in the north direction are detected. The counter has been configured to increment the count whenever the zone (Zone 0) is triggered. Currently two objects have been counted.

INCREMENTAL COUNTERS

When a zone is assigned to an incremental counter, the count will increment by 1 every time the zone is triggered.

DECREMENTING COUNTERS

When a zone is assigned to a decrementing counter, the count will decrement by 1 every time the zone is triggered.

OCCUPANCY COUNTERS

When a zone is assigned to an occupancy counter, the counter displays the number of active triggers in the zone. E.g. if there are 2 objects in the zone that triggered the detection rule, then the count will display 2.

OBJECT CLASSIFICATION

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

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 page and the object class to modify:

The screenshot shows the 'Classification' configuration page. On the left, a table lists object classifiers:

ID	Name
0	Person
1	Vehicle
2	Clutter
3	Group of People

The 'Vehicle' classifier (ID 1) is selected. On the right, the 'Detailed object classifier information' for 'Vehicle' is shown:

- Name: Vehicle
- Enable: Yes
- Min Area (m²): 4.0
- Max Area (m²): 100.0
- Min Speed (km/h): 0
- Max Speed (km/h): 200

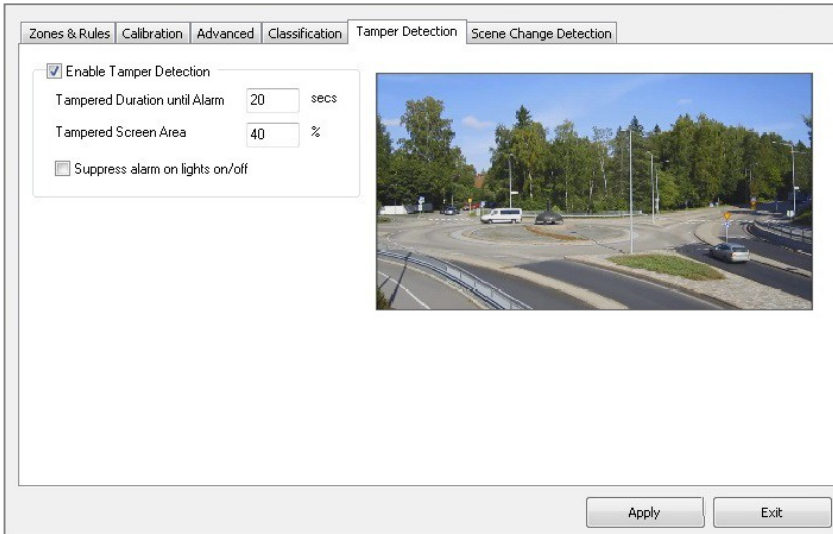
Buttons at the bottom include 'Add New Object Classifier', 'Remove Object Classifier', 'Reset Default Values', 'Apply', and 'Exit'.

Adjust the minimum and maximum object speed and area, and apply the changes.

Objects that do not fit into any class are labelled as "Unclassified".

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.



The output of the tamper detection algorithm is displayed as red blocks on the image. The red area is where the algorithm has detected that the image has changed from its reference image. Once enough of the image has changed and remained so for a certain length of time, a tamper alarm is triggered.

Note: In order to see the output of the tamper detection on the image, Tamper Debug metadata must be enabled on the VCA -> Advanced page. Please refer to Advanced Settings for more information.

Tamper Debug

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 alarm is triggered.

- **Tampered Duration until Alarm:** The length of time that the image must be persistently changed before the alarm is triggered.
- **Tampered Screen Area:** Percentage area of the image which must be changed for tampering to be triggered.

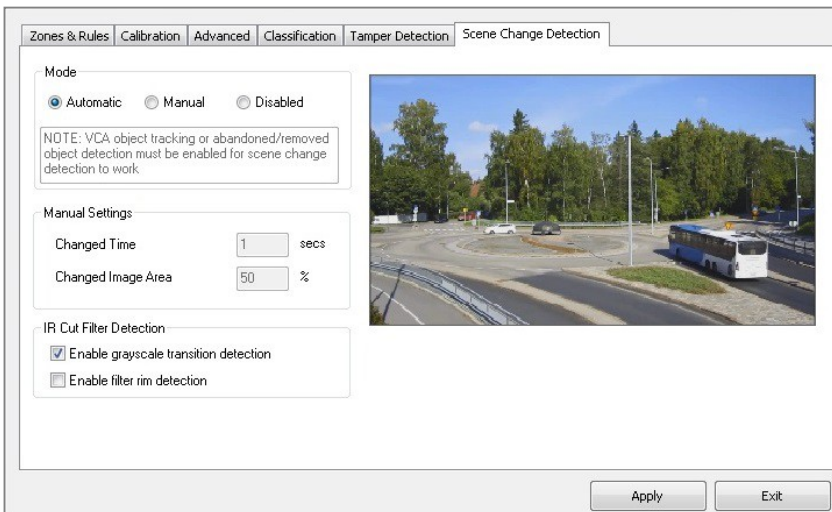
If false alarms are a problem the duration and/or area should be increased so that large transient changes such as a close object temporarily obscuring the camera do not cause false alarms.

Suppress alarm on lights on/off

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 to genuine alarms so it is not recommended if fast light changes are not likely to be a problem.

SCENE CHANGE DETECTION

The Scene Change Detection page allows the user to adjust the settings of the scene change detection algorithm. The scene change detection module resets the tracking algorithm when it detects a large persistent change in the image. This prevents the tracking algorithm from detecting image changes as tracked objects which can be potential sources of false alarms.



There are 3 options for the scene change mode:

- **Automatic:** Default setting. Uses the recommended settings.
- **Manual:** Allows the user to adjust the parameters used by the scene change detection algorithm.
- **Disabled:** Scene change detection is disabled.

Note: In order to see the output of the scene change detection on the image, Scene Change diagnostics metadata must be enabled on the VCA -> Advanced page. Please refer to Advanced Settings for more information. It's only possible to see the detection diagnostic data when in Manual mode.

Scene Change

MANUAL SCENE CHANGE DETECTION SETTINGS

In the manual mode the following settings are available:

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

STABILIZER

The VCA algorithm accuracy can be improved by using video stabilizer. This is intended to pre-process the VCA video stream and minimize the scene change in case of the slightly moving camera. For example outdoor cameras may sometimes move due to strong wind.

NOTE: stabilizer does NOT alter the video stream in EASYVIEW, i.e. live or recorded stream.

EXIT VCA CONFIGURATION TOOL

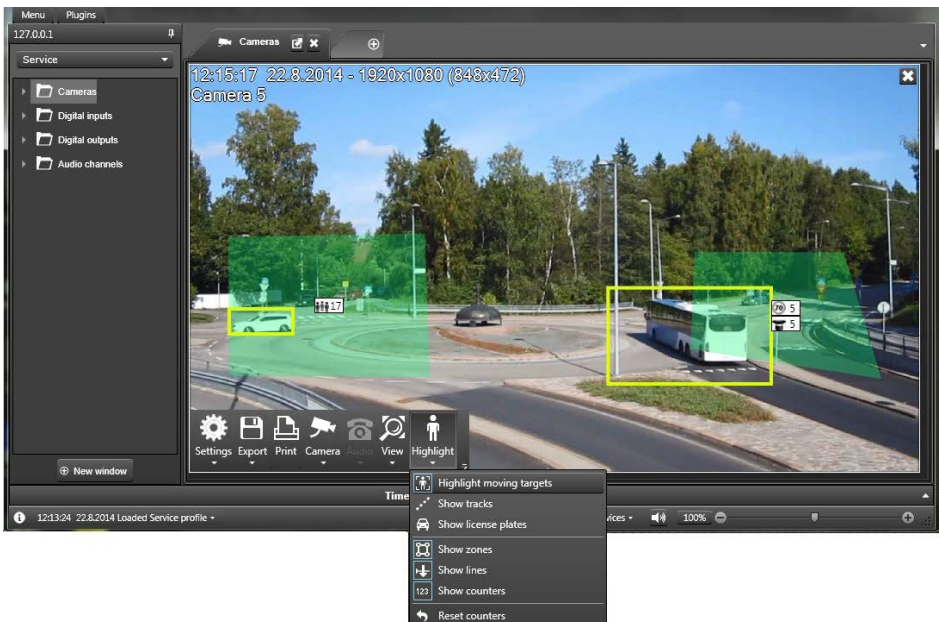
- 1) After all events are configured you can exit the VCA Configuration Tool by selecting “Apply” in the VCA Channel Configurator window. Apply window is inactive and you can select “Exit” after this.
- 2) Close the window and confirm changed settings.
- 3) Now VCA Configurator window is the only window that is open and it can be closed by selecting “Exit VCA Configurator tool”.
- 4) When VCA Configurator is exited, all services are restarted.

Depending on your system size, the restart of services might take a while.

7. ERNITEC VCA VISUALIZATION

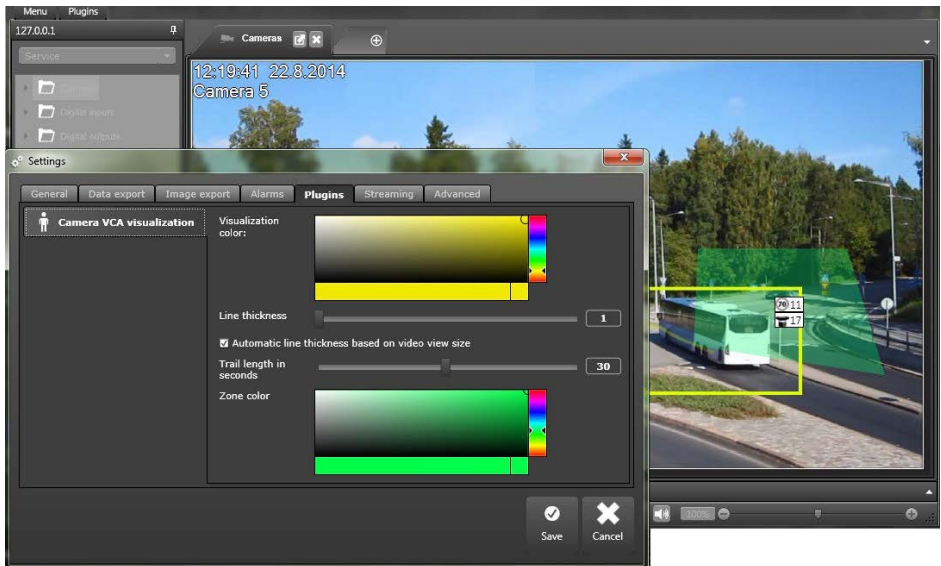
VCA VISUALIZATION IN EASYVIEW

- 1) Open Ernitec EasyView and open a camera where you configured VCA.
- 2) Open camera tools and select “Highlight”. The “Highlight moving targets” is on by default, if camera has VCA configured. You can leave it on or deselect it. You can select which other options you want to see for the VCA camera. The available options are: Highlight moving targets, Show tracks, Show license plates (if ANPR+ is configured), Show zones, Show lines, Show counters and Reset counters
- 3) You can set these settings on and off anytime you want in EasyView. Zones/lines will only appear when the related rule was triggered.



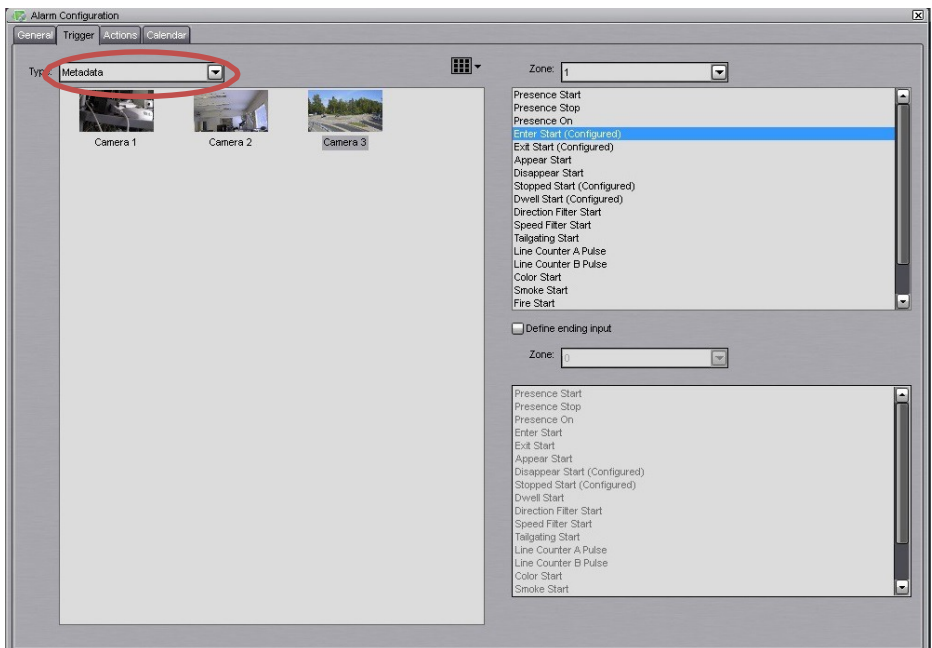
CUSTOMIZE VCA VISUALIZATION IN EASYVIEW SETTINGS

- 1) To customize the Bounding box colours, etc., open EasyView Settings and select the Plugins tab.
- 2) Select VCA Visualization plugin. You can now select Visualization colour and Zone colour. It is also possible to set Line thickness and time for line length. These settings are also possible to set to be automatic, which means that line thickness is adjusted to window size.



8. USING VCA TO TRIGGER ALARMS

- 1) Open Ernitec System Manager Alarm Settings
- 2) Create new alarm and select “Metadata” as Trigger type.
- 3) Select a camera where you have VCA events configured and select correct zone (the zones you set in VCA Configuration tool) for it. Below the zone dropdown all events are listed. The ones you configured are marked in the list with brackets that say “(Configured)”. Select one of the configured events. It is up to you whether you want to define an ending input as well.
- 4) Move to the actions tab and select an action for your alarm.
- 5) Save Settings and open EasyView to view Alarm list.



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