VaxALPR for LINUX

Software Setup and Configuration

Version 2.0

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1. Introduction

This guide will take you through some basics of ALPR camera setup and help you to install and correctly configure the VaxALPR software to run on a Linux-based platform.

The VaxALPR Linux Software is a real-time solution for Automatic License Plate Recognition (ALPR) that runs on PCs running Linux or on specialist ARM-based processors often incorporated into intelligent CCTV / ALPR cameras which usually run derivatives of Linux such as Ubuntu.

2. Linux Variants

Available Debian distributions include:

- Buster - Debian 10
- Bullseye - Debian 11
- Xenial - Ubuntu Linux 16.04
- Bionic - Ubuntu Linux 18.04
- Focal Fossa - Ubuntu Linux 20.04 LTS

There are three variants of ALPR engines available for these platforms:

- Main - Standard ALPR
- Mmc - ALPR with Make, Model & Color recognition
- Nosimd- For older processors without AVX2 support

Check with Vaxtor for other variants.

3. Requirements for License Plate Images

LPR (License Plate Recognition) is an image processing technology used to identify vehicles by their license plates. It is also known as ALPR (Automatic License Plate Recognition) and ANPR (Automatic Number Plate Recognition) among other names.

The following examples show two images of how license plates should be seen in both daytime and night-time conditions:

Ideal daytime license plate image

Ideal night-time license plate image

However, recognizing the license plate is more challenging if the images have any of the following characteristics or artifacts:

- Overexposed
- Blurred
- Distorted
- Unevenly lit
- Low contrast
- Bad weather conditions

Undesirable license plate images

The less clear that the plate images are, then the more likely it is that ALPR software will report then incorrectly. Garbage In –> Garbage Out.

As a general guide, if a human has difficulty reading a plate, then so will ALPR software!

It is recommended that the images captured by the ALPR cameras be more like the first two examples shown above.

4. Processor Requirements

The Linux ALPR software will run on both Intel X86 and ARM based processors that support AVX2 (Intel® Advanced Vector Extensions). These were introduced in 2013 and programs such as Microsoft Teams use AVX to blur backgrounds in real time.

Refer to the processor spec. sheet or Intel Arc or check your processor under Linux using:

cat /proc/cpuinfo ... and avx2 needs to appear

Note that Vaxtor can supply a non-AVX2 version of the ALPR engine but it will not support MMC or have all the latest engine refinements

5. Camera Requirements

The camera used should have a web interface allowing you to control all of the parameters such as shutter speed etc. and for night time use where the plates are retro-reflective (see later) then it should have Infrared LEDs of the appropriate wavelength. Most reflective plates show up best with almost invisible wavelengths of 840nm. Axis for example make the Q1700-LE which will capture plates from about 10m-50m at night. In some US states a longer wavelength such as 720-730nm can be added to illuminate some of the more challenging plates such as those found in Florida where the thin paint lets a lot of the reflected IR light pass through to the reflective background resulting in a low-contrast image.

5.1 Frame Rate

The frame rate, also known as frames per second (FPS), is the number of frames or images that the camera can capture per second. For example, 30 fps means the camera captured 30 frames in a single second of video. Choosing the right frame rate is very important:

- Lower frame rates:
  - Can result in choppy or broken movement
  - Are ideal for locations with no fast-moving objects
  - Are less intense for the camera and network (bandwidth)
  - Result in less frames and smaller video files

- Higher frame rates
  - Produce smoother movement
  - Are ideal for locations with faster traffic
  - Are more intense for the camera and network (bandwidth)
  - Result in more frames and larger video files, which may result in the need for more storage capacity.

For ALPR cameras, the following frame rates are recommended:

- **Barrier or Gate** → Frame rate **> 5 fps**
- **Road or Street** → Frame rate **≥ 15 fps**
- **Fast Urban** → Frame rate **≥ 20 fps**
- **Motorways** → Frame rate **≥ 25 fps**

You should set your frame rate accordingly.

5.2 Shutter Speed

Shutter speed, also known as the "exposure time", is the length of time a camera shutter is open for in order to expose light onto the camera sensor. The shutter speed is measured in seconds, or fractions of a second. The bigger the denominator, the faster the speed. For example, 1/250th means one two-hundred-and-fiftieth of a second or four milliseconds.
(1 second = 1000 milliseconds)

The following shutter speeds are recommended:

- **Barrier or Gate** → Minimum exposure time **1/250th sec** (4 milliseconds)
- **Road or Street** → Minimum exposure time **1/500th sec** (2 milliseconds)
- **Fast Urban** → Minimum exposure time **1/1000th sec** (1 millisecond)
- **Motorways** → Minimum exposure time **1/1000th sec** (1 millisecond)

5.3 Resolution and Lens Focal Length

5.3.1 Resolution

The resolution of the camera determines the amount of detail that can be captured. The smaller the object detail, the higher the resolution that is required. There are several factors that determine the detail captured:

1. The resolution (pixel size) of the camera sensor. This sensor (normally CMOS) where the light eventually falls and a typical IP camera has a sensor resolution of 2 or 4 Megapixels.

2. The resolution of the camera's electronics. A typical CCTV camera can output video at a resolution of 1920 x 1080 – but may be set to a lower resolution if not needed.

3. The quality and focal length of the lens. The quality of the optics can play a part in challenging circumstances. The focal length (zoom factor) determines the field of view that can be seen.

4. The quality of the images can be influenced by factors such as the type of lighting used.

   Depending on where the ALPR camera will be deployed, the following resolutions are recommended for a single lane:

   - **Barrier or Gate** → Resolution **800 x 600 pixels** or higher
   - **Roadside Deployment** → Resolution **1280 x 720 pixels** or higher

5.3.2 Focal length

The focal length of the lens determines how "zoomed in" the image is. It is usually expressed in millimeters (e.g., 6 mm, 25 mm, or 50 mm).

The focal length tells us the angle of view (how much of the scene will be captured) and the magnification (how large individual elements will be). The longer the focal length, the narrower the angle of view and the higher the magnification. The shorter the focal length, the wider the angle of view and the lower the magnification.

In the case of zoom lenses, both the minimum and maximum focal lengths are stated, for example 10–40 mm.

When it comes to purchasing a lens for ALPR use, we need to know the distance between the camera and the plate reading point. The following varifocal lenses are recommended:

- **Barrier or Gate**

  Distance between camera and reading point

  - **2 to 6 meters** → Recommended lens: **2-8 mm or similar**

- **Highway, road or street**

  Distance between camera and reading point

  - **15 to 30 meters** → Recommended lens: **5-50 mm or similar**

IMPORTANT: The **lens** should be **IR corrected** to avoid out of focus images.

IR Corrected Lenses should be used on both day/night and monochrome cameras in all lighting conditions in order to achieve a crisp sharp image.

5.3.3 Infrared illumination

Infrared (or IR) illuminators are designed to provide additional illumination that the camera can see but humans normally cannot. In low light conditions, an IR illuminator is used as a spotlight to facilitate 24-hour recognition. It can penetrate darkness and to a lesser extent fog, rain and snow and it eliminates the inconsistency of ambient light.

Infrared illuminators add light across the camera's field of view to produce the desired image quality, lighting up the area and reflecting the plate.

For ALPR, it is recommended that the camera **always** has an **infrared illuminator**. This can be built into the camera or added as an external unit providing that it is placed very close to the camera lens. *(The angle made between the light leaving the IR light source and that of the reflected light returning to the camera lens should be 5° or less.)*

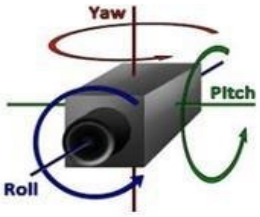
6. Other requirements

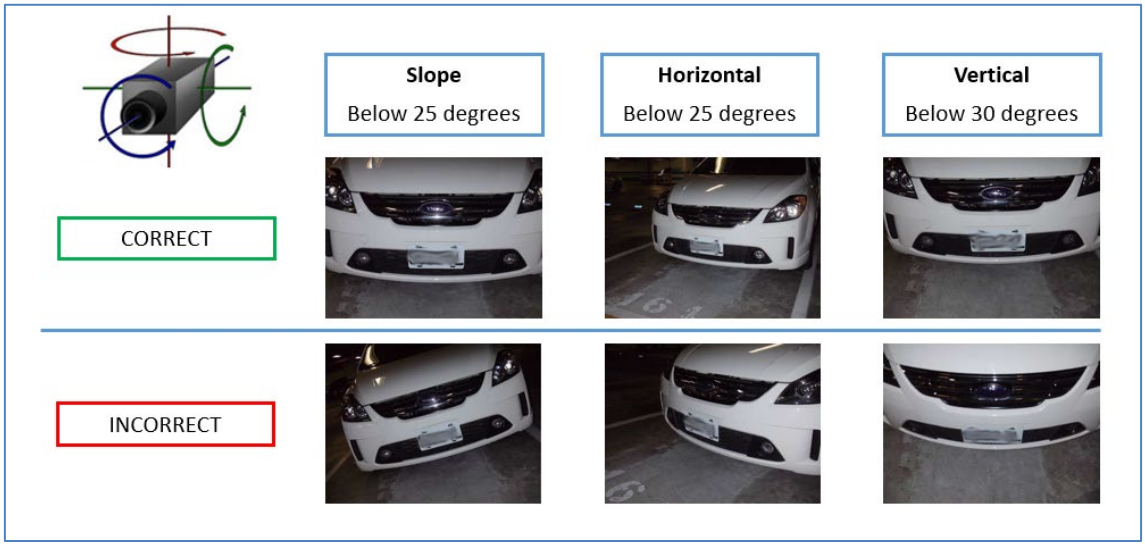
The positioning of the camera is key to achieving maximum OCR accuracy**.**

6.1 Camera Orientation

The image orientation is a key factor in achieving the maximum OCR efficiency. It is recommended that you stay within the following thresholds:

Pitch (Vertical) should be: ***< 30°***
Roll (Slope) should be: ***< 25°***
Yaw (Horizontal) should be: ***< 25°***





Examples of different camera orientations

Accuracy will decrease significantly if these guidelines are not adhered to.

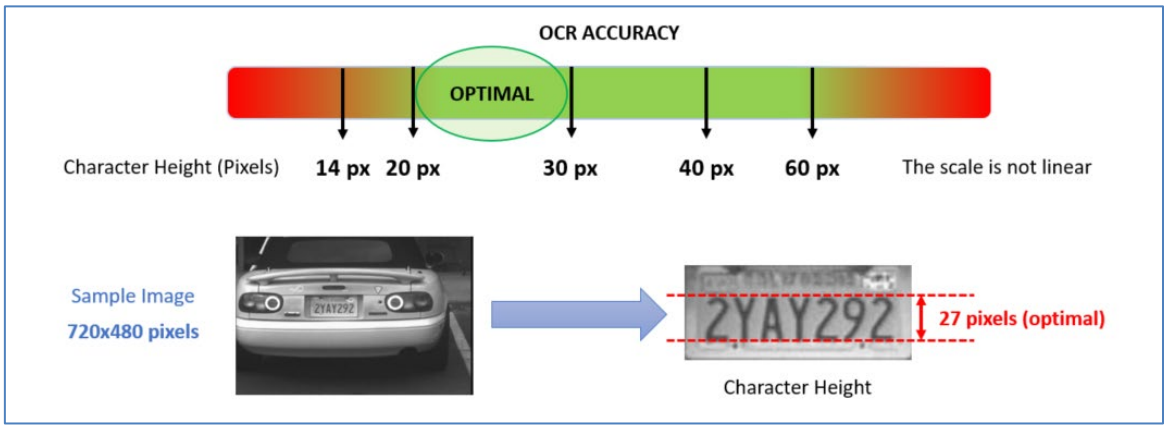
6.2 Distance

The objective of an ALPR system is to capture an image with a good readable plate. In order to achieve this the characters on the plate should have a height between 20 and 30 pixels for larger plate formats (e.g. EU 50cm plates) and about 25-35 pixels for USA–style plates which are physically smaller and have a narrow character stroke width in many states.

Certain Middle East and Arabic plates are smaller still and will need an even greater character pixel height of say 30-40 pixels. For example, in Abu Dhabi the small characters next to or above the main characters are only 3cm high and may require a much higher camera resolution.

The camera should be setup so that the combination of the **distance**, the **lens's focal length** and the **camera's resolution** provide an image that can be accurately analyzed by the OCR.

More details on combining these settings are provided later in this guide.



Optimal character height in pixels

Note that for small plates such as most Arabic plates - or plates with additional small characters such as Costa Rica, – then a minimum character pixel height of 30 pixels is recommended.

Another way that you can estimate this when selecting and setting up your camera is to use the horizontal pixels per meter. A large EU plate needs a minimum 256-300 pixels per meter – so a typical lane = 3m – so can be read with a resolution of 1024h or 1280h. Wide lanes = 6m – so use 1600h if available. In the USA the plates are smaller and so a resolution of 300-320 pixels per meter is best. (1 lane = 3m = 10'). In countries with Arabic characters then higher resolutions (e.g. double) will produce better results – for example 1920h for a single lane. Note that this has an effect on processing times.

7. Camera Setup and configuration for License Plate Recognition

In this section, we describe how to set up a CCTV Camera for optimum image quality

7.1 Setting up the Camera

Once the camera has been installed it must be set up and configured. Use a web browser to logon to the camera using its IP address. *(refer to the camera's documentation for the default IP address, username and password)*

All cameras have very different use interfaces but generally all have the same basic functions that you can control, refer to your camera manufacturer if you need help attaining a perfect image.

7.1.1 Set the date and time of the camera

It is important to set the camera to have the correct date and time. Refer to the camera's documentation to do this. It is usual to use a standard time server such as the UK Stratum 1 NTP Server.

7.1.2 Recommended frame rates, shutter speeds and resolution

Different frame rates, shutter speeds and resolutions should be setup depending on where the camera is to be placed,

At a barrier or gate the vehicle will come to a complete stop before entering or leaving a controlled area and so when configuring the camera:

- The **Frame Rate** should be between **5 and 15 frames per second.**
- The **Shutter Speed (minimum exposure time)** should be set at a high speed:- **at least 1/500th sec (2 milliseconds).**
- The **Resolution** should be set at **800 x 600 pixels** or higher.

For faster roadside use, the vehicles are in motion and so when configuring the camera:

- The **Frame rate** should be between **15 and 30 frames per second**.
- The **Shutter speed (minimum exposure time)** should be set at a very high speed; **at least 1/1000th sec (1 milliseconds).**
- The **Resolution** should be set at **1280 x 720 pixels** or higher.

7.1.3 Set the camera resolution

Note that if you buy a high resolution camera, then the default resolution is normally the maximum available. Setting the resolution higher than is necessary wastes processing time and can cause fewer frames to be analyzed.
As mentioned above, about 256-300 pixels per meter is normal for large plates, 300-320 for USA sized plates and up to 500-600 pixels per meter for Arabic characters.

For example, for large EU plates then use 800h or more normally 1024h on a single lane and 1600h on dual lanes. (not all resolutions are available on all cameras)

(Check this by ensuring that your character height is 20-30 for large EU & 25-35 for US plates)

7.1.4 Setting the shutter speed and other important image settings

Set the following **shutter speed (minimum exposure time)** and other important settings in your CCTV camera if these options are available:

- **Maximum Shutter speed (maximum exposure time). See Section 3.2**
- Do not enable **Wide Dynamic Range**.
- Set the **IR-cut filter** to Auto in the Day and Night section. This causes the filter to be present on color images (to remove IR light interference / color distortion) and be Off when it gets dark and the IR illumination switches on (if present).
- Set the **Max gain** to 12dB or below to reduce noise on the images.
- Select the **Enable IR Illumination** checkbox in the IR Illumination section.
- If available select the **Synchronize IR illumination with day/night** checkbox in the IR Illumination section.

Other settings

It is advisable to set **Sharpness** to 0. You do not want the camera altering the pixels in any way by enhancing edges.

Day / Night Threshold – this can sometimes be changed, on an Axis camera for example then moving this to the right (Dark) means that the camera will change to night mode when it gets quite dark. To change to night mode earlier – slide towards Bright.
If IR is used then changing between modes should preserve focus as the lenses are IR corrected.
(If not using IR then an advanced setting is required)

Target aperture – this controls the iris and should normally be midway. A smaller iris (towards closed) will increase the depth of field but cut down the light received.

Exposure level – this setting will attempt to lighten or darken the resulting image – subject to the gain, iris and shutter settings. Normally leave midway.

Blur-noise trade-off – Low noise means shutter priority, Low motion blur means gain priority. Leave these midway as your maximum shutter speed will determine when the aperture will start to change.

Note that a P1445 has a motorized varifocal lens and will therefore need re-focusing after a zoom change. A Q1700 has a true motorized zoom lens that will maintain its focus.

7.1.5 Getting it wrong

In the following image taken at dusk, the shutter speed is too low, WDR has been left ON and there is no IR illumination:

8. Installing the Vaxtor ALPR Linux Software

It is assumed that you have installed a Debian based Linux distribution (apt available).

Please contact support@vaxtor.com for further details regarding OS requirements.

Steps

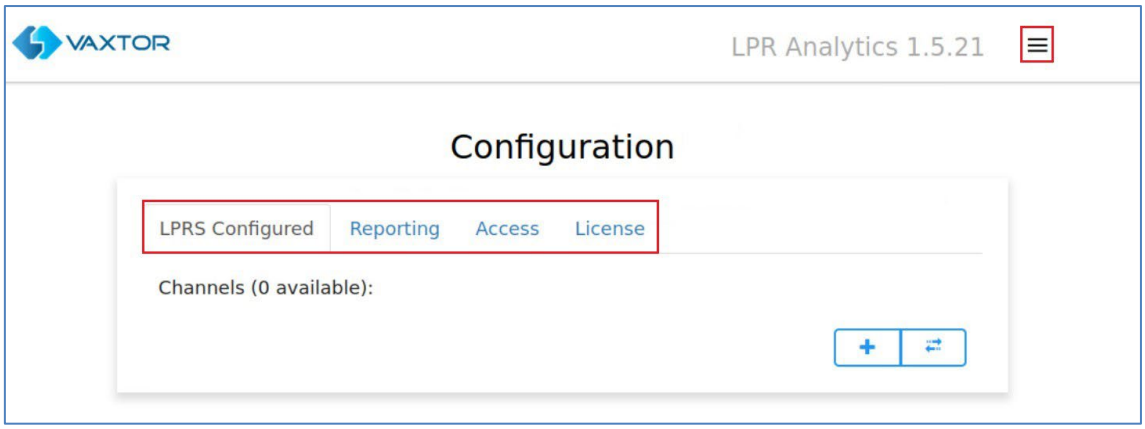
1. Ensure that your target machine has an internet connection
2. Open a Terminal Window in Linux (right click on the desktop)
3. Execute: ***wget -qO- https://deb.vaxtor.com/setup_vaxtor.sh | sudo -E bash -***
4. Enter your user password
5. Install VaxtorALPR application: ***sudo apt-get install vaxtorlpr***
6. Enter '**y**' to confirm and wait for the installation to complete.
7. Open Browser and navigate to '**https://localhost:8443**' to access the program's Webpage.

9. Licensing the VaxALPR Linux software

To access the program's GUI, using Firefox enter the address:

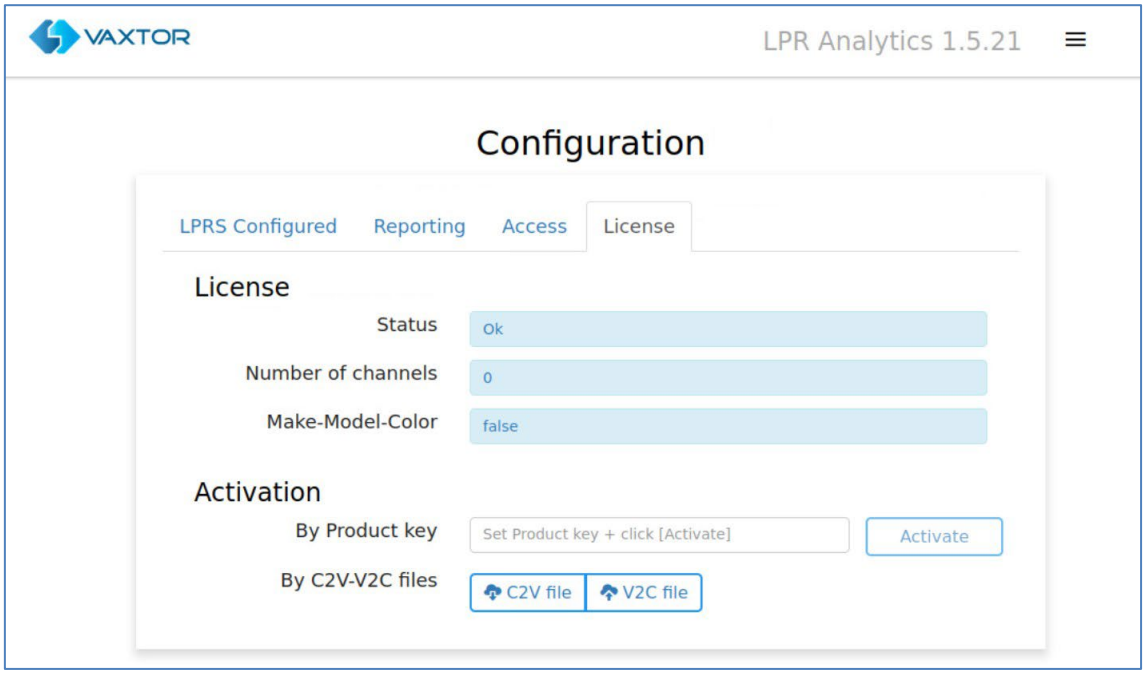
https://localhost:8443

This takes you to the main configuration page of the program:



Navigate by using the main tabs shown above and also by clicking on the 3-bar icon top right.

Click on the License tab:

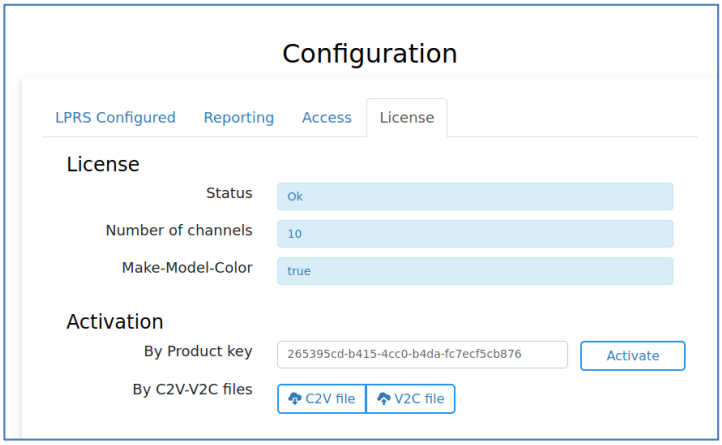


This window displays the status of the license and number of channels installed (available ALPR camera connection) if a license has already been installed. If not, then a license must be applied.

The Vaxtor ALPR software for Linux uses the Sentinel software licensing system from Thales. Contact your supplier or Vaxtor in order to purchase a software license. You will be sent a Product Key which looks something like: a13c5eb4-a962-406c-99e0-93f8fdfd9ae7

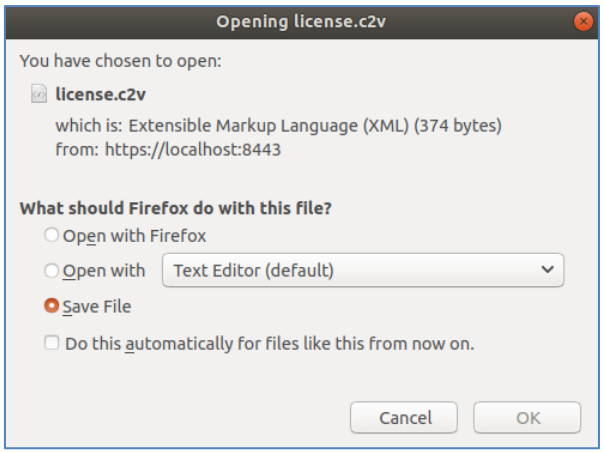
Licenses can be redeemed in 2 ways: -

1. **Online** (The target PC must have internet access to https://licensing.vaxtor.com)
   a. Type or copy in the provided **Product Key**
   b. Click **Activate**:



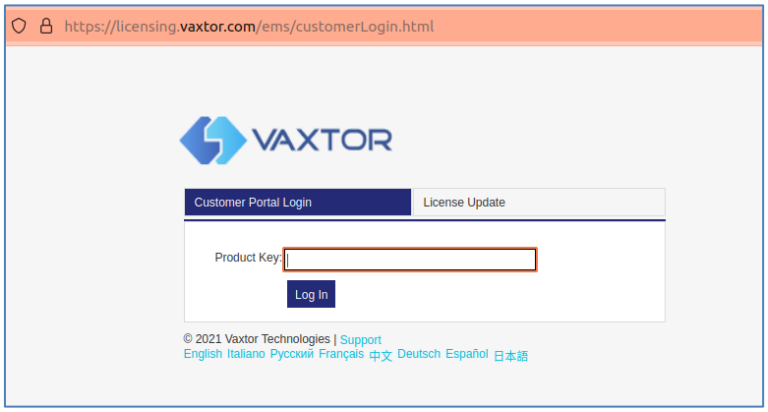
2. **Offline**
   If your Linux computer doesn't have internet access then you can generate a C2V file. You can then upload it from another online PC to Vaxtor's licensing server where you can then download a corresponding V2C file for you to copy on to your target machine.

   a. Select the download **C2V** icon and select Save File.

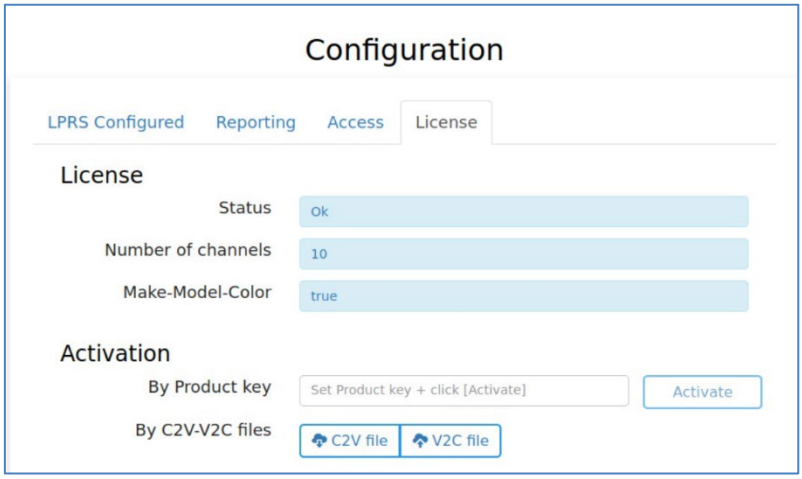


   This saves a C2V file to your computer's Download Directory which you can access using the Linux Files program: 

b. On another computer browse to the website: https://licensing.vaxtor.com using and use your product key to log on.



c. Select **Upload V2C** and browse to the V2C file to upload it to license your software:

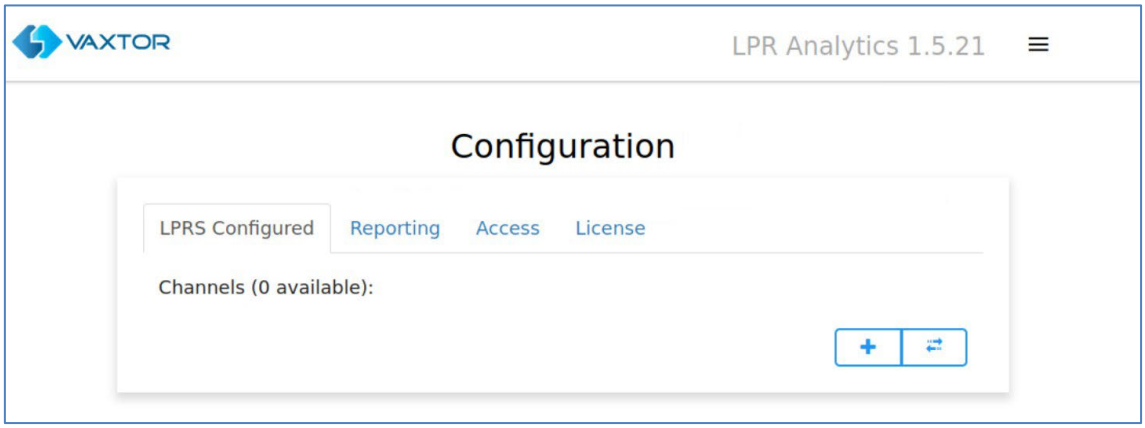


Click **Activate** and once licensed, return to the main menu.

The License Tab will confirm that status of your license.

10. Configuring the ALPR Software

10.1 Adding and configuring an ALPR channel



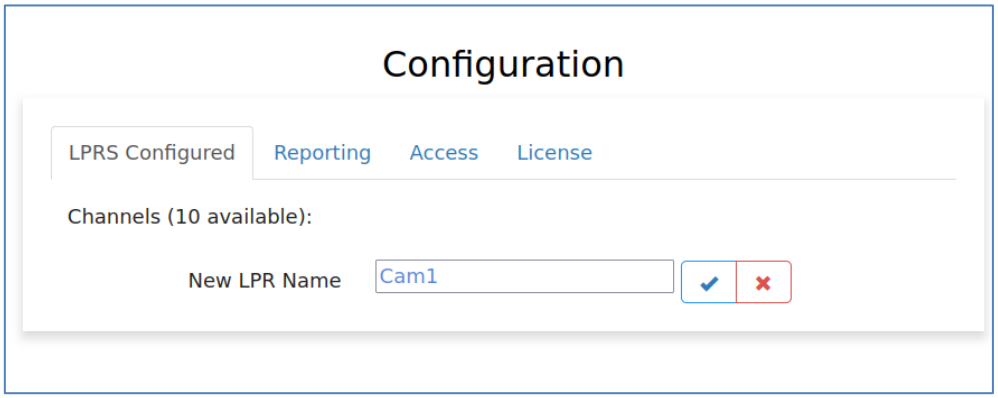
Depending on the license applied, you can add several channels to the system. This would normally be an attached camera and systems can typically range from 1 to 32 channels or more depending on the speed of recognition required and the performance of your processor. For fast moving traffic then often only 4 channels should be set up (one per core), but more can be added in slow moving traffic scenarios or parking applications where vehicles approach a barrier and wait for it to be opened by the system.

Contact Vaxtor for guidelines on traffic speed vs channels added.

To add a channel, click on the + icon 

You are prompted to give a name to your channel such as ‘Camera1’ or ‘Main-Entrance’.

(Note that channel names cannot contain spaces)

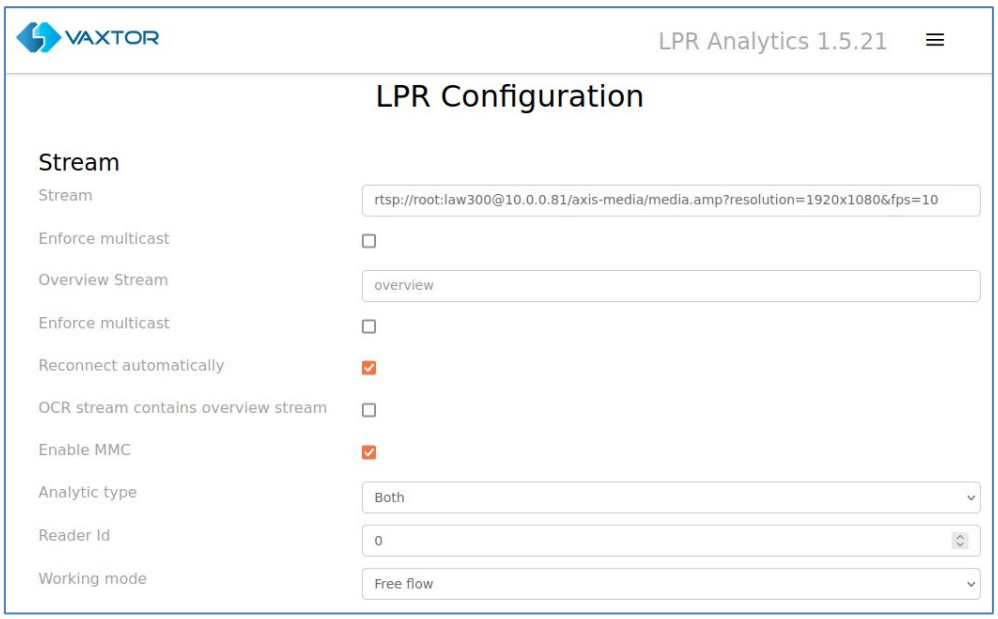


For each channel added you must configure all the ALPR settings. The LPR Configuration page is divided into sections as follows:

- **Stream** Add a camera IP stream
- **Country Options** Define country of use and grammar rules
- **Plate** Define the types of plate seen and set the resolution
- **Environment** Specify the delay between reading the same plate again
- **Multiplate** Specify how long to spend analysing each plate etc.
- **OCR** Filter on confidence and set engine OCR level

Note that the software version number is displayed in the header bar.

10.1.1 Stream



This menu is where you can select a video input stream (RTSP) and connect to a camera. The program requires an h.264/5 ONFIV compatible stream which most CCTV cameras have.

Stream

Enter the IP address of the target camera's RTSP stream, port number, user name and password (if used) for your camera. Consult your camera manufacturer's documentation for the exact RTSP stream

For example, for a typical Axis camera enter something like:

rtsp://root:pass@10.0.0.81/axis-media/media.amp?resolution=1280x720&fps=10

Other cameras might be something similar to:

rtsp://admin:Pass@192.168.16.59:554/profile1/media.smp

Enforce Multicast

A camera (or router) can be setup to transmit data in unicast (one-to-one) or multicast (one-to-many). Select this option if you are receiving a multicast transmission.

Overview Stream

Here you can specify a second RTSP stream for a second camera to act as a color overview or contextual image source. This might be a zoomed-out view of a vehicle showing the vehicle type or positioned from above showing the contents of a trailer or any vehicle damage. By using a polarizing filter, a good image of the vehicle's occupants can be captured. The second camera might be used to supply a 4k video stream and so a high-quality still can be captured. When saved or transmitted to a back office such as Helix, the two images are sent as one package for later viewing or processing.

Enforce Multicast

Set this as described above.

Reconnect automatically

Select this to automatically reconnect to a camera if the connection becomes lost. If this option is disabled the OCR will stop running if connectivity is lost. If enabled then once the connectivity is recovered, VaxALPR will continue running automatically.
This option is normally enabled unless the system is configured to process video files (instead of live cameras) and we don't want the ALPR to reload the media clip after finishing. Contact Vaxtor for further deails.

OCR stream contains overview stream

This is used for very specific cameras which can provide two combined images and the left side of the image is used for the OCR image and right side is used for the overview image.

Enable MMC

This enables Vaxtor's Make, Model, Color and vehicle Class option which is licensed separately.
The Make Model Color analytic is not available in all countries where VaxALPR can operate, please contact us for further information

Analytic type

This is used with the MMC option above and lets you choose between MMC, Vehicle Classification (bus, truck, car etc.) or both.

Reader ID (1 or above)

This is the ID (Identifying number) of the ALPR camera and should be set to one or above. In a system with several lanes, then each time a camera is setup, it should be given a unique ID. This ID is passed on the VaxALPR Viewer to differentiate between cameras / lanes.

Working mode

Set this to free flow (default) or signaled.
Free-flow: the ALPR continuously searches for plates without needing any external triggers.

Signaled (or Triggered): the ALPR requires an external trigger in order to read a plate. This can be generated from say a beam being broken or a pressure pad for example. It is often used at Toll booths or when being used with under-vehicle scanning or radiation detection where the external equipment knows when a vehicle is present and can instruct the Engine to attempt to read a plate at that point. Most users will always use free-flow.

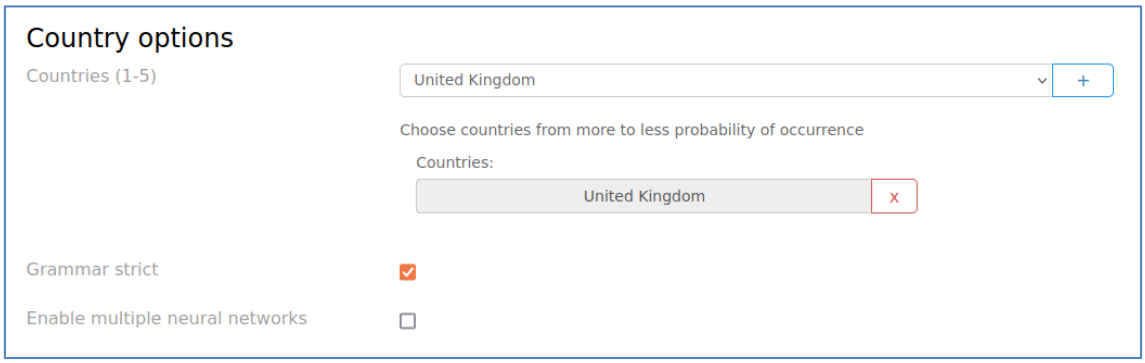
When using signaled mode on a PC, the software listens to port 19000 by default (but this is configurable).

You should then open the socket connection, send a message (TCP/IP packet) with the reader ID you want to trigger and then close the socket.

When the socket is closed, the OCR takes the current frame from the video and scans it looking for a plate. If a plate is found then it is reported as normal and if no plate is present it reports 'NONE' as the plate.

Contact Vaxtor for more information on setting up a trigger.

10.1.2 Country Options



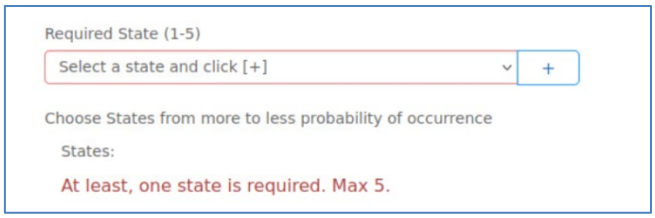
Countries (1-5)

At least one country must be selected and up to ten countries may be included.

Select a country from the drop-down list and click the + button. The country will be added to the list. Repeat to add multiple counties and these will be added to the bottom of the list. Make sure that the list is ordered so that those countries with the higher probability of occurrence appear first.

Required State (1-6)

If one of selected countries is *United States*, a main state must be selected from the drop-down menu. A total of five states can be added – again in likely order of occurrence.



Note that the same neural engine (used for matching character shapes) is used for all of the Americas, selecting the state simple loads the possible syntax (grammar) for those states to help with the letter O and zero for example. Other states not in the list will still be recognized.

Grammar Strict

Select to force the Engine to only use the syntax from countries or states that you have selected. Plates that do not match these rules will **not** be reported. This is the recommended option for using ALPR for access control where exact matches are required.

Do not select this checkbox when you want to report ALL valid license plates. This is the recommended option for ALPR in triggered mode. (see Working Mode later)
In the USA, plates are often seen from multiple States – and so the recommended setting is **OFF**.

NOTE: False triggering may occur when this checkbox is not selected.

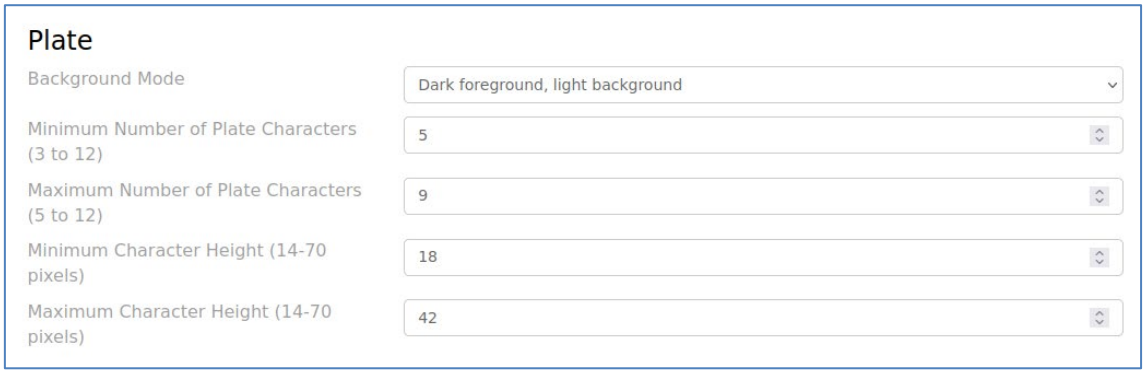
Enable multi neural networks

Default OFF. This Increases the accuracy of country identification.

The engine contains 5 neural nets:
Europe, Americas, Middle East and Asia – with an additional net for German plates to handle accents.

When multiple countries are included in the list, these countries might utilize different networks to aid recognition. When enabled the network for each country region is loaded; if not a common network is used. This will increase the accuracy but will also increase the processing time.

10.1.3 Plate



Background Mode

Select the option from the drop-down list that best defines the color of the target license plate. There are three possibilities:

- *Dark foreground, light background*: The plate background color is lighter than the characters (e.g. black fonts on white background).
- *Light foreground, dark background*: The plate background color is darker than the characters (e.g. white fonts on black background)
- *Both*: Plates are expected in both forms.

Minimum number of Plate Characters (3-12)

Set the minimum number of characters expected in your region

Maximum number of Plate Characters (5-12)

Set the maximum number of characters expected in your region

Minimum Character Height (14-70 pixels)

This is the minimum height that a license plate's characters should be before being read. If the camera's lens (zoom) is setup correctly then the plate characters should be about 20-30 pixels high in the area of the field of view where they should be read. Set this too small and the tiny plates will cause misreads.

Note that for small plates such as most Arabic plates - or plates with additional small characters such as Costa Rica, – then a minimum character pixel height of 30 pixels is recommended.

Maximum Character Height (14-70 pixels)

Set the maximum height of the plate's characters in pixels.
NOTE: The recommended difference between the min and max heights is about 15 pixels.

10.1.4 Environment

Same Plate Delay (seconds)

Set the number of seconds that should elapse before reading the same plate twice.
This is to prevent multiple reporting of the same plate in situations when the traffic is slow or stationary. For example, if a vehicle stops at a barrier and the plate is reported but the car doesn't move for 30 seconds, then this delay should be set to say 60 seconds or more to prevent a duplicate read.

NOTE: When using signalled (triggered) mode, it is recommended that you set this delay to 0 seconds.

Same Plate Max Chars Distance

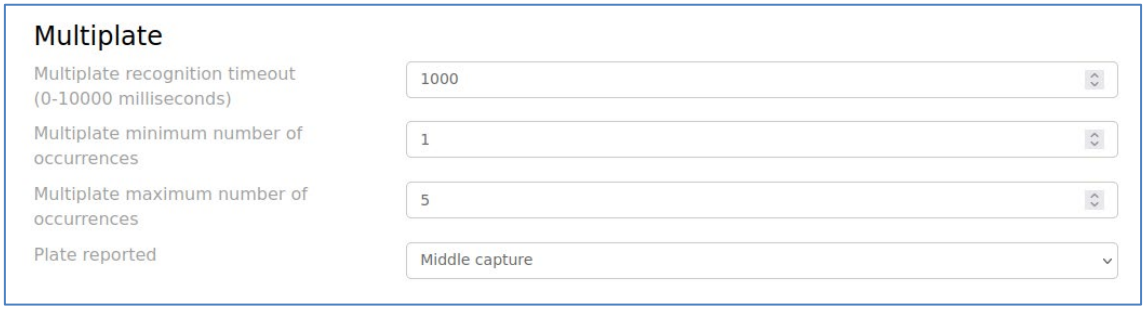
Set the number of characters that two plates must differ by to be considered different.
The software is capable or reading a plate several times as it passes through the field of view. If one character is misread on one of the reads then by setting this value to 2 then both reads will contribute towards the reported plate text.

Maximum Slope Angle (0-40 degrees)

Set the angle of slope of a plate that the engine should attempt to read up to.

NOTE: If you know that the plates will be skewed then by setting this parameter higher you can force the engine to look for plate shapes that are more skewed. However, you should setup your ALPR camera to keep plates as close to the horizontal as possible.

10.1.5 Multiplate



Multiplate recognition timeout (0-10000 milliseconds)

Set the number of milliseconds that the engine should spend analysing a plate.

(1000 milliseconds = 1 second)

In free-flow mode the engine continuously analyses video frames and reads and reports plates. It makes a final decision on the plate read after an interval of time - the maximum recognition timeout period. There is a dedicated time counter for every plate which starts counting after the first read. When it reaches the preset timeout it stops, checks the number of samples read of the same plate and returns the "best" result.

If an instantaneous plate read is not needed, then set this timer to say 1500ms (1.5 seconds) so that the engine continues to look for the same plate to read again for as long as possible. Note that if a new plate is spotted, the old one will be reported and a new plate-trace started.

We call the number of times the same license plate has been read within the maximum recognition period the multiplate rate. Several reads of each plate are good and produce better results.

Multiplate minimum number of occurrences (1-10)

Set the minimum number of times that a plate should be read within the Timeout period to be considered a valid plate. Set this to 1 or 2 for most scenarios.

Multiplate maximum number of occurrences (1-10)

Set the maximum number of times that a plate should be read before being reported (this may happen before the timeout). Set this to about 5 for most scenarios.

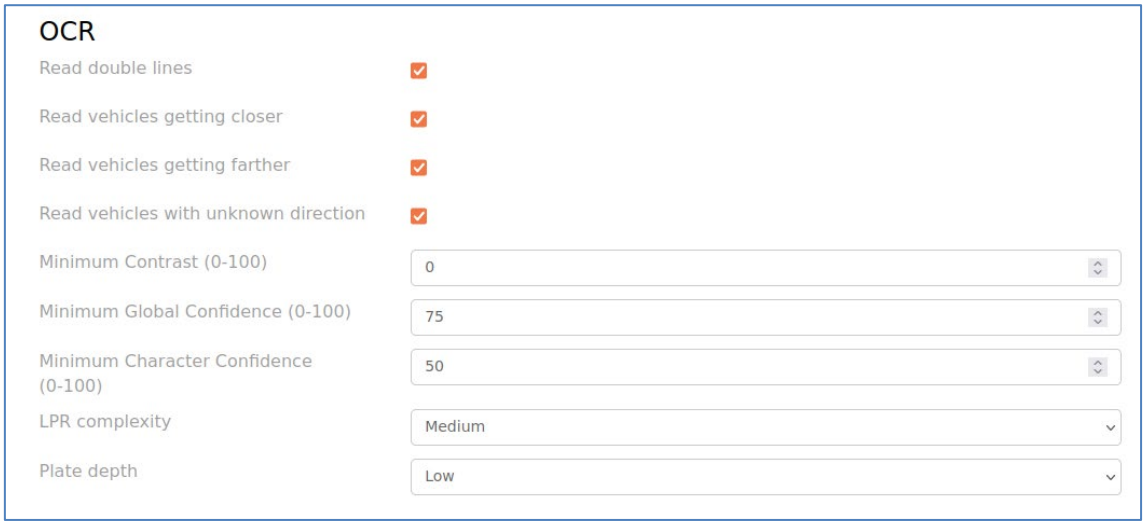
Plate Reported

Select which plate image should be saved from the drop-down list:

- *First capture*.
- *Middle capture.*
- *Last capture*

A plate is normally read several times as it passes through the camera's field of view. You may want to use the largest (Last) image for oncoming traffic & the First image for vehicles moving away from the camera.

10.1.6 OCR



Read double lines

Some countries or regions do not have two-line plates. If this is the case then unticking this option will allow the engine to run faster.

Read vehicles getting closer / farther / unknown direction

If the camera is pointing at a road or entrance where traffic is moving in both directions, then by ticking the boxes you can choose to only process/report plates in one direction. Note that at least two reads of a plate must have been obtained in order to determine the direction. If a car is maneuvering or stopped (or moving so fast that you only capture the plate once), then by also selecting: 'Report vehicles with unknown direction' you will ensure that all required plates are captured.

Select all three options for normal usage.

Minimum Contrast (0-100) (Advanced feature – default 0 (Off))

This is an advanced feature which should be used with caution.
Sometimes in very low light conditions at night the camera image can become grainy and of very low contrast. This can sometimes cause the plate finder to generate a lot of plate candidates from the image which the engine then takes time to analyze and remove.

If the plates are retro reflective and therefore of a reasonable contrast at night, then by setting this value to say 10, the number of false positive plate candidates generated is dramatically reduced and the OCR time improves resulting in a higher multiplate value and better recognition.

- For most low light situations set to 10 or max 20.

Minimum Global Confidence (0-100)

Set the minimum confidence level that the whole plate read must meet in order to be accepted. The global confidence is the average of all individual characters' confidences.

The recommended value is 75. Set lower if you see some plates in very bad condition but want to read them. (Setting this too low will cause the engine attempt to read other items such as vehicle signage etc.)

Minimum Character Confidence (0-100)

Set the minimum confidence level that a single character must meet in order to be accepted. The recommended value is 50.

TIP: In regions with open grammars such as the USA keep these two values high, e.g. 90-80 respectively. Higher values mean a lower probability of false positives but a lower probability of missing plates.

LPR complexity

This is the complexity of the analytics to be applied during the ALPR Engine's stage of plate reading. Set this according to the OCR mode and type of traffic expected.
There are three possibilities:

- Low: Recommended for very high-speed traffic where the OCR needs to work faster and your preference is for plate detection over perfect recognition.
- Medium (Default): Recommended when the OCR mode is set to free-flow.
- High: Recommended when the OCR mode is set to signalled (triggered.)

NOTE: Higher complexities give more accurate reading but make the ALPR engine run slower.

Plate depth

This is the complexity of the analytics to be applied during the ALPR Engine's stage of plate finding. Set this to one of the following three values:

- *Low – apply up to 3 levels (Default)*
- *Medium – apply up to 8 levels*
- *High – apply up to 12 levels*

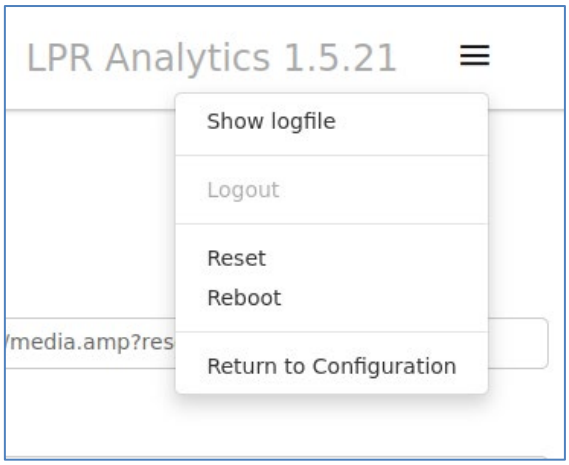
NOTE: Always use Low unless you are losing plates because of processing power.

10.1.7 Submit / Reload

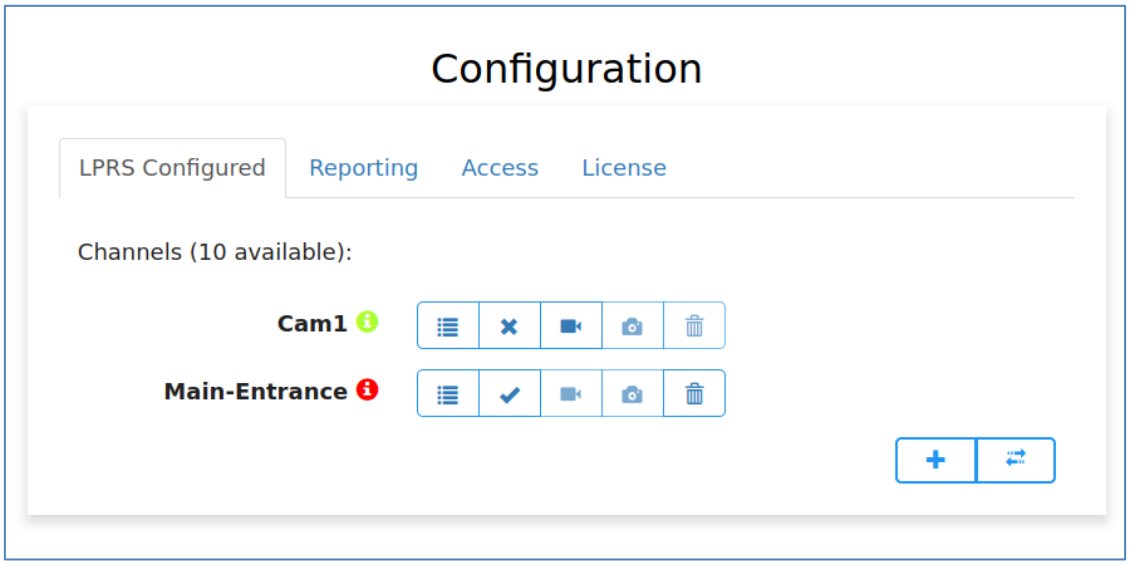
Save all of your settings by clicking on Submit.

Caution: Reload will lose all of your new settings and restore the previously saved (submitted) ones.

Use the three bars (top right) to return to the main configuration menu and add other cameras as required.

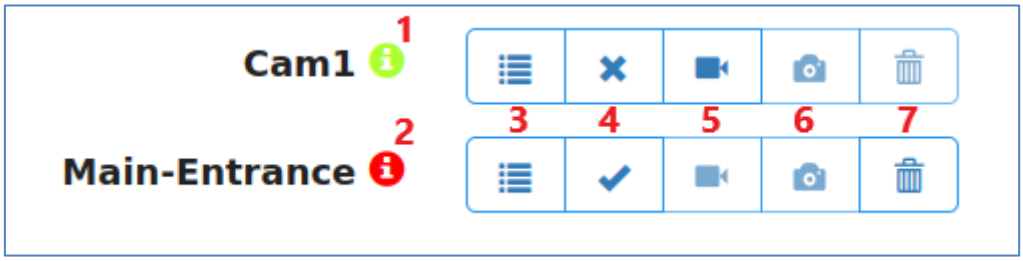


The cameras will appear here:



10.1.8 Camera Management

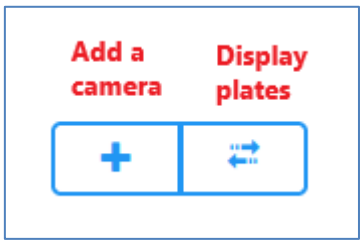
To add Once the cameras have been configured you can edit the camera settings and optionally set an ROI (Region of Interest):



Key

1: If green, the information icon indicates that the camera has been activated
2: If red, the information icon indicates that the camera is not activated
3: Camera configuration menu
4: Activate / deactivate a camera
5: If activated, set up an ROI for this camera
6: Display images from both the ALPR and Environment (Overview) camera
7: Remove this camera

Use the + icon to add an additional camera and the results icon to show the latest plate reads (See later):



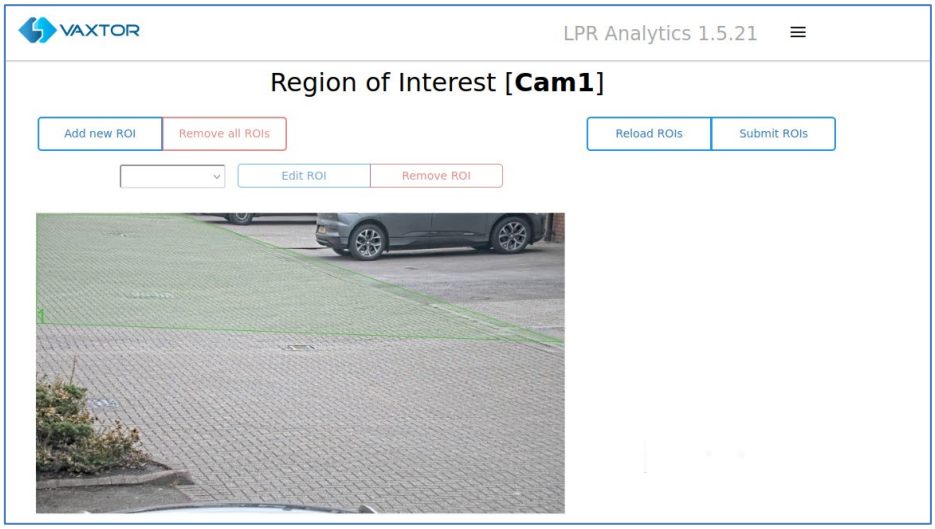
10.1.9 Setting an ROI (Region of Interest)

A Region of Interest (ROI), sometimes known as the Crop Zone, is used to define an area within the video frame where the OCR analytics takes place. The user can define a polygon and choose whether the area to look for plates in Inside or Outside this region. The user can then set multiple regions i.e. multiple ROIs, in complex situations although this is rare.

Using an ROI can decrease OCR processing time and also reduce false positives.
So, if the camera is looking across a large stretch of road, the ROI can be used to limit the OCR to the area near to the camera thus reducing the processor load.

If a parked car (as shown below), a plate-shaped house window or road sign for example is within the camera's field of view and keeps getting mistaken for a license plate, then these false positives can be eliminated by creating an ROI to exclude this part of the image.
Each ROI must be given a unique numeric Identifier from the dropdown list.

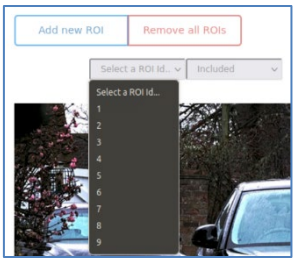
Note that the whole license plate must be in or out the ROI to pass the test.



***IMPORTANT**: ROIs con be configured to either include the areas defined from the OCR – or exclude them. If multiple ROIs are added they must all be of the same type.*

VaxALPR ROI: Add ROIs

1. To add a new ROI, click the main Add new ROI button:
2. Then, use the pop-down to allocate an ID number to the ROI that you are adding and if this is the first ROI, then specify the ROI Type between: *Included* or *Excluded./*



3. Draw points:
    a. Add points: Click on the live image to add new points to define the polygon.

***NOTE**: Each ROI must have at least 3 points but can also be quite complex*

    b. To start again, click on the Clear points button.

    c. To cancel the new ROI, click Cancel Edit button.

    d. When you are satisfied with the shape click the Confirm ROI button.

4. Click Add new ROI to add more ROIs as required remembering to select a new ID number.
5. ROIs are not stored on the camera until changes are submitted.

VaxALPR ROI: Remove all ROIS

1. To remove all of the ROIs click Remove all ROIs button.

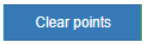
NOTE: This only deletes them in the local web interface. If they have been saved to the camera then you will need to Submit ROIs once more.

VaxALPR ROI: Edit ROI

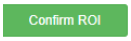
1. To edit an existing ROI, select the *ROI Id* from the list and click 

button:

2. Move any points as required:
    a. Add an extra point to last point added by moving the cursor and mouse click.

    b. Or, clear all existing points 

and start again.

3. To confirm changes by clicking the 

button.

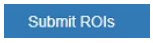
4. To reject any changes, click the 

button.

VaxALPR ROI: Save changes

Submit current ROIs

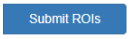
Once the ROIs have been setup, they **must** be saved into memory on the PC.

- To save all ROIs, Click on the 

button and wait for the confirmation message.

Note: Once deleted, an ROI cannot be recovered.

Delete all the current saved ROIs in the Camera

- Delete all of the ROIs individually and then click the 

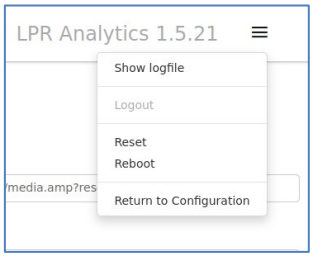
button.
- A confirmation message will appear. Accept to delete all of the stored ROIs and wait for the confirmation message.

VaxALPR ROI: Reload ROIs

1. To reload *ROIs* from the camera into the web interface for editing, click the 

button.

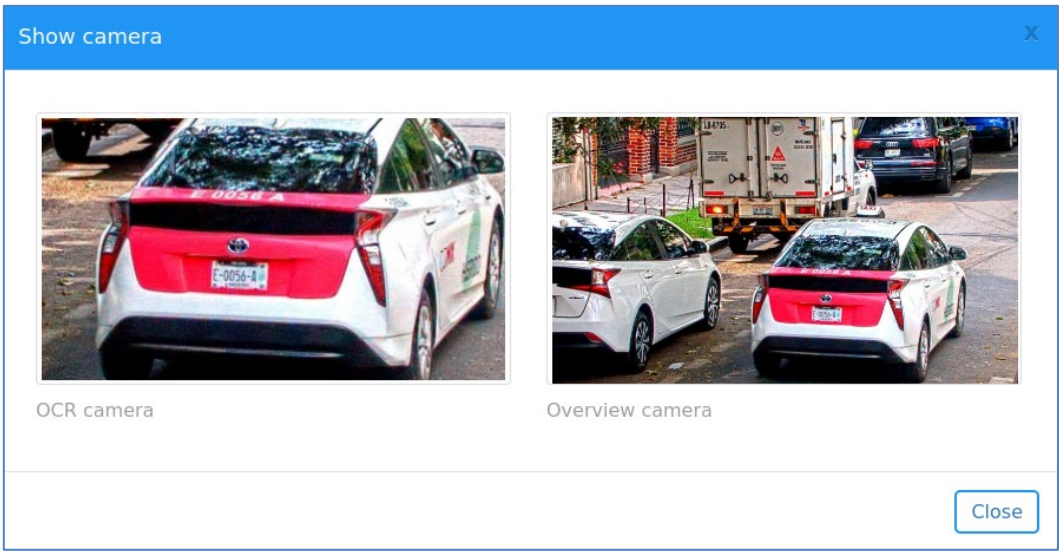
Use the three bars (top right) to return to the main configuration menu:



10.1.10 Viewing the Environment Camera

If an Environment camera (Overview Stream) has been set up then every time a plate is captured by the main OCR camera, then a second image from the Environment camera will be captured and saved/reported.

Click the icon to view live images from both video streams:

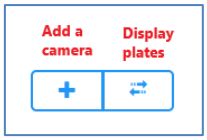


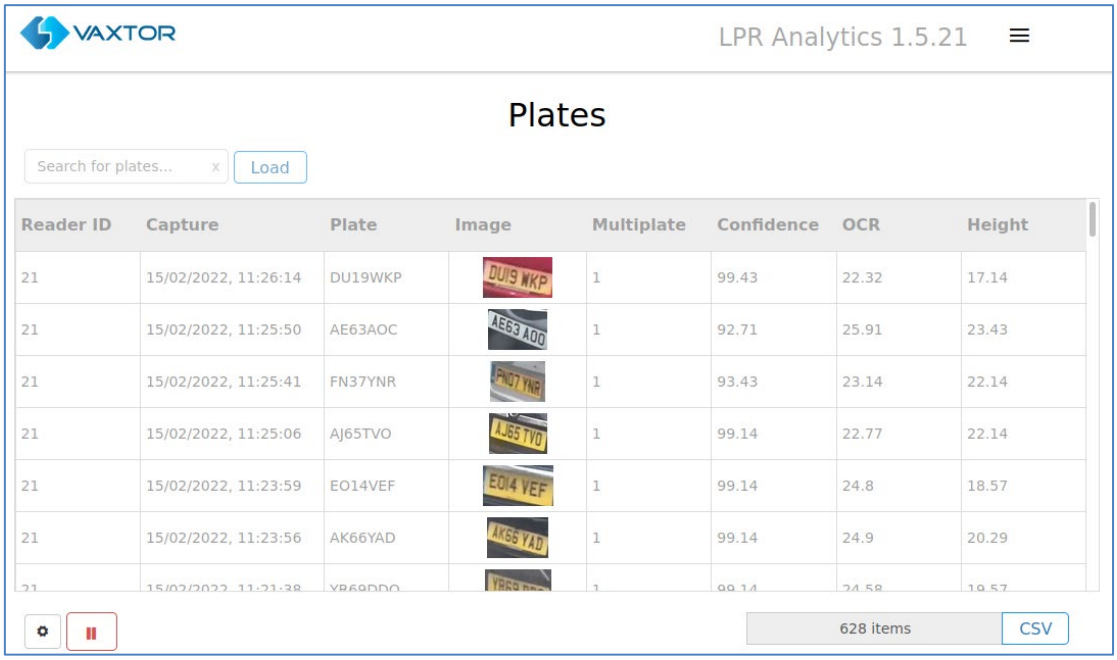
You can then make any necessary adjustments. The Environment image is often used by the police as a contextual image proving the location of the vehicle against the background.

Often overview images are zoomed out to show this and sometimes a polarizing filter is used to more clearly show the driver or any passengers removing glare from the windscreen.

10.1.11 Display plates

Click on the results icon to show the latest plate reads:



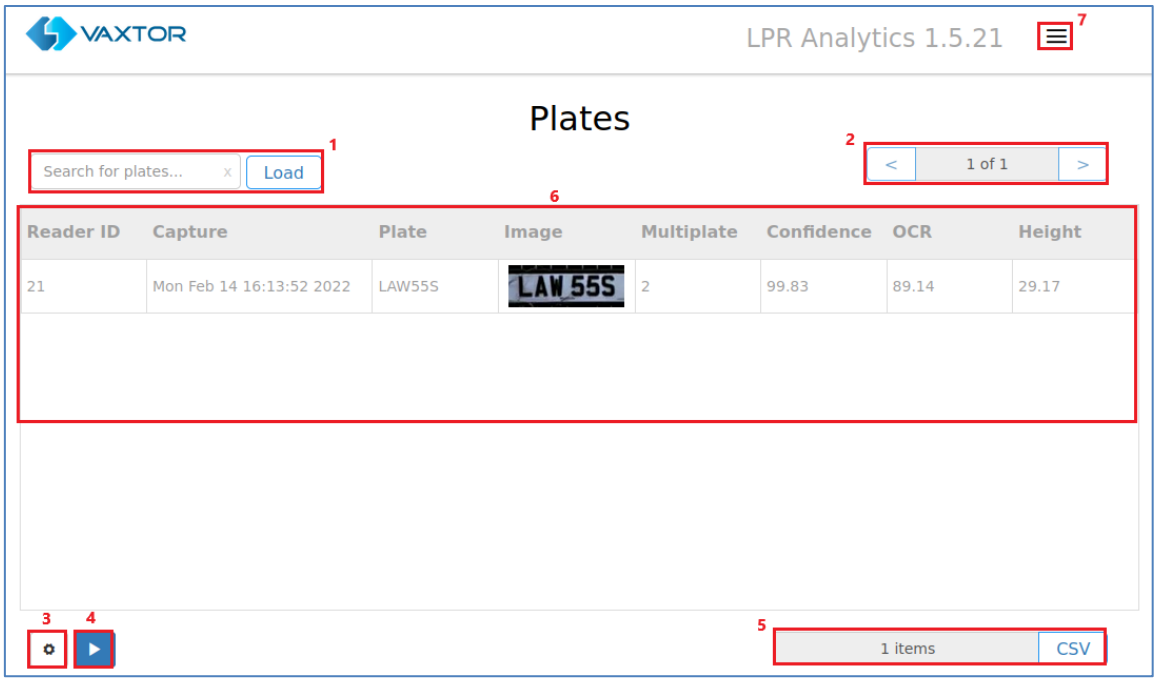


This displays a list of the last 100 plates that have recently been read and are stored temporarily in the computer's memory. Resetting the software or re-booting the PC would cause these to be lost.

To permanently save all reads to the local PC you must create and activate a database on your computer. (See the Reporting section later in this manual for details on how to set this up).

Once the database is active then you are able to search the list of stored plates.

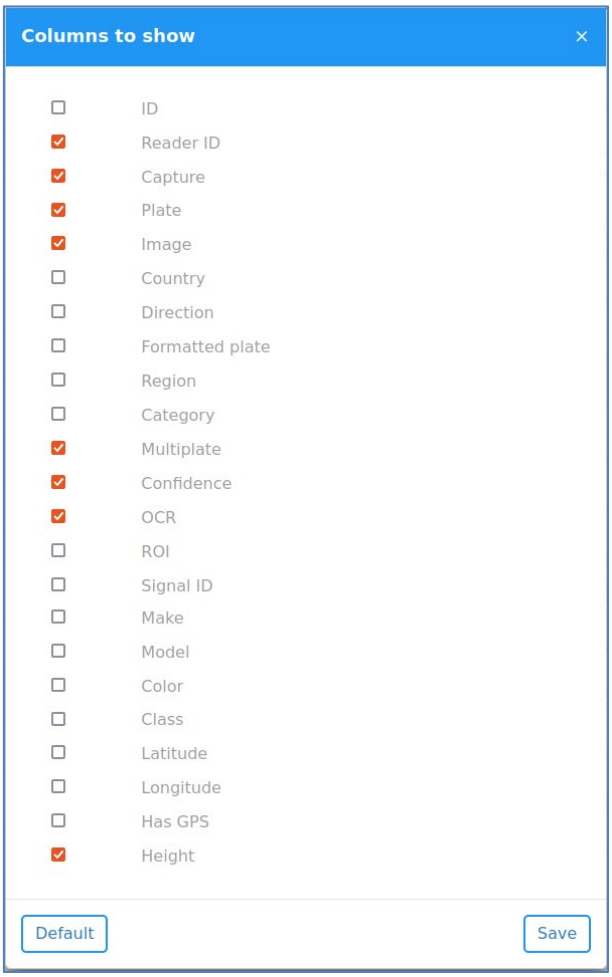
Navigation is as follows:



1: Search and Load area
2: Page display control
3: Column display control
4: Play / Pause updating the database with new reads
5: Total Items stored and CSV download
6: Main plate list
7: Main drop-down menu

Column display control

Use this option to control what columns to display in the plate list.



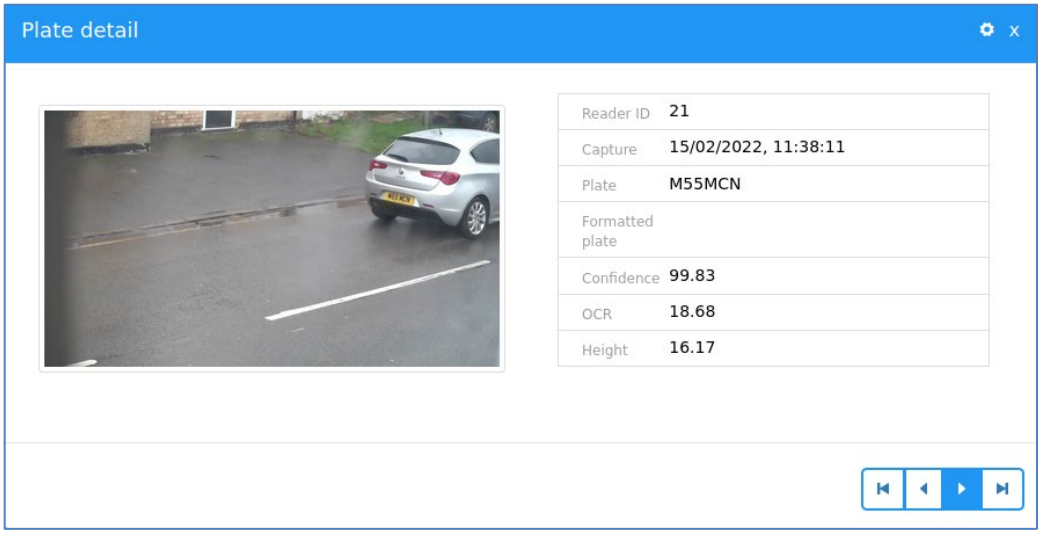
Note that some of these fields may not be available in your version of the software or are used for internal purposes such as communicating with certain third-party applications of Back Offices or VMS systems such as Genetec or Milestone.

When setting up a system the most useful to display include the Height (average character height), OCR (processing time), Confidence, Multiplate (how many reads were processed) etc.

Plate details

1. To show item details, click on a plate record:

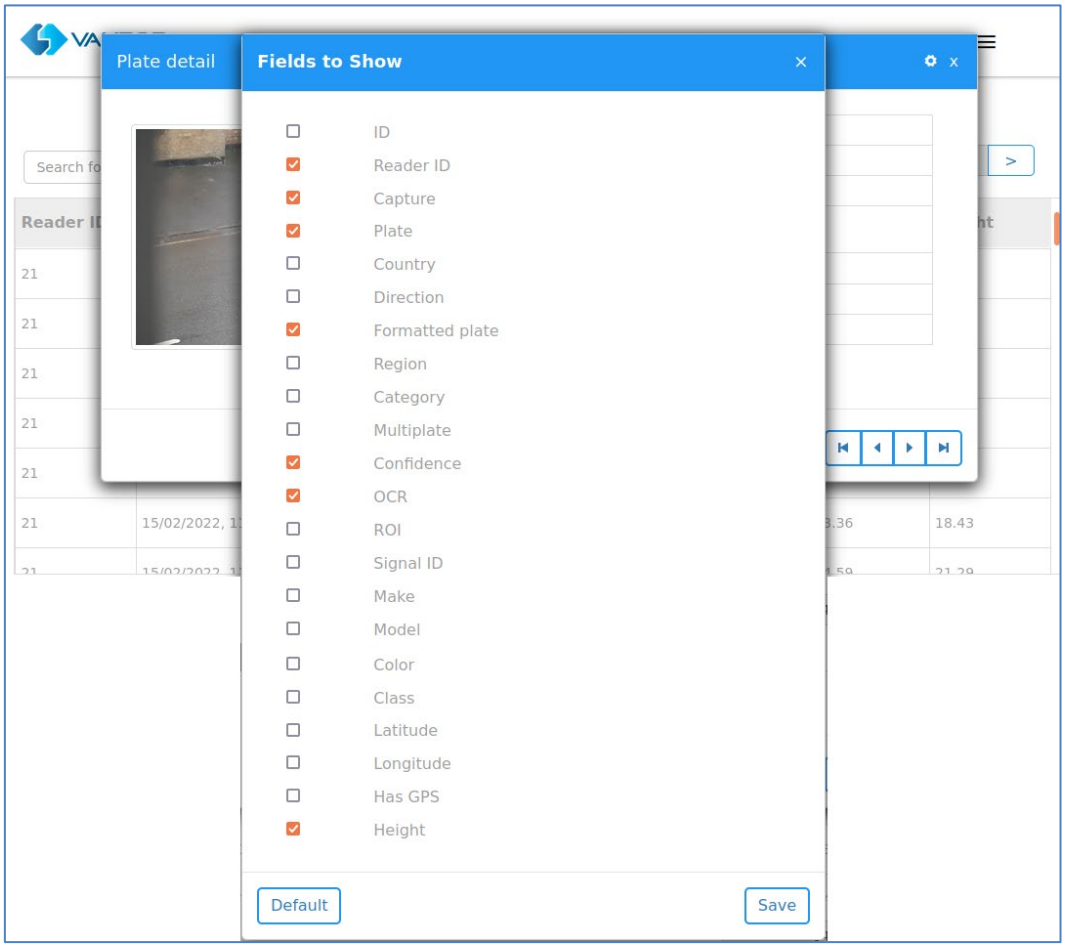
2. A new window appears with the vehicle details:



You can move up and down the complete database by using the arrows at the bottom of the plate record:

Use the double arrows to move to the first or last record in the database.
Note that if you have performed a Search (see below), then here you can step through all the plates that satisfy the search. e.g. all plates containing the numbers “123”.

Use the Settings Icon, top right, to control what information is displayed when you select a plate. i.e. a list of the available stored fields:



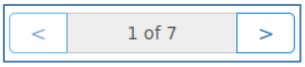
Note that some of these fields may not be available in your version of the software or are used for internal purposes such as communicating with certain third-party applications of Back Offices or VMS systems such as Genetec or Milestone.

When setting up a system the most useful to display include the Height (average character height), OCR (processing time), Confidence, Multiplate (how many reads were processed) etc.

Page Control

If there are more than 100 stored plate reads, the camera will paginate the results.

1. Use the Page Control box to navigate through the pages



Use the UP and DOWN buttons to scroll 100 plates at a time

Search and Load Plates

Load plates

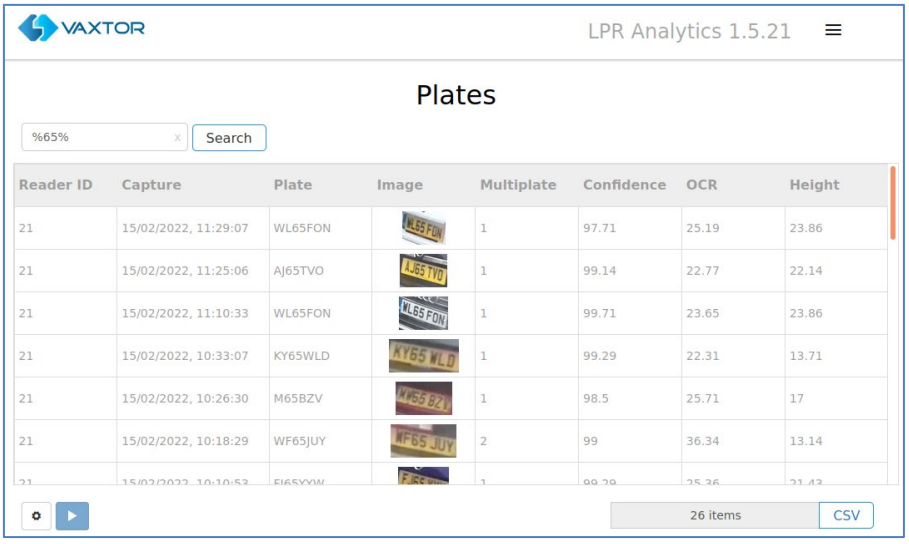
1. To load all the detected plates stored in camera, keep the Search input zone 

empty and click the Load button
This will refresh the list with the latest captures.

Search for plates

1. To search for a specific plate or partial plate stored in camera, enter the plate in the Search box and click the Search button. Use the symbol "%" as a wildcard character.

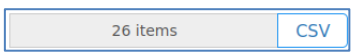
2. Example of a search for all plates containing the characters: '65':



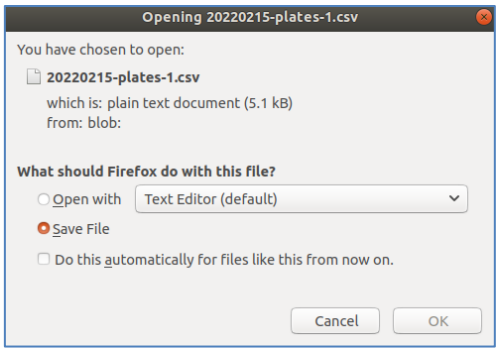
3. To clear the search criteria, click  button inside the Search window zone, and click the Load button.

Download the Plate list.

You can download the current Plate list by clicking on the CSV button:



button. You are prompted to save the file or open it for editing:



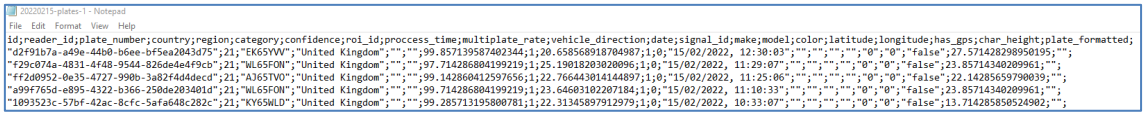
The resulting .csv file will be saved in your downloads folder.

NOTE: In this example only 26 items were in the search list which were then downloaded successfully. if you need to download the full database, then this must be downloaded page by page, 100 records at a time.

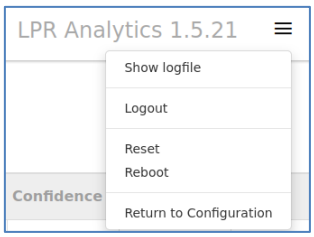
Do this by Pausing the live reads  and then selecting each page in turn and downloading.

If you need to see all of the camera reads then it is recommended that you send all the plate reads as they happen to a back office such as Helix. The program contains many reporting protocols and methods, - see the Reporting section.

Downloaded .csv file:

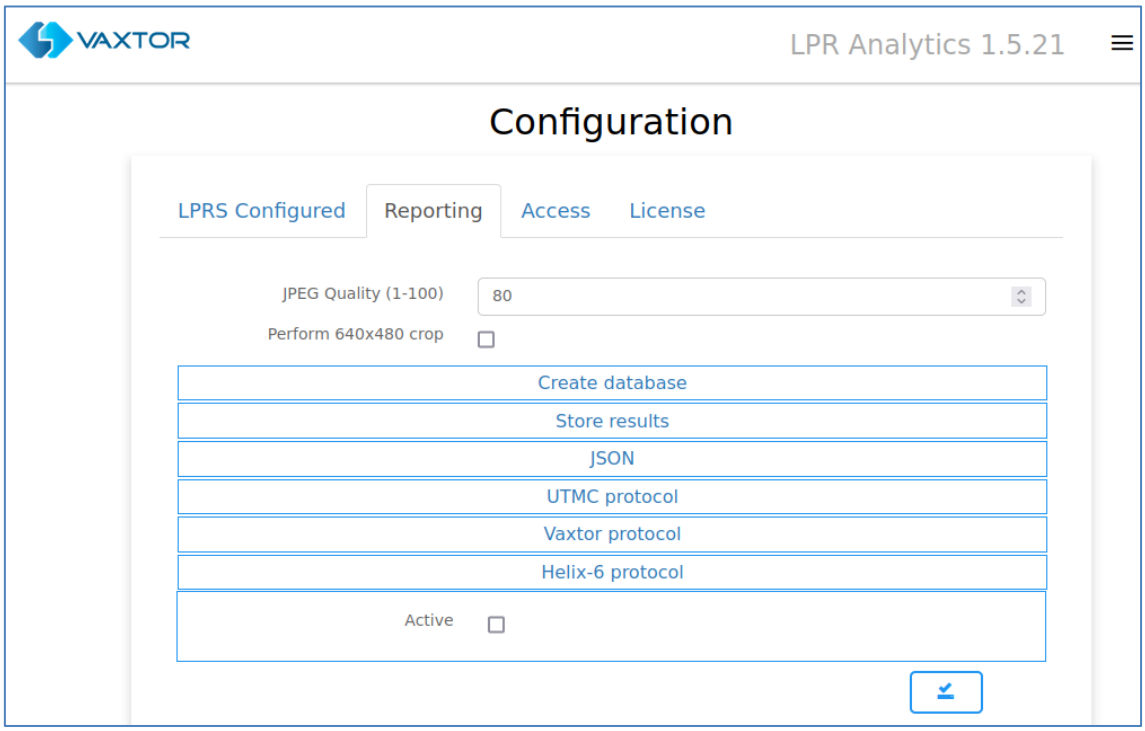


Use the three bars (top right) to return to the main configuration menu:



10.2 Reporting

VaxALPR is able to output all plate reads in real time using a variety of standard protocols so that the plate reads can be accepted remotely by a variety of programs including Vaxtor's powerful Back Office - Helix, which can accept and store plate reads in real time from hundreds of ALPR cameras.



By selecting one of the listed protocols, a sub-menu will appear with fields for setting up parameters such as remote IP addresses etc.

10.2.1 JPEG Settings

Common to all the reporting options are the JPEG quality and image crop settings.

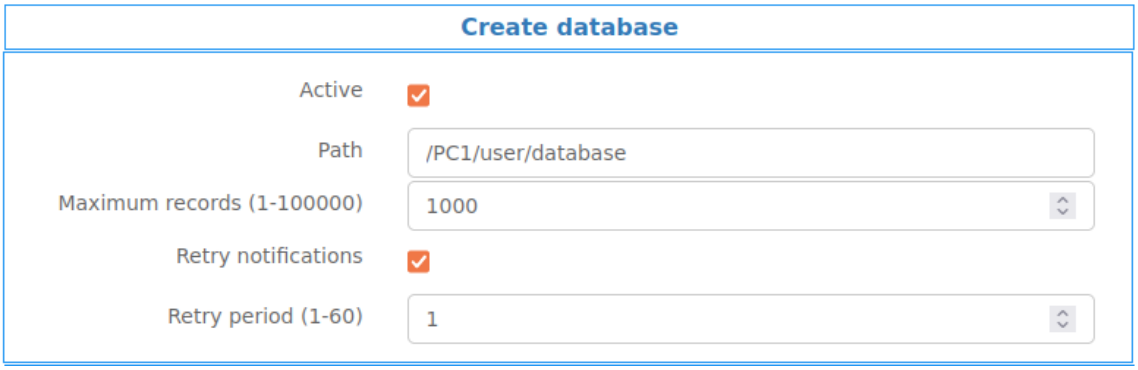
Select the required compression ratio for the saved images. The lower the number, the higher the compression ratio (and smaller the image size) but the quality of images will be lower. 80 is a good compromise.

The 'Perform 640x480 crop' setting will crop an area around the license plate to apply the compression to. This is better method to reduce the size of the image than over-compressing the whole image which will result in a very low-quality result!

Click the 'Submit reporting' icon  at the bottom of the reporting options to save your configuration on the PC.

10.2.2 Create Database

In order to store plate reads and their associated images on your Linux PC to you must first create a target directory and set the Path to point at it, in this case the PC1/user/database



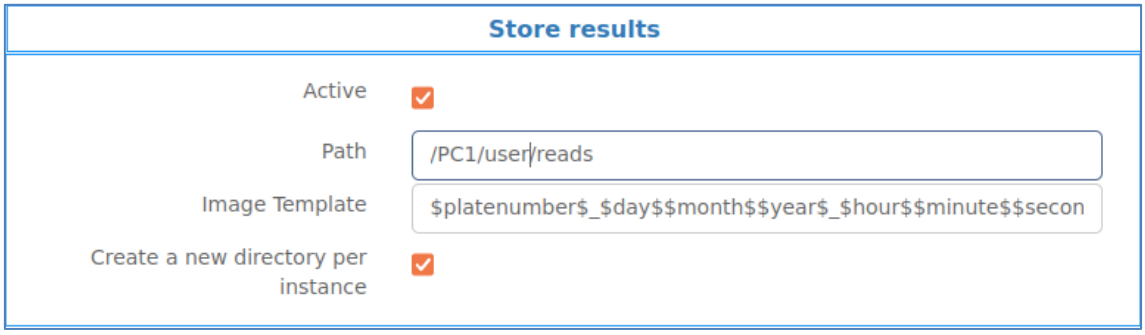
Set the maximum number of records to be stored locally (max 100,000). Using a Jpeg compression of 80, a typical record (1280 x 720) might take up to about 80-120KB depending on image complexity and over 220KB for a 1920 x 1080 image.

Select the 'Retry notifications' checkbox to retry the sending of any notifications (plate reads) if any fail, for example due to a comms problem. (Most back offices acknowledge the receipt of data packets). You may then specify a retry period in seconds.

Click the 'Submit reporting' icon at the bottom of the reporting options to save your configuration on the PC.

10.2.3 Store Results

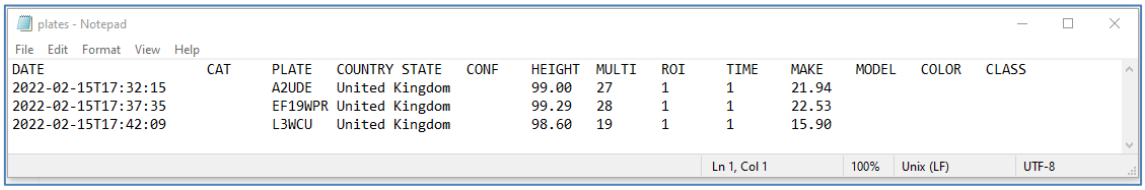
This option is used to save reads as one or more .csv files and associated images on the Linux PC. Unlike the option above, these are not organized into a database and will create a new directory each day:



The Image Template is used to form the image file names using Vaxtor standard reserved words (see later for a full list).

You can optionally create a new directory for every instance of the channel (camera) or merge the reads into one directory.

The images are all saved in the designated directory along with a .csv file as follows:



Click the 'Submit reporting' icon  at the bottom of the reporting options to save your configuration on the PC.

10.2.4 JSON

JSON is probably the most used protocols for sending images and data to back offices and VMS Systems. (Video Management Systems).

This option is used to send every plate event in a JSON object over an HTTP or HTTPS POST:

To setup this option, do the following:

1. Click on the **Active** tickbox
2. Enter the **URL**. The URL should be a 'well-formed' URL such as:
   http://myserver.com/ or https://myserver.com:port/destination/mypage.php.
   Both domain names or IP address can be used.
   IMPORTANT: If you are using a URL rather than an IP address, make sure that you have setup a DNS server on your PC.

3. Modify the message as needed. The message can use Dynamic text.

   NOTE: You can use dynamic text replacement to match the current plate information: See separate doc "Complete List of Dynamic Replacement Reserved Words" for the latest additions.

- **$image$**: Full JPEG image encoded in base64.
- **$jpegsize$:** JPEG size in bytes.
- **$date$**: Timestamp in ISO8601 format
- **$plate$**: Plate number
- **Etc.**

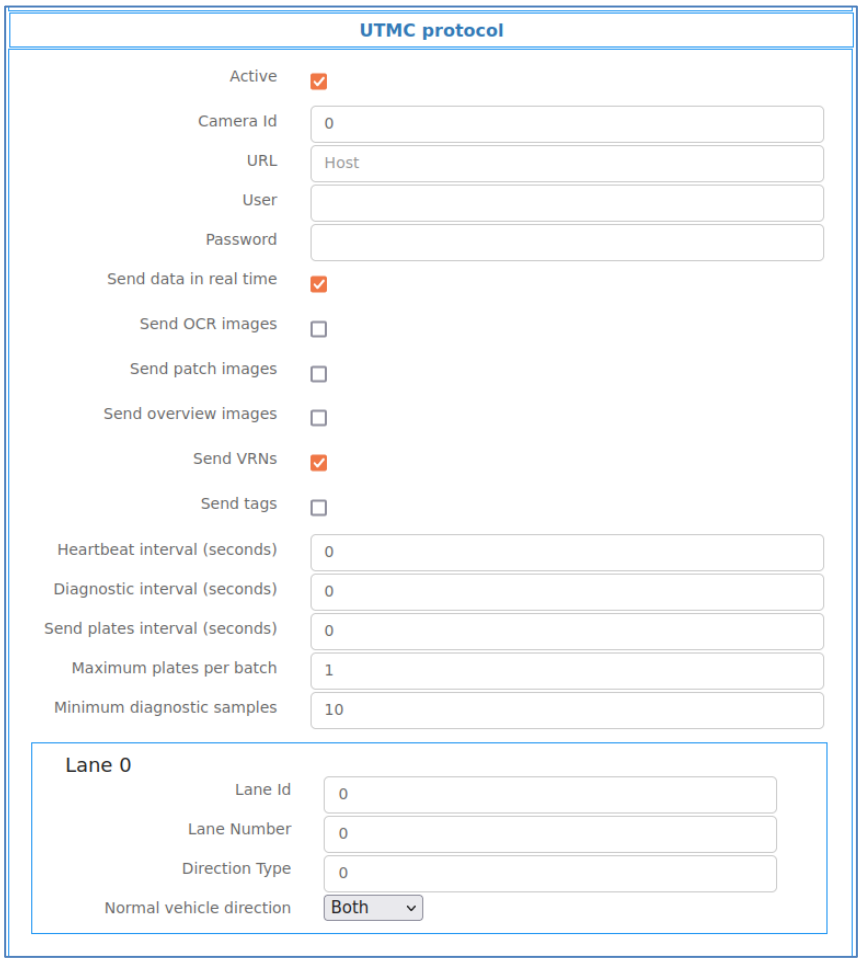
You can add your own parameters into the message, so if you want to add say a site ID, your message might look like this:
{ "plate":"$plate$", "date":"$date$", "ip":"ip", "country":"$country$", "sitecode": 12345}

Click the 'Submit reporting' icon  at the bottom of the reporting options to save your configuration on the PC.

10.2.5 UTMC Protocol

Choose this reporting option if you want VaxALPR to send plate reads using UTMC protocol. The Urban Traffic Management & Control programme is a UK initiative for a more open method of communication in the ITS industry, especially in urban areas.

Plates can be sent in real time (individually) or in batches.

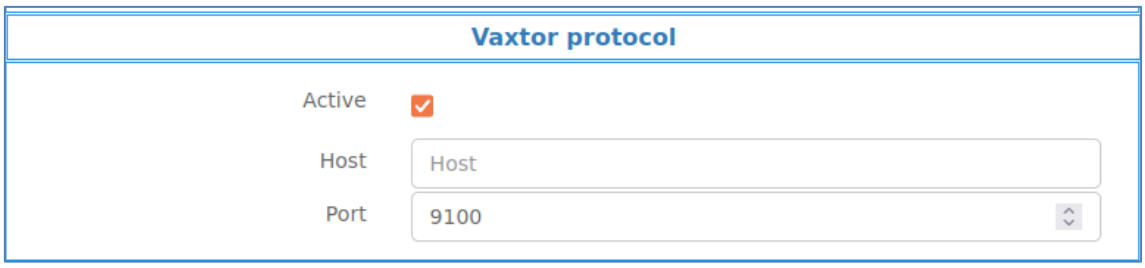


To activate this option, do the following:

1. Click on the UTMC protocol header to expand the UTMC setup menu as shown above.
2. Enable the **Active** checkbox.
3. Enter a Camera **ID** (unique identifier for each camera).
4. Enter the **URL** of the receiving server.
5. Enter a user name and password if required by the receiving server
6. Enter the **Heartbeat and Diagnostics** intervals to monitor the connection.
7. All other fields are self-explanatory and define what data is transmitted to the UTMC BOF. Note that the default timeout is set to 5 seconds. If your server takes longer than this to respond then you should increase this value.
8. Click the 'Submit reporting' icon  at the bottom of the reporting options to save your configuration on the PC.

10.2.6 Vaxtor Protocol

Choose this reporting option if you want VaxALPR to send a predefined data stream to a server after each plate recognition using TCP/IP. This is not encrypted.



To activate this option, do the following:

1. Click on the Vaxtor protocol header to expand the Proprietary events integration menu.
2. Enable the **Active** checkbox.
3. Enter the **Host** address. Domain names or IP address can be used.
4. Enter the **Port** (destination port). The default port for Helix is 9100.
5. Click the 'Submit reporting' icon  at the bottom of the reporting options to save your configuration on the PC.

Contact Vaxtor for a full code sample which allows you to capture and parse the results obtained from the Vaxtor ANPR system. It is programmed in .NET:

- VaxAlprRemotePlateParser.dll: The library used to capture and parse incoming data packages from VaxALPR

To use the source code, do the following:

1. Listen to a socket and capture the data package sent by VaxALPR (see description of the data package below).
2. Send the data package to the DLL parser and receive the license plate information. *NOTE: Some of the functions that appear in the parser are "GetPlateNumber()", "GetOCRImage()", "GetCountry()", etc.*
3. Display the license plate reads on your computer.

10.2.7 Proprietary notification data package

Each time a license plate is recognized, VaxALPR opens a TCP/IP communication, sends a predefined data stream and then closes the communication. The format of the message sent is detailed below:

	Message length	Message type	Fixed message	Description
	4 bytes	int32	**0xCAFEBABE**	**Header message**
	4 bytes	int32	**0xBABE10**	**Result message**
	4 bytes	int32	-	VaxALPR ID (Instance ID in VaxALPR configuration file)
	8 bytes	int64	-	Time Stamp (date in milliseconds)
	4 bytes	int32	-	NC1: Number of ASCII characters in the plate
	NC1 bytes	byte	-	ASCII bytes array
	4 bytes	int32	-	NC2: Number of ASCII characters of the plate origin
	NC2 bytes	byte	-	ASCII bytes array
Not used	4 bytes	int32	-	ROI ID containing the license plate (1…n) If 0, license plate is situated out of ROI.
	8 bytes	double	-	Global Confidence of the plate (0 – 100)
	8 bytes	double	-	Plate characters' height (pixels)
	NC1 bytes	float	-	Character confidence of the plate (0…100)
	8 bytes	double	-	Time the OCR takes to process the reading (milliseconds)
	4 bytes	int32	-	x0 coordinate of the plate (pixel coordinates of the top left corner of the license plate image)
	4 bytes	int32	-	y0 coordinate of the plate (pixel coordinates of the top left corner of the license plate image)
	4 bytes	int32	-	x1 coordinate of the plate (pixel coordinates of the bottom right corner of the license plate image)

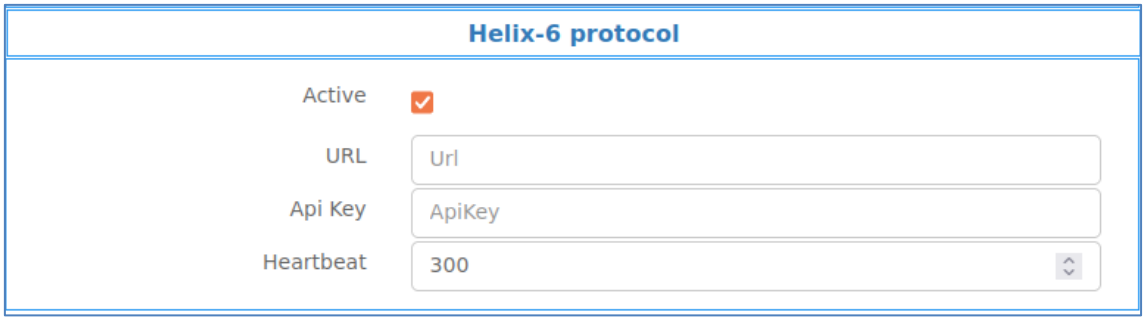
	4 bytes	int32	-	y1 coordinate of the plate (pixel coordinates of the bottom right corner of the license plate image)
	8 bytes	int64	-	OCR image timestamp (milliseconds)
	4 bytes	int32	-	SF: Size of the OCR image (bytes)
	SF bytes	byte	-	OCR image data (JPG format)
	4 bytes	int32	-	R1: Size of image reserved data (bytes)
	R1 bytes	byte	-	Reserved data (R1 bytes)
Not used	8 bytes	int64	-	Environment image timestamp (milliseconds)
Not used	4 bytes	int32	-	SF: Size of the environment image (bytes)
Not used	SF bytes	byte	-	Environment image data (JPG format)
Not used	4 bytes	int32	-	R2: Size of image reserved data (bytes)
Not used	R2 bytes	byte	-	Reserved data (R2 bytes)
Not used	4 bytes	int32	-	Vehicle direction (0=>unknown, 1=>getting closer, 2=>getting farther)
Not used	4 bytes	int32	-	ALPR multi-plate rate
	4 bytes	int32	-	OCR mode (1: Triggered mode, 0: Free-flow mode)
	4 bytes	int32	**0x42F83988**	**Header of optional data**
Optional	4 bytes	int32	**0x50000001**	**Plate number in wide string format section**
	4 bytes	int32	-	Number of characters in the plate
	4 bytes	int32	-	NC3: Number of bytes the full plate string occupies
	NC3 bytes	byte	-	Array of bytes representing the string in UTF8 or UNICODE format
Optional	4 bytes	int32	**0x50000002**	**Hot-List section** *NOTE*: This section can appear twice, once per list.
	4 bytes	int32	-	List type (1:white list, 2: black list)
	4 bytes	int32	-	NC4: Number of ASCII characters in the message
	NC4 bytes	byte	-	ASCII bytes array containing the message

Optional	4 bytes	int32	**0x50000003**	**String code section (**)** *NOTE*: This section can appear more than once, but only once per string code.
	4 bytes	int32	-	String code (1:plate country region, 2: vehicle color, 3: vehicle brand, 4: vehicle model)
	4 bytes	int32	-	NC5: Number of ASCII characters of the string
	NC5 bytes	byte	-	ASCII bytes array containing the characters
Optional	4 bytes	int32	**0x50000004**	**GPS section**
	8 bytes	double	-	Latitude (decimal format)
	4 bytes	int32	-	Latitude direction (1:North, 2:South)
	8 bytes	double	-	Longitude (decimal format)
	4 bytes	int32	-	Longitude direction (1:West, 2:East)
	4 bytes	int32	**0x42F87D89**	**End message**

Proprietary event format

10.2.8 Helix-6 Protocol

Choose this reporting option if you need to encrypt the data sent to Helix – or support cameras in different time zones.

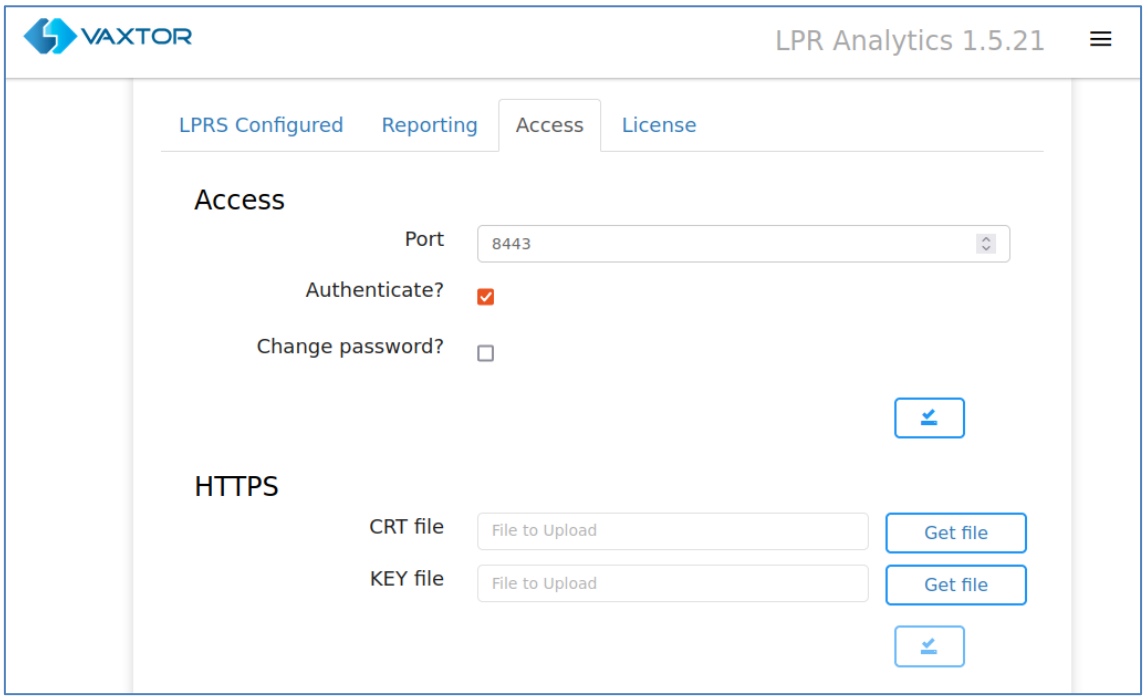


To activate this option, do the following:

1. Click on the Vaxtor protocol header to expand the Proprietary events integration menu.
2. Enable the **Active** checkbox.
3. Enter the **URL** of the receiving PC. E.g. 10.0.0.12:8080/helix6
   Note that this can be an http or an https address supporting data encryption.
4. Enter an API key to be used for authentication
6. Enter the Heartbeat interval in seconds for Helix to monitor the connection. Diagnostic information will be sent at this interval.
7. Click the 'Submit reporting' icon  at the bottom of the reporting options to save your configuration on the PC.

10.3 Access

In this section you can set the port to be used, select authentication and upload a security certificate:

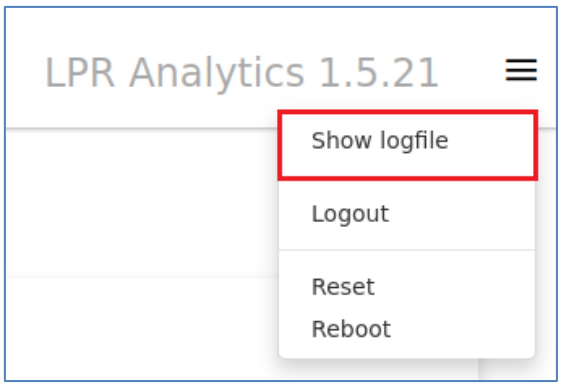


The KEY file is the private key to the certificate and the CRT is the signed certificate.

You may also change your password here.

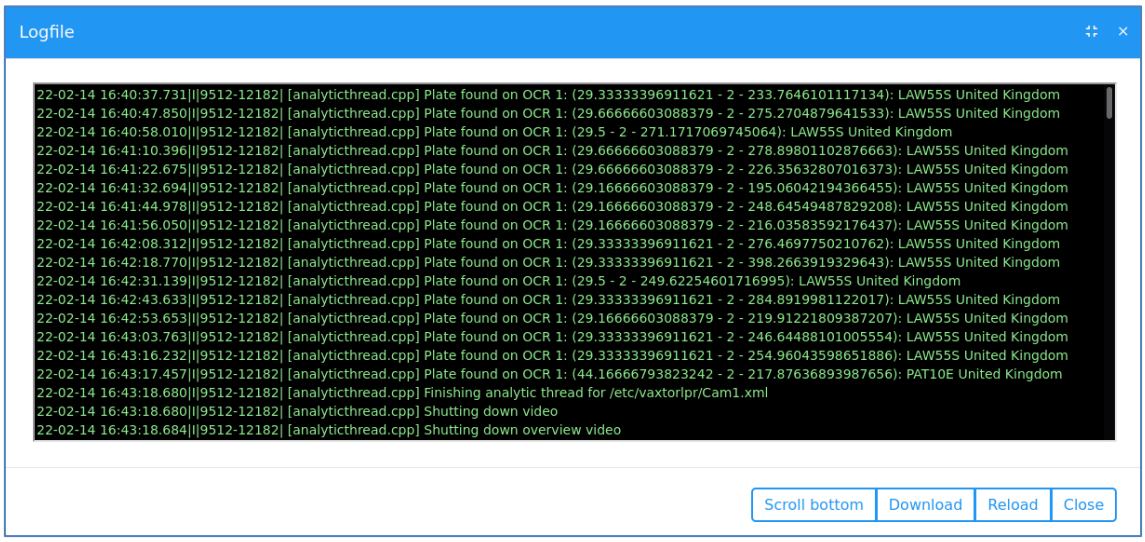
10.4 Show Logfile

Select this from the main menu:



The internal logfile contains a list of internal actions and messages which can show any communication problems. Logfiles are very useful in troubleshooting any problems and for examining the reads in detail.

A window will open:



The software will write up to five logfiles of 1MB each before overwriting the earliest one and are stored in the directory: **/var/log/vaxtorlpr**

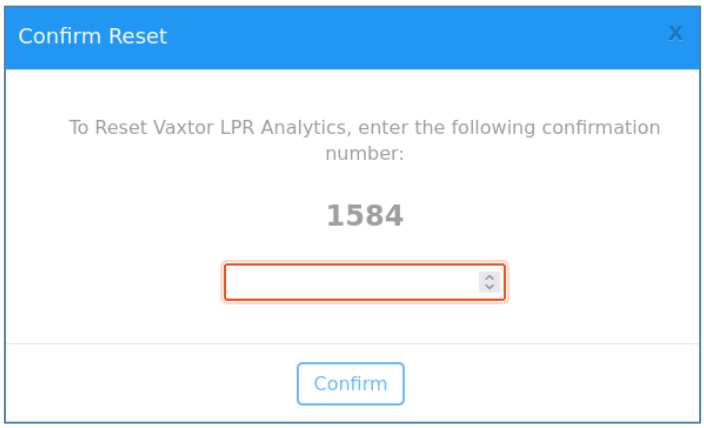
Use the **Scroll bottom** button to look at the last items written.

Selecting **Reload** will refresh the display and show the latest entries to the log.

Download will allows you to save the current log in a folder of your choice on the Linux PC.

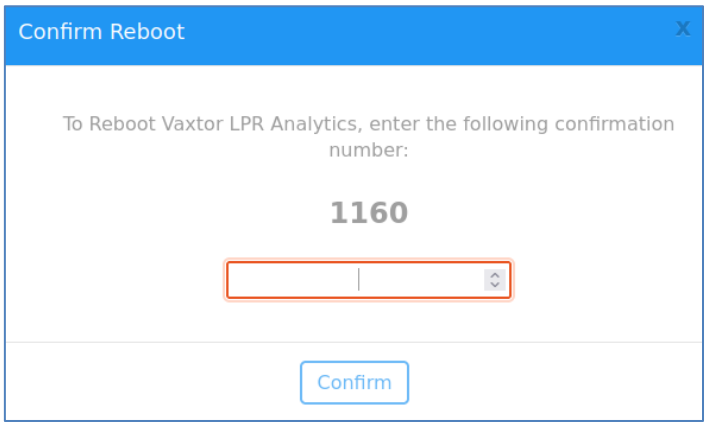
Select **Close** when finished.

10.5 Reset



Enter the reset code to reset the ALPR software

10.6 Reboot



Enter the reset code to reboot the Linux PC

11. Troubleshooting

Many license plate reading issues are caused by:

- Incorrect positioning of the camera
- Incorrect camera lens (or zoom setting)
- Insufficient illumination
- Incorrect camera settings - e.g. shutter speed
- Incorrect settings of the ALPR App.

In this section, we will study the most common of these issues and how to fix them.

11.1 The VaxALPR On Camera software starts and then stops suddenly.

Solution:

Check that you have uploaded the license key and check that the date and time of the camera is set correctly.

11.2 The VaxALPR On Camera license is valid but a 'Check license' message appears.

Solution:

Check that the date and time of the camera is set correctly.

11.3 The VaxALPR On Camera software is running but not reading plates.

Solution:

Check if you can see the license plate in the image and that the image is of good quality, not under or over exposed. As a general rule, if you can't easily read the plates then the software won't be able to read them either!
Image is everything so first try to adjust the camera lens to zoom in or out. Failing that, check if the camera itself can be repositioned closer or further from the reading point. The captured image should show the complete vehicle. This however depends on the resolution that the camera has been set to.

If the video quality looks good then go to the camera's settings and ensure that the shutter speed is set high enough. (See earlier in this manual for a guide to shutter speeds)

If you CAN see the license plate clearly in the image and the software is not reading anything, try changing following parameters in the settings section of the App to be more tolerant:

1. In the Country options, unselect the **Grammar Strict** checkbox.
2. In the Video options, change the **Minimum Character Height** to 14 pixels.
3. In the Video options, change the **Maximum Character Height** to 60 pixels.

4. In the OCR options, change the **Minimum Global Confidence** to 50.
5. In the OCR options, change the **Minimum Character Confidence** to 25.
6. In the Region of Interest section, delete any existing **Region of Interests** (ROIs).

Once you can see the license plate image and the software is now reading, change these settings to appropriate values back one by one.

11.4 The VaxALPR On Camera software is running but it does not read all of the plates.

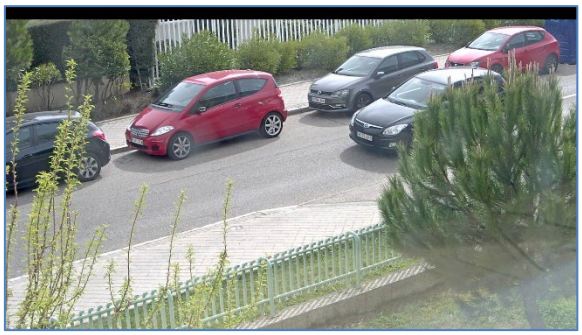
Solution:

1. Ensure your connected camera's stream setting is set to an adequately high resolution.
2. In the main menu, select **Show logfile**.
3. Scroll to the end of the log file and look for the message:
   [INFO] Vaxreader[xxxx]: -Plate 0 (<pixel height> - <milliseconds>): <plate>
   and check the value of the plate's character pixel height registered in the log.

If the resolution is 1280 x 960 and the pixel height of the plate is 40, It is recommended you set the resolution to a lower value.

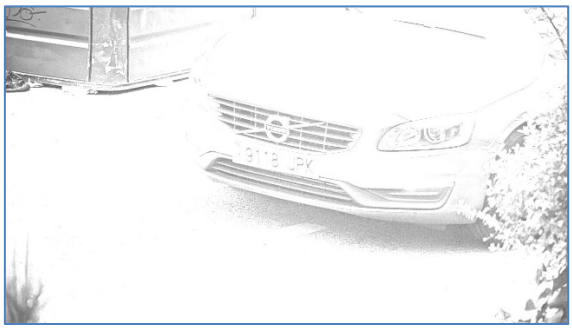
11.5 Examples of incorrect camera setup

The camera is zoomed out too much and the plates are too small to be read properly:



The camera is zoomed in too much and the plates are too big to be read:

The license plates appear over exposed:



Solution:

Adjust the exposure in the camera, possibly by decreasing the shutter speed (e.g. to 1/1000th sec). If this is a night-time shot, try reducing the IR illumination

The license plates appear blurred:

Solution:

Try adjusting the focus or shutter speed of the camera. If this only happens at night, check that the Temperature correction is set to none.

The license plate image appears distorted or at an acute angle:

Solution:

Try adjusting the position of the camera to make the plates more level and all angles less severe.

The plate image appears unequally lit or contains shadows:

Solution:

Avoid placing the camera where it can encounter direct sunlight or reflections. Shadows in the image can decrease the recognition accuracy.

The plate images are of low contrast at night:

Solution:

Try improving low lighting conditions and always use a good IR illuminator.

11.6 JSON or TCP setup but no plates being received

Solution

If you are using a remote URL to receive the data, check that a DNS server has been selected on your PC. Refer to your Linux documentation.

12. Dynamic Text Replacement Reserved Words

- **$image$**: Full JPEG image encoded in base64.
- **$jpegsize$:** JPEG size in bytes.
- **$date$**: Timestamp in ISO8601 format
- **$plate$**: Plate number
- **tag**: Unique hash for this plate number. Same plate number will always give the same tag. Format based on UTMC algorithm.
- **$plateutf8$**: Plate number in utf8 format.
- **$country$**: Full country of origin name.
- **$countrycode$**: 3 letter country code.
- **$state$**: Plate State for USA.
- **$category$**: Plate category for countries that support it. E.g. the small prefix on some UAE plates.
- **$blacklist$**: Description on the blacklist linked to the plate number.
- **$whitelist$**: Description on the whitelist linked to the plate number.
- **$ifblacklist$ .... $ifblacklist$**: If the plate is on the blacklist, the text in the 'if clause' will be displayed.
- **$ifwhitelist$ .... $ifwhitelist$**: If the plate is on the whitelist, the text in the 'if clause' will be displayed.
- **$ifnolist$**...**$ifnolist$:** If the plate in not on a list, the test in the 'if clause' will be displayed.
- **$confidence$**: Global confidence (0-100).
- **$charheight$**: Average charheight (pixels).
- **$processingtime$**: Processing time in milliseconds.
- **$left$**: Left coordinate for the plate on the image (pixels).
- **top**: Top coordinate for the plate on the image (pixels).
- **$right$**: Right coordinate for the plate on the image (pixels).
- **$bottom$**: Bottom coordinate for the plate on the image (pixels).
- **$absoluteleft$**: Plate left position based on the total image width (0-1).
- **$absolutetop$**: Plate top position based on the total image height (0-1).
- **$absoluteright$**: Plate right position based on the total image width (0-1).
- **$absolutebottom$**: Plate bottom position based on the total image height (0-1).
- **$width$**: OCR image width.
- **$height$**: OCR image height.
- **ip**: Camera IP address.
- **$roiid$**: Roi ID where the plate number is found.
- **$speed$**: Vehicle speed (Km/h).
- **$multiplate$**: Amount of times that the plate has been read before reporting.
- **$signaled$**: True if the read has been done due to a trigger.
- **id**: Database ID for this read.
- **$direction$**: Enumerate with the vehicle direction (0: Unknown, 1: Towards, 2: Away, 3: Stopped)
- **$directionstr$**: String with the vehicle direction.
- **$safedate$**: Date in format %Y%m%d_%H%M%S in the camera time zone (Useful for filenames).
- **$localdate$**: Date in format %d/%m/%Y in the camera time zone
- **$localtime$**: Date in format %H:%M:%S in the camera time zone.
- **$imageid$**: Signal ID in case of a trigger read.
- **$plateimage$**: Plate crop JPEG image encoded in base64.
- **$platejpegsize$**: JPEG size in bytes.
- **$overviewimage$**: Overview JPEG image encoded in base64.
- **$overviewjpegsize$**: JPEG size in bytes.

- **$epoch$**: Unix epoch (seconds).
- **$utcdate$**: Will report the date at ISO8601 format but always in UTC. (2020-12-31T16:11:30.000Z)
- **etx**: End transmission character (03)
- **stx**: Start transmission character (02)

13. Changelog

13.1 Version 1.5.21

- ✓ Disable Helix-6 heartbeat if notificator is not enabled

13.2 Version 1.5.20

- ✓ Fix: Camera location fails for Helix notificator if a ROI is not defined

13.3 Version 1.5.19

- ✓ Added heartbeat information to Helix-6 reporting
- ✓ Added -bind option on start

13.4 Version 1.5.17

- ✓ Added global JPEG quality option
- ✓ Added global 640x480 cropping option
- ✓ Added direction filter

13.5 Version 1.5.16

- ✓ Add: New option to enforce multicast on RTSP streams (fix bug with Vivotek cameras)

13.6 Version 1.5.15

- ✓ Added more reserved words
- ✓ Fix: Authentication issue if there are multiple cookies

13.7 Version 1.5.14

- ✓ Fix: Load correctly all the reporting options on startup

13.8 Version 1.5.13

- ✓ Update to libvaxtorocr7

13.9 Version 1.5.12

- ✓ Added new tags: $roiid$, $left$, top, $right$, $bottom$

Ends.